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Activities to Reduce Pesticide Risks in OECD and Selected FAO Countries

Part II: Survey Responses

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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Activities to Reduce Pesticide Risks in OECD and Selected FAO Countries

Part II: Survey Responses

Environment Directorate
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Also published in the Series on Pesticides:

No. 1, *Data Requirements for Pesticide Registration in OECD Member Countries: Survey Results* (1993)

No. 2, *Final Report on the OECD Pilot Project to Compare Pesticide Data Reviews* (1995)

No. 3, *Data Requirements for Biological Pesticides* (1996)

No. 4, *Activities to Reduce Pesticide Risks in OECD and Selected FAO Countries. Part I: Survey Report* (1996)

Environmental Health and Safety Publications

Since 1988, many of the technical documents prepared by the OECD Environment Directorate have been available to the public in the form of "Environment Monographs" (see list of publications beginning on page 509). As of mid 1996, however, new titles are no longer being published in the Environment Monograph Series. The Environmental Health and Safety Division is now publishing documents in several different series: Testing and Assessment; Good Laboratory Practice and Compliance Monitoring; Risk Management; Harmonization of Regulatory Oversight in Biotechnology; Chemical Accidents; and Pesticides. Information on how to obtain these documents is provided on page 509.

The Inter-Organization Programme for the Sound Management of Chemicals (IOMC) was established in 1995 by UNEP, ILO, FAO, WHO, UNIDO and the OECD (the Participating Organizations), following recommendations made by the 1992 UN Conference on Environment and Development to strengthen co-operation and increase international co-ordination in the field of chemical safety. The purpose of the IOMC is to promote co-ordination of the policies and activities pursued by the Participating Organizations, jointly or separately, to achieve the sound management of chemicals in relation to human health and environment.

Foreword

This publication contains the responses of 20 OECD countries and the European Commission, as well as eight non-OECD FAO countries, to a survey on pesticide risk reduction conducted in 1994-95 at the request of the OECD Pesticide Forum.

A copy of the survey questionnaire, which was sent to national governments and the European Commission, is included. The purpose of the survey was to provide a starting point for the exchange of information concerning new approaches to pesticide risk reduction. These survey responses accompany *Activities to Reduce Pesticide Risks in OECD and Selected FAO Countries. Part I: Survey Report,* OCDE/GD(96)121*.*

This publication was produced within the framework of the Inter-Organization Programme for the Sound Management of Chemicals.

Derestriction of this publication was recommended by the Joint Meeting of the Chemicals Group and Management Committee of the Special Programme on the Control of Chemicals. It has been made public on the authority of the Secretary-General of the OECD.

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Survey Questionnaire

SURVEY OF PESTICIDE RISK REDUCTION ACTIVITIES IN OECD AND SELECTED FAO COUNTRIES

QUESTIONNAIRE

To be completed by end of July 1994.

> *Note:* This survey covers only *plant protection uses* of pesticides, such as uses on agricultural crops, forests, turf, and ornamental plants. It does not include non-plant protection uses of pesticides, such as wood treatment and insect control in buildings.

I. Framework for Pesticide Risk and Use Reduction Activities

Describe your country's framework for pesticide risk reduction, by answering the following questions:

1. How does your country approach pesticide risk reduction? For example, is there a coordinated programme at the national level? Are there programmes or activities at the regional, state, provincial, or local levels? Rather than having one general programme, does your country have a range of activities carried out in different places by different organisations or authorities?

2. What principal factors prompted your country to initiate efforts to reduce pesticide risks? For example, were activities begun in response to drinking water contamination, concern about worker health, public demand, international agreement, or export market requirements?

3. Is there a legal or regulatory mandate for your country's pesticide risk reduction activities?

Keep in mind that this section of the questionnaire is intended to serve as an introduction The goal is not to describe specific activities in detail (this will be done in other sections of the questionnaire), but to tell how, when, and why your country began its activities to reduce pesticide risk.

II. Description of Activities and Results

Describe your country's specific pesticide risk reduction activities. For each activity, answer the following questions:

1. When did the activity begin and what prompted its initiation?

2. What are its specific goals and/or targets?

3. Who is involved in carrying it out?

4. Is there a legal or regulatory mandate?

5. Is the activity monitored or enforced? If so, how?

6. How are results or progress measured?

7. What specific progress and/or results have been achieved?

Please include all pesticide risk reduction activities that are important in your country. Keep in mind that this survey is intended to be broad and to cover not only national programmes but also local and non-governmental efforts. The Appendix provides examples of the types of pesticide risk reduction activities that could be included. ***Please note:*** This appendix is provided to show the range of activities that could be covered, but it is not meant to be a model for your response. If your country has other activities not listed in the appendix, please include them. If your country has activities in just one or a few of the areas, do not feel compelled to respond in the other areas.

III. Conclusions

Assess the outcome of your country's pesticide risk reduction activities, by answering the following questions:

1. Which activities have been most successful? What are the reasons for their success?

2. Which activities have been least successful or presented the most difficulties? What are the reasons for these difficulties?

4. What successes and difficulties have you encountered in measuring the progress and/or results of the activities?

5. How have other policies or programmes in your country affected the outcome of the pesticide risk reduction activities?

6. What projects at the international level would help your country achieve further progress in pesticide risk reduction?

IV. Contact Names

Please provide names, addresses, and telephone and fax numbers of persons we may contact if clarification of the information provided in this survey is necessary. For each contact, indicate which activity(ies) the person is involved in or knowledgeable about, so that questions can be directed accordingly.

APPENDIX

EXAMPLES OF PESTICIDE RISK REDUCTION ACTIVITIES

1. Elimination of hazardous pesticides

- activities to identify and to ban or restrict pesticides whose use may pose unacceptably high risks
- activities to identify and register safer alternatives

2. Reduction in pesticide use

- targets to reduce overall pesticide use by a set deadline
- limits on the amount of pesticide that can be applied, the frequency of application, or the area that can be treated
- increased use of information from efficacy trials to identify lower, but still efficacious, pesticide application rates (i.e. lower than generally recommended rates)
- changes in pest control practices (e.g. need-based rather than calendar-based pesticide application)
- developments in application technology (e.g. micro-encapsulated formulations, low-volume applications, directed spraying)
- changes in production or pest-control goals (e.g. establishing economic thresholds or other measures of acceptable pest damage)

3. Regulations, education, and other policy tools to increase safety in pesticide handling, use, and disposal

- education, training, licensing programmes for pesticide applicators and farm workers
- improvements in pesticide labeling
- improved standards and certification programmes for pesticide application equipment
- use restrictions (e.g. buffer zones to protect water bodies, prohibitions on aerial spraying)
- regulation of pesticide distribution and disposal

4. Promotion of alternative pest management strategies such as integrated pest management or organic farming

- financial support for farmers making the transition to alternative methods
- programmes to provide information to farmers on alternative strategies
- research and development on alternative strategies (including pest/disease-resistant crop varieties, crop rotations that reduce need for pesticides, etc.)
- development and use of networks for information exchange about alternative strategies

5. Use of economic incentives to reduce pesticide use

- removal of *disincentives* to the adoption of alternative pest management strategies, such as pesticide subsidies that keep prices artificially low, or crop price support programmes that require calendar-based pesticide use
- tax reductions or subsidy programmes to encourage adoption of alternative pest management strategies
- marketing programmes aimed at promoting food produced using alternative methods (e.g. "green" labeling)
- levies, taxes, or surcharges on pesticide products
- marketable use rights, i.e. in cases where restrictions have been placed on the total amount of a pesticide that can be used, provisions for pesticide users to sell their use rights to another user

OECD Member Countries' Responses

AUSTRALIA

CONTACT PERSON(S):

Dr Jack Holland (environmental and policy activities)
Manager, Chemicals Section
Environment Protection Agency
PO Box E305
QUEEN VICTORIA TERRACE ACT 2600
AUSTRALIA
Tel: (61) 6 274 1643
Fax: (61) 6 274 1610

Mr Ian Coleman (policy activities)
Director
Agricultural and Veterinary Chemicals Policy Section
Crops Division
Department of Primary Industries and Energy
GPO Box 858
CANBERRA ACT 2600
AUSTRALIA
Tel: (61) 6 272 6371
Fax: (61) 6 272 5899

Mr Greg Hooper (regulatory activities)
National Manager, Registration
National Registration Authority for Agricultural and Veterinary Chemicals
PO Box 240
QUEEN VICTORIA TERRACE ACT 2600
AUSTRALIA
Tel: (61) 6 272 6319
Fax: (61) 6 272 3195

Mr Graham Savage (technical, educational, promotional and marketing activities)
Project Officer
National Registration Authority for Agricultural and Veterinary Chemicals
PO Box 240
QUEEN VICTORIA TERRACE ACT 2600
AUSTRALIA
Tel: (61) 6 272 3194
Fax: (61) 6 272 4753

I. Framework for Pesticide Risk and Use Reduction Activities

1.1 Modus operandi

1.1.1 Introduction

While Australia has no formal overall policy on pesticide risk reduction, risk reduction activities are carried out by a number of different organisations at national and state level, partly for historical reasons, but also because of the diversity of Australian agriculture, climate and land type. The main focus is on pesticide risk reduction through the improved management of pests and diseases, and more effective use of pesticides, rather than on pesticide use reduction *per se*. Current activities fall broadly into four main program areas:

(a) a national registration scheme which regulates the manufacture, supply, distribution and sale of pesticides up to the point of retail sale;

(b) State-run control-of-use programs which aim to ensure that pesticides are used safely and only for the purpose for which they are intended - these programs include both regulatory and educational type activities;

(c) a number of research and development programs run at both the national and state level, with the general aim of improving the efficiency of pesticide use and reducing our dependence on chemical pesticides for pest and disease control.

(d) a number of residue monitoring programs to ensure that agricultural produce meets national and international standards with respect to residues.

A more detailed description of each of these main program areas follows.

1.1.2 National Registration Scheme

Australia is about to put in place a National Registration Scheme for Agricultural and Veterinary Chemicals. It is expected to commence by 1 January 1995 at the latest. This scheme will be administered by the National Registration Authority for Agricultural and Veterinary Chemicals (NRA), under the auspices of the Agricultural and Veterinary Chemicals Code Act 1994, and relevant State legislation.

Under this scheme, all agricultural and veterinary chemicals will have to be registered by the NRA before they can be manufactured, supplied or sold in Australia. The proposed registration process is a rigorous one which will involve an evaluation of each chemical's safety to humans and the environment, its safety to the target plant or animal, and its efficacy. Any product deemed to be unduly hazardous will either not be registered or will have restrictions placed on its use which will be communicated to users via the label.

A similar evaluation and registration system is presently in operation in Australia, except that evaluation is carried out by the Commonwealth and registration is the responsibility of the individual States and Territories, with Commonwealth clearance being a necessary prerequisite for State/Territory registration.

Evaluations are carried out by several Government agencies, including:

- the Chemical Safety Unit of the Commonwealth Department of Human Services and Health, which evaluates the human toxicology of the product and its residue status, and then determines poison schedule classification, first aid and safety directions, MRLs and withholding periods;

- Worksafe Australia which evaluates the product from an occupational health and safety perspective and determines safe handling and use practices in the workplace (at manufacturing, distribution and end-use levels), the need for protective clothing, etc.;

- the Federal Environment Department's Environment Protection Agency which assesses the environmental toxicology, chemistry and fate, and makes recommendations on how the likely environmental impact of the chemical's use can be minimised;

- State Departments of Agriculture which evaluate the product's efficacy and its safety to target plants and animals.

The NRA is also responsible for the regulation of the manufacture, distribution and supply of pesticides up to the point of retail sale. A national compliance program is being set up to ensure compliance with the provisions of the Agricultural and Veterinary Chemicals Code Act. The Act provides for strict penalties for non-compliance.

The NRA has power to deregister, or impose additional restrictions on the use of, any chemical if new information comes to light which challenges the safety of that chemical. Numerous products have been withdrawn or have had severe restrictions placed on their use in recent years under those provisions (e.g. organochlorines, mercurial fungicides, dithiocarbamates such as Ferbam, Maneb and Nabam, the nitrofurans).

The NRA has also undertaken to implement an Existing Chemicals Review Program which will systematically review the safety of chemicals already registered and this program may see the withdrawal of a number of older chemicals which have largely been superseded by more effective and less hazardous ones. The program will have provision for community input into firstly the selection of chemicals to be reviewed, and secondly, the final decision-making process.

1.1.3 State Control-of-Use Programs

Under the National Registration Scheme, the States will be responsible for the control of use of pesticides after the point of sale, i.e. it will be the States responsibility to ensure that pesticides are used safely and only for the uses for which they are registered.

State control-of-use activities fall broadly into two discrete areas of activity:

(a) Extension/education activity

All States and Territories have extension and education activities aimed at achieving safe and effective use of pesticides. These activities include:

- extension/promotional programs on safe and effective use of pesticides, aimed primarily at growers;
- accredited training programs, usually run in association with professional course providers and relevant industries, on safe handling and effective use of pesticides, aimed at farmers, commercial operators, and retailers;
- promotion of more cost-effective application rates and improved application technology;
- promotion of Integrated Pest Management (IPM) techniques;
- promotion of innovative production techniques to reduce the need for pesticides, for example, out-of-season production.

Most of these programs are joint exercises involving State Departments of Agriculture, grower organisations, industry groups and educational institutions.

(b) Regulatory activities

The States are also responsible for a number of regulatory activities aimed at pesticide risk reduction, e.g. controls on aerial spraying, licensing of commercial pest control operators, investigation of aerial spray drift complaints. The States also run residue monitoring programs to ensure MRL standards are met. These range from random sampling of produce to ensure consumer confidence, to targeted monitoring programs combined with traceback activity to identify specific problem areas and take corrective action.

1.1.4 Research and Development

A large program of research and development is conducted by various national and state organisations. This is usually done by State departments responsible for agriculture and resource management, in co-operation with national research organisations such as the CSIRO and the universities, as well as the chemical manufacturers. In most cases this work is co-ordinated by Industry Research and Development Corporations and Co-operative Research Centres.

Research activities include:

- field evaluation of new products;
- efficacy trials to determine the most cost-effective treatment and application rate;
- development and evaluation of alternative pesticides;
- development and evaluation of integrated pest management technology;
- identification and evaluation of biological control agents;
- development and evaluation of pest and disease resistance in host plants and animals.

1.1.5 Residue monitoring programs.

Australia has in place a number of residue monitoring programs to ensure that agricultural produce meets both national and international standards with respect to pesticide residues. They include:

(a) The National Residue Survey

The National Residue Survey is conducted by the Commonwealth Department of Primary Industries and Energy's Bureau of Resource Sciences. It regularly tests raw food and other agricultural commodities produced in Australia for residues of a wide range of chemicals normally used in the production of those commodities. It also tests for residues of common environmental contaminants such as heavy metals.

(b) The Australian Market Basket Survey

This survey by the National Food Authority calculates the intake of residues in the Australian diet. Hypothetical diets based on actual food intakes are developed for males and females of various ages. The components of the diets are purchased from retail outlets in three randomly selected metropolitan areas of each capital city. Foods are then cooked, or otherwise processed, to present them as ready for the table. At this point, they are sampled and analysed.

(c) Australian Quarantine and Inspection Service (AQIS) Residue Testing Programs

The Australian Quarantine and Inspection Service (AQIS) in the Department of Primary Industries and Energy (DPIE) has conducted several residue testing programs which are really quality assurance programs for export products. Because they are aimed at reducing the prevalence of residues in the end product, AQIS programs differ from the National Residue Survey in that they are generally biased towards detecting contaminated products. Examples of AQIS programs include:

- organochlorine residues in Australian export beef;
- organochlorine and organophosphate residues in Australian fish species;
- monitoring of paralytic and diaphoretic shellfish poisons in Australian shell fish, and sediments and heavy metals in Australian crustaceans;
- organochlorine residues in dried fruit exports.

(d) National Antibacterial Residue Minimisation Program (NARM)

Another major residue testing program currently under way is the National Antibacterial Residue Minimisation program, which is a joint Commonwealth, State and Territory initiative. An initial screen test for antibacterial residues is carried out on urine samples from animals slaughtered at abattoirs. When a positive urine sample is detected, a sample of meat is collected from the carcass and forwarded with the urine sample to laboratories for confirmatory testing.

Samples confirmed as containing unacceptable levels of antibacterial residues are immediately reported to the relevant State or Territory authorities, and an effective traceback system allows the problem to be dealt with at the property level.

(e) State Residue Surveys

The various States from time to time conduct their own residue surveys. In some cases these are random surveys of residue status of raw agricultural produce,

which complement the National Residue Survey. More often they are targeted surveys to identify a specific residue problem and facilitate corrective action.

1.1.6 Scope of the Programs

In Australia, pesticide risk reduction activities cover both agricultural and veterinary chemicals. A number of pesticides are in fact used as veterinary chemicals (e.g. animal ectoparasiticides). Consequently a number of activities reported relate to pesticides used on animals.

1.1.7 Availability of Data on Pesticide Use in Australia

There are very few statistics kept on the quantities of pesticides used in Australia, let alone the quantities used by specific agricultural industries, e.g. horticulture, cereal cropping, extensive grazing, etc.

The Australian Bureau of Statistics (ABS) last recorded the quantities of herbicides, insecticides and fungicides used and the area treated in 1991/92 and these data are expected to be available shortly.

Avcare Limited, the body representing the major agricultural and veterinary chemical manufacturers in Australia, keeps records of the value of farm chemical sales, which can be broken up into a number of commodity groups, e.g. crop related vs animal related products, herbicides, fungicides, insecticides, etc. However they keep no records of quantities sold.

Australian use of pesticides is generally considered to be low by world standards, e.g. figures supplied by Avcare indicate that in 1991, Australian farmers spent US$ 0.89/ha on farm chemicals compared with US$ 13.17 for the USA, US$ 39.72 for the UK, US$ 70.38 for France, and US$ 575 for Japan. However such figures are misleading as much of Australian agriculture is characterised by low-chemical input systems (extensive cropping and grazing). Use figures for intensive horticultural production in Australia, for example, are likely to be much higher than the mean Australian figure.

1.1.8 Co-ordination/Future Directions

In the past the various state and national efforts toward pesticide risk reduction have not been co-ordinated as well as we would have liked. However, the recently established Agricultural and Veterinary Chemicals Policy Committee has recognised the need for such co-ordination and is expected to take a more pro-active role in developing a more nationally co-ordinated approach to pesticide risk reduction.

The AVCPC has recently established a working party to review current policies on pesticide risk reduction and associated with that, improved pest and disease management. In summary, the Working Party's terms of reference are to review existing pesticide risk reduction programs in Australia and assess the relevance of overseas programs, with a view to developing a nationally co-ordinated policy on the issue.

1.2 Initiating Factors

The National Registration Scheme was prompted by general community concern about pesticide residues, occupational health and safety issues, environmental concerns and concerns about trade implications and the expectations of overseas markets. It was also prompted by the need to rationalise seven different state registration schemes into one. The need for a National Registration Scheme was recognised in the report of the Senate Select Committee on Agricultural and Veterinary Chemicals in Australia (July 1990).

Most other programs were prompted by growing concern about the development of pesticide resistance by target species, as well as general community concern about the use of agricultural chemicals and their possible adverse impact on human health, the environment and food quality, particularly with respect to residues. This has lead to a growing awareness of the need to reduce dependence on agricultural and veterinary chemicals for pest and disease management.

1.3 Legal Mandate

The legal mandate for the operation of the National Registration Scheme is provided by the Agricultural and Veterinary Chemicals Code Act 1994.

Control-of-Use activities fall under relevant State legislation listed in Annex A.

II. Description of Activities

1. Elimination of hazardous pesticides

1.1 Identification, banning and restriction of hazardous pesticides
- 1.1.1 National Registration Scheme for Agricultural and Veterinary Chemicals
- 1.1.2 Deregistration of hazardous chemicals
- 1.1.3 Existing Chemicals Review Program
- 1.1.4 Chemical collection programs

1.2 Activities to identify and register safer alternatives
- 1.2.1 Identification and development of safer alternative pesticides
- 1.2.2 Facilitating the registration of biological control agents

2. Reduction in pesticide use

2.1 Targeted pesticide reduction programs
- 2.1.1 Pesticide Charter between Australian Consumers' Association and grower organisations
- 2.1.2 Wool Industry strategy to reduce levels of pesticide residues in Australian greasy wool

2.2 Efficacy trials to identify more cost-efficient application rates

2.3 Biological control

2.4 Development of host resistance to pests and diseases

2.5 Improved application technology

2.6 Alternative (non chemical) methods of controlling sheep parasites

2.7 Integrated Pest Management research

2.8 Development of non-chemical post-harvest treatment of plant products

2.9 Minimisation of pesticide use in the production of cotton

3. Regulations and education to increase safety

3.1 Education and training in safe pesticide use
- 3.1.1 Farmer education and training in pesticide use
- 3.1.2 Education and training of commercial operators and retailers in safe handling and use of pesticides

3.2 Licensing of commercial operators

3.3 Improvement in pesticide labelling

3.4 Use restrictions on spraying
- 3.4.1 Use restrictions on aerial spraying
- 3.4.2 Draft Code of Practice on loading and wash-down of aircraft used in aerial spraying

3.5 Regulation of pesticide distribution

4. Promotion of alternative strategies

4.1 Promotion of "clean food" production, IPM and organic farming
- 4.1.1 Development of a National Standard for Organic and Biodynamic Produce

4.2 Development of networks

5. Economic incentives

5.1 Subsidy programs to encourage adoption

5.2 Marketing programs

5.3 Levies

Pesticide Reduction Activity

1. Elimination of hazardous pesticides

1.1 Identification and banning/restriction of hazardous pesticides

1.1.1 National Registration Scheme for Agricultural and Veterinary Chemicals

Activity	**National Registration Scheme** Australia is setting up a National Registration Scheme for Agricultural and Veterinary Chemicals to replace the existing two-tiered Commonwealth clearance/State registration system. Under both the existing clearance process and the proposed National Registration Scheme all new chemicals are evaluated for their safety to humans and to the environment, as well as to target plants and animals. Any chemicals considered unduly hazardous are either not registered or have restrictions placed on their use. The proposed National Registration Scheme will be implemented by the National Registration Authority for Agricultural and Veterinary Chemicals (NRA).
When did the activity begin and what prompted its initiation?	Prior to 1988 the States had responsibility for clearance and registration of agricultural and veterinary chemicals. In 1988 a national clearance program was introduced, that was a prerequisite to State registration. The National Registration Scheme is expected to commence on 1 January 1995. The scheme was initiated in response to a recognised need for better co-ordination of pesticide regulation in Australia and the need to rationalise the seven existing registration systems into one. It was one of the recommendations of the Senate Select Committee on Agricultural and Veterinary Chemicals in Australia.
What are its specific goals and/or targets?	The National Registration Scheme for Agricultural and Veterinary Chemicals aims to ensure that products registered are safe for humans and the environment, efficacious, safe to the target plant and animals, and properly labelled and formulated.
Who is involved in carrying it out?	National Registration Authority for Agricultural and Veterinary Chemicals.
Is there a legal or regulatory mandate?	Agricultural and Veterinary Chemicals Code Act 1994.
Is the activity monitored or enforced? If so, how?	A national compliance program is being set up to replace existing state compliance programs (3.5), which aims to monitor and enforce the correct registration of agricultural and veterinary chemicals.
How are results and progress measured?	The scheme is to be reviewed two years after commencement.
What specific progress/results have been achieved?	The NRA has been established, as have national clearance and registration procedures. The National Registration Scheme is expected to commence on 1 January 1995.

Pesticide Risk Reduction Activity
1 Elimination of hazardous pesticides
1.1 Identification and banning/restriction of hazardous pesticides
1.1.2 De-registration of hazardous chemicals

Activity	De-registration of hazardous chemicals Registration Authorities in Australia have the power to de-register or impose additional restrictions on existing registered products if new information comes to light which questions the safety of those products.
When did the activity begin and what prompted its initiation?	From time to time specific pesticides or groups of pesticides have either been banned or had restrictions imposed on their use in response to genuine community concern about the safety of those chemicals. Examples include the withdrawal of the organochlorines and other chemicals from agricultural use, and restrictions on the use of mercurial fungicides.
What are its specific goals and/or targets?	To withdraw or restrict use of chemicals identified as hazardous to humans, the environment and target plants and animals.
Who is involved in carrying it out?	National Registration Authority as well as state registration authorities.
Is there a legal or regulatory mandate?	The National Registration Authority for Agricultural and Veterinary Chemicals is currently authorised to suspend or cancel a product's registration via the Agricultural and Veterinary Chemicals Act 1988, and associated state legislation (as listed in Appendix 1). In future such actions will be covered by the Agricultural and Veterinary Chemicals Code Act 1994.
Is the activity monitored or enforced? If so, how?	The activity is both monitored and enforced. When a product is de-registered, a program of withdrawal is agreed to by the registrant. Products are usually phased out by ceasing production from a certain date and using up existing supplies. Compliance with this agreement is monitored and enforced under State and Commonwealth programs.
How are results and progress measured?	Progress is measured by the number of chemicals which have had to be withdrawn or which have had restrictions imposed on their use. Progress with individual withdrawals is measured by the degree to which the withdrawal agreement is adhered to.
What specific progress/results have been achieved?	To date more than 20 individual chemicals or groups of chemicals have either been withdrawn from use or had restrictions imposed on their use. Examples include: • the withdrawal from agricultural use of the organochlorines, dithiocarbamate fungicides such as Ferbam, Maneb and Nabam and the nitrofurans (veterinary chemicals); • restrictions on the use of mercurial fungicides, and atrazine, and the use of organochlorines for termite control.

Pesticide Risk Reduction

1 Elimination of hazardous pesticides

1.1 Identification and banning/restriction of hazardous chemicals

1.1.3 Existing Chemicals Review Program

Activity	Existing Chemicals Review Program (ECRP) The NRA is setting up a program to review the safety of existing chemicals, i.e. chemicals that are already registered. The program is to be known as the Existing Chemicals Review Program (ECRP). The program has provision for community input, firstly in identifying chemicals that need to be reviewed, and secondly in the final decision making process.
When did the activity begin and what prompted its initiation?	The ECRP is presently being developed and is expected to be operational by 1 January 1995. It was prompted by consumer and user concerns about the safety of chemicals registered in the past when there was less awareness of the potential human and environmental hazards of pesticides. Another impetus was the report of the Senate Select Committee on Agricultural and Veterinary Chemicals.
What are its specific goals and/or targets?	To review the toxicology, residue and environmental data packages for previously registered chemicals considered to be potentially hazardous. The program will involve six steps- nomination, screening assessment, review, referral and determination.
Who is involved in carrying it out?	National Registration Authority for Agricultural and Veterinary Chemicals
Is there a legal or regulatory mandate?	Agricultural and Veterinary Chemicals Code Act 1994.
Is the activity monitored or enforced? If so, how?	The activity will be monitored by an annual formal review process. Compliance with determinations which involve restrictions on the use of products or removal of products from sale will be monitored via the National Compliance Program.
How are results and progress measured?	The program will be assessed by the number of reviewed products, and stakeholder satisfaction with progress.
What specific progress/results have been achieved?	The Existing Chemical Review Program has been finalised following a period of public consultation and the first invitation to nominate chemicals for review was recently advertised in national daily newspapers. The first reviews are expected to commence in January 1995. An *ad hoc* review program is presently in place under which chemicals which are of concern can be nominated and examined by the NRA and this program will continue.

Pesticide Reduction Activity
1 Elimination of hazardous pesticides
1.1 Identification and banning/restriction of hazardous pesticides
1.1.4 Chemical collection programs

Activity	Chemical Collection Programs A Rural Chemical Collection Program was initiated by the Government of Victoria in 1989, ran for three years and covered most of rural Victoria. It was one of a number of programs aimed at managing de-registered and unwanted pesticides. A secondary aim was to improve the control of disposal of pesticides and pesticide containers in rural areas. Associated information on the responsible disposal of pesticide containers was prepared by the Environment Protection Authority of Victoria (EPAV) and the Department of Agriculture. Similar programs were conducted in other States.
When did the activity begin and what prompted its initiation?	The Victorian program began in 1989, and followed on a successful DDT buy-back program run by the Department of Agriculture. The programs were initiated following the discovery of elevated levels of DDT and dieldrin in meat for export, as well as some elevated levels of persistent pesticides in aquatic systems in Victoria. Programs in other States were conducted for similar reasons.
What are its specific goals and/or targets?	To minimise the stocks of de-registered and unwanted hazardous pesticides stockpiled in rural and urban areas and to collect, store and dispose of them in an environmentally acceptable manner.
Who is involved in carrying it out?	The former Agricultural and Veterinary Chemicals Association (AVCA, now known as Avcare), Victorian Department of Agriculture, Melbourne and Metropolitan Board of Works (now Melbourne Water), local municipalities and EPAV, as well as waste transport, storage and disposal industries. Corresponding agencies were involved in other States.
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	The collection was voluntary. Records were kept of the quantities of chemicals collected by the co-ordinating agency and these were published in the media.
How are results and progress measured?	Progress was measured by the quantities and types of pesticides collected, and stakeholder satisfaction with the program.
What specific progress/results have been achieved?	Approximately 338 tonnes of chemicals and containers were collected for storage and/or destruction over the three year period in Victoria alone. EPAV believes there has been an increase in awareness of improved disposal practices for pesticides and pesticide containers.

Pesticide Reduction Activity

1 Elimination of hazardous pesticides

1.2 Identification and registration of alternative pesticides

1.2.1 Identification and development of safer alternative pesticides

Activity	Identification and development of safer alternative pesticides Australia has in place a number of projects aimed at identifying and/or developing safer alternative pesticides. Examples include: • studies on the use of *Bacillus thuringiensis* for insect control in crops and sheep lice control; • studies on the use of *Metarrhizium* fungus for the control of pasture grubs such as red-headed cockchafer, locusts and termites; • Development of pesticides from essential oils; • Use of pheromones to disrupt insect mating; • development of a vaccine for cattle ticks to reduce use of ectoparasiticides.
When did the activity begin and what prompted its initiation?	Projects have been ongoing mainly since the late 1980's. Projects were initiated by community concern about the safety of pesticides and the need for safer alternatives.
what are its specific goals and/or targets?	To identify, develop and evaluate safer alternative pesticides.
Who is involved in carrying it out?	Various research agencies including State Departments of Agriculture, CSIRO, Co-operative research centres, universities and industry research and development corporations.
Is there a legal or regulatory mandate?	No - not applicable
Is the activity monitored or enforced? If so, how?	No - not applicable
How are results and progress measured?	Successful development of alternative pesticides. Research work is subject to the normal scientific peer review process.
What specific progress/results have been achieved?	• Pheromones have been used to disrupt mating of codling moths in apple orchards; • *Bacillus thuringiensis* effective against certain classes of insects in crops; • Use of *Metarrhizium* for pasture grubs such as red-headed cockchafer; • TickGARD vaccine has been registered for use against cattle ticks Research has generally shown that while safer alternative pesticides have a potentially useful role to play, their performance under commercial agricultural conditions is sometimes disappointing.

Pesticide Reduction Activity
1 Elimination of hazardous pesticides
1.2 Identification and registration of alternative pesticides
1.2.2 Facilitating the registration of biological control agents

Activity	Introduction of a specific assessment process for biological control agents The NRA is developing specific guidelines for the registration of biological pest control agents which will recognise the different nature of these products and facilitate their evaluation and registration, without compromising the need to ensure their safety to humans and the environment. The NRA recognises that some biological products, due to their inherently lower risk, may be more desirable than synthetic pesticide chemicals and therefore, specific guidelines have been developed which simplify the registration process for these products. Lessening any requirements does not eliminate the obligation to prove safety.
When did the activity begin and what prompted its initiation?	New guidelines for registration of biological products are currently being developed, which will recognise the different nature of these products.
What are its specific goals and/or targets?	The guidelines are intended to expedite the registration of products where the exposure and toxicological profiles indicate that they are low risk, whilst allowing for full examination of any product which may give cause for concern.
Who is involved in carrying it out?	National Registration Authority for Agricultural and Veterinary Chemicals
Is there a legal or regulatory mandate?	Yes - The guidelines will need to comply with the requirements of the Agricultural and Veterinary Code Act 1994.
Is the activity monitored or enforced? If so, how?	Compliance with the guidelines will be a necessary requirement for registration.
How are results and progress measured?	Results and progress will be measured by the number of biological products that are successfully processed via the guidelines.
What specific progress/results have been achieved?	The guidelines have been drafted although the program is not yet underway

Pesticide Reduction Activity

2 Reduction in pesticide use

2.1 Targeted pesticide reduction programs

2.1.1 Pesticide Charter between Australian Consumers Association and grower organisations

Activity	Pesticide Charter between Australian Consumers Association and Grower Organisations The Australian Apple and Pear Growers Association has recently signed a pesticides charter with the Australian Consumers Association and other interested parties to reduce the use of chemicals in the pome fruit industry over the next ten years. The charter has five key elements: • chemical identification and classification to identify pesticides that are no longer necessary; • research and development program to identify alternative methods of pest control; • development of codes of practice covering various aspects of chemical use; • a monitoring program to monitor pesticide use over the period; • education and training program to educate growers about the benefits of IPM. The program aims for a 50% reduction in pesticide use in the apple and pear industry by the end of 1996. Similar charters have now been signed by the Rice Growers Co-operative and the Banana Industry Committee at Murwillumbah NSW.
When did the activity begin and what prompted its initiation?	The activity was initiated by the Australian Consumers Association and the Apple and Pear Growers Association in 1991, in response to consumer concern about chemical residues on apples. The Charter has been adopted by other grower organisations for similar reasons.
What are its specific goals and/or targets?	50% reduction in pesticide use in the apple and pear industry by the end of 1996. Other grower organisations have similar aims.
Who is involved in carrying it out?	The Australian Apple and Pear Growers Association, the Rice Growers Co-operative, the Banana Industry Committee, the Australian Consumers Association and other interested parties.
Is there a legal or regulatory mandate?	No, it is a purely voluntary action undertaken by the growers organisations
Is the activity monitored or enforced? If so, how?	The activity is monitored by the grower associations through their pesticide use monitoring program.
How are results and progress measured?	Reductions in pesticide use recorded through the monitoring program. Adoption rate of IPM. Number of growers attending training programs. Stakeholder satisfaction with the program.

What specific progress/results have been achieved?	The Apple and Pear Growers Association has identified 12 active constituents which are no longer necessary for apple and pear production. 55% of the apple and pear industry research budget is devoted to projects aimed at reduced pesticide use. A code of practice for pesticide use in apple and pear orchards has been prepared and distributed to growers. At least 30 orchards are now keeping records of pesticide use as well as use of alternative products, e.g. predators, bactericides, oils, etc. IPM module suitable for apple and pear growers has been developed for farmer education courses. Other grower organisations have signed the charter.

Pesticide Reduction Activity
2. Reduction in pesticide use
2.1 Targeted reduction
2.1.2 Wool Industry strategy to reduce levels of pesticide residues in greasy wool

Activity	Wool Industry strategy to reduce levels of pesticide residues in Australian greasy wool. The Australian Wool Industry recently announced a strategy to reduce the current level of organophosphate and synthetic pyrethroid pesticide residues in greasy wool by 50% by identifying and actively discouraging management practices which result in unacceptably high pesticide residues in greasy wool. Key aspects of the activity include a research program aimed at identifying management practices leading to high residue levels, monitoring of residue levels in the clip and the development of management strategies to control external parasites which minimise residue levels in greasy wool.
When did the activity begin and what prompted its initiation?	June 1994. Concern within the industry over the levels of organophosphate and synthetic pyrethroid levels detected in Australian greasy wool, and the realisation that 50% of the residue loading came from a small number of lots with unacceptably high residue levels. Industry recognition that there is a marketing advantage in being able to offer wool with minimal pesticide residues.
What are its specific goals and/or targets?	To halve the current mean levels of organophosphate and synthetic pyrethroid pesticide residue levels in Australian greasy wool by June 1997. This will be achieved by a comprehensive education and extension program, targeted at producers of wool clips with high residue levels. To identify pesticide use patterns resulting in high levels of residual pesticide in greasy wool and develop management strategies to control external parasites which minimise pesticide residues.
Who is involved in carrying it out?	The Australian Wool Industry, in co-operation with the Australian Wool Research and Promotion Organisation (AWRAP), State Departments of Agriculture, CSIRO Division of Wool Technology and the agvet chemical industry.
Is there a legal or regulatory mandate?	No. Not applicable.
Is the activity monitored or enforced? If so, how?	Yes. AWRAP monitor residual pesticide levels in the wool clip. Producers of clips with high residue levels are surveyed to establish pesticide use patterns, and if considered necessary, trace-back procedures will be initiated.
How are results and progress measured?	AWRAP monitoring program.
What specific progress/results have been achieved?	The monitoring program has established that 50% of the residue loading comes from a small number (about 5%) of growers. Research has identified problem chemicals and use patterns. Corrective management strategies are being developed.

Pesticide Reduction Activity
2 Reduction in pesticide use
2.2 Efficacy trials to identify more cost efficient application rates

Activity	Efficacy trials to identify lower and more cost efficient application rates All pesticides used in Australia are subject to efficacy trials under local conditions to establish rates of use which are cost effective.
When did the activity begin and what prompted its initiation?	Rates of use in Australia became subject to intensive research starting in the early 1970s. This was prompted by the need to minimise costs.
What are its specific goals and/or targets?	To identify the most cost effective rate necessary to achieve effective pest and disease control.
Who is involved in carrying it out?	Mostly State Departments of Agriculture, but also other agencies (CSIRO, Universities, Co-operative Research Centres) to a minor degree.
Is there a legal or regulatory mandate?	No - not applicable
Is the activity monitored or enforced? If so, how?	Registration processes ensure that minimum effective doses are identified. Use patterns frequently reflect economic compromises on control which further reduce these rates, thus ensuring minimal use patterns.
How are results and progress measured?	The results of research and 'on-farm' experimentation are broadcast widely in the farm community. Commercial pressure ensures that minimal effective rates are used.
What specific progress/results have been achieved?	All chemicals registered are used at the most cost-effective application rate.

Pesticide Reduction Activity
2. Reduction in pesticide use
2.3 Biological control

Activity	Use of biological control measures Australia has been very active in the field of biological control of pests and diseases since the 1950's following the spectacular success with biological control of the cactus Prickly Pear with the caterpillar, *Cactoblastis cactorum* and the control of rabbits with the virus, *Myxomatosis*. Since then significant research effort has gone into identifying and releasing other biological control agents.
When did the activity begin and what prompted its initiation?	In the 1950s. It was prompted by failure of chemical methods to deal with two major pests, prickly pear and rabbits. It has continued to appeal because of its potential cost-effectiveness and also because it offers an alternative to chemical pest control.
What are its specific goals and/or targets?	To replace wherever possible chemical methods of pest control with biological ones.
Who is involved in carrying it out?	Various research agencies such as CSIRO, Universities and State Departments responsible for Agriculture and Resource Management
Is there a legal or regulatory mandate?	No - not applicable
Is the activity monitored or enforced? If so, how?	This activity is monitored by a Government/scientific committee responsible for biological control. Stringent controls are applied to the release of any new biological agents to ensure that the agents themselves do not become a problem.
How are results and progress measured?	Sustained activity of the biological control agent under normal environmental conditions is the most reliable indicator of the success of these programs.

What specific progress/results have been achieved?	Australia's experience with biological control can best be summed up as a couple of spectacular successes (*Cactoblastis* and *Myxomatosis*), several acceptable outcomes, and at least one dismal failure (introduction of the cane toad to control cane beetles, which subsequently became a pest). Many biological control agents provide at best partial control and hence only partial reduction in pesticide use. Examples of successful biological control agents include: • control of prickly pear cactus with *Cactoblastis cactorum*; • control of rabbits with *Myxomatosis;* • use of insects to control weeds such as ragwort, Paterson's curse and boneseed; • use of fungal rusts to control blackberry; • use of dung beetles to control buffalo flies in northern Australia; • use of nematodes from the *Heterorhabditidae* and *Steinernematidae* families to control insect pests in pastures; • *Metarrhizium* fungus is presently being evaluated for the control of various insect pests including termites and plague locusts; • The control of crown gall in fruit trees by the use of a bacterial inoculant; • The control of bacterial blotch in mushroom production by the use of a bacterial inoculant.

Pesticide Reduction Activity

2. Reduction in pesticide use

2.4 Development of host resistance to pests and diseases.

Activity	Development of host resistance to pests and diseases. Australia has devoted significant research effort to developing plants and animals that are resistant to pests and diseases.
When did the activity begin and what prompted its initiation?	This has been an ongoing program for many years in many areas of agriculture, It was prompted initially by the rising cost of chemical pest and disease control measures, and more recently has also been driven by a general philosophy of reducing dependence on pesticides where possible.
What are its specific goals and/or targets?	To minimise dependence on chemical control wherever possible by breeding commercial strains of plants and animals that are resistant to diseases and pests.
Who is involved in carrying it out?	Various research agencies, such as CSIRO, Universities, State Departments of Agriculture.
Is there a legal or regulatory mandate?	No - not applicable.
Is the activity monitored or enforced? If so, how?	Programs are evaluated by scientific peer groups.
How are results and progress measured?	Successful development of pest and disease resistance in commercial plants and animals.
What specific progress/results have been achieved?	Examples of successful development of host resistance include: • tick resistant strains of cattle; • rust resistant strains of wheat; • aphid resistant strains of lucerne; • aphid resistant strains of rape and other Brassicas; • black leg resistant rape seed; • root-rot, clover scorch (*Kabatiella*) and sub clover red leaf virus resistant strains of subclover.

Pesticide Reduction Activity
2 Reduction in Pesticide Use
2.5 Improved application technology

Activity	Development of improved application technology In recent years Australian scientists have developed or modified some innovative cost effective application techniques which have resulted in a reduction in the amount of agricultural chemical applied. Examples include: • rope-wick and carpet-wick applicators which allow more specific targeting of erect weeds in crops and pastures; • the "Detectspray" unit which uses electronic sensors to detect the presence of weeds in a fallow paddock and activate the spray unit only when required; • band spraying techniques used in direct-seeding of crops and pastures; • directed spraying techniques which direct the spray unit only at those parts of the plant where the target pests or diseases normally occur; • "spray topping" techniques where low rates of herbicide are directed specifically at the seed head of annual grass weeds in pastures to kill the seed head.
When did the activity begin and what prompted its initiation?	Research to find more cost-effective application techniques has been going on for some time. Such activities were prompted initially to reduce the cost of pesticide application by reducing the amount of chemical used, and to find ways of applying herbicides to weeds in sensitive crops. In recent times this research is also prompted by the need to minimise pesticide use and minimise the harmful effects of pesticides (e.g. harm to natural predators, reduce spray drift).
What are its specific goals and/or targets?	To improve the cost-efficiency of pesticide application of pesticides and generally reduce the amount of pesticide applied.
Who is involved in carrying it out?	Various research agencies such as State Departments responsible for Agriculture and Resource Management, CSIRO, universities, agvet chemical industry.
Is there a legal or regulatory mandate?	No - not applicable
Is the activity monitored or enforced? If so, how?	No - not applicable.

How are results and progress measured?	Experimental reports are subjected to scientific peer evaluation. Measurable financial benefits and environmental and health benefits. Successful adoption of new technology.
What specific progress/results have been achieved?	Examples of improved application technology adopted include: • rope-wick and carpet-wick applicators are now used to control erect weeds in crops and pastures in many areas of Australia; • the "Detectspray" unit is now commercially available, although further developmental work is required before its potential can be fully exploited; • band spraying techniques are used in direct-seeding of crops and pastures; • directed spraying techniques which direct the spray unit only at those parts of the plant where the target pests or diseases normally occur are now being used; • “spray topping” techniques are being used to control annual grass weeds in pastures.

Pesticide Reduction Activity
2. Reduction in pesticide use
2.6 Alternative (non chemical) methods of controlling sheep parasites

Activity	Research into alternative (non chemical) methods of controlling sheep parasites. In recent years the former Wool Research and Development Corporation has spent over $3 million annually on research into and promotion of alternative (non chemical) methods of controlling external parasites such as body lice and blowflies, and internal parasites such as intestinal worms. Examples of the type of work conducted include: • management of blowfly strike with behaviour modifying chemicals; • development of immunological control methods for blowfly strike; • development of strategies for more effective chemical control of blowflies; • biological control of sheep lice using lice toxic strains *of Bacillus thuringiensis*; • development of immunological control of internal parasites; • development of sheep selection strategies for breeding increased resistance to internal parasites; • development of information packages promoting an integrated approach to parasite management.
When did the activity begin and what prompted its initiation?	Late 1980's. The activity was initially prompted by the increasing cost of chemical methods of parasite control as well as the development of parasite resistance to existing chemical control methods. More recently there has been a growing awareness of the need to minimise pesticide residue levels in sheep meat and greasy wool, and the market advantages that can be gained by doing so.
What are its specific goals and/or targets?	To develop more cost-effective and sustainable methods of controlling internal and external parasites of sheep, with a view to maintaining productivity and animal welfare, as well as the quality and marketability of Australian wool and sheep meat.

Who is involved in carrying it out?	A wide range of research establishments throughout Australia (State Departments of Agriculture, CSIRO, Universities). The work is funded and co-ordinated by the Australian Wool Research and Promotion Organisation -AWRAP (formerly Wool Research and Development Corporation).
Is there a legal or regulatory mandate?	No. Not applicable
Is the activity monitored or enforced? If so, how?	Yes. The activity is closely monitored by AWRAP by means of annual reviews of progress and priorities.
How are results and progress measured?	Completion of research projects and assessment of how well objectives have been met. Stakeholder (wool producers, Government) satisfaction with the outcomes of the program.
What specific progress/results have been achieved?	Results so far have been very disappointing. Some progress has been made in developing a vaccine against the organisms causing fleece rot and the sheep blowfly larvae, but it will be several years before a vaccine will be commercially available. Some success has been achieved in developing methods of baiting and trapping blowflies in order to reduce the population.

Pesticide Reduction Activity
2. Reduction in pesticide use
2.7 Integrated Pest Management research

Activity	Integrated Pest Management (IPM) Research Australia has in place a number of research programs addressing various aspects of IPM. The programs deal with the specific components of IPM mentioned above (cost effective rates, non-chemical means of control, biological control, breeding for host resistance, improved application technology), as well as the practical integration of all these techniques on the farm.
When did the activity begin and what prompted its initiation?	Although research into the various components of IPM has been going on for many years, the concept of IPM really took off in the late 1980s in response to widespread community concern about pesticide residues on food. Also, continuous and often excessive use of broad-spectrum chemicals has resulted in problems such as the development of resistant strains of pests, toxic residues and environmental hazards from accidental or unwise use. This lead to the recognition that we need to, and can reduce our dependence on pesticides by using non-chemical methods of control where possible, in association with reduced rates of pesticides.
What are its specific goals and/or targets?	To improve our management of pests and diseases, and reduce our dependence on pesticides through the integrated use of all appropriate control mechanisms.
Who is involved in carrying it out?	IPM research is carried out at many levels, by a number of different research agencies such as State Departments of Agriculture, Universities, CSIRO and Co-operative Research Centres. There are farm based projects initiated by growers, however more complicated systems and those involving new control agents tend to be developed by research institutions such as the CSIRO, universities, industry research corporations and State Departments of Agriculture.
Is there a legal or regulatory mandate?	No - not applicable.
Is the activity monitored or enforced? If so, how?	No - not applicable.
How are results and progress measured?	Progress is measured by the number of successful IPM projects underway and the financial environmental and human health benefits that are perceived to flow from them. The extent to which IPM is successfully used on farms.
What specific progress/results have been achieved?	Examples of successful programs include the development of: • a computer software package to identify appropriate control measures in the integrated management of aphids in lucerne; • integrated pest management packages for apple and pear orchards, citrus orchards potatoes and cotton; • “spray-graze” techniques for controlling weeds in pastures.

Pesticide Reduction Activity

2. Reduction in pesticide use

2.8 Development of non-chemical post-harvest treatment of plant products

Activity	Development of non-chemical post-harvest treatment of plant products Development of a range of post-harvest treatments for the elimination of pests and diseases that do not rely on the use of pesticides or fumigation with chemicals.
When did the activity begin and what prompted its initiation?	In the 1980s. It was prompted by concerns about the safety and residue problems related to the use of chemical fumigants.
What are its specific goals and/or targets?	To find safe and effective post-harvest treatments for plant products.
Who is involved in carrying it out?	Various research laboratories such as State Departments and CSIRO are developing these methods. Actual treatments are carried out by commercial processors and exporters.
Is there a legal or regulatory mandate?	The use of these techniques may be incorporated in an agreed procedure between Australia and importing countries and enforced under the International Pant Protection Convention
Is the activity monitored or enforced? If so, how?	The use of these techniques is subject to checks and audits to ensure that they are working properly. In cases where the plant products are to be exported the procedures may be audited by Australian and other quarantine officials.
How are results and progress measured?	By the implementation of a satisfactory technique to replace chemical treatments.
What specific progress/results have been achieved?	Development of a range of disinfestation methods for wide range of fruit and vegetables based on the use of heat, cold and controlled atmosphere storage. This includes methods for tomatoes, mangoes, cucurbits, stone fruit, berries and apples.

Pesticide Reduction Activity
2. Reduction in pesticide use
2.9 Minimisation of pesticide use in the production of cotton.

Activity	Minimisation of the use of chemicals in the production of cotton. The Cotton Industry's reliance on chemicals for insect and mite control is a cause for concern due to the growing resistance of pests to commonly used chemicals, and because of the environmental implications of the accumulation of pesticides in waterways. A number of programs aimed at reducing pesticide use in the cotton industry are currently underway such as: • projects to examine the development of resistance to both insects and disease; • the development of kits to enable identification of pest species; • a three year project on IPM in rain-grown cotton; • genetic manipulation of natural plant defences for the control of *Veticillium* wilt — disease in cotton; • optimal early-season insect control strategy.
When did the activity begin and what prompted its initiation?	Various activities have been ongoing for several years.
What are its specific goals and/or targets?	To reduce the reliance of the cotton industry on the use of pesticides and to minimise the environmental impact of pesticides.
Who is involved in carrying it out?	The Cotton Research & Development Corporation, CSIRO, Land and Water Resources Research & Development Corporation.
Is there a legal or regulatory mandate?	Not applicable
Is the activity monitored or enforced? If so, how?	The activities are monitored by the various Research & Development Corporations and the Cotton Industry.
How are results and progress measured?	The successful reduction of reliance on pesticides and reduced pollution of waterways by pesticides.
What specific progress/results have been achieved?	The breeding of disease resistant strains of cotton has been very successful. CSIRO bred varieties now account for over 90% of Australia's cotton plantings.

Pesticide Reduction Activity

3. Regulations and education to increase safety

3.1 Education and training in safe pesticide use

3.1.1 Farmer education and training in pesticide use

Activity	Farmer Education & Training in Pesticide Use In Australia, farmer education and training occurs at two levels: • farmer awareness and extension programs run by State Departments of Agriculture, that focus on cost-effective pest and disease management, as well as safe use of pesticides; and • short, formal training courses on safe handling of pesticides, usually run by agricultural colleges, and developed in association with the State Departments of Agriculture and other relevant Government agencies, farmer organisations and the agricultural and veterinary chemical industry. Course modules on safe use of chemicals are usually also included in any other relevant short courses, e.g. courses on IPM. These training courses are now being co-ordinated and promoted by the National Farmers Federation under their Farm Chemical Users Course program.
When did the activity begin and what prompted its initiation?	This type of activity has been going on for a long time, but it really began in earnest in the late 1980's following trade problems experienced with organochlorine residues in Australian beef. This was associated with general community concern about pesticide residues in food and the general safety of agricultural chemicals. The National Farmers Federation became involved in the early 1990's, in response to a recognised need for a more co-ordinated and uniform national approach to farm chemical users courses.
What are its specific goals and/or targets?	To ensure the safe and effective use of pesticides on farms by improving farmer knowledge about their safe and correct use.
Who is involved in carrying it out?	State Departments of Agriculture, agricultural colleges, Technical and Further Education colleges, agricultural and veterinary chemical industry, and farmer organisations.
Is there a legal or regulatory mandate?	No - not applicable.
Is the activity monitored or enforced? If so, how?	The activity is not enforced. Progress is being watched closely by all involved agencies, to ensure that the programs are relevant and of practical use to farmers.
How are results and progress measured?	Number of people attending courses, change in farmer attitude to the use of farm chemicals and reduced frequency of residue detection. The program will be formally evaluated after an appropriate settling-in period.
What specific progress/results have been achieved?	The Farm Chemical Users Course, which is based on similar courses originally developed in Victoria and South Australia, has been completed by more than 3000 farmers, and there is evidence of enhanced farmer awareness of the need to use chemicals safely.

Pesticide Reduction Activity

3. Regulations and education to increase safety

3.1 Education and training in safe pesticide use

3.1.2 Education and training of commercial operators and retailers in safe handling and use of pesticides

Activity	Education & Training of Commercial Operators and Retailers in Safe Handling and Use of Pesticides. In recent years increasing emphasis has been placed on competency based training of commercial pest control operators including aerial agriculture operators and ground-based contract herbicide applicators. At the same time Avcare Limited, the body representing the major manufacturers of agricultural and veterinary chemicals in Australia has implemented an accreditation program for retailers, the Agsafe program, whereby chemical retailers and their staff are expected to complete an accredited training program, and member companies will not supply chemicals to retailers whose staff have not completed that program and whose premises do not meet approved standards. Training programs for commercial operators and retailers are usually run by approved course providers and developed in association with the relevant industry body, State departments of Agriculture, and the Agvet Chemical Industry. The main emphasis is on safe handling and application of agvet chemicals, and where appropriate, specific modules on particular aspects of use practices (e.g. IPM) are included in the course.
When did the activity begin and what prompted its initiation?	This type of activity began in earnest in the early 1990's following a significant reduction in the availability of Government extension services and subsequent recognition that commercial operators and retailers would in future be a major source of technical information to farmers and other users of agvet chemicals. This was associated with general community concern about pesticide residues in food and the general safety of agricultural chemicals.
What are its specific goals and/or targets?	To ensure the safe and effective use of pesticides by improving the knowledge of commercial operators about their safe handling and correct use.
Who is involved in carrying it out?	Agricultural colleges, Technical and Further Education colleges and other approved course providers, State Departments of Agriculture, agricultural and veterinary chemical industry, and relevant industry organisations.
Is there a legal or regulatory mandate?	No - not applicable.

Is the activity monitored or enforced? If so, how?	In the case of licensed pest control operators and aerial agriculture operators, attendance at an approved training course is usually a necessary prerequisite for acquiring a licence to operate. In the case of retailers, supplies of chemicals are not available from Avcare members unless an accredited course has been completed by staff and the premises meets approved standards.
How are results and progress measured?	Number of people attending courses, and change in operator attitude to the use of farm chemicals. Number of retailers refused supply because of inadequate standards.
What specific progress/results have been achieved?	Training of licensed pest control operators has only recently started. The original course was developed in Victoria and is being used as a model for similar courses in other States. The Avcare program has also started recently, but already more than 1000 premises have been accredited and there has been a noticeable improvement in the standard of Avcare approved retailers.

Pesticide Reduction Activity
3 Regulations and education to increase safety
3.2 Licensing of commercial operators

Activity	Licensing of commercial operators All States and Territories in Australia regulate aerial spraying by licensing of pilots and most States/Territories also licence commercial ground spraying contractors working in farming industries. In some States, licensed pest control operators, licensed by the Health Department to apply termiticides to building sites, are also licensed to apply pesticides in farming situations. There are State differences in the training and examination requirements for obtaining a licence. A recent review of agricultural spray drift has recommended that steps be taken to achieve uniform regulation of both aerial and ground application of pesticides across Australia, uniform licensing of commercial operators and a national code of practice for the application of agricultural chemicals.
When did the activity begin and what prompted its initiation?	This activity has been in operation for many years, and was initiated by the recognition that commercial pest control operators and aerial spraying contractors needed to be regulated.
What are its specific goals and/or targets?	To ensure that pesticides applied by commercial operators are applied in the approved manner, and for the purposes for which they were intended.
Who is involved in carrying it out?	There are State differences in terms of which agency issues the licences. In some cases it is the State Department responsible for agriculture, in others it is the State Health Department. Agricultural pilots must be licensed by the Civil Aviation Authority (Commonwealth) and have an agricultural pilots rating.
Is there a legal or regulatory mandate?	Yes - varies from State to State.
Is the activity monitored or enforced? If so, how?	Yes - aerial spraying is tightly controlled, with operators required to submit monthly job sheets to the relevant agency. Complaints about inappropriate spraying activity and spray drift are investigated and appropriate action taken. Similar controls are applied to ground spraying operators in some States.
How are results and progress measured?	Number of complaints about operators investigated.
What specific progress/results have been achieved?	It has been recognised that there is a need for better training of licensed pest control operators, aerial spraying contractors and ground spraying contractors. Steps are being taken to achieve that. There is also a need for more uniform regulation across the country.

Pesticide Reduction Activity
3. Regulations and education to increase safety
3.3 Improvements in pesticide labelling

Activity	Improvements in pesticide labelling Labelling requirements are constantly under review. At present there are separate labelling codes in place for agricultural and veterinary chemical products. These are being reviewed with a view to making labels easier to read and follow. There is presently a move towards designing more specific labelling codes for the different types of chemical products.
When did the activity begin and what prompted its initiation?	This activity has been on-going for many years. It was prompted by complaints from users of pesticides that instructions on labels were too hard to read and follow. A number of studies on the effectiveness of labels in terms of getting a message across have raised doubts about the effectiveness, for example, of current health and safety warnings/directions, etc.
What are its specific goals and/or targets?	To improve the comprehensibility of labels to ensure better compliance with directions for use. To design labelling codes which are more specific to the class of chemical concerned thus leading to greater clarity of expression.
Who is involved in carrying it out?	National Registration Authority for Agricultural and Veterinary Chemicals.
Is there a legal or regulatory mandate?	The labelling codes are not legally enforceable but in practice compliance with the code is a condition of registration. There is provision in the Agricultural and Veterinary Chemicals Code Act 1994 for the labelling codes to be incorporated into the Regulations. Good compliance with the codes as they stand has meant that this has not been necessary in the past.
Is the activity monitored or enforced? If so, how?	All labels must be approved before a product can be registered and are examined in the context of the Labelling Code at this stage. The NRA compliance program ensures that only labels that are approved are being used in the marketplace.
How are results and progress measured?	Progress can be measured by the number of recorded instances of misuse due to a lack of understanding the product label, or consumer complaints about the clarity of labels.
What specific progress/results have been achieved?	There has been a high level of compliance with the Labelling Codes to date. More specific codes for different classes of chemicals are currently being developed.

Pesticide Reduction Activity

3. Regulations and education to increase safety

3.4 Use restrictions on aerial spraying

Activity	Restrictions on aerial application. All States impose restrictions on aerial spraying in order to minimise drift onto non-target areas and crops. The restrictions vary from State to State, but in most cases they include "buffer zones" between target and specific non-target areas; "exclusion zones" or "chemical control areas" where restrictions are put on specific chemicals and operators are expected to take additional care to ensure that drift does not occur in particularly sensitive areas.
When did the activity begin and what prompted its initiation?	This activity began many years ago in response to community concerns about spray drift.
What are its specific goals and/or targets?	To minimise damage and community concern caused by aerial spray drift.
Who is involved in carrying it out?	Varies from State to State. In most cases, responsibility rests with the State Departments responsible for agriculture, although in some cases, Health Departments are involved. State Environment Protection Agencies also get involved when spray drift causes environmental damage.
Is there a legal or regulatory mandate?	Yes, although it varies from State to State.
Is the activity monitored or enforced? If so, how?	This activity is enforced through the legislation in each State. In most cases, operators must complete job sheets for each job and forward them to relevant authorities on a regular basis. Complaints about aerial spraying activity in control areas and aerial spray drift are investigated by relevant State authorities. Operators are required to carry insurance policies and premiums are influenced by the number of claims made against the policy.
How are results and progress measured?	Progress can be measured by the number of complaints made by the community.
What specific progress/results have been achieved?	Community concern about aerial spraying and spray drift prompted the former Co-ordinating Committee on Agricultural Chemicals (CCAC) to conduct a review of problems associated with aerial spray drift. The report has recommended a more uniform national approach to the regulation of aerial spraying and the development of a national code of practice for application of agricultural chemicals. The Environment Protection Authority of Victoria (EPAV) has taken a tougher stance on of-target damage and contamination following aerial spraying operations.

Pesticide Reduction Activity
3. Regulations and education to increase safety
3.4 Use restrictions on aerial spraying
3.4.1 Draft code of practice on loading and wash-down of aircraft used in aerial spraying

Activity	Draft code of practice on loading and wash-down of aircraft used in aerial spraying The Environment Protection Authority in Victoria (EPAV) has developed a draft code of practice for the management of pesticide waste resulting from loading and wash-down of aircraft used for aerial spraying.
When did the activity begin and what prompted its initiation?	1988. Complaints about site contamination, runoff of contaminated water and general complaints about other aspects of the aerial spraying industry focused EPAV's attention on the aircraft loading and wash-down procedures.
What are its specific goals and/or targets?	To control the off-site discharges of pesticides from aeroplane loading and wash-down facilities located at aerodromes.
Who is involved in carrying it out?	EPAV, Department of Agriculture, Department of Conservation and Natural Resources, Aerial Agricultural Association of Australia Ltd.
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	EPAV do not intend to use the Code as an enforcement tool. However EPAV inspects aerodromes and if potential to pollute was found, enforcement action would most likely be taken.
How are results and progress measured?	Adoption of the Code once it is finalised.
What specific progress/results have been achieved?	A draft code has been prepared and circulated to the aerial spraying industry. A number of aerodromes servicing aerial sprayers have improved loading and wash-down procedures. EPAV believes there has been general improvement in loading and wash-down procedures.

Pesticide Reduction Activity
3 Regulations and education to increase safety
3.5 Regulation of pesticide distribution

Activity	Regulation of pesticide distribution Pesticide distribution in Australia is presently regulated under relevant State agricultural and veterinary chemicals legislation. However, with the introduction of the National Registration Scheme, at the end of this year, the manufacture and distribution of pesticides up to the point of retail sale will be regulated under that Scheme. A National Compliance Program is being developed to ensure compliance with the requirements of the Agricultural and Veterinary Chemicals Code Act 1994.
When did the activity begin and what prompted its initiation?	Pesticide distribution has always been a State responsibility since the introduction of State registration schemes. The National Registration Scheme and its associated compliance program is expected to commence on 1 January 1995. The program will ensure that products being sold are registered and all conditions of registration and labelling are complied with. The compliance program was initiated as part of the National Registration Scheme and recognises the need to rationalise seven different State compliance programs into one national program.
What are its specific goals and/or targets?	The program is designed to support the evaluation and registration process with a cost effective compliance program which monitors the continued compliance with standards for safety and quality of agricultural and veterinary chemical products available to the community.
Who is involved in carrying it out?	National Registration Authority, in co-operation with State agricultural and veterinary chemical regulatory authorities.
Is there a legal or regulatory mandate?	Yes - the Agricultural and Veterinary Chemicals Code Act 1994.
Is the activity monitored or enforced? If so, how?	The compliance program will be continually monitored and modified if necessary to ensure its effectiveness.
How are results and progress measured?	The extent of compliance with the Agricultural and Veterinary Chemicals Code Act 1994
What specific progress/results have been achieved?	The National Registration Scheme and the National Compliance Program are expected to commence on 1 January 1995. Existing State compliance programs have achieved effective regulation of the distribution of agricultural and veterinary chemicals, with very few instances of non-compliance.

Pesticide Reduction Activity

4. Promotion of alternative strategies

4.1 Promotion of “clean food” production, IPM and organic farming

Activity	Promotion of agricultural production systems with reduced chemical input Since the late 80's, Australia has actively promoted agricultural production systems with reduced chemical input. There have been several different approaches, but the common aim has been to produce food and other forms of agricultural produce which is of high quality and which meets MRL standards, or which can be guaranteed free of chemical residues. Examples include: • the "clean agriculture" program; • promotion of integrated pest management; • promotion of organic farming.
When did the activity begin and what prompted its initiation?	The activity began in the late 80's in response to general consumer concern about the presence of pesticide residues in or on food, the potential threat of residue violations to export markets, and a growing interest in sustainable agriculture.
What are its specific goals and/or targets?	To produce food and other forms of agricultural produce which is of high quality and which meets MRL standards, or which can be guaranteed free of chemical residues
Who is involved in carrying it out?	State Departments responsible for agriculture, Industry research and development corporations, producer organisations, organic farming associations. The various organic farming organisations (National Association for Sustainable Agriculture Australia, the Biological Farmers of Australia and the Biodynamic producers association) have recognised certification schemes which allow organic growers to label their products accordingly.
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	The various activities are monitored and co-ordinated by the National Clean Agriculture Working Group.
How are results and progress measured?	The residue status of Australian agricultural produce is monitored by a number of residue surveys such as the National Residue Survey, the Australian Market Basket Residue Survey, and State surveys of produce. The number of producers adopting IPM programs. The number of growers seeking organically-grown certification.
What specific progress/results have been achieved	A very high level of compliance with MRL standards, e.g. the latest Market Basket Survey found that all estimated dietary intakes of pesticides and contaminants were well within internationally safe limits set by the World Health Organisation. The use of IPM has been embraced by the Apple and Pear Growers Association, the Cotton Industry, the Citrus Industry, the Potato Industry and others. There is growing consumer demand for certified organic produce, and the number of certified growers is increasing.

Pesticide Reduction Activity

4. Promotion of alternative strategies

4.1.1. Development of a National Standard for Organic and Biodynamic Produce

Activity	National Standard for Organic and Biodynamic Produce In 1993, Australia introduced a National Standard for Organic and Biodynamic Produce to ensure that food labelled as "organic" was produced under an approved organic production system using farm inputs such as fertilisers and pesticides that are regarded as "natural" by recognised organic farming authorities. The standard lists approved "natural" chemical inputs.
When did the activity begin and what prompted its initiation?	The Standard was introduced in 1992, partly in response to consumer demand for such a Standard, and also to ensure that exported organic produce met standards set by importing countries.
What are its specific goals and/or targets?	To ensure that food labelled as "organic" is produced under an approved organic production system using farm inputs such as fertilisers and pesticides that are regarded as 'natural' by recognised organic farming authorities, and to ensure that Australian standards for organic food match those of our trading partners.
Who is involved in carrying it out?	The Standard was developed by the Department of Primary Industries and Energy and is incorporated into national food standards set by the National Food Authority. The Standard is enforced under State regulations relating to food standards. Exported organic produce must meet the Standard in order to meet Australian Quarantine and Inspection Service requirements for exported "organic" produce.
Is there a legal or regulatory mandate?	Yes. The Standard is incorporated into National Food Standards set by the National Food Authority.
Is the activity monitored or enforced? If so, how?	Yes - food labelled as "organic" must not contain residues of any chemicals not approved under the Standard. The NASAA inspection program, for example, ensures that organic growers are encouraged to meet the Standard.
How are results and progress measured?	Residue monitoring programs will detect whether organic growers are using unapproved chemicals. Consumer satisfaction with organic produce.
What specific progress/results have been achieved?	The Standard has been introduced and adopted by organic producer organisations. Growers generally use only those chemical inputs approved by the Standard.

Pesticide Risk reduction activity
4. Promotion of alternative strategies
4.2 Development of networks

Activity	Development of networks. Several networks have been developed in Australia to provide information to and support producers who choose to adopt alternative systems of farming. These networks include: • the Clean Food Network; • the National Association of Sustainable Agriculture Australia; • the Biodynamic Farming and Gardening Association of Australia; • Biological Farmers of Australia; • the permaculture network; • various local organic growers associations; • industry associations which promote IPM (apple and pear growers, citrus and cotton growers, etc.).
When did the activity begin and what prompted its initiation?	The networks have been in place for some time. They were prompted by the growing demand for information about alternative farming systems.
What are its specific goals and/or targets?	To provide information and support to producers who choose to adopt alternative farming systems.
Who is involved in carrying it out?	Mostly producer organisations. The Clean Food network is essentially a Government initiative.
Is there a legal or regulatory mandate?	No - not applicable
Is the activity monitored or enforced? If so, how?	No - not applicable.
How are results and progress measured?	Growth in popularity. Member satisfaction with information and support provided.
What specific progress/results have been achieved?	Membership of the various networks continues to grow. Experience suggests that the various networks provide a valuable contribution to the successful adoption of alternative farming systems.

Pesticide Risk Reduction Activity

5 Economic incentives

5.1 Subsidy programs to encourage adoption

Activity	Subsidy programs to encourage adoption Most if not all of the activities mentioned above are subsidised by Government funding to some extent. The National Registration Scheme for Agricultural and Veterinary Chemicals will become fully industry funded in 1995. However all research, educational, extension and other control-of-use programs are at least partly funded by Government.
When did the activity begin and what prompted its initiation?	Government subsidies have been provided for all activities since their commencement. The funding was prompted by Government realisation that it had a responsibility to ensure and promote the safe, effective and responsible use of pesticides.
What are its specific goals and/or targets?	To ensure and promote the safe, effective and responsible use of pesticides.
Who is involved in carrying it out?	Both Commonwealth and State Governments
Is there a legal or regulatory mandate?	Funding is controlled by various Commonwealth and State legislation.
Is the activity monitored or enforced? If so, how?	No - not applicable.
How are results and progress measured?	All government funding is subjected to normal provisions of accountability and evaluation.
What specific progress/results have been achieved?	A national registration scheme and associated programs are about to be introduced Wide ranging State control-of-use programs are in place. Wide ranging research programs have been carried out into various pesticide risk reduction techniques, alternative control measures such as biological control, IPM, improved spray application technology, etc.

Pesticide Risk Reduction Activity
5 Economic incentives
5.2 Marketing programs

Activity	Marketing programs Two major marketing programs are in place to market pesticide free produce or produce which meets agreed MRL standards. These include the Government sponsored "Clean Food" program and the marketing of certified organically grown produce.
When did the activity begin and what prompted its initiation?	Both programs were initiated in the late 80's in response to consumer demand for high quality produce free of pesticide residues.
What are its specific goals and/or targets?	To provide consumers with high quality food with no harmful pesticide residues.
Who is involved in carrying it out?	Government, producer organisations, organic farming organisations.
Is there a legal or regulatory mandate?	No - not applicable
Is the activity monitored or enforced? If so, how?	Market surveys are used to monitor consumer reaction to the programs and satisfaction with the produce.
How are results and progress measured?	As above.
What specific progress/results have been achieved?	The "Clean Food" program has given consumers confidence in the quality of the produce they buy. The demand for certified organically grown produce is growing.

Pesticide Risk Reduction Activity
5 Economic incentives
5.3 Levies

Activity	Levies. Sales of agricultural and veterinary chemicals are levied to provide funding for the National Registration Scheme. The scheme is also funded by an initial registration fee and annual re-registration fees.
When did the activity begin and what prompted its initiation?	The collection of initial registration fees commenced in 1993. Levies on sales will commence this year.
What are its specific goals and/or targets?	To fund the operation of the National Registration Scheme.
Who is involved in carrying it out?	Commonwealth Government
Is there a legal or regulatory mandate?	Yes - the Agricultural and Veterinary Chemicals Code Act 1994 and the Agricultural and Veterinary Chemical Products (Collection of Levy) Act 1994.
Is the activity monitored or enforced? If so, how?	Yes - through legislation. The program will be constantly monitored.
How are results and progress measured?	Successful funding of the NRA.
What specific progress/results have been achieved?	Yet to be fully implemented.

III. Conclusions

3.1 Which activities have been most successful? What are the reasons for their success?

The concept of a nationally co-ordinated approach to pesticide risk reduction activities is relatively new to Australia. Although there has been a lot of activity in this area, much of this work has not been well co-ordinated. While most of these activities have been successful in terms of meeting their own objectives, it is difficult to assess them in terms of their overall impact on pesticide risk reduction in Australia.

Nevertheless three groups of activities appear to have potential for success in this regard. They are:

(a) The National Registration Scheme for agricultural and veterinary chemicals and the associated Existing Chemical Review Program

The National Registration Scheme will bring together seven different State registration schemes under one national chemical evaluation and registration scheme, which will be equal to the best in the world. The primary objective of this scheme is to ensure that the risks to human, the environment and to target plants and animals, associated with the use of agricultural and veterinary chemicals are as low as they possibly can be.

The Existing Chemicals Review Program is an important part of that scheme, which will see either the withdrawal, or restrictions imposed on the use of, any chemicals deemed to pose an unacceptable risk to either humans, target plants or animals, or the environment.

(b) The development and adoption of integrated pest management programs aimed at improving pest and disease management, while reducing dependence on chemical pesticides.

Integrated pest management programs have now been successfully developed for and adopted in a number of crop industries, such as the citrus, pome fruit, potato and cotton industries. They all incorporate the use of biological control agents, the use of insect and disease resistant varieties, the use of agronomic practices to minimise exposure to pests and diseases, insect population monitoring programs to determine when pesticides need to be used, the use of pesticides only when necessary and the use of 'softer' alternative pesticides where possible. In most cases computer programs are available to assist decision making and farmers are encouraged to participate in training programs aimed at helping them develop the management skills necessary for the successful adoption of an integrated approach to pest and disease management. Follow-up support services are a necessary component of the program.

These programs have been successful because of a high degree of co-operation between research agencies, farmers and industry bodies, the availability of industry funding for research, extension and education programs, and a high degree of commitment on the part of growers and their industry bodies.

(c) Education programs and associated accreditation programs aimed at changing user attitudes to chemical use.

These programs are primarily aimed at three main target audiences - farmer users of agricultural and veterinary chemicals, professional operators such as licensed pest control operators and retailers. The prime objective is to encourage the adoption of correct and responsible use, storage and handling of pesticides.

These programs are now being co-ordinated at national level and although attendance is not always compulsory, the introduction of professional and trade accreditation programs is putting pressure on retailers and professional operators to complete these courses. The National Farmers Federation Farm Chemical Users Courses are particularly well attended by farmers.

The Farm Chemical Users Courses have been successful to date because of their practical nature and the ability of course facilitators to run the courses in such a way that farmers can learn at their own pace in a non-threatening environment. There is some anecdotal evidence that they have had a positive impact on farmers attitudes to farm chemical safety, although their overall impact on pesticide risk reduction has yet to be evaluated.

Much the same applies to the accreditation programs run for professional operators and the Farmsafe accreditation program run for retailers by the Agvet Chemical Industry.

3.2 Which activities have been least successful or presented the most difficulties? What are the reasons for these difficulties?

Again, for the reasons outlined in 3.1, it is difficult to identify the least successful activity in terms of “pesticide risk reduction”.

However, there is one activity introduced for environmental reasons which has been identified as leading to increased pesticide use:

(a) Minimum cultivation techniques

The introduction of minimum cultivation techniques to minimise soil structure decline and reduce soil erosion in cropping areas of Australia has resulted in a significant increase in the use of herbicides in Australian cereal cropping systems, and the development of a herbicide-resistant weed population.

If anything, this highlights the trade-offs that may need to be made to pursue environmental objectives - a balance has to be struck between the benefits and the disadvantages of pesticide use.

(b) Other factors likely to inhibit success.

The key factors likely to inhibit success of any activity are lack of user commitment and co-operation, insufficient or incomplete research into alternative methodology (largely because of insufficient funding), poor promotion of the concept and inadequate training of users (e.g. failure to recognise the need for training in managerial skills as well as

technological skills), and inadequate follow-up support for users once the program is under way.

3.3 What successes and difficulties have you encountered in measuring the progress/results of the activities?

Major difficulties include:

(a) the lack of a well defined national policy on pesticide risk reduction with well defined objectives and hence the lack of well defined parameters on which to base any assessment.

(b) the lack of baseline data - as mentioned earlier, it is very difficult to get useful data on agricultural and veterinary chemical use in Australia.

(c) difficulty in assessing the impact of pesticide risk reduction activities on actual risk reduction (i.e. to human health and the environment)

3.4 How have other policies or programmes in your country affected the outcome of the pesticide risk/use reduction activities?

Some minor legislative problems we have encountered include:

(a) Legislation in some States which makes it illegal to use pesticides contrary to label directions, including rates lower than those detailed on the label. In some cases this can act as a deterrent to the use of lower rates when appropriate, although in practice, most experienced users will have no hesitation in using lower application rates if they think it appropriate.

(b) Some State Departments of Agriculture still issue spray calendars which promote/encourage set or regular spraying routines whether they are needed or not. While following these guidelines is not a legal requirement, the calendars do give the wrong message.

Other problems relate to prevailing consumer preferences for unblemished produce, which has lead to the use of grading programs which reject even slightly blemished or dimpled fruit.

A beneficial policy has been the withdrawal of the legislative need to wax pome fruit in some States and reduced use of cosmetic sprays.

3.5 What projects at the international level would help your country achieve further progress insecticide risk and use reduction?

The main types of international activity which would help Australia with its pesticide risk reduction program include:

(a) Continued promotion of such programs from the OECD. The request for this questionnaire, for example, has given impetus to the development of a national pesticide risk reduction program in Australia and should ensure its future

implementation. It should also result in more effective co-ordination and direction of the activities listed above.

(b) Publishing details of successful activities carried out in other countries - this would allow Australia to draw on the experiences of other countries and select those activities that may be most suited to our particular needs.

ANNEX A

LEGISLATION RELEVANT TO PESTICIDE RISK REDUCTION ACTIVITIES AS AT OCTOBER 1994

(a) Commonwealth legislation

Agricultural and Veterinary Chemicals Act 1994
Agricultural and Veterinary Chemicals Code Act 1994
Agricultural and Veterinary Chemicals (Consequential Amendments) Act 1994
Agricultural and Veterinary Chemical Products (Collection of Levy) Act 1994
Agricultural and Veterinary Chemical Products Levy Imposition (Excise) Act 1994
Agricultural and Veterinary Chemical Products Levy Imposition (Customs) Act 1994
Agricultural and Veterinary Chemical Products Levy Imposition (General) Act 1994

The following Regulations were developed and gazetted during the year:

Agricultural and Veterinary Chemicals Regulations (Amendment)
Agricultural and Veterinary Chemical Products (Collection of Interim Levy) Regulations
Agricultural and Veterinary Chemicals Code Regulations.

(b) State Legislation

Victoria

Animal Preparations Act 1987
Animal Preparations Regulations 1988
Fertilizers Act 1974
Fertilizers Regulations 1975
Agricultural Chemicals Act 1958
Pesticides Regulations 1976
Agricultural and Veterinary Chemicals Act 1992

Tasmania

Pesticides Act 1968
Pesticides Regulations 1969
Veterinary Medicines Act 1987
Veterinary Medicines Regulations 1987

New South Wales

Pesticides and Allied Chemicals Act 1978
Pesticides Regulation 1979
Pesticides Act 1978
Stock Medicines Act 1989
Stock Medicines Act 1989 Regulation
Statute Law (Miscellaneous Provisions) Act (No. 2) 1990
Poisons Act 1966

Poisons Regulations under the Poisons Act 1966
Food Act 1989
Regulation - Pure Food Act 1908

Northern Territory

Poisons and Dangerous Drugs Act 1987
Poisons and Dangerous Drugs Regulations 1985
Food Act 1986
Food (Interim Provisions) Regulations 1980
Stock Diseases Act 1988
Stock Diseases Regulations 1982
Therapeutic Goods and Cosmetics Act 1986

Queensland

Agricultural Chemicals Distribution Control Act 1966-1983
Agricultural Chemicals Distribution Control Act Regulations
Chemical Usage (Agricultural and Veterinary) Control Act 1988]
Chemical Usage 1989
Agricultural Standards Act 1952-1981
Agricultural Standards Regulations 1984

Western Australia

Veterinary Preparations and Animal Feeding Stuffs 1976
Health Act 1911
Health (Pesticides) Regulations 1956

South Australia

Agricultural Chemicals Act 1955-1975
The Agricultural Chemicals regulations 1962-1977
Stock Medicines Act 1939-1956
Stock Medicines Regulations 1977

Australian Capital Territory

Pesticides Act 1989
Poisons Act 1933
Dangerous Goods Act 1984

AUSTRIA

I. Framework for Pesticide Risk Reduction Activities

In Austria a number of activities and measures are taken, both on national and regional level, to reduce the risks of pesticides. The environmental aspect, which is of great importance in Austria, has been given even more attention recently, because of public pressure partly because of problems arising in connection with the concentration of some pesticide ingredients in the ground water, and mainly because of Austria's reorientation towards an “ecosocial agricultural policy”.

In accordance with the ministries competent for pesticides - mostly under the leadership of the Federal Ministry of Agriculture and Forestry - acts and regulations were passed containing very strict and restrictive provisions. Secondly, incentives were created, in particular in the form of subsidies by the Federal Ministry of Agriculture and Forestry, which directly or indirectly aim at optimizing the application and minimizing the risk of pesticides, and which enable farmers to co-operate in the spirit of the above acts and regulations, and produce under ecological conditions.

In order to minimize the risk of pesticides Austria does not pursue a general programme, but takes numerous measures and regulations from various legal fields, which are supported by accompanying measures (measure-mix).

It is also generally agreed that chemical plant protection cannot be completely dispensed with.

Legal Measures

- Act on pesticides - PMG 1990 (Federal Law Gazette No. 470 / 1990)
  Regulation on active substances (FLG No. 626 / 1992)

- Act on chemicals - ChemG 1987.
  Regulation on the prohibition of certain dangerous substances in pesticides (Federal Law Gazette No. 36 / 1992)

- Amendment to the act on water rights 1990:
  Regulation on groundwater threshold (FLW No. 502 / 1991)
  Regulation on water quality survey /FLG No. 338 / 1991)

- Food Act - LMG 1975:

  Regulation on pesticides in drinking water (FLG No. 448 / 1991)
  Regulation on maximum values for pesticides (FLG No. 649 / 1988)

- Act on plant protection equipment (draft)

Other Measures and Activities:

Incentives and financial support by the Federal Ministry of Agriculture and Forestry

- Establishment of integrated plant protection;

- Use of warning systems to determine a potentially necessary or exact application of pesticides;

- Supply and breeding of healthy plant material;

- Promotion of extension, information, and of working parties, which deal with integrated plant protection;

- Grants for the inspection of sprayers;

- Use of EDP software systems (e.g., Herbasys);

- Austrian programme to promote an environmentally sound, extensive agriculture, which protects the natural living space according to EU Regulation 2078 / 92;

- Compensation payments for the setting-aside of arable land in cases where the use of pesticides is prohibited;

- Enhancement of the use of beneficial organisms; and

- Research.

II. Description of Activities

- Act on pesticides - PMG 1990

The 1990 act on pesticides took effect on July 1, 1991. It governs the commercialization and approval of pesticides. In the assessment in the course of the approving procedure the effects upon the environment are increasingly considered. Approval is limited to a maximum of ten years.

Pesticides approved in line with the former 1948 act on pesticides are either eliminated after a transitional period or require new approval according to the most recent scientific findings. The execution of the act lies with the Federal Ministry of Agriculture and Forestry. Monitoring and control of the observance of the provisions lies with the "Official Pesticide Control" (Bundesamt und Forschungzentrum für Land-wirtschoft), which is subordinate to the Federal Ministry of Agriculture and Forestry.

Results:

As a consequence of the strict conditions for the approval of pesticides, from the middle of 1991, the number of chemical preparations approved was drastically reduced (see Table 1). Only a herbicide for maize, a dressing agent, and a wild repellent were approved as new preparations in 1993. Under consideration of the regulation on the prohibition of certain dangerous substances in pesticides (Federal Law Gazette No. 97/1992) in line with the 1987 act on chemicals, at the end of 1993 only 930 preparations were marketable. By virtue of the regulation on active substances (FLG 626 / 1992), which stipulates a reassessment of the approved preparations according to the most recent scientific findings (renewal of approvals), a further drastic reduction in number and thus in the choice of pesticides can be anticipated. For many indications in small sized cultivations (e.g. small alternative cultivations, vegetables) pesticides are no longer approved.

For the years 1991, 1992, and 1993 there are statistics on active substances available, which are based on the act on pesticides (see Table 2). A comparison of the quantities of active substances in individual groups of preparations shows that herbicides account for the largest proportion of the total pesticide quantity marketed. Fungicides represent the second important group. The comparisons of the years 1991 and 1993 show an overall reduction in the use of pesticides by 503 tons or 11.2 per cent.

At present, some 270 different active substances are marketed. The total quantity of substances applied is useful for annual comparisons in a specific country, to see basic trends. However, as a parameter for the total contamination of the environment and the danger for humans it is of limited value only, because the substances vary widely as to their potential hazard since different substances are summed up. Comparisons with other countries are also problematic, since climatic and soil conditions vary, the spectrum of substances is not identical, and the survey procedure differs with the legal basis.

Table 1

Number of Pesticides Approved (by the end of the respective year)

Year	Number of pesticides approved	Difference compared with previous year
1983	*1. 730*	+ 14
1984	1. 765	+ 35
1985	1. 827	+ 62
1986	1. 890	+ 63
1987	1. 912	+ 22
1988	1. 918	+ 6
1989	1. 914	- 4
1990	1. 910	- 4
1991	1. 194	-716
1992	1. 036	-158
1993	978	- 58

Source: Federal Ministry of Agriculture and Forestry

Table 2

Quantities of Active Substances In Pesticides Commercialized within the Scope of the 1990 PMG (Statistics 1991 / 92 / 93)

Group of Preparations		Pesticide Quantities in tons			Difference between 1991 and 1993 in tons
		1991	1992	1993	zw.93 u.91
1.	Herbicides	2.165,82	1.825,49	1.873,09	- 292,73
2.	Fungicides (incl. bactericides and seed treatment)	1.842,76	1.488,83	1.579,66	- 263,10
3.	Mineral oils and paraffin oils	275,34	331,64	325,11	+ 49,77
4.	Insecticides (include. acaricides, molluscicides, and synergists)	156,94	413,36	140,63	- 16,31
5.	Growth regulators	43,56	74,53	63,54	+ 19,98
6.	Rodenticides	1,02	4,66	0,48	- 0,54
7.	Other	0,99	0,87	0,84	- 0,15
Total		4.486,43	3.869,38	3.983,35	- 503,08

Source: Federal Ministry of Agriculture and Forestry

- Act on Chemicals - 1987

The regulation on the prohibition of dangerous substances in pesticides, Fed. Law Gazette No. 97 / 1992, became effective on February 20, 1992 (for some substances, such as atrazine only one year later). By means of bans or restriction of the use of some 90 pesticides various hazardous substances were withdrawn from circulation.

- Amendment to the Act On Water Rights, 1990

Austrian water rights are based on the objective to avert pollution from all waters including groundwater to such an extent that groundwater can be used as drinking water.

The use of pesticides in water protection zones is subject to considerable restrictions or prohibited.

The regulation on water quality survey (Fed. Law Gazette No. 338 / 1991) became effective in 1991. Since monitoring of pollution in groundwater and in running waters is required throughout Austria. At present the observation grid comprises already 1500 of the planned 2050 groundwater surveying spots. In case of running waters a monitoring network comprising 243 surveying spots, is already being established. The objective is to the determine and describe water quality through chains of surveying spots installed at running waters according to priorities or by means of a wide-meshed-grid in case of groundwater. This is to recognise regional trends of water quality over the medium term, in order to counteract in time any negative trends or, if mitigation measures are imposed, to observe progress and success of such measures. In the course of the water quality survey the herbicidal agents of the triazine and phneoxyalkon carboxylic acids as well as alachlorine and metachlorine are analyzed. First results show that Atrazine, which meanwhile has been prohibited in Austria, and its metabolites pose the main problems (see Table 3 in the Attachment).

The regulation on groundwater threshold (Fed. Law Gazette No. 502 / 91) became effective in 1991 and lays down threshold values for those substances — including pesticide ingredients — which may make groundwater unsuitable for drinking or requiring extensive or lengthy restoration efforts.

If, in a groundwater area the threshold values are exceeded for an extended period of time, this area has to be indicated as sanitation area and adequate measures have to be taken.

- 1975 Food Act

The regulation on pesticides in drinking water came into force on August 20, 1991. This prohibits the circulation of drinking water which contains pesticide levels above a limit set in a “phase plan”. Operators of drinking water supply plants are obliged to have the drinking water examined for specific pesticides.

The regulation on maximum values for pesticides came into force in 1988. It states maximum residue levels of pesticide ingredients in food.

- Act on Plant Protection Equipment

For the economic and environmentally-friendly application of chemical pesticides, the function and operation of equipment is of decisive importance. Sale of new plant protection equipment is regulated by a type test at federal level. The respective act is presently in the draft stage. Periodic checks of plant protection equipment in use shall be regulated by the individual federal provinces.

- Use of Warning Systems

The Federal Ministry of Agriculture and Forestry supports the installation of climate observation systems to estimate more precisely the pressure of past infestation. Depending on the crop this causes a reduction of chemical pesticides up to 50 percent. Gouging stations are erected in the cultivation area, which measure various environmental data such as temperature, atmospheric humidity, precipitation quantities and leaf wetness. The data are collected every 15 minutes, transmitted to a central computer and processed. The communication with the computer is via radio transmission. Individual computers can contact each other by modem so that with an adequate network an entire region can be monitored.

From the available data, detailed recommendations for plant protection as well as warnings can be given if the risk of a disease exists. The precise data of the micro-climate presently permit among others the reliable warning in case of powdery or downy mildew, brown rot, and gray mould.

- Supply and Breeding of Healthy Plant Material

The examination of plant material for the freedom from specific diseases and pests is an important precaution in integrated plant protection. Laboratories to test for viruses, micoplasmoses as well as pest infestation were financially supported in Austria in recent years and established in some federal provinces.

- Inspection of Plant Protection Equipment

The repeated inspection of plant protection equipment in use is financially supported in Austria.

- Austrian Programme to Promote an Environmentally Sound, Extensive Agriculture, Which Protects the Natural Living Space according to EU Regulation 2078 / 92

In 1992 the EU passed a regulation stipulating environmentally sound agricultural production methods protecting the natural living space. The measures provided for in this regulation are supposed to encourage production practices compatible with the requirements of environmental protection and the preservation of the natural living space and to contribute to the balance in the markets. Income losses of the farmers caused by the production decline and the increase of production costs shall be compensated.

At present there are a series of measures at federal and provincial level which are similar to those of the EU regulation and which give incentive to farmers to apply

environmentally sound production methods. Among these are programmes to promote biological farming. (In Austria there are presently some 15,000 biological farms, i.e. farms which among others things do not use any synthetic chemicals. This is unique in Europe, and is due to the considerable support by the Federal Ministry of Agriculture and Forestry. In addition, ecological projects, projects to reduce intensity, etc. are also being implemented.

Austria's accession to the EU requires the adjustment and further development of many support measures to regulation 2078 / 92. The programme is carried in the whole territory in line with the EU regulation. Within the framework of the catalogue of measures valid for the whole territory the federal provinces elaborate area-specific programmes. In principle there is an obligation to participate for 5 years. If farmland is set aside within the framework of agro-ecological projects, the period is 20 years. The major contents of the Austrian project are the following:

- Conversion of the whole farm to biological and other extensive forms of farming and its continuation,
    - ◊ promotion of biological farming
    - ◊ renouncement of certain yield-increasing inputs (renouncement of freely soluble commercial fertilizers and chemical plant protection on all farmland; in crop areas no chemical / synthetic pesticides can be applied, on grassland no chemical plant protection covering the whole area is allowed;
    - ◊ renouncement of intensification in grassland farming
    - ◊ observance of Guidelines for integrated vegetable growing (on vegetable growing farms);
    - ◊ observance of the guidelines for integrated fruit growing (on fruit growing farms);
    - ◊ use of beneficial organisms and renouncement of herbicides in horticultural areas;

- Extensive farming related to individual areas:
    - ◊ observance of land planting in crop farming
    - ◊ cultivation of low-yielding resistant or tolerant grain varieties adapted to the site
    - ◊ renunciation of CCC-agents and fungicides

- Extensive utilisation of grassland related to individual areas
    - ◊ renunciation of freely soluble commercial fertilizers and chemical plant protection covering the whole area

- Special landscape preserving forms of farming

    ◊ 20 years' setting aside of farmland and grassland (permanent fallow land).

- Compensatory payments for the set-aside of agricultural areas

In order to improve the ecological situation, setting aside of farmland is financially supported by the Federal Ministry of Agriculture and Forestry. For this purpose a support guideline is being prepared, which provides an option for an economic land diversion and an additional voluntary land diversion. The obligation for participants in this programme ended on August 31, 1995. In addition to other considerable obligations, no pesticides must be used on the set-aside areas.

- Encouragement to use beneficial organisms

In order to encourage biological measures of past control, in 1993 the first Austrian breeding station of beneficial organisms was established in Vienna-Simmering with the financial support of the Federal Ministry of Agriculture and Forestry and is already in operation.

Biological pest control is practiced in Austria not only in horticulture but also in crop cultivation (maize), fruit growing, and viticulture. All together in 1993 an area of 7,956 ha was treated with organisms, including 144 ha of green houses. The largest areas were treated with *bacillus thuringiensis* in vegetable growing, fruit growing, maize cultivation, and viticulture (7,107 ha), with *Typhlodromus pyri* in viticulture (550 Ha) and with *Trichogramma evanescens* in maize (144 ha) (see Table 4 on next page).

Table 4

Use of Organisms as Pesticides 1993

Organism	Area of Application		Area in ha
	Cultivation	Pest	
Bacillus thuringienses	vegetables, maize, fruits, vine	various caterpillars	7,107.
Predatory mite (*Typhlodromus*)	vine	gatt midge	550.
Parasitoid (*Trichogramma evanesceus*)	maize	European corn borer	144.
Parasitoid (*Encarsia formosa*)	hothouse	white fly	36.84
Predatory mite (*Phytosoiolus)*	hothouse	spider mites	34.17
Parasitoid (*Aphidius sp.*)	hothouse	aphids	25.56
Parasitoids (*Dacnusa / Diglyphus*)	hothouse	mining flies	15.29
Gall midge	hothouse	aphids	14.06
Predatory mite (*Amblyseius cucumens*)	hothouse	thrips	10.49
Predatory bug (*Orius sp.*)	hothouse	thrips	8.87
Entoparasitic nematoden	ornamental plants, hothouse, tree nurseries	vine weevil fickle midges	6.15
Parasitoid / *Aphelinus abdaninalis*)	hothouse	aphids	1.34
Golden eye (*Chrysoppserla*)	hothouse	aphids	1.18
Ladybird (*Chryptolaemus*)	hothouse	leak stalk aphids	0.76
Total			7.955.71

CANADA

CONTACT PERSON(S):

Mrs Wendy Sexsmith
Director, Alternatives Office
Pest Management Regulatory Agency
59 Camelot Drive
Nepean K1A 0Y9
Ontario

Tel: (1) 613 952 5330
Fax: (1) 613 952 6547

I. Framework for Pesticide Risk and Use Reduction Activities

How does your country approach pesticide risk reduction? For example, is there a co-ordinated programme at the national level? Are there programmes or activities at the regional, state, provincial, or local levels? Rather than having one general programme, does your country have a range of activities carried out in different places by different organisations or authorities?

In 1992, the Government of Canada committed new resources to improving the federal pesticide regulatory system with three stated objectives: (a) enhance protection of health, safety and the environment; (b) enhance competitiveness of the resource and manufacturing sectors; and (c) enhance openness and transparency. The specific improvements stem from the recommendations of an independent review by the Pesticide Registration Review (PRR) Team. The team included representatives of health, environmental, research and consumer groups as well as manufacturers and representatives from the agricultural and forestry sectors. Their final report — based on extensive negotiations and public consultation — reflected the need to design a comprehensive system to guide pesticide regulation into the future. The current government, elected in October 1993, is examining ways to accelerate these improvements.

As part of the improvement to the pesticide regulatory system, a national policy on pesticide risk reduction, including, where appropriate, reduced use, is in the beginning stages of development. Development of this policy will require co-operation with the provinces and consultation with stakeholders. Many existing initiatives, both federal and provincial, already contribute to pesticide risk reduction. A national policy framework would serve to further clarify links between those existing initiatives and identify areas requiring further action.

What principal factors prompted your country to initiate efforts to reduce pesticide risks? For example, were activities begun in response to drinking water contamination, concern about worker health, public demand, international agreement, or export market requirements?

Key issues about the pest management regulatory system which gave rise to the PRR and persist today include farmers' concerns about timely access to cost-effective pest control products, particularly for minor uses and alternatives; manufacturer's concerns about the time and cost of the registration process; and those of public interest groups about the safety of pest control products, reduced use of chemical pesticides and the introduction of safe alternatives, and opportunities for the public to influence policy and registration decisions. The development of a risk reduction policy is seen as an important component of the initiatives to address these issues.

Is there a legal or regulatory mandate for your country's pesticide risk reduction activities?

All pest control products used in Canada must be registered by the federal government in accordance with the Pest Control Products Act. The products regulated are diverse, covering pesticides used in agriculture, forestry, industry, public health and household situations. Products are evaluated on the basis of data submitted by companies to prove that the product is safe and has merit and value when used according to label directions. Maximum residue limits for residues of agricultural chemicals in food are set federally under the Food and Drugs Act. Provincial/territorial and municipal governments further regulate the transportation, storage, sale, use and disposal of pest control products.

It is important to note that the Canadian legal framework provides a basis for minimizing risks, even in the absence of a risk reduction policy. Because pesticides must have demonstrated efficacy (merit) before they can be registered, unnecessary use of pesticides is prevented rather than having to be reduced subsequently. Furthermore, the legal framework prohibits use of pesticides contrary to label directions, i.e. off-label use is illegal. This is enforced through federal and provincial compliance programs.

The legal framework is supplemented by many important policies which also contribute to risk minimization/reduction. The legal/policy mandates are summarized as follows:

Federal

- *Pest Control Products Act*
  - administered by Agriculture and Agri-Food Canada with advice from Health Canada, Environment Canada and Natural Resources Canada
  - safety, merit and value must be demonstrated
  - off-label use is not permitted

- *Food and Drugs Act*
  - administered by Health Canada
  - maximum residue limits (MRLs) for food

- *Workplace Hazardous Materials Information System*
  - administered by Health Canada
  - right to know legislation designed for the protection of workers and prescribing the health and safety information about hazardous workplace chemicals to be provided
  - specifies training of workers, easily understood labels, material safety data sheets

- *Canadian Environmental Protection Act*
  - administered by Environment Canada
  - disposal
  - site contamination

- *Policies*
  - **efficacy** (merit): label must reflect lowest effective rate, i.e. good agricultural practices - therefore, assessment of efficacy studies is important
  - **residues:** MRLs must be set as low as possible, consistent with effective use - therefore, assessment of residue studies is important
  - **occupational safety:** margin of safety must be adequate under actual conditions of use - therefore, assessment of exposure studies is important
  - **environmental protection:** products that are persistent and bioaccumulative should not be registered - therefore, assessment of environmental fate and toxicology studies is important
  - **formulants:** all ingredients must be safe
  - **efficiency:** registration processes must be efficient in order to register safe alternatives to traditional chemical products and to re-evaluate older products

Provincial

- legislation to control the transportation, storage, sale, use and disposal is specific to each province
- authority to ban the use of specific hazardous pesticides in their jurisdictions
- authority to issue use permits/restrictions
  - to protect sensitive areas (bodies of water, forests, public lands)
  - aerial application
  - to use fumigants, vertebrate toxicants
  - promotion of integrated pest management
- jurisdiction over drinking water contamination, with standards being set by a federal/provincial committee

Municipal

- authority to reduce or prohibit pesticide use on public land within their jurisdictions

Activities

The following describes the types of activities currently underway in Canada that contribute to risk reduction. The appended tables describe specific examples, but should not be construed to be a comprehensive list.

Elimination of Hazardous Pesticides

Federal

⇒ Reevaluation
- Registration of older products is reviewed applying current data requirements and evaluation procedures.

⇒ Special reviews
- When specific concerns are identified, the registration status of registered pesticides is reviewed in the light of evidence that has not previously been considered.

⇒ International co-operation
- e.g. methyl bromide
  - Canada is implementing regulations and policies to phase-out the use of methyl bromide in accordance with the Montreal protocol on ozone depleting substances.

Provincial

⇒ Classification of products according to the level of hazard, with a view to reducing or eliminating the use of the most hazardous products

Reduction in Pesticide Use

Federal

⇒ Label improvement project has been undertaken to reflect good management practices.

Federal-Provincial Initiatives

⇒ National Spray Efficacy Research Group
- To improve the efficiency of pesticide application so that the amount of pesticide needed to manage forest pests is reduced to an absolute minimum

⇒ Canada-Quebec agreement on the St. Lawrence River (Vision 2000)
- to prevent and reduce the effects of pollution on the St. Lawrence ecosystem

⇒ Canada-Ontario Agreement on the Great Lakes
- to restore, maintain and protect the Great Lakes Basin Ecosystem

⇒ Various agreements for "Best Management Practices" have been established between the federal and provincial governments.
- Goals are to examine all agricultural activities that have an impact on the environment (including pesticide use) and to come up with "Best Management Practices" that producers can adopt to reduce the environmental impacts of their farming operations.

Provincial

⇒ Specific use reduction targets for pest control products have been set in some provinces.

Municipal

⇒ Many local municipalities have either voluntarily reduced or eliminated pesticide use or enacted municipal bylaws to prohibit pesticide use on public land within their jurisdictions.

Regulations, Education, and Other Policy Tools to Increase Safety in Pesticide Handling, Use and Disposal

Federal

⇒ Re-entry times
- Canada is actively involved in the ongoing revisions of U.S. EPA guidelines on Post Application Exposure Assessment for both residential and agricultural scenarios. Once complete, these guidelines will ensure more accurate estimates of risk and the establishment of scientifically based re-entry times.

⇒ Spray Drift Task Force
- Investigating the use of computer modelling for establishing more precise buffer zones to protect sensitive areas

⇒ Environmental labelling
- Guidelines for placing environmental claims/symbols (i.e. recyclable, degradable, etc.) on pesticide containers are being developed.

⇒ Post-registration monitoring and compliance programs
- Monitoring is conducted to determine levels of pesticides in food, environmental substrates, etc.; results could influence priorities for compliance programs, special reviews, etc.
- Compliance programs are designed to ensure compliance with the *Pest Control Products Act* and the *Food and Drugs Act*.

Federal-Provincial Initiatives

⇒ Training and certification of applicators and vendors
- A national standard for pesticide education, training and certification is under development by a federal/provincial task force and will be completed in 1995.
- Implementation is by provinces as resources permit. All are currently training and certifying applicators and vendors; most have updated their programs according to the national standard.

Provincial

⇒ Establishment of buffer zones
- Most provinces have established buffer zones to protect sensitive areas.

⇒ Post-registration monitoring and compliance programs
- Monitoring is conducted to determine levels of pesticides in food, environmental substrates, etc.; results could influence priorities for compliance programs
- Compliance programs are designed to ensure compliance with provincial legislation

⇒ Disposal of unwanted pesticides
- Most provinces have waste collection programs to assist farmers in safely disposing of unregistered and/or unusable agricultural pesticides.

⇒ Dissemination of information
- Numerous publications and fact sheets to workers, applicators, dealers and the public to promote safe handling of pesticides and to raise awareness of the hazards and legal implications of misuse
- Information is also disseminated through training and technical transfer sessions and educational forums.

Joint Provincial / Industry Initiatives

⇒ Container disposal/recycling
- Most provinces, in collaboration with industry, have pesticide container collection programs to ensure their safe and appropriate disposal.
- Many provinces also have collaborative programs with industry to promote pesticide container recycling.

Industry Initiatives

⇒ Warehousing standards
- The Crop Protection Institute (CPI) established minimum standards for the warehousing and storage of pesticides, and identified a specific timeframe for the implementation of these standards.
  - All CPI members have agreed not to ship or store any products in warehouses that do not meet their standards as of a specified date.

⇒ Improvements in packaging
- Waste reduction and increased safety, e.g. recyclable containers, returnable containers, dissolvable packaging

Promotion of Alternative Pest Management Strategies such as Integrated Pest Management or Organic Farming

Federal

⇒ Research projects
- Natural Resources Canada and Agriculture and Agri-Food Canada have a number of ongoing research projects aimed at developing viable alternatives to the use of traditional pest control products.

⇒ Training / Technical transfer
- Natural Resources Canada has implemented an Integrated Forest Pest Management (IFPM) Course
  - To advance skills and knowledge of forestry professionals in current techniques and principles for planning, implementing and evaluation of IFPM programs

⇒ Monitoring / Development of thresholds
- Natural Resources Canada is developing operational pheromone-based monitoring systems for major forest pests.

⇒ Dissemination of information
- Information on alternatives is provided through newsletters
  - Describe current research, new developments, and important information about alternative pest management strategies
- Numerous publications, such as work reports from alternatives workshops, research programs and other activities are provided.

Provincial

⇒ Research
- Numerous research projects on alternative pest management strategies, such as non-chemical pest controls, crop rotation, silvicultural methods, early harvesting, top clipping, irrigation management and pheromone mating disruption.

⇒ Promotion / Implementation of Integrated Pest Management (IPM)
- Many provinces have undertaken extensive programs to promote IPM and to implement it through a number of special projects.

⇒ Dissemination of information
- Information on alternative pest management strategies is disseminated, for example:
  - information and recommendations on biological control options, alternatives to pesticides, improved crop management techniques, pest economic thresholds
  - databases of IPM programs
  - educational programs and forums, including technical transfer.

⇒ Diagnostic clinics
- Some provinces have created Pest Diagnostic Clinics for agricultural pest control and pest resistance problems
  - Clinic provides growers with control recommendations, thereby reducing needless or ineffective pesticide treatments

Measurement Tools

Federal

⇒ Environmental indicators
- Developing a comprehensive set of criteria and indicators to measure the sustainability of Canadian agriculture and forestry
- Provide agri-food decision makers and stakeholders with succinct information on key environmental sustainability trends in their sector
- Facilitate the integration of environmental considerations into the sectors' policy-making, programming and planning processes, by providing relevant information

⇒ Post-registration monitoring and compliance programs
- Results of these programs, mentioned under "Regulations, Education and Other Policy Tools to Increase Safety in Pesticide Handling, Use and Disposal," provide information to measure the impact of risk reduction measures, through:
  - analytical results
  - numbers/types of non-compliance investigations (incident reporting)
  - numbers/types of complaints
  - numbers/types of enforcement actions

Provincial

⇒ Post-registration monitoring and compliance programs
- See above under “Federal”

⇒ Pesticide use databases
- Regular use surveys are conducted by some provinces. In some cases, electronic databases are maintained.
- Many provinces receive pesticide use information through statutory requirements.

⇒ Documentation of IPM uptake/availability by crop/region

⇒ Environmental criteria and indicators

Federal-Provincial Initiatives

⇒ A national database on pesticide use is proposed.

II. Description of Activities

ELIMINATION OF HAZARDOUS PESTICIDES

FEDERAL ACTIVITY

CANADA
Project or Activity: Re-evaluation
Risk Reduction Category: Elimination of Hazardous Pesticides

What are the key elements of the project/activity?	Registration of older products is reviewed applying current data requirements and evaluation procedures.
When did the project activity begin and what prompted its initiation?	1986 Concerns about the adequacy (completeness, health and environmental aspects) of data packages supporting registered pesticides.
What are its specific goals and/or targets?	Pesticides were prioritized for re-evaluation based on such factors as: age and completeness of database, special concerns, human and environmental exposure, extent of use. Specific timeframes were not set.
Who is involved in carrying it out?	Federal government (Agriculture and Agri-Food Canada, Health Canada, Environment Canada, Natural Resources Canada).
Is there a legal or regulatory mandate?	No. The legislation states that the safety, merit, and value of a product must be demonstrated before it can be registered but there is no legal requirement for re-evaluation.
Is the activity monitored or enforced? If so, how?	N/A
How are results and progress measured?	N/A
What specific progress/results have been achieved?	Due to lack of resources, very little progress has been made in re-evaluation since 1986. At the present time, Canada is pursuing international co-operation, particularly through the OECD, to accelerate re-evaluation.

CANADA
Project or Activity: Special Review
Risk Reduction Category: Elimination of Hazardous Pesticides

What are the key elements of the project/activity?	Review of the registration status of a registered pesticide as a result of specific concerns and in the light of evidence that has not previously been considered.
When did the project/activity begin and what prompted its initiation?	N/A Specific concerns (health or environmental) about safety of particular products.
What are its specific goals and/or targets?	To take appropriate regulatory decisions in light of the review of data related to specific concerns.
Who is involved in carrying it out?	Federal government (Agriculture and Agri-Food Canada, Health Canada, Environment Canada, Natural Resources Canada).
Is there a legal or regulatory mandate?	While there is no specific legal mandate to conduct special reviews, the overall mandates of Health and Environment Canada to protect human health and the environment, respectively, would compel them to advise the initiation of special reviews when specific concerns are identified.
Is the activity monitored or enforced? If so, how?	N/A
How are the results and progress measured?	N/A
What specific progress/results have been achieved?	

PROVINCIAL ACTIVITY

CANADA

Project or Activity: Classification of pesticides and replacement of most hazardous pesticides

Risk Reduction Category: Elimination of Hazardous Pesticides

What are the key elements of the project/activity?	Development of a classification system for pesticides with a view to replacing the most hazardous.
When did the project/activity begin and what prompted its initiation?	1994 Need to develop systematic means of working towards the elimination of the most hazardous pesticides.
What are its specific goals and/or targets?	Identify “red” pesticides, i.e. most hazardous, which should be priorities for replacement by other management methods. This could lead to targeting research funds or implementing taxes or other disincentives. Identify “green” pesticides, i.e. least hazardous, for use on public lands.
Who is involved in carrying it out?	Provincial government (B.C.).
Is there a legal or regulatory mandate?	This activity supplements the legal authority of the province to approve the use of pesticides in its jurisdiction.
Is the activity monitored or enforced? If so, how?	N/A
How are the results and progress measured?	N/A
What specific progress/results have been achieved?	Literature study of existing classification systems completed.

INDUSTRY/GOVERNMENT ACTIVITY

CANADA
Project or Activity: Withdrawal
Risk Reduction Category: Elimination of Hazardous Pesticides

What are the key elements of the project/activity?	During the past 10 years, over 1900 products of concern (e.g. DDT, aldrin, dieldrin, etc.) have been withdrawn from the Canadian marketplace.
When did the project/activity begin and what prompted its initiation?	N/A
What are its specific goals and/or targets?	N/A
Who is involved in carrying it out?	Government/Industry
Is there a legal or regulatory mandate?	N/A
Is the activity monitored or enforced? If so, how?	N/A
How are the results and progress measured?	N/A
What specific progress/results have been achieved?	N/A

INDUSTRY ACTIVITY

CANADA

Project or Activity: Crop Protection Institute Member Activities Related to registration

Risk Reduction Category: Elimination of Hazardous Pesticides

What are the key elements of the project/activity?	• In support of the re-evaluation process, individual companies submit up-to-date data packages to support the safety of various older products (e.g. atrazine, simazine, diazinon, 2,4-D). This ensures that the data packages for products are representative of today's scientific standards. • $60-80 million dollars is spent on the development of each pest control product, by a company. These studies are conducted following the principles of good laboratory practice (GLP). If there is any possible risk related to a particular product or use, this is further clarified in the field through monitoring studies and risk reduction measures are applied. • As the Canadian environment differs from that of other countries, a company conducts various field studies on all new products to ensure that, under Canadian practical use conditions, the product will not result in an unacceptable risk to the environment or to the user. • Development of new “low use rate” chemistry. • The Crop Protection Institute participated in the review of the Federal Pest Management Regulatory System as a member of the Federal Pesticide Registration Review team along with representatives from the chemical manufacturers, public health, Consumers Association, environmentalist organizations, forestry representatives, Labour Congress, biological control group and farmer organizations in order to ensure that new technology and IPM friendly products are available to Canadian agriculture in a timely fashion.
When did the project/activity begin and what prompted its initiation?	N/A
What are its specific goals and/or targets?	N/A
Who is involved in carrying it out?	N/A
Is there a legal or regulatory mandate?	N/A
Is the activity monitored or enforced? If so, how?	N/A
How are the results and progress measured?	N/A
What specific progress/results have been achieved?	N/A

REDUCING PESTICIDE USE

FEDERAL ACTIVITY

CANADA
Project or Activity: Label Improvement
Risk Reduction Category: Reducing Pesticide Use

What are the key elements of the project/activity?	Review good agricultural practices for certain pesticides with a view to changing labels.
When did the project/activity begin and what prompted its initiation?	1994 Initiated to harmonize with international good agricultural practices and reduce MRLs.
What are its specific goals and/or targets?	To delete label uses which are no longer needed, lower use rates and number of applications to a minimum, lengthen pre-harvest intervals while maintaining effective pest control, update label statements for protective clothing, equipment and measures.
Who is involved in carrying it out?	Federal government (Agriculture and Agri-Food Canada, Health Canada) and provincial experts.
Is there a legal or regulatory mandate?	No. Registered uses of these pesticides already meet legislated requirements. Label improvement would further reduce risks and facilitate trade through harmonization with Codex MRLs.
Is the activity monitored or enforced? If so, how?	N/A
How are the results and progress measured?	N/A

What specific progress/results have been achieved?	• 2,4-D - Risk reduction in occupational exposure through requirement for more protective clothing and equipment; - Implementation of a mechanical transfer system to minimize spillage and exposure during mixing; - Clear instruction on pre-harvest intervals prior to grazing, feeding to livestock, and harvesting for hay thus reducing risk of increased residues in food and feed; - Clear instructions on aerial application thus reducing the risk of spraying environmentally sensitive areas; and - Maximum application rate and frequency of application thus reducing the risk of over application. • Atrazine - To reduce risk of groundwater contamination application rates have been reduced by up to 15% (ppi) up to 35% for pre-emergence and post emergence; - All non-essential uses (e.g. non-crop and industrial) deleted from the label. • Bromoxynil - Withdrawal of formulations that are more easily absorbed through the skin (e.g. bromoxynil butyrate) reduces occupational exposure; - Requirement for use of chemically resistant gloves when handling bromoxynil products reduces risk of occupational exposure. • 1,3-dichloropropene - Introduction of optically pure isomers reduces the rate and use of soil fumigants (this was initiated after reading of work done in the Netherlands in an early draft of this report).

FEDERAL/PROVINCIAL ACTIVITY

CANADA
Project or Activity: National Spray Efficacy Research Group
Risk Reduction Category: Reducing Pesticide Use

What are the key elements of the project/activity?	Federal-Provincial group established to encourage and co-ordinate the development of improved application techniques.
When did the project/activity begin and what prompted its initiation?	mid 1970s Health and Environmental concerns about spray drift.
What are its specific goals and/or targets?	To improve the efficiency of pesticide application, so that the amount of pesticide needed to manage forest pests is reduced to an absolute minimum.
Who is involved in carrying it out?	Federal (Natural Resources Canada) and Provincial governments.
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	N/A
How are the results and progress measured?	N/A
What specific progress/results have been achieved?	Improved targeting, understanding of spray drift and deposit, development of models to facilitate drift prediction.

CANADA

Project or Activity: Canada-Quebec Agreement on the St. Lawrence River (Vision 2000)

Risk Reduction Category: Reducing Pesticide Use

What are the key elements of the project/activity?	Prevent and reduce the effects of pollution on the St. Lawrence ecosystem.
When did the project/activity begin and what prompted its initiation?	April 1994 Concerns about degradation of the St. Lawrence ecosystem.
What are its specific goals and/or targets?	The plan comprises agricultural, protection of biodiversity, decision-making assistance, human health, restoration and community involvement components. Each has specific objectives to be reached by 1998. For the agricultural component, there is a specific goal to reduce pesticide use by 50%. In addition, watershed committees will elaborate and implement action plans for reducing the impact of agricultural operations.
Who is involved in carrying it out?	Federal (Agricultural and Agri-Food Canada, Fisheries and Oceans Canada, Environment Canada) and Provincial governments (Quebec).
Is there a legal or regulatory mandate?	No. Activities are carried out on a voluntary basis.
Is the activity monitored or enforced? If so, how?	Yes. The project is overseen by a Federal-Provincial committee. A monitoring plan is under development in consultation with the watershed committees.
How are the results and progress measured?	Results will be monitored through a sampling network. A project manager will be assigned to each committee and will be responsible for keeping the Federal-Provincial committee informed. Two pilot projects in small basins will serve as a reference point for four larger basins.
What specific progress/results have been achieved?	Development of an inventory of information on drainage basins, including geographic, agricultural and ecological information has begun.

CANADA
Project or Activity: Canada-Ontario Agreement on the Great Lakes
Risk Reduction Category: Reducing Pesticide Use

What are the key elements of the project/activity?	Restore and protect, prevent and control pollution into, and conserve species, populations and habitats in the Great Lakes Basin Ecosystem.
When did the project/activity begin and what prompted its initiation?	April 1994 Concerns about degradation of the Great Lakes Basin ecosystem.
What are its specific goals and/or targets?	The agreement includes many specific goals and targets. With regard to pesticides, the agreement sets goals and targets to reduce or eliminate those that are persistent and bioaccumulative.
Who is involved in carrying it out?	Federal (Environment Canada, Fisheries and Oceans Canada, Agriculture and Agri-Food Canada, Health Canada) and Provincial governments (Ontario).
Is there a legal or regulatory mandate?	Federal and Provincial statutes give authority for implementation of the agreement. Some elements of the plan involve voluntary actions.
Is the activity monitored or enforced? If so, how?	Implementation of the agreement will be monitored by a Federal-Provincial Review Committee.
How are the results and progress measured?	Review Committee will review workplans, prepare annual reports, and report to the biennial meeting of the International Joint Commission on the Great Lakes.
What specific progress/results have been achieved?	N/A

PROVINCIAL ACTIVITY

CANADA
Project or Activity: Use Reduction Targets
Risk Reduction Category: Reducing Pesticide Use

What are the key elements of the project/activity?	Specific targets for pesticide use reduction.
When did the project/activity begin and what prompted its initiation?	Early 1990's Public concern about the health and environmental impacts of pesticides.
What are its specific goals and/or targets?	Ontario: 50% reduction in pesticide use by 2002. Quebec: 50% reduction in agricultural pesticide use by 2000; elimination of use of chemical pesticides in public forests by 2001.
Who is involved in carrying it out?	Provincial governments (Ontario, Quebec).
Is there a legal or regulatory mandate?	Yes. Provincial governments have the legal authority to take such action.
Is the activity monitored or enforced? If so, how?	
How are the results and progress measured?	Provincial governments will monitor progress by means of pesticide use surveys.
What specific progress/results have been achieved?	

INDUSTRY ACTIVITY

CANADA
Project or Activity: Use Restrictions, Buffer Zones
Risk Reduction Category: Reducing Pesticide Use

What are the key elements of the project/activity?	• Crop Protection Institute member companies' labels stipulated buffer zones. • Crop Protection Institute member companies' label improvement programs provide environmental advice and risk mitigation labelling for environmentally sensitive areas. • Canadian companies have initiated a process whereby the USA Spray Drift Task Force data base will be available for use by the Canadian authorities. • Individual companies conduct or support post registration monitoring programs on specific products and uses where it is felt that additional information is needed. • As the Canadian environment differs from that of other countries, a company conducts various field studies on all new products to ensure that, under Canadian practical use conditions, the product will not result in an unacceptable risk to the environment or to the user.
When did the project/activity begin and what prompted its initiation?	N/A
What are its specific goals and/or targets?	N/A
Who is involved in carrying it out?	N/A
Is there a legal or regulatory mandate?	N/A
Is the activity monitored or enforced? If so, how?	N/A
How are the results and progress measured?	N/A
What specific progress/results have been achieved?	N/A

CANADA

Project or Activity: Crop Protection Institute Member - Activities to promote good agricultural practice

Risk Reduction Category: Reducing Pesticide Use

What are the key elements of the project/activity?	• Companies which are members of the crop protection industry association have 1-800 information hot lines, emergency numbers and response plans to deal with fires, spills or accidents involving their products. • Label improvement programs have been conducted voluntarily by basic manufacturers for various products such as atrazine and 2,4-D. Various other label improvement projects are in progress (e.g. azinphos-methyl, ethyl-parathion). • Various videos and brochures have been produced by companies to promote good agricultural practice in the farm community, e.g. Ciba's video and brochure on Best Management Practices, Monsanto's Detail Program, Zeneca's Crop Management Plan, Dupont's brochure “Wildlife and Agriculture” and the Crop Protection Institute's “Water in Trust” and “Farm Chemical Safety in Your Hands” brochures. • With respect to the provincial vendor and grower training and certification programs, the Crop Protection Institute and member companies assisted the Canadian Association of Pesticide Control Officials (CAPCO) in the development and funding of the core standard for vendor training.
When did the project/activity begin and what prompted its initiation?	N/A
What are its specific goals and/or targets?	N/A
Who is involved in carrying it out?	N/A
Is there a legal or regulatory mandate?	N/A
Is the activity monitored or enforced? If so, how?	N/A
How are the results and progress measured?	N/A
What specific progress/results have been achieved?	N/A

REGULATIONS, EDUCATION, AND OTHER POLICY TOOLS TO INCREASE SAFETY IN PESTICIDE HANDLING USE AND DISPOSAL

FEDERAL/PROVINCIAL ACTIVITY

CANADA

Project or Activity: Training and Certification of Users
Risk Reduction Category: Increasing Safety in Pesticide Handling

What are the key elements of the project/activity?	A national standard for pesticide education, training and certification is under development by a federal/provincial task force and will be completed by 1995. Implementation is by provinces as resources permit. All are currently training and certifying applicators and vendors; most have updated their programs according to the national standards.
When did the project/activity begin and what prompted its initiation?	1987 Recognition that all provinces were acting independently in their certification and training programs.
What are its specific goals and/or targets?	To achieve a minimum consistent level of knowledge for all pesticide applicators and vendors across the country. This in turn will allow for increased competency of certified applicators and vendors, federal regulators to restrict the use of certain pesticides to certified individuals on a national level, reciprocity with respect to pesticide applicator and vendor certification and licensing, and increased public confidence that pesticides are being handled responsibly and safely.

Who is involved in carrying it out?	Once complete, each province will implement the standard by changing their certification and training programs. Examples are: • British Columbia will require certification for everyone except domestic users by 1997. • In Alberta, certification of applicators is mandatory for commercial pesticides and for application in rental or public buildings. Vendors must employ at least one certified dispenser. • In Manitoba, applicators' and vendors' certification is mandatory for commercial and restricted pesticides. • Since 1989, certification has been mandatory in Quebec for farmers using “restricted use” pesticides and all others using or selling pesticides. Domestic users are exempt. • Ontario has implemented mandatory certification programs for growers and vendors for restricted pesticides. • In New Brunswick, certification of all commercial applicators is mandatory and by 1995, certification of all private users of commercial, and restricted class products will be mandatory. • Prince Edward Island implemented a Pesticide Certification Program in 1991 for commercial and agricultural applicators. • Newfoundland has implemented mandatory training programs for commercial and agricultural applicators in collaboration with community colleges and the federal government.
Is there a legal or regulatory mandate?	It is up to the provinces to decide on legislative needs. Some have enacted scheduling provisions in their legislation whereby certain pesticides can only be applied by certified applicators.
Is the activity monitored or enforced? If so, how?	N/A
How are the results and progress measured?	Each province maintains its own statistics on changes and results of certification and training programs.
What specific progress/results have been achieved?	Number of trained and certified applicators has already increased dramatically.

CANADA
Project or Activity: Guide to Crop Protection
Risk Reduction Category: Increasing Safety in Pesticide Handling

What are the key elements of the project/activity?	*The Guide to Crop Protection* is a publication that outlines the proper use of registered pesticides in Manitoba. The Guide also provides information on the safe and accurate application of registered pesticides as well as information on economic thresholds that assist the producer in determining if pesticide application is warranted. *The Guide to Crop Protection* is updated annually to ensure that the information is as current and relevant as possible.
When did the project/activity begin and what prompted its initiation?	*The Guide to Crop Protection* has been published annually since the mid 1960's. It was initiated to assist producers in choosing and using pesticides properly and effectively.
What are its specific goals and/or targets?	The goal of *The Guide to Crop Protection* is to ensure that pesticides are used in a proper and safe manner, only when required as determined by the economic threshold guidelines.
Who is involved in carrying it out?	Manitoba Agriculture publishes *The Guide to Crop Protection* with assistance from the pesticide industry, the University of Manitoba and Agriculture Canada.
Is there a legal or regulatory mandate?	The Pesticides and Fertilizers Control Act requires that pesticides be used in accordance with provincial recommendations. *The Guide to Crop Protection* outlines the product label directions and helps ensure that producers use pesticides in a manner that satisfies the requirements of the Act.
Is the activity monitored or enforced? If so, how?	No.
How are the results and progress measured?	There are no direct measurements. However, some indication of the influence of the Guide is provided by feedback from producers and industry to Manitoba Agriculture staff.
What specific progress/results have been achieved?	There are no specific results. However, from indirect feedback we know that there is widespread use of the product information and economic threshold guidelines in the Guide.

CANADA
Project or Activity: Post-registration monitoring and compliance programs
Risk Reduction Category: Regulations, Education and Other Policy Tools/Measurement Tools

What are the key elements of the project/activity?	Monitoring and compliance programs related to the federal *Pest Control Products Act* and the *Food and Drugs Act* and provincial legislation.
When did the project/activity begin and what prompted its initiation?	N/A
What are its specific goals and/or targets?	Goals would be to determine levels of pesticides in food, environmental substrates, etc. and to ensure compliance with relevant legislation. Elements of the programs would include sampling and analysis, inspection, incident reporting/investigation, education, and enforcement. The results would contribute to risk reduction activities in the area of "Regulations, Education and Other Policy Tools" and also to measuring progress in risk reduction.
Who is involved in carrying it out?	Federal (Agriculture and Agri-Food Canada, Health Canada, Environment Canada, Natural Resources Canada, Fisheries and Oceans Canada) and Provincial governments.
Is there a legal or regulatory mandate?	Yes
Is the activity monitored or enforced? If so, how?	N/A
How are the results and progress measured?	Programs are evaluated on a regular basis using such performance measures as analytical results, percentages of samples in compliance, numbers/types of complaints, numbers/types of non-compliance investigations, numbers of enforcement actions, numbers of appeals of approval/certification holders.
What specific progress/results have been achieved?	N/A

PROVINCIAL ACTIVITY

CANADA
Project or Activity: Pesticide Dispenser and Applicator Certification
Risk Reduction Category: Increasing Safety in Pesticide Handling

What are the key elements of the project/activity?	Training and examination of pesticide dealers and applicators being carried out by Assiniboine Community College (ACC) in Manitoba.
When did the project/activity begin and what prompted its initiation?	Training responsibilities were transferred to ACC in December 1993. This was prompted by a desire of ACC to carry out the training and the opportunity to have the courses delivered on a cost recovery basis.
What are its specific goals and/or targets?	Target is all pesticide dealers and applicators who require a license to sell or apply pesticides. Goal is to provide basic training on pesticide use and safety in conformance to the National Standard of Pesticide Education.
Who is involved in carrying it out?	Assiniboine Community College provides the training.
Is there a legal or regulatory mandate?	The training is required as a requirement for licensing of pesticide dealers and applicators under the Pesticides and Fertilizers Control Act.
Is the activity monitored or enforced? If so, how?	Manitoba Agriculture is involved in ensuring the training materials, courses and exams are provided and up to standard.
How are the results and progress measured?	Progress is measured in terms of improvements. Several improvements have been made, e.g. pesticide dispenser courses have been split into three components, i.e. field crops, livestock, and structural. Course materials are better organized, exams have been shortened to allow sufficient time for completion. Improvements continue to be made.
What specific progress/results have been achieved?	In 1994 approximately 450 dealers and 450 applicators have been put through the ACC training program.

CANADA

Project or Activity: Producer Training in Safe Pesticide Handling and Use - Agricultural Chemicals in the 90's

Risk Reduction Category: Increasing Safety in Pesticide Handling

What are the key elements of the project/activity?	A course for producers in the safe use, handling and application of pesticides called “Agricultural Chemicals in the 90's” is offered through a community college.
When did the project/activity begin and what prompted its initiation?	The course started in 1991. It was requested by a major farm group in Manitoba and was prepared by provincial extension specialists.
What are its specific goals and/or targets?	The goals of the course are to provide producers with information on use, handling and application of pesticides and fertilizers to minimize environmental impact and protect human health.
Who is involved in carrying it out?	Assiniboine Community College delivers the course as requested.
Is there a legal or regulatory mandate?	No.
Is the activity monitored or enforced? If so, how?	No.
How are the results and progress measured?	The course is updated when needed.
What specific progress/results have been achieved?	Over 1000 producers in Manitoba have taken the course. Staff are currently looking at changing the course and delivery mechanism to accommodate more producers.

CANADA
Project or Activity: Pesticides and Fertilizers Control Act
Risk Reduction Category: Increasing Safety in Pesticide Handling

What are the key elements of the project/activity?	Licensing commercial pesticide dealers and applicators in Manitoba.
When did the project/activity begin and what prompted its initiation?	The Act was declared in 1977 under which all retail pesticide dealers and commercial pesticide applicators are required to be licensed. The Act came into effect to control and regulate the sale and use of pesticides, and to require training of dealers and applicators to ensure safe handling and application of pesticides.
What are its specific goals and/or targets?	Target is all persons who retail or commercially apply pesticides. Goal is to ensure they are knowledgeable in their safe use.
Who is involved in carrying it out?	Administration of the Pesticides and Fertilizer Control Act is being carried out by the Crop Management Section, Soils and Crops Branch of Manitoba Agriculture.
Is there a legal or regulatory mandate?	Mandate is under the Pesticides and Fertilizers Control Act.
Is the activity monitored or enforced? If so, how?	There is regular enforcement to ensure compliance with the Act.
How are the results and progress measured?	The number of pesticide incidents and complaints has been decreasing.
What specific progress/results have been achieved?	Total licensed dealers in 1994 were 522, and total applicators licensed in 1994 were 780. Number of pesticide problems and complaints is decreasing.

CANADA
Project or Activity: Environment Act – Warehouse Licenses
Risk Reduction Category: Increasing Safety in Pesticide Handling

What are the key elements of the project/activity?	Environment Licenses are issued for warehouses which store crop protection products: fertilizer, seed plants, grain elevators, warehouse and bulk handlers.
When did the project/activity begin and what prompted its initiation?	June 1988 With the Revision of the Clean Environment Act, in Manitoba.
What are its specific goals and/or targets?	To establish conditions of operation for bulk material handlers to protect the environment and public health.
Who is involved in carrying it out?	Pesticide Approvals-Industrial Approvals and Director of the Environment Act and Regional Operation Environment Officer.
Is there a legal or regulatory mandate?	Yes, Environment Act plus regulation.
Is the activity monitored or enforced? If so, how?	Regular enforcement to ensure license compliance.
How are the results and progress measured?	Progress is measured when improvements are carried out to comply with license conditions.
What specific progress/results have been achieved?	Majority of crop protection warehouses have received current licences and currently undertaken warehouse and site improvements.

CANADA
Project or Activity: Manitoba Pesticide Applicator Newsletter – TOPICS
Risk Reduction Category: Increasing Safety in Pesticide Handling

What are the key elements of the project/activity?	"TOPICS" newsletter was initiated in October 1994 as a means of providing chemical dealers and applicators with information on new developments in pest control and fertilizers.
When did the project/activity begin and what prompted its initiation?	First issue was sent out October 1, 1994. Dealer and applicators indicated a need for a newsletter, and "TOPICS" was instituted.
What are its specific goals and/or targets?	Target is all licensed pesticide dealers and applicators. Goal is to keep them informed on latest developments in pest problems, product registrations and fertilizer uses.
Who is involved in carrying it out?	The newsletter is prepared by staff of the Crop Management Section of Soils and Crops Branch, Manitoba Agriculture.
Is there a legal or regulatory mandate?	The activity is being carried out as a training function under the Manitoba Pesticides and Fertilizers Control Act.
Is the activity monitored or enforced? If so, how?	The dealers and applicators will be surveyed annually to determine the success of the newsletter.
How are the results and progress measured?	Survey results.
What specific progress/results have been achieved?	To date, five monthly issues of the "TOPICS" newsletter have been prepared. The newsletter is intended to go out regularly on a monthly basis.

INDUSTRY ACTIVITY

CANADA

Project or Activity: Container Labelling,Disposal and Recycling – Crop Protection Institute

Risk Reduction Category: Increasing Safety in Pesticide Handling

What are the key elements of the project/activity?	Canada is recognized as the world leader in pesticide container management. The industry actively practices the "3R's" of packaging waste management, REDUCE, REUSE, RECYCLE. In 1989 Canadian industry made a commitment to reduce packaging waste by 50%. This will be achieved through innovations such as water soluble bags, reusable multi-trip containers, new concentrate formulations and low use rate products that require less packaging, and a national empty pesticide container management recycling strategy. • The container management program operates in nine provinces, through ten stakeholder groups comprising of industry, farmers, rural municipalities, dealers and provincial governments. • Today rinsed, clean, dry pesticide containers are collected at more than 700 designated collection sites across Canada. Since the program's inception in 1989, the container management program has removed 13,730,000 empty pesticide containers from the Canadian environment. • To date, the recycling program has reclaimed more than 3.5 million pounds of steel as rebar for reinforcing concrete in construction projects. Plastic is now being recycled into fence posts for rural installation across Canada. • In 1994, nearly 3 million containers were collected – an increase of 26% over the 1993 total, with all provinces registering an increase in the number of containers collected. • Funded completely by the crop protection industry in Canada-since its inception in 1989, members of the Crop Protection Institute have contributed over $20 million to the program. • To increase safety to the user, the Crop Protection Institute member companies have taken various initiatives including development of closed system handling of products, water soluble bags, "no-glue" jugs, lock and load systems, child proof containers, low use rate formulations, and formulations which reduce the possibility of exposure (e.g. gels, dry flowables, or water dispersible granules) • International packaging initiatives to develop safety standards.
When did the project / activity begin and what prompted its initiation?	N/A
What are its specific goals and/or targets?	N/A
Who is involved in carrying it out?	N/A
Is there a legal or regulatory mandate?	N/A
Is the activity monitored or enforced? If so, how?	N/A
How are the results and progress measured?	N/A
What specific progress / results have been achieved?	N/A

CANADA

Project or Activity: Various Programs – Crop Protection Institute
Risk Reduction Category: Increasing Safety in Pesticide Handling

What are the key elements of the project/activity?	The five-year implementation program for national Warehousing Standards was completed March 31, 1995. A proactive industry-led initiative, the Standards are designed to minimize the risk to employees, the environment and the public of storing agrochemical products. All members of the Crop Protection Institute have supported a "No Certificate, No Ship" clause in their manufacturer's agreement, meaning they will not ship product to dealers and distributors who are not in compliance with the Warehousing Standards. • The Standards evolved through a Crop Protection Committee composed of industry personnel. Their implementation was guided by key stakeholders including members of the Institute, the Canadian Association of Pest Control Officials, independent dealers and retailers, and representatives of the warehousing and insurance industries. • The Warehousing Standards encompass three primary areas: - Construction and structural requirements of the warehouse facility, to minimize the risks associated with fire, flooding, spills, explosions, and similar storage accidents. Includes ventilation, diking, and containment systems, lighting, fire walls, 24-hour monitoring. - Employee training designed to minimize risks such as personal injury, occupational illness, insufficient training, and equipment handling, as well as comprehensive emergency response training and documentation. Includes standard operating procedures, pesticide handling and training, WHIMIS and MSDS training, fork-lift operation, spill clean-up, and new employee induction programs. - Documentation designed to minimize the risk of products with information about their chemical components, degree of hazard, method of containment. Includes a preventative maintenance program, site and building design information, adequate on-site and off-site insurance coverage, approvals/certification from officials (government), and emergency response plan • As of April 30, 1995 1,260 warehouses across Canada were in compliance with the Institute Warehousing Standards. • It is expected that warehousers in Canada will spend $80 to $90 million in this upgrading process. • This program is believed to be the largest self-regulatory initiative in Canada. This industry-led self enforcement program is unique to Canada, and clearly reflects the agriculture industry's commitment to the safety and well-being of the Canadian environment and the public at large.
Others	N/A

CANADA
Project or Activity: Dissemination of Information
Risk Reduction Category: Increasing Safety in Pesticide Handling

What are the key elements of the project/activity?	• Support of CAPCO safety initiatives (e.g. vendor and applicator certification initiatives). • Millions of dollars per year spent on promotional technical information for registered products (for use at grower meetings, etc.). • Various videos and brochures have been produced by companies to promote good agricultural practice in the farm community, e.g. Ciba's video and brochure on Best Management Practices, Monsanto's Detail Program, Zeneca's Crop Management Plan, the Crop Protection Institute's “Water in Trust” and “Farm Chemical Safety in Your Hands” brochures. These documents are distributed to government (Federal and Provincial extension), growers, farm associations and distributors. • Companies which are members of the crop protection industry association have 1-800 information hot lines and emergency numbers to call in case of fires, spills or accidents. • Numerous sprayer clinics are held every year. • The Crop Protection Institute conducts annual communication programs for growers to rinse and return empty containers.
When did the project/activity begin and what prompted its initiation?	N/A
What are its specific goals and/or targets?	N/A
Who is involved in carrying it out?	N/A
Is there a legal or regulatory mandate?	N/A
Is the activity monitored or enforced? If so, how?	N/A
How are the results and progress measured?	N/A
What specific progress/results have been achieved?	N/A

CANADA
Project or Activity: Training and Certification of Users
Risk Reduction Category: Increasing Safety in Pesticide Handling

What are the key elements of the project/activity?	• Crop Protection Institute member companies have supported the provincial vendor and applicator certification through participation on CAPCO (participation in the design of the program), and funding ($10,000 in 1994, since 1987). • Crop Protection Institute member companies have taken the initiative to ensure all Material Safety Data Sheets for their products are available to the public electronically on a CD-ROM and through regular distribution channels. • Through discussions with CAPCO, the crop protection industry defined the types of protective gloves which provide the most consistent safety to the user. • A number of companies include protective equipment or accessories in their product packaging (e.g. warning signs, gloves (e.g. bendiocarb, bromoxynil)). • Crop protection companies spend millions of dollars per year on conducting field exposure and dislodgeable residue studies to ensure the appropriate safety precautions are defined. • Various videos and brochures have been produced by companies to promote good agricultural practice in the farm community, e.g. Ciba's video and brochure on Best Management Practices, Monsanto's Detail Program, Zeneca's Crop Management Plan, and the Crop Protection Institute's “Water in Trust” and “Farm Chemical Safety in Your Hands” brochures.
When did the project/activity begin and what prompted its initiation?	N/A
What are its specific goals and/or targets?	N/A
Who is involved in carrying it out?	N/A
Is there a legal or regulatory mandate?	N/A
Is the activity monitored or enforced? If so, how?	N/A
How are the results and progress measured?	N/A
What specific progress/results have been achieved?	N/A

CANADA
Project or Activity: Container Labelling, Disposal and Recycling
Risk Reduction Category: Increasing Safety in Pesticide Handling

What are the key elements of the project/activity?	• Chemical container collection programs/recycling. • Collection and disposal of products. • Reusable containers
When did the project/activity begin and what prompted its initiation?	N/A
What are its specific goals and/or targets?	**Alberta Chemical Container Collection Program** • Began in 1980 to ensure that containers are not disposed of improperly in the environment; goal is to get 100% return of empty containers to designated collection sites. • All registrants must collect, accept back, or dispose of any cancelled products in accordance with provincial direction. **British Columbia Pesticide Management Program** • Program to collect waste pesticides in storage; disposal of domestic and farm products. **PEI Pesticide Container Recycling Program** • Implemented in 1982. • Goal is to recycle all pesticide containers. **Manitoba** • Over 80% of pesticide containers are returned to approved landfill sites and are recycled into energy and other products. **Ontario Pesticide Container Management Program** • Container collection and recycling program was implemented in 1982. **Quebec Pesticide Container Management Program** • Container collection and recycling program implemented in 1993.
Who is involved in carrying it out?	Federal/Provincial/industry effort.
Is there a legal or regulatory mandate?	N/A
Is the activity monitored or enforced? If so, how?	N/A
How are the results and progress measured?	N/A
What specific progress/results have been achieved?	N/A

CANADA

Project or Activity: Pesticide Container Disposal – Association for a Clean Rural Environment

Risk Reduction Category: Increasing Safety in Pesticide Handling

What are the key elements of the project/activity?	The Crop Protection Institute (CPI) collects one dollar from each pesticide container sold in Canada. This levy goes towards the collection and recycling of empty pesticide containers. The Association for a Clean Rural Environment (ACRE) is a non-profit organization in Manitoba formed to manage funds collected by CPI. Initially, more than 125 environmentally approved pesticide container collection sites were established by rural municipalities with funding assistance from ACRE.
When did the project/activity begin and what prompted its initiation?	As a result of the need to ensure safe disposal of empty pesticide containers, ACRE began collecting and recycling containers in 1990.
What are its specific goals and/or targets?	Education and awareness is one important goal of the program. Advertisements have made producers aware of collection sites and the need to properly dispose of pesticide containers. The major goal of ACRE is to clean up the pesticide collection sites. ACRE collects containers, ensures proper disposal of rinsate and unused product, and recycles retrieved containers. Recycled metal containers are used to make rebar used in strengthening cement structures. Recycled plastic containers are shredded and used to replace coal for energy generation.
Who is involved in carrying it out?	ACRE works in co-operation with the chemical industry, several municipalities across the province, Manitoba Agriculture, and Manitoba Environment.
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	ACRE keeps a record of the number of containers it retrieves each year.
How are the results and progress measured?	The success of the program is evaluated based on the number of containers retrieved vs. the number sold.
What specific progress/results have been achieved?	The following containers have been retrieved since the start of the program: ***YEAR METAL PLASTIC RATE OF RETURN*** 1990 165,000 320,000 33% 1991 65,000 325,000 42% 1992 68,000 450,000 61% 1993 34,000 480,000 71% 1994 16,000 690,000 80% TOTAL 348,000 2,265,000 - estimate only -

CANADA
Project or Activity: New Formulations
Risk Reduction Category: Increasing Safety in Pesticide Handling

What are the key elements of the project/activity?	Formulations that reduce exposure
When did the project/activity begin and what prompted its initiation?	1990
What are its specific goals and/or targets?	N/A
Who is involved in carrying it out?	N/A
Is there a legal or regulatory mandate?	N/A
Is the activity monitored or enforced? If so, how?	N/A
How are the results and progress measured?	N/A
What specific progress/results have been achieved?	• Eight new dispersible granular pesticides have been registered, replacing comparable wettable powder formulations. Granular formulation reduces the risk of exposure through inhalation of dust. • Six new gel formulations and several formulations packaged in polyvinyl acetate have been registered. These types of formulations and packaging reduce the risk of occupational exposure through inhalation of dust formulations.

INTEGRATED PEST MANAGEMENT (IPM)

FEDERAL/PROVINCIAL ACTIVITY

Project or Activity: Training, Information and Dissemination
Risk Reduction Category: Promoting IPM

What are the key elements of the project/activity?	**Federal Projects:** • Natural Resources Canada has implemented an Integrated Forest Pest Management (IFPM) Course to advance skill, knowledge of forestry professionals in current techniques, and principles for planning, implementing and evaluating IFPM programmes. • Newsletters which describe current research, new developments and important information about alternative pest management strategies are published. • Numerous publications, such as reports, from other workshops, research programmes, and other activities are provided. **Provincial Projects:** • Provide information on pest resistance such as diagnostic clinics. • British Columbia Ministry of Agriculture, Fisheries and Foods maintains a laboratory that provides information and recommendations on alternatives to pesticides, advice on improved crop management to reduce pesticide use. • B.C.'s growers organizations also recommend alternatives to interested parties. • B.C. is compiling a database of information on IPM programmes. • Manitoba provides information (gathered from producers and forest managers) on such topics as evaluation techniques, biological control options, chemical recommendations, monitoring and pest economic thresholds.
When did the project/activity begin and what prompted its initiation?	
What are its specific goals and/or targets?	
Who is involved in carrying it out?	
Is there a legal or regulatory mandate?	
Is the activity monitored or enforced? If so, how?	
How are the results and progress measured?	
What specific progress/results have been achieved?	

CANADA
Project or Activity: Training, Information Dissemination
Risk Reduction Category: Promoting IPM

What are the key elements of the project/activity?	**Atlantic Canada Domestic Pesticide/IPM Awareness Program:** • The four Atlantic Canada Provinces, Environment Canada, and Agriculture and Agri-Food Canada will be implementing a program in 1995 aimed at increasing the general public's knowledge of pesticide use. In co-operation with a marketing firm, information sheets will be developed on the major insect and weed pests in Atlantic Canada. The sheets will describe important aspects of the pest and how to control it using pesticides and IPM techniques. First aid information will also be given.
When did the project/activity begin and what prompted its initiation?	• Idea development started in August 1994 when the four Atlantic provinces met to discuss pesticide projects of mutual interest. Poisoning statistics initiated the program in the first place.
What are its specific goals and/or targets?	• A specific number has not been set. It is hoped that poisoning statistics will decline.
Who is involved in carrying it out?	• The four Atlantic Provinces will be working closely with the Federal Government to develop and distribute the information sheets.
Is there a legal or regulatory mandate?	• No
Is the activity monitored or enforced? If so, how?	• The activity will be monitored by staying in close contact with the regional offices responsible for distributing the material.
How are the results and progress measured?	• Poisoning statistics will be monitored. Surveys may be conducted.
What specific progress/results have been achieved?	• Project has not been completed. Sponsoring agencies have just recently agreed to finance the initiative.

CANADA
Project or Activity: Research Projects
Risk Reduction Category: Promoting IPM

What are the key elements of the project/activity?	Various projects are underway to develop alternatives to traditional pesticides. These include: **<u>Federal Projects (NRCan and AAFC):</u>** • Silvicultural and agricultural approaches to pest management: designing management techniques that minimize pest impacts and the need for pesticides. • Managing competing vegetation: development of strategies for reducing the impact of competing vegetation (Canada). • Biological control: research and development on the release of insect natural enemies as a component of integrated pest management. • Biologicals: research and development on microbial pest control products, both natural and genetically modified. • Development of pheromone-based monitoring systems for pests. • Research and development of pheromones for pest control. • Development of IPM systems. **<u>Provincial Projects</u>**: • Research on alternative methods of pest control is underway in Alberta: project includes field trials. British Columbia: looking at non-chemical pest controls, crop rotation, early harvesting, top clippings, irrigation management, and use of pheromones to disrupt mating. **<u>Ontario</u>**: Research underway since 1987. Ontario has initiated a Vegetation Management Alternatives programme to develop approaches that will reduce dependence on use of herbicides in Ontario forests. **<u>Alberta:</u>** Sterile grass carp release program for the control of aquatic weeds in irrigation canals. **<u>Quebec:</u>** • Réseau d'avertissements phytosanitaires (IPM Network) supported by the provincial agricultural department since 1975. • R&D on Alternative Pest Management Practices (IPM) supported by Agricultural, Natural Resources and Environment Provincial Departments.

When did the project/activity begin and what prompted its initiation?	
What are its specific goals and/or targets?	
Who is involved in carrying it out?	Federal and Provincial agencies, researchers, pesticide users.
Is there a legal or regulatory mandate?	
Is the activity monitored or enforced? If so, how?	
How are the results and progress measured?	
What specific progress/results have been achieved?	Many of the alternative projects have been quite successful, e.g.: • At the Federal level, Natural Resources Canada research and development efforts on *B.t.,* resulting in improvements, has helped encourage the use of *B.t.* in forest pest management. • At the provincial level, IPM practices have been adopted and have met with multiple successes in many of the provinces.

PROVINCIAL ACTIVITY

Project or Activity: Sterile Insect Release Project
Risk Reduction Category: Implementing IPM

What are the key elements of the project/activity?	British Columbia has developed a Sterile Insect Release Project which entails the release of sterilized moths into the wild codling moth population (wild females that mate with sterile males will produce infertile eggs).
When did the project/activity begin and what prompted its initiation?	1994
What are its specific goals and/or targets?	To reduce pesticide use in apple production.
Who is involved in carrying it out?	Federal and Provincial agencies.
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	Monitoring with pheromone traps.
How are the results and progress measured?	Monitoring with pheromone traps.
What specific progress/results have been achieved?	N/A

CANADA

Project or Activity: Integrated Pest Management Program in Manitoba
Risk Reduction Category: Implementing IPM

What are the key elements of the project/activity?	Integrated Pest Management programs are currently being implemented on a variety of commodities. Pest scouting and monitoring, the use of economic thresholds, forecasting models, cultural and biological controls, as well as effective pesticide applications have all been implemented where appropriate. There are well established IPM programs for a number of vegetable, fruit and pulse crops. Currently IPM strategies are being devised and tested for oilseed, cereal and forage crops. IPM programs will continue to encompass the management of insects, disease and weeds in order to maximize returns for producers.
When did the project/activity begin and what prompted its initiation?	IPM programs in the province are either recent activities or currently being developed. There are a number of factors behind this initiative, including profitability and pest resistance to pesticides.
What are its specific goals and/or targets?	To better understand pest population dynamics, in order to manage populations below economic densities and maximize economic returns to producers, as well as ensuring environmental and human safety.
Who is involved in carrying it out?	IPM programs are being carried out and developed by a number of stakeholders, including producers and producer groups, provincial specialists, and university and federal researchers.
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	No
How are the results and progress measured?	Results and progress will be measured directly through damage and pest control levels, as well as economic returns.
What specific progress/results have been achieved?	Successes have been achieved in a number of areas, including the prediction and successful control of a large bertha armyworm outbreak in 1994. The use of an environmental forecasting model for early and late blights in potato, was successfully introduced in 1994, prepared producers for the arrival of the disease. Other initiatives have lead to the adoption of economic thresholds and monitoring activities, as well as the production of IPM manuals for specific commodities. IPM is a dynamic process, and successes will continue as information becomes available.

CANADA
Project or Activity: Pest Prevention and Exclusion Programs
Risk Reduction Category: Implementing IPM

What are the key elements of the project/activity?	**Alberta: Pest Prevention and Exclusion Programs** • Preventing the establishment of the pest through prevention negates the need for control programs. Main targets are the Norway Rat, Diffuse Knapweed, Spotted Knapweed, Nodding Thistle, Dutch Elm Disease.
When did the project/activity begin and what prompted its initiation?	• Activity started with the Norway Rat in 1948. Other species have been added as pests have developed in neighbouring jurisdictions.
What are its specific goals and/or targets?	• Reduce pesticide use by preventing its need.
Who is involved in carrying it out?	• Joint Provincial/Municipal program.
Is there a legal or regulatory mandate?	• Regulatory requirement under the Weed Control Act and the Agricultural Pests Act.
Is the activity monitored or enforced? If so, how?	• Continued monitoring for new infestations.
How are the results and progress measured?	• Inspections ensure the pests do not establish a foothold in the province.
What specific progress/results have been achieved?	• No establishment of the target pests. Continued monitoring for new infestations exists. New infestations are immediately excluded.

CANADA
Project or Activity: Training, Information Dissemination
Risk Reduction Category: Promoting IPM

What are the key elements of the project/activity?	**Alberta:** Dissemination of information (development of an Educational Module on Environmental Toxicology).
When did the project/activity begin and what prompted its initiation?	November 1994. It is currently being developed because of the current lack of appropriate information within the school curriculum on environmental toxicology.
What are its specific goals and/or targets?	To develop useable and sufficient numbers of teaching materials and student materials for introduction into the junior/senior high school science curriculum for use across Canada.
Who is involved in carrying it out?	Dissemination of finished copies will be through various agencies.
Is there a legal or regulatory mandate?	No. Development of this education module is voluntary.
Is the activity monitored or enforced? If so, how?	Once the module is completed (completion date is expected to be the spring of 1995) staff will monitor the number of requests for the environmental toxicology module from teachers.
How are the results and progress measured?	Success of the module will be determined by the number of requests for the module from teachers and the type of feedback received from teachers (either by letter, word of mouth, or questionnaire).
What specific progress/results have been achieved?	No specific results have been achieved to date with this module, since it is still in development. Based on the 5 previous education modules developed for the pesticide education program (PEP), it is expected that this module will be well received by teachers and students. PEP has been used by over 2,600 teachers and 40,000 students in Alberta and across Canada.

CANADA
Project or Activity: Training, Information Dissemination
Risk Reduction Category: Promoting IPM

What are the key elements of the project/activity?	Development of Codes of Good Practice in Quebec
When did the project/activity begin and what prompted its initiation?	1990. Information on recommended practices came in the past from various departments and from industry. The need for a consensus on "good practices" prompted the creation of provincial/industry working groups to write down the codes.
What are its specific goals and/or targets?	To provide concise educational documents on IPM and safe use of pesticides that can be adopted as "codes of good conduct".
Who is involved in carrying it out?	The Environment Department is assuming the leadership, but other departments (Health, Agriculture, Natural Resources, Worker Safety) and industry are closely involved.
Is there a legal or regulatory mandate?	No. Development and updates are voluntary.
Is the activity monitored or enforced? If so, how?	- These documents are the main tools used to promote IPM; more technical documents are also available. - To date, the landscape industry association has adopted the code as a standard for its members. The structural industry is planning to do the same.
How are the results and progress measured?	- The publication of each code is an achievement, since it is the result of a consensus. - Success of a code is determined by the number of requests for the document and by the feedback of the readers.
What specific progress/results have been achieved?	**Codes published:** • **Agricultural:** Published in 1991; 42,500 copies. To be updated in 1995 with the support of Quebec's Farmers Union (UPA). • **Domestic:** Published in 1993; 75,000 copies. To be update in 1995 with the support of Quebec's Horticultural Societies Federation (FSHEQ). • **Landscape:** Published in 1994; (5,000 copies); with the support of Quebec's Landscape Federation (FIHOQ). **Codes in progress:** • **Structural:** To be published in 1995 with the support of Quebec's Structural Association (ASEQ).

INDUSTRY/GOVERNMENT ACTIVITIES

CANADA
Project or Activity: Training, information dissemination
Risk Reduction Category: Promoting IPM

What are the key elements of the project/activity?	• Various companies offer monitoring service in orchards and greenhouse vegetables and ornamentals (e.g. plant products). • Various companies are developing or marketing beneficial insects or organisms for sale as biological pest control agents. • A Crop Protection Institute representative served on the board of directors of the Pest Management Alternatives Office from 1990 to 1995. The PMAO's main focus was on IPM and reduced dependence on pesticides, from the perspective of research and dissemination of information. • Various documents have been produced (e.g. Plant Products Technical Manual, PMAO pest management brochures) and workshops have been held (e.g. PMAO National IPM workshop, National Pesticide Risk Reduction workshop, and various crop-specific IPM workshops). • IPM is integrated into the registered labels of most products. • Crop Protection is involved in the K.E.Y. Foundation effort (Knowledge and Education for Youth). • Crop Protection Institute members participate in the National Workshops on agri-environmental indicators. • Crop Protection Institute has funded work on models for risks evaluation (e.g. applicator exposure, spray drift).
When did the project/activity begin and what prompted its initiation?	N/A
What are its specific goals and/or targets?	N/A
Who is involved in carrying it out?	N/A
Is there a legal or regulatory mandate?	N/A
Is the activity monitored or enforced? If so, how?	N/A
How are the results and progress measured?	N/A
What specific progress/results have been achieved?	N/A

CANADA
Project or Activity: Training, Information Dissemination
Risk Reduction Category: Implementing IPM

What are the key elements of the project/activity?	Consultation and Extension Programs (provides a one-on-one consultation as well as information on technology transfer activities).
When did the project/activity begin and what prompted its initiation?	• Ongoing since the mid 1930's.
What are its specific goals and/or targets?	• Assists the producer in incorporating specific pest control techniques into his system of production. Tries to develop a systems approach; integration of techniques into normal agronomic practices to reduce the extensive use of one pest control technique.
Who is involved in carrying it out?	• Federal and provincial government and industry experts.
Is there a legal or regulatory mandate?	• N/A
Is the activity monitored or enforced? If so, how?	• Not actively monitored.
How are the results and progress measured?	• No tangible measurements. Success is measured by the type and number of changes to pest control adopted by the target audience.
What specific progress/results have been achieved?	• N/A

CANADA
Project or Activity: Integrated Pest Management in Forestry
Risk Reduction Category: Implementing IPM

What are the key elements of the project/activity?	An IPM approach for the use of forest pest control products has been developed by provincial forest pest managers. • **Forecasting Survey:** Conducted annually to monitor and forecast population levels which are rated according to expected damage thresholds to determine areas in need of protection. • **Hazard Rating:** Analysis of forest parameters (age, species, etc.) and present or past damage to determine along with the population forecast which areas are most at risk and hence are priorities for protection. • **Susceptibility Rating:** Analysis of stand parameters and their different influences on damage for use in prioritizing areas for protection used in the initial development of Hazard rating. • **Timing Survey:** Monitoring the phenological development of (a) insects and (b) host trees, to determine the optimum biological time to apply the insecticide to maximize the chances for desired levels of efficacy. Different criteria are used for different tree hosts and different insecticides (e.g. timing, *B.t.* application on balsam fir or red spruce is different from using chemical on either host). • **Development Surveys:** Conducted during the control operation to determine if it is at the point where applying the insecticide is no longer beneficial and hence terminating the operation. Can also lead to cancellation of second applications, or re-prioritizing treatments. • **Weather Monitoring:** Assessing temperature, wind speed, relative humidity, and rain to determine condition most appropriate for application of insecticide to minimize off-target contamination and increase chances for efficacy. • **Efficacy Evaluation:** Establishing assessment plots in treated and untreated areas, monitoring pre- and post-treatment areas, and monitoring pre- and post-treatment data to assess the benefits (=efficacy) of the program. Such data can be used in product evaluations and project logistics (e.g. timing, etc.) to make appropriate modification to future programs. In some cases the data can be used to modify the program by identifying target areas not requiring treatment; areas requiring only one treatment; or areas of high priority that should be treated more times (subject to label conditions) or with shorter intervals (again subject to label conditions). • **Computer Technology:** Use of Geographic Information Systems (GIS) to identify target forest stands which meet various criteria for protection; and, alternatively for identifying special areas where treatments are not permitted, i.e. Buffer Zones.

What are the key elements of the project/activity? **(Continued)**	• **Decision Support Systems:** Computer models under development to modify and/or improve protection planning by making the analysis of multiple variables in short time periods. Some examples include: PKBW2, BIOSIM, PROPS. Also programs to analyze long-term timber supplies.
When did the project/activity begin and what prompted its initiation?	Approach evolved from early 1950's.
What are its specific goals and/or targets?	Improve cost/effectiveness of forest pest control.
Who is involved in carrying it out?	Provincial agencies and industry.
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	Monitoring is carried out by user agencies.
How are the results and progress measured?	Monitoring for efficacy/targeting.
What specific progress/results have been achieved?	Substantially improved efficacy/targeting.

CANADA
Project or Activity: Research Projects
Risk Reduction Category: Promoting IPM

What are the key elements of the project/activity?	• The Crop Protection Institute was represented on the board of directors of the Government of Canada's Pest Management Alternatives Office. • The Crop Protection Industry developed a national position and directive on weed resistance management and participated in a similar international initiative. • Various crop/disease resistance management programs have been developed by companies, and research dollars spent to study pest organism (e.g. potato late blight resistance). • The crop protection industry continues to invest in research on new technologies such as biotechnology (e.g. disease and insect resistant plants) and development of biologicals (e.g. *B.t.*, nematodes, etc.) for pest control. • Individual companies fund research with Agriculture and Agri-Food Canada and Natural Resources Canada. • The Crop Protection Institute members are very involved in projects to identify agri-environmental indicators. This industry recognizes the importance of looking at the whole input/output of farm practice and how any change can affect the environment.
When did the project/activity begin and what prompted its initiation?	N/A
What are its specific goals and/or targets?	N/A
Who is involved in carrying it out?	N/A
Is there a legal or regulatory mandate?	N/A
Is the activity monitored or enforced? If so, how?	N/A
How are the results and progress measured?	N/A
What specific progress/results have been achieved?	N/A

MEASUREMENT TOOLS

FEDERAL ACTIVITY

CANADA
Project or Activity: Indicators and Criteria
Risk Reduction Category: Developing Measuring Tools

What are the key elements of the project/activity?	Canada is developing Indicators and Criteria to measure the sustainability of Canadian agriculture/forestry. These will provide decision makers and stakeholders with succinct information on key sustainability trends in their sector. This will facilitate the integration of environmental considerations into policy-making and planning.
When did the project/activity begin and what prompted its initiation?	Recommendation of: UNCED, OECD, the Federal-Provincial Agriculture Committee on Environmental Sustainability, the Federal Green Plan, Office of Research Council, House of Commons Standing Committee on Agriculture, 1989 Agri-Food Policy Review, Canadian Council of Forest Ministers, International Initiatives on Criteria and Indicators.
What are its specific goals and/or targets?	To develop a capability for evaluating the agriculture/forest sectors, environmental performance.
Who is involved in carrying it out?	Agriculture and Agri-Food, Natural Resources Canada, Environment Canada and Provinces.
Is there a legal or regulatory mandate?	N/A
Is the activity monitored or enforced? If so, how?	N/A
How are the results and progress measured?	N/A
What specific progress/results have been achieved?	N/A

FEDERAL/PROVINCIAL ACTIVITY

CANADA
Project or Activity: Pesticide Use Database
Risk Reduction Category: Measurement Tools

What are the key elements of the project/activity?	Development and maintenance of databases on pesticide use.
When did the project/activity begin and what prompted its initiation?	1970's Need to have accurate information on pesticide use to support policy development, compliance programs, and measurement of progress in risk reduction.
What are its specific goals and/or targets?	N/A
Who is involved in carrying it out?	Regular use surveys are conducted by many provinces. In some cases, electronic databases are maintained. A national database is planned to be developed by a Federal-Provincial working group.
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	N/A
How are the results and progress measured?	N/A
What specific progress/results have been achieved?	Databases have been successfully established in several provinces.

III. Conclusions

Which activities have been most successful? What are the reasons for their success?

Obviously the success of any program varies from one jurisdiction to another; what works in one province may not necessarily work in another. But there have been some common success stories that may provide some valuable insight into risk reduction activities in Canada.

- Generally speaking, the certification activities carried out at the provincial and federal levels have been quite successful. This is largely because they are regulated and enforced.

- Most of the educational programs (applicator, vendor, or within the education system itself) have also been quite successful.

- Many of the alternative programs have also been quite successful.
  - At the federal level, Natural Resources Canada (NRCan) research and development efforts on *B.t.*, resulting in improvements, has helped encourage the use of *B.t.*
  - At the provincial level, Integrated Pest Management (IPM) practices have been adopted, and have met with multiple successes in many of the provinces.

The reasons for success are as diverse as the success stories themselves. However, most of the provinces indicated that their most successful programs were those that were mandatory (i.e. applicator certification programs, retailer education, etc.).

Those programs that were considered voluntary were not as successful.

Which activities have been least successful or presented the most difficulties? What are the reasons for these difficulties?

Along with a number of success stories, Canada has experienced a number of difficulties concerning risk reduction activities.

- There are three explanations for most of the Canadian difficulties.
  - Funding/investment crisis;
  - In general, those programs requiring a large infusion of capital or resources were likely to encounter difficulties;
  - A number of alternative programs experienced similar crises; new alternatives require new technologies and new procedural systems. Due to a general uneasiness and scepticism towards new practices, funding is often quite difficult to attain. Without adequate funding, programs are likely to fail.

- Balancing interests
  - Due to the competing interests surrounding the pesticide portfolio (i.e. users vs. environmentalists), it is often difficult to achieve some form of cohesion or compromise amongst the various stakeholders.
  - Conflict is often inherent in the system.

- Volunteer vs. mandatory involvement
  - Voluntary programs have not been as successful as the mandatory ones.

What successes and difficulties have you encountered in measuring the progress and/or results of the activities?

Because of Canada's federal nature, and specifically the overlap with regard to the pesticide issue, it is sometimes very difficult to distinguish between federal or provincial programs.

Also, because many of the risk reduction activities are relatively recent developments, it is too early to draw conclusions and assess the success or failure of specific programs.

Some provinces have complained about the difficulty in acquiring some of the data needed to assess the success of particular programs.

Other jurisdictions reported difficulties in assessing programs, largely as a result of a lack of resources and funding.

How have other policies or programmes in your country affected the outcome of the pesticide risk reduction activities?

A number of provinces and federal departments indicated that increased environmental awareness and health consciousness were facilitating the movement towards alternative approaches to pest management.

Financial constraints on all levels of government have seemingly inhibited new initiatives, including risk reduction activities. As a result, many provinces simply cannot afford to implement these programs.

What projects at the international level would help your country achieve further progress in pesticide risk reduction?

International programs in pesticide risk reduction would be of significant benefit to Canada. According to provincial and federal survey responses, a number of potential projects could dramatically help them achieve further progress in risk reduction activities. Among them:

- The development of a co-ordinated international effort to promote IPM. This would aid in the reduction of risks globally and would also support local pesticide reduction efforts.
- The development of a common core set of data requirements for alternatives would be extremely beneficial to Canadian users.
- Harmonization efforts for alternative products would also assist Canadian efforts in risk reduction; and the development of a supportive regulatory climate internationally for alternatives would also be advantageous.
- And finally, continued participation in international activities and forums, such as CUSTA, CODEX, and the OECD, inevitably increase Canadian awareness of risk reduction activities in general.

DENMARK

CONTACT PERSON(S):

Pesticide Risk Reduction Plan:

Mr. Lars Fock and Mrs. Lene Gravesend
Danish Environmental Protection Agency
The Pesticide Division
Strandgade 29
DK-1401 Copenhagen K
Tel: (45) 32 66 01 00 Fax: (45) 32 66 04 79

Organic farming:

Mr. Jens Holt-Nielsen and Mrs. Anita Kjeldsen
The Plant Directorate
Skovbrynet 20
DK- 2800 Lyngby
Tel: (45) 45 96 66 00 Fax: (45) 45 96 66 10

Spray equipment and spraying journals:

Mrs. Lisbeth Ott-Ebbesen
The Plant Directorate
Skovbrynet 20
DK 2800 Lyngby
Tel: (45) 45 96 66 00 Fax: (45) 45 96 66 10

Information to users of pesticide:

Mr. Hans Kristensen
The Danish Agricultural Advisory Centre
Udkaersvej 15 - Skejby
DK-8200 AArhus N
Tel: (45) 86 10 90 88 Fax: (45) 86 10 97 00

IP for fruit and vegetables:

Mr. Preben Henriksen
The Marketing Board for fruit and vegetables
Torveporten 10
DK-2500 Valby
Tel: (45) 31 16 62 00

I. Framework for Pesticide Risk and Use Reduction Activities

1. Since 1986 Denmark has had a national action plan aiming at reducing damage from pesticides to health and the environment. The plan includes the whole country and is primarily aiming at the agriculture. There have not been specific targets for individual parts of the country.

Establishing and administration of rules concerning marketing and use of pesticides are made by central authorities, mainly the Danish EPA. The Danish Working Environment Inspection is involved as to the working environmental aspects, and the National Food Agency is involved in connection with evaluation of pesticides' health effects through food. Finally the Ministry of Agriculture is involved in the evaluation of the efficacy, the registration of the use and the supervision with pesticides.

Both central and local authorities may have stipulated more strict objectives for use of pesticides on their own land. This can be seen in the state forests, the churchyards and the National Railways.

Add to this that many citizens, organizations and grass root movements are participating in the public debate in order to urge a minimized use of pesticides.

2. In Denmark there is a broad consensus of opinion that the damage to health and the environment from pesticides shall be limited. This can be seen from the great interest from the public and from a general political agreement which has been accepted by most members of the Parliament.

The background for the effectuation of the plan in 1986 was a worry as a consequence of an increased use of pesticides and the placing on the market of biologically more active products. During the last years focus has been on the risk of pollution of the ground water. At the same time there is a general worry about the working environment, and about products with oestrogenic effect among others.

3. According to Act on Chemical Substances and Products (cf. Consolidation Act No. 583 of July. 9, as amended by Art No. 438 of June 1, 1994). all pesticides shall be approved before marketing or use. Approvals have a time limit of 10 years.

The use of pesticides is regulated by Statutory Order on Pesticides (Statutory Order No. 584 of July 9, 1993). Moreover Denmark has separate Statutory Orders on Instruction of trade users of pesticides, on pesticide spraying from aeroplane, on spraying journals and on inspection of spraying material. In the action plan from 1986 mainly voluntary arrangements, information and research are included.

II. Description of Activities

DENMARK
Project or Activity: National action plan
Risk Reduction Category: Reducing pesticide use

What are the key elements of the project/activity?	Since 1986 Denmark has had a national action plan intended (1) to protect both pesticide users and the general public from pesticide risks and (2) to protect the environment, i.e. harmless and beneficial organisms. The objective of the plan is to halve pesticide use before 1997, as compared to the period 1981-1985. This target was fixed on the basis of estimates of what would be both efficacious (i.e. adequate pest control) and economically feasible (i.e. economic losses for farmers not too great). In 1991 the plan was confirmed and linked to an action plan for sustainable development of agriculture. Applied research to support the plan (e.g. on preventive and non-chemical products and on spraying according to need) is being done by the Danish Institute of Plant and Soil Science (Ministry of Agriculture).
When did the project/activity begin and what prompted its initiation?	In Denmark there is a broad consensus that pesticide damage to both health and the environment should be limited. The national action plan was begun in 1986 because of concern about: · the increase use of pesticides · the placing on the market of biologically more active products · groundwater pollution and related risks for agricultural workers. The basic assumption of the action plan was that it is impossible to establish an environmentally sound level for the use of pesticides, and therefore their use should be reduced to a minimum. The action plan for sustainable agriculture was initiated in response to an acknowledgement that the measures in the existing environmental action plans were insufficient.

What are its specific goals and/or targets?	While the overall goal is a 50% reduction, the plan aims to reduce both the quantity of pesticide applied and the frequency of application (number of dosages according to the recommended dose rate per hectare cultivated). This is to be achieved by getting farmers to: · spray according to need rather than by a set schedule · choose the proper product · use the smallest doses possible · use good agricultural practices that reduce pest problems, such as crop rotation and resistant species · do not spray when it cannot pay · spray at optimum times, considering both the development of the pest and the best time of day
Who is involved in carrying it out?	Danish PEA Ministry of Agriculture Danish Institute of Plant and Soil Science Danish Plant Directorate The Agricultural Consultant Service
Is there a legal or regulatory mandate?	Act on Chemical Substances and Products
Is the activity monitored or enforced? If so, how?	Monitoring: quantity of sold pesticides used in different crops Enforcement: education, supervision with field spraying equipment
How are results and progress measured?	Annual statistic publication (in Danish)
What specific progress/results have been achieved?	The quantity of active substances sold in 1994 has decreased by 44% since 1981-1985 and the treatment frequency has decreased by 6%. The crop composition has changed toward crops which traditionally require more intensive treatments with pesticides. The treatment frequency in the specific crops has on average been reduced by approx. 20%. It seems difficult to achieve the target of halving the use before 1997, especially when the use is calculated with the treatment frequency.

DENMARK
Project or Activity: Education and training
Risk Reduction Category: Increasing safety in pesticide use

What are the key elements of the project/activity?	Danish farmers must follow one of several possible courses on pesticide use and safety: 1) those who study agriculture have a special course that, since the mid-1980s, includes information about the health and environmental problems (and solutions) of pesticides 2) farmers who did not have this special course but use pesticides commercially must attend a special 72-hour course with a similar content (e.g. safety in pesticide use, identification of the most important pests, use of pesticide in need-based strategies). 3) farmers established before 1991 can attend a shorter course if they use pesticides only on their own farm. 4) users of very toxic products must attend a special course.
When did the project/activity begin and what prompted its initiation?	Mid-1980s to 1993 Part of the action plans
What are its specific goals and/or targets?	To make the professional users be able to use pesticides with a minimum of risks for health and the environment.
Who is involved in carrying it out?	Association for Agriculture Colleges in Denmark Directorate General for Employment, Placement, and Vocational Training
Is there a legal or regulatory mandate?	Statutory Order from the Ministry of the Environment No. 360 of May 24, 1993, on education for professional pesticide users.
Is the activity monitored or enforced? If so, how?	The municipal councils shall see that the provisions in the statutory Order are observed.
How are results and progress measured?	
What specific progress/results have been achieved?	At the end of 1994, approx. 13,700 persons have passed the 72-hour course, and approx. 7,000 farmers have passed the shorter course.

DENMARK
Project or Activity: Use restrictions
Risk Reduction Category: Protecting sensitive areas, species

What are the key elements of the project/activity?	Several types of restrictions are linked to registration: <u>To protect water bodies:</u> - pesticides estimated to be dangerous to aquatic organisms may not be applied within 10 metres of water - for approving a water catchment plant the Danish EPA has stipulated rules concerning use of pesticides <u>Aerial spraying:</u> Spraying pesticides by aeroplane requires a special authorization from the Danish EPA
When did the project/activity begin and what prompted its initiation?	Use restrictions have been in force for many years
What are its specific goals and/or targets?	To protect aquatic organisms
Who is involved in carrying it out?	Danish EPA
Is there a legal or regulatory mandate?	At the approval of a pesticide, it is stipulated that the label shall mention specified risks and safety measures. The measures are mandatory for the users.
Is the activity monitored or enforced? If so, how?	
How are results and progress measured?	
What specific progress/results have been achieved?	Aerial spraying is seldom done

DENMARK
Project or Activity: Activities to improve pesticide spraying
Risk Reduction Category: Increasing safety in pesticide use

What are the key elements of the project/activity?	Denmark initiated activities in 1994 to improve pesticide spraying: <u>Spray equipment:</u> From August 1994, the Danish Plant Directorate supervises field spraying equipment (precise dosages and installations) <u>Spraying journal:</u> From August 1994, all farmers must keep a journal of the quantity and sort of pesticides used in all fields. The journal can be used to control which products are being used. It also enables the farmer to evaluate the spraying he has done.
When did the project/activity begin and what prompted its initiation?	1994 The action plan for sustainable development
What are its specific goals and/or targets?	To secure that the quantity of pesticides spread out is not more than aimed
Who is involved in carrying it out?	Danish Plant Directorate
Is there a legal or regulatory mandate?	Statutory Order from the University of Agriculture on spraying journals and viewing on spray equipment, no. 492 of June 7, 1994.
Is the activity monitored or enforced? If so, how?	The Danish Plant Directorate look at farmers' journals and spray equipment.
How are results and progress measured?	
What specific progress/results have been achieved?	500 spraying journals have been controlled during autumn 1994. The spraying equipment is more defective than supposed. It seems that final conclusions cannot be made.

DENMARK
Project or Activity: Subsidy programmes
Risk Reduction Category: Reducing pesticide use, promoting IPM

What are the key elements of the project/activity?	Denmark has several programmes that offer subsidies for reduced pesticide use: · as part of the common EC agriculture policy there is a subsidy per hectare for establishing non-sprayed marginal zones · subsidies will also be given from 1995 for establishing unsprayed marginal zones at especially sensitive areas, e.g. watercourses. The marginal zones must be at least 12 metres wide and totally unsprayed · subsidies can be granted for a period of up to 20 years for leaving fallow (and not spraying) agricultural land · subsidies are given to ecological agriculture: the subsidy is 1350 DCR per hectare during the first 3 years, then 750 DCR per hectare thereafter
When did the project/activity begin and what prompted its initiation?	1994
What are its specific goals and/or targets?	
Who is involved in carrying it out?	Ministry of Agriculture
Is there a legal or regulatory mandate?	
Is the activity monitored or enforced? If so, how?	
How are results and progress measured?	
What specific progress/results have been achieved?	In 1994, 225.000 hectares of agricultural land (7% of total agricultural land) have been left fallow as part of Common EU-policy: 1/3 has been left fallow for 1 year, 2/3 has been left fallow for 5 years. 20-year fallow starts in 1995.

DENMARK
Project or Activity: Farmers associations
Risk Reduction Category: Promotion of alternative pest management strategies

What are the key elements of the project/activity?	Producers of fruit and vegetables can join an arrangement concerning controlled integrated production. The purpose is to promote good cultivation practices and to reduce the use of pesticides and fertilizers. IP concept has been developed for the cultivation of 14 sorts of fruits and 52 sorts of vegetables.
When did the project/activity begin and what prompted its initiation?	1993
What are its specific goals and/or targets?	
Who is involved in carrying it out?	User groups
Is there a legal or regulatory mandate?	
Is the activity monitored or enforced? If so, how?	- Voluntary - The Danish Plant Directorate does spot checks of IP-producers' farms.
How are results and progress measured?	
What specific progress/results have been achieved?	It is estimated that between 2/3 and 3/4 of the total fruit and vegetable production is made within IP schemes. The products may not be marketed as "open products", because of the risk of confusing the consumers with different kinds of green labelling.

DENMARK
Project or Activity: Providing information to users
Risk Reduction Category: Promoting IPM

What are the key elements of the project/activity?	There are many different activities and written materials aimed at providing information to pesticide users: - Codex for good agriculture (e.g. guidelines for use of resistant varieties and crop rotation), elaborated by the Danish EPA and the Royal & Agricultural University. The Codex will be distributed in spring 1995. - Handbook on non-chemical control in green areas, to be used by gardeners, local authorities - Leaflet on how to place non-sprayed marginal zones near quickset or small biotopes, by the Danish EPA and Agricultural Advisory Centre - PC-Plant Protection (computer programme) which aims at an integrated cultivation practise and at making leaflets and videos concerning need-based pest strategies, elaborated by the Danish Institute of Plant and Soil Science and the Danish Agricultural Advisory Centre. - Educational Activities: The Danish Agriculture Directorate grants subsidies for different information/education activities as part of its effort to promote the sale of ecological products. The Danish Agriculture Ministry plans to create a ecological demonstration farm.
When did the project/activity begin and what prompted its initiation?	
What are its specific goals and/or targets?	
Who is involved in carrying it out?	Danish Environmental Protection Agency Danish Agriculture Ministry Royal & Agricultural University Danish Institute of Plant and Soil Science
Is there a legal or regulatory mandate?	
Is the activity monitored or enforced? If so, how?	
How are results and progress measured?	
What specific progress/results have been achieved?	

DENMARK
Project or Activity: "Green" labelling
Risk Reduction Category: Promoting IPM

What are the key elements of the project/activity?	Ecologically produced products receive a state controlled label. To get a label, a product has to derive from farms which are authorized by the Danish Plant Directorate (it has set up directives for use of raw materials and cultivation).
When did the project/activity begin and what prompted its initiation?	1989
What are its specific goals and/or targets?	
Who is involved in carrying it out?	Danish Agriculture Ministry
Is there a legal or regulatory mandate?	
Is the activity monitored or enforced? If so, how?	
How are results and progress measured?	
What specific progress/results have been achieved?	Less than 1% of the crops have an ecological label. In 1994-1995, the demand for ecologically produced products has been increasing and the supply of these products cannot cope with the demand. Of the crops with ecological labels, wheat represents 3-4%, milk for consumption: 6-7%, carrots: 7-9%, potatoes: 3-4%.

III. Conclusions

The objective of halving the pesticide use before 1997 will be very difficult to fulfil – especially when using the treatment frequency as a unit of measurement.

A reduction of the use implies an active effort from the agriculturist. Frequent inspections in the fields must be made, knowledge of the damaging elements must be maintained, and a postponement of spraying requires a willingness to take a risk, even though the risk seen from a managerial economic view is profitable.

Motivation is very important for the behavior. The attitude of the agriculturists and their organizations has changed, so that now there is a greater understanding as to the environmental consequences by using pesticides – especially as to the ground water. This change of attitude is most important as to the understanding of encouraging the use of less dangerous products and to prohibit the use of the most dangerous products. The consideration for the competition with agriculturists in other countries however is a part of the agriculturists' acceptance of prohibition of products especially damaging to the environment. There are different attitudes among the agriculturists as to the target of a general reduction of the use of pesticides.

It is important to involve the agriculture organizations as much as possible in order to obtain a broad change of attitudes, and it is important to use the ordinary agriculture information channels as much as possible.

Another important motivation factor is the farming economy.

In 1996, Denmark will introduce a tax of 37 percent on the retail price of insecticides and soil disinfection agents, and a tax of 15 percent on herbicides, fungicides, repellents and growth regulators. The tax rates reflect the differences in the average costs of these two groups of pesticides, so that farmers' tax burden for spraying one hectare will be the same regardless of the pesticide used. About 80 percent of the revenue obtained will be returned to the farmers through reduced land taxes. The rest will be used for research and registration costs.

International levies on pesticides would reduce the use and at the same time have the effect that no country will be inferior in competition.

The EC-agriculture reform in 1992 will gradually cause a reduced pesticide use. In the past heavy subsidies of the prizes of agriculture products could cause a large use of pesticides. By adjusting the support calculating it on the basis of land an extensive cultivation will be encouraged, and by this also a decreased use of pesticides.

There is still a great public interest in reducing the use of pesticides. Especially a still increasing discovery of pesticide residues in the ground water has focused the area politically.

It is impossible to point alone single factor having been a special success. It is important that the agriculturists have the necessary knowledge and understanding of reducing the use of pesticides, but the economic frames and procedures with results have to be present too in order to obtain a reduction.

FINLAND

CONTACT PERSON(S):

Programme for reducing use of pesticides

Hans Blomqvist
Plant Production Inspection Centre
Pesficide Division
P.O. BOX 42
FIN - 00501 HELSINKI
Tel: (358) 0 134211
Fax: (358) 0 13421421

EnvIronment/authority

Kaija Kallio-Mannila
Finnish Environment Institute
Chemicals Division
P.O. BOX 140
FIN - 00250 HELSINKI
Tel: (358) 0 403 00532
Fax (358) 0 403 00591

Environment/research and integrated control

Sirpa Kurppa
Agricultural Research Centre
FIN - 31600 JOKIOINEN
Tel: (358) 0 16 1881
Fax: (358) 0 16-188584

Extension

Risto Lallukka
Association of Rural Advisory Centres
Lönnrotinkatu 13
FIN - 00120 HELSINKI
Tel: (358) 0 680700
Fax: (358) 0 68070270

I. Framework for Pesticide Risk and Use Reduction Activities

Ministry of Agriculture and Forestry and Ministry of Environment accepted a rural environmental programme in fall 1992. The programme contains a plan to reduce the use of pesticides (enclosed).

According to the programme pesticides shall be used by scrutinized need only. The quantity used should be halved by the mid 1990's in relation to the average amount sold in 1987-1991. Thereafter the trend of usage should be further diminishing. The programme contains a rather general proposal about the measures to be taken to reach the national objective set.

A more detailed programme about reducing measures is at present under preparation.

The reduction programme is based on voluntary measures. In addition to the quantitave reduction target in pesticide usage, the risk minimising aspect has received consideration. Reduction in usage is based primarily on environmental reasons. The usage of pesticides has not caused similar environmental problems in Finland, which have occurred in many European countries in extent, that there have been necessity to correct the situation by legislative measures. In Finland the objective has rather been to follow the international practice by working out a programme targeting for reducing the use of pesticides.

Although a clear and well defined reduction objective for the usage of pesticides has been set just a few years ago, there have already been undertakings during many years to promote the use of pesticides according to the scrutinized need.

Extension and public education activities aiming to prevention of disadvantages caused by pesticide use, have been carried out as well on the governmental as on the regional and community level. Agricultural as well as environmental authorities, research Institutes and other organisations such as various societies have given training and have drafted publications and advisory leaflets on i.a. good agricultural practice as well as on biological and integrated control methods. Testing for the condition of the spraying equipment has been considered to be an important measure in reaching the objective of reduced quantifies of use.

II. Description of Activities

FINLAND
Project or Activity: Rural Environmental Programme
Risk Reduction Category: Reducing pesticide use

What are the key elements of the project/activity?	A Rural Environment Programme was initiated in 1993 to expand existing activities and create new ones to reduce the overall input of chemicals in agriculture including pesticides (to reduce pesticide use and risk). The programme has 6 elements: 1. restricting pesticide use to a need-only basis 2. testing and inspection of spray equipment 3. providing advice and training in pesticide use 4. reducing use by cultivation techniques and other measures 5. revising use of growth regulators so as to reduce nitrogen leaching 6. monitoring and follow-up
When did the project/activity begin and what prompted its initiation?	The programme was accepted by the Ministry of Agriculture and Forestry and the Ministry of Environment in fall 1992. Finland adopted the programme in order to follow international practice, although Finland has not experienced the types of environmental problems that have prompted pesticide reduction programmes in other European countries.
What are its specific goals and/or targets?	The long-term objective is to adopt agricultural practices that are environmentally sustainable, produce clean foods with minimal pesticide residues, and are economically profitable. The programme sets a specific target of halving pesticide use by the mid 1990's from an average amount sold in 1987-1991 (i.e. to a level of 1,000 tons of active ingredient per year). Thereafter a further reduction in pesticide use must take place. The programme also focuses on minimising risk.
Who is involved in carrying it out?	Authorities, farmer organizations, farmers, etc. (see responses for specific activities)
Is there a legal or regulatory mandate?	Farmer (pesticide user) participation in the programme is voluntary.
Is the activity monitored or enforced? If so, how?	The activity is monitored by the Ministry of Agriculture in cooperation of the Ministry of the Environment.
How are results and progress measured?	The activity is monitored on the basis of numeric indicators such as pesticide sales statistics, land use data collected for agricultural environmental statistics.
What specific progress/results have been achieved?	Although a well-defined reduction objective for the usage of pesticides has been set just a few years ago, there have been different undertakings and the sales of pesticides has diminished by about 40%.

FINLAND
Project or Activity: Restricting use to a need-only basis
Risk Reduction Category: Reducing pesticide use

What are the key elements of the project/activity?	To promote the use of pesticides according to need-based practices (using knowledge about control thresholds, stand development, forecasts, weather, outcome of pest trapping and monitoring)
When did the project/activity begin and what prompted its initiation?	1992
What are its specific goals and/or targets?	• to change farming habits so that spraying occurs only after the need is verified (scrutinized need) • to increase farmers' expertise in estimating the need for pest control using thresholds and pest prognoses • to ensure that pesticides do not enter agricultural products or the environment (especially watercourses) Pesticide use could be reduced by 10-15%
Who is involved in carrying it out?	- Advisory services - Researchers - Farmers
Is there a legal or regulatory mandate?	Part of the Rural Environment Programme; farmers participate on a voluntary basis
Is the activity monitored or enforced? If so, how?	
How are results and progress measured?	On the basis of the pesticide sales statistics
What specific progress/results have been achieved?	Pesticide use has been decreasing for some years. Pesticide sales dropped considerably in Finland from 1980 (2,580 tn a.i.) to 1993 (1,279 tn a.i.). This was partly due to the shift from phenoxy acids to new low-dose herbicides approved in 1982. According to the latest research data, pesticide residues occurring in vegetables, berries and fruits have decreased in recent years. It was estimated on the basis of the average in 1981-1990 that the total intake of pesticides through Finnish domestic fresh products was 10.3 mg per person/year. On the basis of the latest residue analyses, the intake has dropped to approximately one-third of the previous level, being at present 3.7mg per person/year.

FINLAND
Project or Activity: Testing and inspection of spray equipment
Risk Reduction Category: Reducing pesticide use

What are the key elements of the project/activity?	• Inspecting sprayers • Teaching users about sprayers • Co-operating in the European Standardization Organisation (CEN), which started standardisation activities connected with environmental aspects of some equipment (evenness of distribution, dribbling prevention, etc.) in 1992
When did the project/activity begin and what prompted its initiation?	1987 - Survey data indicated that spray equipment was in poor condition
What are its specific goals and/or targets?	• to test all plant protection spraying equipment within the period 1993-1996 • to re-test all sprayers every 5 years (objective of the Rural Environmental Programme) • to reduce the use of pesticides by 10-15% through better quality equipment
Who is involved in carrying it out?	A state-funded extension organisation and a private entrepreneur (funds from Ministry of Agriculture and Forestry)
Is there a legal or regulatory mandate?	Inspection is mandatory: it is one of the conditions for receiving the environment financial support
Is the activity monitored or enforced? If so, how?	Yes
How are results and progress measured?	number of inspections
What specific progress/results have been achieved?	7,000 sprayers have been inspected

FINLAND
Project or Activity: Extension and training for pesticide users
Risk Reduction Category: Increasing safety in pesticide use

What are the key elements of the project/activity?	Activities to educate pesticide users about good agricultural practice and safe pesticide use already existed but will be increased under the Rural Environmental Programme. Activities include: • drafting, distributing publications and advisory leaflets on good agricultural practice (including biological and integrated control methods) and safe use of pesticides • a farmer education campaign called "Our Common Environment" (done by the agricultural societies) • an Action Programme of the National Board of Waters and the Environment (to include distribution of materials, extension on the use of pesticides) • training for users of specifically hazardous pesticides, who must pass a special examination and receive a certificate that enables them to buy and use these products • basic training (over a period of 5-6 years) for all agricultural pesticide users, covering the use of pesticides, spraying accuracy and techniques, and instructions for spraying of fields bordering watercourses. The programme is intended to be in place by 1998. Training is compulsory to all users, but an exam is organised only for those using the most hazardous pesticides
When did the project/activity begin and what prompted its initiation?	Activity became high in 1994, when Finland joined the EU
What are its specific goals and/or targets?	To teach users the proper use of pesticides and thus to reduce environmental and health risks
Who is involved in carrying it out?	Ministry of Agriculture and Forestry Finnish Environmental Agency Agricultural Research Centre Association of Rural Advisory Centres Society of Pesticide Producers
Is there a legal or regulatory mandate?	Activity to increase under Rural Environmental Programme; farmer participation is voluntary

Is the activity monitored or enforced? If so, how?	Monitored
How are results and progress measured?	Number of people trained (taken the exam)
What specific progress/results have been achieved?	Publications already distributed include: Good Agricultural Practice Cultivate Wisely - Produce Safely Pesticides and the Environment (by the Finnish Environmental Agency) Responsible Control (by ARAC and the Society of Pesticide Producers). Up to now, about 4,000 farmers have passed the examination

FINLAND
Project or Activity: Extension, information for users
Risk Reduction Category: Reducing pesticide use, increasing safety

What are the key elements of the project/activity?	Providing information to farmers to help them time and target (and thereby reduce) pesticide applications. Specific projects include: • providing timely advice on pest control needs on different crops in a weekly newspaper read by farmers • development of an "Agronet database" (in preparation) to (1) help farmers plan control operations for specific pesticides or pests, and (2) contain information about harmful effects of the products
When did the project/activity begin and what prompted its initiation?	Originally in 1992, actively from 1995.
What are its specific goals and/or targets?	To reduce the use of pesticides with 50% by mid 1990's in relation to the average amount sold in 1987-1991
Who is involved in carrying it out?	Extension services, farmers, researchers
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	
How are results and progress measured?	On the basis of the pesticide sales statistics User number on Agronet
What specific progress/results have been achieved?	

FINLAND

Project or Activity: Financial support for farmers making the transition to alternative methods

Risk Reduction Category: Promoting IPM, organic farming

What are the key elements of the project/activity?	The state pays farmers a subsidy of about FIM 2,000/ha for three years, during the shifting phase to organic farming. Farmers who produce "organic" products are obliged to use production methods predetermined by the Ministry of Agriculture and Forestry. Fields must have been under cultivation by these approved methods for at least two years.
When did the project/activity begin and what prompted its initiation?	1990 - Subsidies increased in 1994
What are its specific goals and/or targets?	To produce pesticide-free products To reduce harmful effects caused by agriculture To develop sustainable, environmentally friendly cultivation
Who is involved in carrying it out?	Ministry of Agriculture and Forestry Local authorities
Is there a legal or regulatory mandate?	
Is the activity monitored or enforced? If so, how?	Farmer registers will be developed
How are results and progress measured?	1,400 farmers (transition phase)
What specific progress/results have been achieved?	There are at present 26,000 ha in organic farming (out of 2.5 million ha, so only 1% in organic farming)

FINLAND
Project or Activity: Research and extension
Risk Reduction Category: Promoting IPM, organic farming

What are the key elements of the project/activity?	The Agricultural Research Centre (which includes a new Research Station on Organic Farming) carries out studies on Integrated Production (IP) and develops guidelines for farmers. Projects include: • IP directions for apple growing (these exist since end of 1980's) • IP principles for vegetables • organic (no pesticide) strawberry production • control thresholds for plant pests, diseases • production of healthy plant stock to reduce need for pesticides • prognosis of need for pest and disease control based on weather and other conditions • alternative measures (cultural, technical, biological) to replace chemical control
When did the project/activity begin and what prompted its initiation?	Originally from the 1980's
What are its specific goals and/or targets?	To reduce harmful effects on health and environment caused by agriculture
Who is involved in carrying it out?	Agricultural Research Centre (and its local research centres) research institutes and organisations extension agents farmers
Is there a legal or regulatory mandate?	
Is the activity monitored or enforced? If so, how?	
How are results and progress measured?	Acceptance of the regulations Residues in products
What specific progress/results have been achieved?	On Åland islands, 60-70% of apple growers are following the IP methods (30-40% in the mainland)

III. Conclusions

The detailed directions for the Reduction programme for pesticide use are still under preparation. However a decrease in pesticide use has already been visible for some years. Sale of pesticides has diminished considerably in Finland from year 1980 (2 580 tn a.i.) to year 1993 (I 279 tn a.i.). This is partly caused by the fact, that since 1982, new low-dose herbicides have been approved for weed control. Their quantity per ha is only a fraction compared to the conventional phenoxy acid herbicides.

According to the latest research data, the pesticide residues occurring in vegetables, berries and fruits have decreased in the latest years. It was estimated on average of 1981-1990, that the total intake of pesticides through Finnish domestic fresh products was 10.3 µg per person in a year. On the basis of the latest residue analyses, the intake has dropped to approximately one-third of the previous level, being at present 3.7µg per person in a year.

In Finland there is no comprehensive survey made on usage of pesticides, such as has been carried out in Sweden. This must be considered as a drawback when considering the risk reduction of pesticide usage.

The Nordic co-operation has for its part influenced and is continuously having an effect on the programmes dealing with pesticides risk reduction. The reduction programmes of Sweden and Denmark have had influence also in the programme launched in Finland. The usage of pesticides has however been more abundant in Sweden and Denmark than it has been in Finland.

Also the Helsinki Commission has recommendations, concerning diminishing of pesticide use.

Finally may be mentioned the international projects COST 66 (Environmental Behaviour of Pesticides and Regulatory Aspects) and COST 711 (Operational of Application of Meteorology to Agriculture Including Horticulture) and the Environmental Risk Assessment project (by EPPO), which may be of use to Finnish decision-making in the risk reduction sector.

Appendix

Rural environmental programme

Programme for reducing the use of pesticides in Finland

Contents

Introduction

The use of pesticides increased in Finland from the mid-1940s up to just a few years ago. The increase was most marked for herbicides, which accounted for 70% of the total. Average use of pesticides, calculated as effective ingredients, was 2,000 metric tons per year in the period 1987-1991.

The agro-economic profitability of pesticide usage would appear to. have decreased since the 1970s in response to the reduction in weed populations. Control practice, however, has not been revised accordingly. As a result, a substantial portion of pest control costs is not offset by an increase in yield.

The overall plan set out here is a proposal for reducing the use of pesticides. The plan emphasizes using pesticides according to need while making every effort to ensure that they do not enter products, the environment or watercourses.

The programme will be implemented by means of administrative decisions and 2nd rural extension advisory work.

Objective

The long-term objective of the programme is the practice of environmentally sustainable agriculture to secure the production of clean foods with minimal pesticide residues. The optimal agro-economic profitability of farms is also taken into account.

Target

To reduce the environmental stress they cause, pesticides are to be used according to established need only. The targeted reduction is to halve the annual mean volume of pesticides used in the above-mentioned period by the mid-1990s. Substantial reductions in usage should continue thereafter.

Implementation of the various measures needed to ensure that the target is reached, including mitigation of the risks caused by pesticide usage, will start before 1995.

Measures

I. Impact of production balancing on use of pesticides

An estimated 700,000 hectares of arable land are expected to be withdrawn from production by the year 2000. Taking the present field bank into account, another 250,000-300,000 hectares of arable land will also be withdrawn from production.

The reduction in arable land will be aimed principally at the area under cereals. Pesticides are also used in areas outside food production, for example, for controlling weeds in fallows and non-food crops. The production technology of non-food crops should not, however, lead to an increase in pesticide usage.

The production balancing measures will reduce total pesticide usage by 15-20% from the annual average for 1987-1991 by the year 2000.

2. Use according to need

Pesticides should be used according to the established real need only. With control measures adapted to the need, it is often possible to reduce the quantity of pesticides used. However, real need cannot be determined without knowledge about control thresholds, stand development, forecasts, the weather and the outcome of pest trapping and monitoring. Specialist systems are being developed to ensure that this knowledge is available. When a sufficient data base exists, spraying can be focused more accurately to reflect the occurrence of pests. Emphasis should be placed on long-term rotation of crops and on adapted and integrated pest control.

The above measures could reduce pesticide usage by 10-15%.

3. Testing and inspection of spraying equipment

If we want to change people's attitudes and provide opportunities for the focused use of pesticides, we must see that the spraying equipment is tested and that people are taught how to use it. Spraying equipment in good condition will improve the outcome of control.

All plant protection spraying equipment in use will be tested. The testing will be supported with state funds in 1993-1996. The Ministry of Agriculture and Forestry will be responsible for arranging the funding.

New plant protection sprayers must undergo the obligatory inspection stipulated by VAKOLA (State Testing Institute of Agricultural Machinery) before being taken into use. Type approval will be adapted to EC standards as and when they are introduced.

Appropriate testing and inspection of the spraying equipment should reduce the use of pesticides by 10-15%.

4. Advice and training in the use of pesticides

Advice and training play an important role in reducing the use of pesticides. Recommendations for good agricultural practice will also refer to the efficient use of pesticides. All users of pesticides will be taught the meaning of appropriate control and the principles of good agricultural practice.

More attention is to be paid to giving advice about the use of pesticides, spraying accuracy and spraying techniques. More accurate spraying instructions will be formulated for fields bordering watercourses. The material to be distributed to farms will be drawn up jointly by those responsible for the advisory work and administration.

The users of the most dangerous pesticides will be trained systematically over a period of 5-6 years. Control of pesticide usage will be stepped up.

Reaching the pesticide reduction targets presented in sections 2 and 3 will require efficient advisory services and training. An estimate of the impact of the procedures is therefore included in the same sections.

5. Reducing usage by cultivation techniques and other measures

Cultivation techniques will be studied and developed in order to reduce the need for control. Particular stress will be laid on the importance of crop variety selection and rotation In the cultivation of special crops. More attention will also be paid to taking weather and other environmental factors into account in estimating the need for control.

Deleterious pesticides will be replaced with new products which disintegrate more rapidly and are less harmful to the environment. These are usually needed in smaller amounts per unit area.

The agricultural and economic importance of pesticides will be studied, and the efficiency of cropping techniques, control measures and spraying techniques will be improved.

Instructions about the methods to be used in assessing the need for control on individual farms will be added to the recommendations for good agricultural practice.

Use of the most dangerous pesticides near watercourses that serve as a source of water supply and groundwater areas will be restricted. The importance of the use of pesticides will be assessed in regional water protection programmes.

Attention will also be paid to other measures such as those concerning biological control.

These measures are expected to reduce the use of pesticides by 15% by the year 2000.

6. Other consequences of pesticide usage

Use of growth regulators will be revised with a view to reducing the risk of nitrogen leaching.

7. Programme follow-up

Implementation of the programme will be monitored using present pesticide sales statistics, land use data collected for agricultural environmental statistics and other statistics.

FRANCE

CONTACT PERSON(S):

Mario NICHELATTI
Bureau des substances et préparations chimiques
DPPR/SDPD
Ministère de l'Environnement
20 avenue de Ségur
75302 Paris 07 SP
Tel: 33 (1) 42 19 15 45
Fax: 33 (1) 42 19 14 68

Marc FAGOT
Bureau du secrétariat du CORPEN
Direction de l'Eau
Ministère de l'Environnement
20 avenue de Ségur
75302 Paris 07 SP
Tel: 33 (1) 42 19 12 89
Fax: 33 (1) 42 19 12 93

Michel LARGUIER
Bureau de Protection des Cultures et Environnement
DGAL/SDPV
Ministère de l'Agriculture et de la Pêche
175 rue du Chevaleret
75646 Paris Cedex 13
Tel: 33 (1) 49 55 81 58
Fax: 33 (1) 49 55 59 49

Eric DABENE
Bureau de l'agriculture, des ressources naturelles et du sol
DERF/BARN
Ministère de l'Agriculture et de la Pêche
19 avenue du Maine
75732 Paris cedex 15
Tel: 33 (1) 49 55 59 10
Fax: 33 (1) 49 55 50 63

I. Framework for pesticide risk and use reduction activities

Two parts:

A. Pesticide (plant protection products) risk reduction activities which aim at protecting the aquatic environment

B. Other pesticide (plant protection product) risk reduction activities

A. Pesticide (plant protection products) risk reduction activities which aim at protecting the aquatic environment

• Interministerial strategy:
Committee ("Comité de liaison") for water contamination by anti-parasitical products.
The committee's strategy is to strengthen co-ordination of regulatory actions among ministries and national commissions.
→ *Table 1*

• National co-ordination strategy on water-agriculture-pesticides
Committee ("Comité d'orientation") to reduce water pollution by nitrates, phosphates and plant protection products (CORPEN)
→ *Table 2*

• Regional or local strategies
→ *Tables 3, 4, 5 & 6*

B. Other pesticide (plant protection product) risk reduction activities

1. First, pesticide risk reduction activities come within the framework of existing regulations which deal with:

Worker protection
• measures on the packaging, sales and use of hazardous substances or preparations
• measures on work accidents and occupational diseases

Public health
• general measures about hazardous substances and preparations

Chemicals control

Regulations and implementations of international measures on importation and exportation of some hazardous chemicals

Protection of the nature and the environment
• rural common Law
• waste
• nature protection
• classified facilities
• international conventions

Registration of plant protection products
• commission on antiparasitical plant protection products
(representatives from ministries, industry and users)
• committee for registration of antiparasitical plant protection products
(representative from ministries)
• commission on toxicity of antiparasitical plant protection products and associated products, and fertilizers
(scientific experts, representatives from ministries, manufacturers)

Product use

2. Secondly, the pesticide risk reduction activities are voluntary, mandatory or not:

• Plant protection technical newsletters
→ *Table 7*

• Training
→ *Tables 8 & 9*

• Reclamation of products
→ *Table 10*

II. Description of activities and results

FRANCE **Table 1**

Project or Activity: Committee ("Comité de liaison") for water contamination by anti-parasitical products

Risk Reduction Category: Protecting the environment (water)

What are the key elements of project/activity?	An interministerial strategy is set up to "strengthen coherence of regulatory actions with those which aim at modifying agricultural practices with a view to reducing water contamination by anti-parasitical products". • development of a French proposal to revise the EEC/778/80 directive re. water for human consumption • development of a classification method for pesticide active substances with a view to establishing a list of indicator substances to monitor water quality at a national level. • communication for water-pesticide actions • co-ordination of international matters
When did the project/activity begin and what prompted its initiation?	1992 Following discussions about Annex VI of EEC/414/91 directive, the ministries of Agriculture, Environment and Health recognize the necessity to "strengthen coherence of regulatory actions with those which aim at modifying agricultural practices with a view to reducing water contamination by anti-parasitical products"
What are its specific goals and/or targets?	Reducing water contamination by anti-parasitical products
Who is involved in carrying it out?	CORPEN (see Table 2), CSHPF (Public Health Committee) Committees re. anti-parasitical products (registration; toxicity,...) Ministry of Agriculture (food; forestry) Ministry of Environment (water; pollution prevention and risks) Ministry of Health
Is there a legal or regulatory mandate?	Interministerial decision (18 Dec. 1992)
Is the activity monitored or enforced? If so, how?	Too early
How are results and progress measured?	Too early
What specific progress/results have been achieved?	• Two publications on the classification of active substances to monitor water quality at a national level • Decision of the Contact committee: national priority lists of active substances to monitor water quality at a national level

FRANCE **Table 2**

Project or Activity: Committee on water pollution by nitrates, phosphates and plant protection products (CORPEN: "Comité d'Orientation pour la Réduction des Eaux par les Nitrates, les phosphates et les produits phytosanitaires provenant des activités agricoles")

Risk Reduction Category: Protecting the environment (water)

What are the key elements of the project/activity?	• Taking part in a program to control agricultural practices • Identifying origins of pollution in a watershed and determining measures to be taken • Improving agricultural practices and plant protection practices (improving efficiency of advisory bodies) • Improving training • Developing communication
When did the project/activity begin and what prompted its initiation?	August 1992
What are its specific goals and/or targets?	• Being aware of programs of action and research carried out to increase anti-pollution efforts • Making suggestions to ministries of Agriculture and Environment in order to reorient, complete or reinforce these programmes
Who is involved in carrying it out?	• Farmers' representatives • Representatives from industry (plant protection products, fertilizers, water) • Agricultural technical research centers (managed by farmers) • Watershed agencies • Elected representatives and water users • Concerned ministries
Is there a legal or regulatory mandate?	• Interministerial decision (agriculture and environment) - Aug. 1992 • Decision of the programme to control agricultural pollution - Oct. 1993
Is the activity monitored or enforced? If so, how?	• Annual report • Permanent bureau at the ministry of Environment • Working groups
How are results and progress measured?	Extension services assess local impacts of recommendations made by the CORPEN
What specific progress/results have been achieved?	In 1995: • publication of recommendations on agricultural practices (regarding use of plant protection products and water protection) • practical guide for diagnosis on a watershed

FRANCE **Table 3**

Project or Activity: Regional committee for water protection against pesticides in Brittany (Western France) - CORPEP ("Comité d'Orientation Régionale pour la Protection de l'Eau contre les Pesticides en Bretagne")

Risk Reduction Category: Protecting the environment (water)

What are the key elements of the project/activity?	Consultation and co-ordination committee: knowledge of the situation, understanding of contamination process and proposals for solutions
When did the project/activity begin and what prompted its initiation?	End of 1990 when people became aware of the issue of surface water contamination by pesticides in Brittany
What are its specific goals and/or targets?	• Reducing pollution at source (agricultural pollution or not) • Studying treatment capacities to make water drinkable
Who is involved in carrying it out?	Watershed agency Regional authorities of agriculture, forestry, fisheries, social affairs, environment Farmers organizations
Is there a legal or regulatory mandate?	Committee created by the head of the local administrative authority
Is the activity monitored or enforced? If so, how?	Annual report
How are results and progress measured?	
What specific progress/results have been achieved?	• Communication towards farmers: "Use of Atrazine", "Better use of plant protection products and protection of our living environment", "Plant protection products and aquatic fauna" The actions taken by the committee revealed: • the state of surface water contamination • the importance of non-agricultural pollution (following this, a video tape was issued on the safe use of plant protection products in a non-agricultural area) • the importance of transfers due to runoff • the impact of treatments on cultures near watercourses

FRANCE **Table 4**

Project or Activity: Regional committee to study water and soil pollution by plant protection products (Central France) - GREPPES ("Groupe Régional pour l'Etude de la Pollution par les Produits phytosanitaires des eaux et des sols en région Centre")

Risk Reduction Category: Protecting the environment (water)

What are the key elements of the project/activity?	Co-ordination, consultation, information exchange among concerned organizations The first stage of the programme reviews the regional context: • use of plant protection products: research on active ingredients, non-agricultural uses of plant protection products • situation of surface and subsurface water contamination (active substances, triazine) • understanding of plant protection product transfers into water • research on new practice to avoid high discharges of plant protection products
When did the project/activity begin and what prompted its initiation?	Early 1991 following frequent water contamination by plant protection products
What are its specific goals and/or targets?	Eliminating water pollution (agricultural pollution or not)
Who is involved in carrying it out?	Watershed agencies Regional authorities of agriculture, forestry, environment, social affairs, mines Local universities and agricultural research institutes
Is there a legal or regulatory mandate?	Committee created at the request of the head of the local administrative authority
Is the activity monitored or enforced? If so, how?	Regular follow-up
How are results and progress measured?	
What specific progress/results have been achieved?	• Lists of active ingredients to be searched in water • Comparison of non-agricultural and agricultural uses • State of water contamination and identification of molecules at stake • Transfer studies

FRANCE **Table 5**

Project or Activity: Working group on plant protection products in Lorraine (North East of France)

Risk Reduction Category: Protecting the environment (water)

What are the key elements of the project/activity?	• Co-ordination and harmonization of actions taken by the different organisms dealing with water pollution by plant protection products • Diffusion of acquired knowledge • Elaboration of future projects
When did the project/activity begin and what prompted its initiation?	1991 following frequent water contamination by plant protection products
What are its specific goals and/or targets?	Avoiding water pollution by encouraging safer use of plant protection products and providing guidance for users' decisions
Who is involved in carrying it out?	The working group consists of: Scientific and technical committee: watershed agency; regional authorities of agriculture, forestry, environment, social affairs; local universities and agricultural technical research institutes Piloting committee: regional administrative authority; ministries of agriculture, fisheries, environment; water agency Secretariat: regional Direction for the environment
Is there a legal or regulatory mandate?	
Is the activity monitored or enforced? If so, how?	Monitoring is carried out by the scientific committee and the piloting committee
How are results and progress measured?	Regional studies and information procedures
What specific progress/results have been achieved?	• Survey on plant protection product use • Study on water quality of 180 water catchments • Follow-ups of experimental sites testing reasoned use of plant protection products

FRANCE **Table 6**

Project or Activity: Regional committee for observation and prevention of pollution by plant protection products in Rhone-Alps (South East of France) - CROPPP ("Cellule Régionale d'Observation et de Prévention de la Pollution par les Produits phytosanitaires en région Rhône-Alpes")

Risk Reduction Category: Protecting the environment (water)

What are the key elements of the project/activity?	Sharing abilities and means, consulting and co-ordinating studies, planning, following-up and supporting different programmes: • diagnoses of sources of pollution and understanding of the mechanisms of transfers • acquisition of data on water resource contamination and advice on water quality control (sanitation and environment monitoring) • prevention actions (studies and communication)
When did the project/activity begin and what prompted its initiation?	Oct. 1991 Directive EEC 80/778 regarding quality of drinkable water made the different actors aware of the weakness of data on water resource pollution by plant protection products. Thus the concerned people wanted to share their abilities and means to develop environment observation and prevention actions.
What are its specific goals and/or targets?	Reducing water pollution at source using prevention actions
Who is involved in carrying it out?	Watershed agency Regional authorities of agriculture, forestry, environment, social affairs Scientific experts
Is there a legal or regulatory mandate?	Committee created by the head of the local administrative authority
Is the activity monitored or enforced? If so, how?	
How are results and progress measured?	Annual assessment
What specific progress/results have been achieved?	The current actions consist of describing contamination and understanding problems. Up to now, they have provided a better knowledge on: • contamination of some water catchments • inventory and cartography of test results on surface and subsurface water • plant protection product use (e.g. for road maintenance) • impact of non-agricultural use on surface water • inventory of polluting pressures on water due to plant protection products

FRANCE **Table 7**

Project or Activity: Plant protection technical newsletters
Risk Reduction Category: Providing advice on pest control needs

What are the key elements of the project/activity?	The newsletters: • are technical messages with a view to guiding producers towards an environment-friendly cultivation protection, efficient, valuable for farmers and respecting crop quality • are written by agents (from the ministry in charge of agriculture) dealing with plant protection. These agents suggest advice on plant protection product use independently from commercial constraints • tend to explain current regulations and to indicate protection strategies • contain, for each pest, the sanitary situation of the concerned crop and give advice on protection methods
When did the project/activity begin and what prompted its initiation?	The technical newsletters exist since 1941 but they consider the protection of the environment as a priority objective only since 1989
What are its specific goals and/or targets?	• Allowing producers to get crops respecting maximum residue limits (it has to be economically feasible for producers while limiting environment contamination) • Reducing plant protection product use and exposure by eliminating unnecessary treatments and choosing active ingredients more sensibly
Who is involved in carrying it out?	The State Observation networks: farmers, voluntary technicians, scientific researchers, etc.
Is there a legal or regulatory mandate?	Yes - The Regional services of plant protection are legally responsible for the newsletters Subscription to these newsletters is voluntary for farmers
Is the activity monitored or enforced? If so, how?	State services control this activity
How are results and progress measured?	• Surveys on residue analyses on foodstuffs, on water • Surveys on agricultural practices • Observation of fauna (mortality of game)
What specific progress/results have been achieved?	General satisfactory sanitary state in compliance with maximum residue limits

FRANCE **Table 8**

Project or Activity: Biological control
Risk Reduction Category: Promoting alternative methods

What are the key elements of the project/activity?	Biological control is a plant protection method which is being developed mainly for greenhouses but also in fields (introduction of predators and use of substances of little toxicity for auxiliary fauna)
When did the project/activity begin and what prompted its initiation?	It has been commonly used since the 1980's in greenhouses at market gardeners' initiative
What are its specific goals and/or targets?	• Introduction of new organisms against pests (e.g. introduction of predatory acarid against phytophagous acarid) • Development of protection practices to avoid use of harmful substances to useful fauna
Who is involved in carrying it out?	Producers organizations Services of plant protection Research institutes Professional organizations
Is there a legal or regulatory mandate?	No - this is a voluntary activity
Is the activity monitored or enforced? If so, how?	Producers organizations check how farmers apply procedures
How are results and progress measured?	• Any action or observation is to be recorded in a report book • A survey is carried out each year to know the % of surface where biological control is applied
What specific progress/results have been achieved?	Biological control is applied on 80% of surface of tomato cultivation under greenhouses use

FRANCE **Table 9**

Project or Activity: Integrated Pest Management and Protection
Risk Reduction Category: Promoting IPM

What are the key elements of the project/activity?	This activity offers consumers foodstuffs of quality, produced using environment-friendly practices. Producers follow directives of the International Organization of Biological Control (IOBC). A label can be applied to foodstuffs produced with these methods.
When did the project/activity begin and what prompted its initiation?	1975
What are its specific goals and/or targets?	• Sensible use of protection techniques: chemical treatments are used as a last resort • Sound choice of products avoiding substances harmful to users, fauna, game and environment • Respect of organoleptic limits for foodstuffs
Who is involved in carrying it out?	Producers organizations Service of plant protection Research institutes Professional organizations
Is there a legal or regulatory mandate?	No - This is a voluntary activity.
Is the activity monitored or enforced? If so, how?	Producers organizations check how farmers apply procedures. An accreditation procedure also exists.
How are results and progress measured?	Any action or observation is to be recorded in a report book. With the accreditation procedure, it is possible to know how foodstuffs are produced.
What specific progress/results have been achieved?	Technically speaking this activity is a real success but it is insufficiently known by consumers.

FRANCE **Table 10**

Project or Activity: Reclamation of unused or expired plant protection products (PIC-Agri Association)

Risk Reduction Category: Increasing safety of pesticide disposal

What are the key elements of the project/activity?	Promoting (financially or technically) local actions to recover unused or expired pesticides so that they can be disposed of in an environmentally-friendly way
When did the project/activity begin and what prompted its initiation?	The PIC-Agri Association was created in 1991 to encourage local actions to collect and destroy products following set procedures. (However reclamation actions have been existed in France for 10 years). (In 1990 a survey showed that 8,000 tons of unused plant protection products were stocked in France and constituted risks for health and environment).
What are its specific goals and/or targets?	Eliminating these stocks of old products (farmers, distributors)
Who is involved in carrying it out?	The Association is led by the National Centre for Young Farmers and includes different organizations (farmers, plant protection industry, agricultural health insurance, agricultural cooperatives, etc.).
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	People locally responsible for reclamation actions must fill in a dossier. A document, entitled "Practical guide and specifications for reclamation and elimination actions regarding unused plant protection products", sums up the procedure to follow.
How are results and progress measured?	Before giving a subsidy, the Association makes sure that all products have been treated using correct procedures.
What specific progress/results have been achieved?	In total, 540 tons of products have been recovered (450 tons since 1992).

III. Conclusions

1. Which activities have been most successful and why?

The activities are too recent to draw conclusions.

GERMANY

CONTACT PERSON(S):

Mr. Ralf PETZOLD
Federal Ministry of Food, Agriculture and Forestry
Postfach 14 02 70
D-53107 Bonn

Tel: (49) 228 529 3527
Fax: (49) 228 529 4406

Risk reduction in the field of plant protection products in the Federal Republic of Germany

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1: Risk reduction through integrated plant protection measures

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3: Regulations in other legal areas relating to risk reduction in plant protection products

1. Introduction

Plant protection products are important today, and will continue to be in the foreseeable future, to secure food for the population at reasonable prices, to protect stocks, but also to protect plants against harmful organisms occurring, for example, in forests, in home and ornamental gardens as well as in public parks. They also serve to clear areas to protect them from the danger of fire, for reasons of traffic safety or for other reasons to ensure public security. Under certain conditions the use of plant protection products is also necessary for nature conservation.

The use of chemical plant protection products as part of plant protection is necessary, because

- time and again, severe infestation with harmful organisms requires immediate massive action because, for example, special weather conditions occur, resistance is broken down, mutants or new pathotypes occur, and areas are newly affected or especially seriously infested;

- other plant protection methods, such as agricultural, agronomical, biological or biotechnical measures, are not always adequately efficient and specific to curb the competition of harmful organisms to a large extent;

- the control of harmful organisms must also be possible at a time when non-chemical plant protection methods have already been applied.

Chemical plant protection products are biologically active substances because they are assigned to a particular purpose. The biological activity is broad, ranging from toxicity to repelling effects (e.g. game repellents to protect young forest plants) or confusing harmful butterflies in viticulture to prevent mating (sex pheromones).

Chemical plant protection products are directly applied to the environment, e.g. in farming, but are also used in partially or almost entirely closed systems (greenhouses, protection of stored products).

2. Present strategy

When considering risks, a distinction has to be made between the risks

- to crop production or the other purposes of plant protection
- to users, consumers or the natural balance.

Here, however, reference should be made to existing interrelationships. A high risk to crop production is also a high risk to consumers due to the potential danger to food security, but also with regard to possible contamination by mycotoxins. A high protection of the ecosystem must not necessarily mean an equally high protection of users or consumers. Often the effects even go in the opposite direction.

Considering risks requires the inclusion of all effects. Restricting ourselves to the normal approach in the general field of chemicals, risk reduction to protect man, animal and the ecosystem, is therefore not permissible. That does not mean that the protection of man, animal and the ecosystem does not have its due status. It must only be embedded into an overall approach.

Until the beginning of the 70s, in the Federal Republic of Germany, like in many other countries of Europe, special attention was paid to reducing the risk of losses in crop production, because at first it was important to produce the necessary foodstuffs in adequate quantity and quality. However, at the beginning of the 70s, possible harmful effects of chemical plant protection on users, consumers and the ecosystem were included to an increased extent in the official authorization of plant protection products existing since 1968.

The Federal Republic of Germany has adopted a concept which greatly differs from that of other European and non-European countries.

1) For the authorization of plant protection products, in addition to the results of tests of their impact on man, animal and the ecosystem, the results of examination for a sufficient degree of efficacy is also a crucial condition for authorization.

2) The authorization of a plant protection product ends ten years after expiry of the year when it was granted. Renewal may be applied for and granted. In a particular case a shorter period of authorization may be fixed.

3) From the very beginning no distinction was made between “new“ and “old“ active substances in plant protection products.

4) The authorization of plant protection products is only possible if the necessary data are available.

5) With a fundamental change in the legal conditions of plant protection through the Plant Protection Act of 1986 integrated plant protection was embodied in law as a basic strategy.

The aims of this plant protection policy of the Federal Republic of Germany have been and still are:

1) to practice the authorization of plant protection products on a high level (with regard to crop production and the other purposes of plant protection as well as with regard to the protection of users, consumers and the ecosystems);

2) to, in the authorization procedure, orientate the range of active substances to the latest scientific knowledge through new assessments at regular intervals in each case - this also includes taking the non-active substances into consideration - (thus no need for re-authorization)

3) to ensure that plant protection is carried out in observance of the use instructions of the products as stated in the authorization and only according to good professional practice. Good professional practice means that the principles of integrated plant protection are observed. In this respect, integrated plant protection means a combination of procedures which restrict the use of chemical plant protection products to the extent necessary with priority regard to biological, biotechnical and plant breeding measures as well as measures relating to cultivation techniques. The restriction to the extent necessary is supported by

   — measures at the preceding stage (quarantine provisions, healthy propagation material),

- a special duty of care for use in a particular case (ban on use if harmful effects must be expected on human and animal health or on the groundwater or other substantial harmful effects, especially on the natural balance),

- the restriction in principle of plant protection product use to production areas provided that plant protection products are to be used on areas outdoors,

- the strict ban on use of plant protection products in or directly alongside surface waters and coastal waters;

4) to accompany and safeguard these objectives

   a) with the regulation that plant protection products may only be used in enterprises of farming, including horticulture and forestry, if the user has special knowledge. The actual restriction to the extent necessary is directly dependent on the level of education and knowledge of users,

   b) by using plant protection equipment of high quality,

   c) through regulations with regard to partial processes not covered by plant protection law concerning the use of plant protection products, such as purchase of very toxic or toxic products, transport, storage and removal of residues of plant protection products or empty packages,

   d) by strengthening the development of non-chemical plant protection alternatives through research and model projects for application in practice.

Additional consideration of economic evidence, with regard to as economical a use of plant protection products as possible, was triggered off by the reform of the agricultural policy of the European Union. The intensity of protection measures based on chemical plant protection products was reduced further through set-aside, creation of landscape elements, e.g. hedges, strips of land alongside water bodies, but also extensification measures.

When formulating plant protection policy under the aspect of reducing chemical plant protection products to the extent necessary, thought was also given to the question of whether a quantitative quota of reduction, as has politically been exemplified by some European countries, was the right way. This approach was not adopted due to the following considerations:

a) A quantitative quota of reduction is a global approach which does not meet actual requirements, because

   - it is derived from the field of general chemicals and industrial emission, e.g. exhaust gases or sewage from industrial plants, whose restriction must be favoured in principle, and thus neglects the fact that plant protection products are used because they are to solve an existing problem,

   - it neglects that there must be a practicable alternative comparable in terms of costs, unless differences are reimbursed,

- it does not meet the different biological activities of the respective active substances and plant protection products and thus does not comply with the actual danger potential. Statements such as kg/ha are meaningless,

- abstaining from using chemical plant protection products is not always the better alternative; e.g. contamination of the harvest by mycotoxins, or erosion on conducive soils following mechanical weed control.

b) The desired objective, restriction and use of chemical plant protection products can be better and more specifically achieved with the following measures, particularly as they insure a dynamic adjustment to future conditions.

3. Risk reduction through legal regulations governing plant protection products

3.1 Risk reduction through authorizing plant protection products and placing them on the market

The legal basis for the authorization of plant protection products in the Federal Republic of Germany lies in the Plant Protection Act (Act Governing the Protection of Crop Plants (Plant Protection Act) of 15 September 1986 (Fed. Law Gazette I P. 1505), last amended by Article 10 of the Act of 27 June 1994 (Fed. Law Gazette I P. 1440)) and in the Ordinance on Bans and Restrictions on Plant Protection Products (Ordinance Governing Plant Protection Products and Plant Protection Equipment (Plant Protection Product Ordinance) of 28 July 1987 (Fed. Law Gazette I P. 1754), amended by the First Ordinance Governing the Amendment of the Plant Protection Product Ordinance of 11 June 1992 (Fed. Law Gazette I P. 1049)).

The authorization and marketing of plant protection products in the Federal Republic of Germany are subject to very strict guidelines.

In order to eliminate risks through plant protection products to the greatest possible extent, they may only be marketed once they have been authorized by the Federal Biological Research Centre for Agriculture and Forestry (hereinafter referred to by its German initials, BBA). The BBA determines whether or not the conditions are fulfilled regarding health in cooperation with the Federal Institute for Consumer Health Protection and Veterinary Medicine (Bundesinstitut für gesundheitlichen Verbraucherschutz, BgVV) and regarding the avoidance of air and water pollution damage in cooperation with the Federal Environmental Office (Umweltbundesamt, UBA). The authorization of a plant protection product is limited to ten years; in particular cases, a shorter period may be agreed upon. In matters of health, permission must be obtained from the Federal Institute of Consumer Protection in Health Care and Veterinary Medicine (subordinate to the Federal Ministry of Health), and in matters of avoidance of damage caused by water and air pollution as well as by refuse, permission must be obtained from the Federal Environment Office (subordinate to the Federal Ministry of the Environment, Nature Conservation and Reactor Safety). Moreover, prior to the authorization of a plant protection product, a hearing must be held by an expert committee. (An expert committee must first be consulted.) The expert committee is a council which is made up of twenty-five honorary experts from the areas of plant protection, environmental conservation and nature preservation. The expert committee shall deliver the results of its discussions in the form of recommendations to the BBA.

Authorization of a plant protection product may only be granted if, among other things, examination of the plant protection product shows that:

1. the plant protection product is sufficiently effective in the light of scientific knowledge and technique;

2. the requirements of the protection of the health of humans and animals when handling hazardous materials do not conflict with the authorization, and

3. the plant protection product, when used for its intended purpose and in the proper manner, or as a result of such use,

    a. does not have any harmful impact on human and animal health or on groundwater, and

    b. does not have any other impact, particularly with regard to the natural balance, which in the light of the present state of scientific knowledge is not justifiable.

The criteria used by the BBA to test whether the plant protection product fulfils authorization requirements are determined according to BBA directives which encompass internationally recognised directives of the FAO, OECD, and WHO. They can be looked up in the pamphlet "Criteria for assessment of plant protection products in the registration procedure" (Mitteilungen aus der Biologischen Bundesanstalt für Land- und Forstwirtschaft, Berlin-Dahlem, 1992, No 285) and are practically in agreement with Directive 93/43/EEC.

3.1.1 Characteristics of plant protection products

In the evaluation and authorization of plant protection products, their chemical and physical characteristics, their active substances, non-active substances and impurities, as well as decomposition and reaction products are taken into account. Furthermore, analysis procedures to determine the active substances, and if relevant, to determine the non-active substances and impurities, are also to be included in the application.
The required data, studies and procedures are in BBA Guideline I, 1-2. During the evaluation of the documents, this information will also be examined by the BBA if considered relevant.

The following criteria for forbidding authorization of the product are additionally taken into account:

1. The required methods of analysis were not submitted or were shown to be unsuitable.

2. The chemical composition of the product does not correspond with that reported in the application form (according to FAO specification).

3. The product contains
    - hazardous non-active ingredients (such as carcinogenic active substances and/or teratogenic materials)
    - substances which may not be marketed due to the Hazardous Substances Ordinance or other ordinances.

4. The impurities of the active substances exceed defined limits.

5. Physical deficiencies are present which cannot be corrected through minor reformulation.

6. The product cannot be handled/removed/stored.

7. The user is endangered by the product despite suitable safety precautions (e.g. intolerably high level of dust).

3.1.2 Efficacy and crop tolerance (phytotoxicity)

The requirement for authorization is proof that the product is sufficiently efficacious according to the state of scientific knowledge and technique. No efficacy which does make it possible to control a harmful organism or achieve a protective purpose under unfavourable practical conditions is accepted. This strict examination standard insures that ineffective or insufficiently effective products do not lead to considerable economic losses and do not put an unnecessary strain on the environment. In addition, the product dosage necessary as a result of the efficacy requirements and the maximum permissible dosage frequency form the basis for a large number of tests in the authorization procedure in order to minimise the risks with regard to human and animal health and to the groundwater as well as other impact on the natural balance.

Another part of the strategy of risk reduction is not to authorize plant protection agents which, although efficient, cause plant damage, reduction in quality or any other disadvantageous impact (such as changes in flavour, etc.). This also applies to phytotoxic damage in succeeding crops. It must be shown on the basis of experiments with graded dosages that the absolute minimum amount of the product necessary ("marginal amount") is not exceeded.

3.1.3 Analytics

In the authorization procedure, not only the method(s) of analysis must be submitted in order to determine the active and non-active substances in plant protection products. Moreover, suitable analysis procedures which can be carried out using commonly employed equipment at a reasonable cost must be submitted so that the residues of authorized plant protection products, metabolites and decomposition and reaction products can be measured in human and animal foods as well as in the environment, also with regard to compliance with existing limits. Thus it is possible to discover risks which could not be estimated or which could only be insufficiently estimated and take the necessary measures with regard to authorization.

3.1.4 Residues in food and feed of plant origin

The residue situation is examined in supervised trials in which the most unfavourable application conditions possible are chosen. The results of the experiments form the basis for the establishing of pre-harvest intervals and maximum residue limits for plant foods as well as for use restrictions for the protection of the customer. Here, maximum amounts shall be set as low as necessary to meet the needs of practical plant protection but no higher than is compatible with the protection of human health.

Existing maximum amounts are adjusted to new discoveries. Should it be necessary for health reasons, or should the corresponding area of application not be envisioned, then the maximum residue limit is the detection limit.

Data about pre-harvest intervals and maximum residue limits are generally required for all active substances of plant protection products which can possibly lead to residues in food and feed. It is important to determine pre-harvest intervals and maximum residue limits for new active substances or for uses claimed for the first time in the authorization and to re-examine existing information in the case of old active ingredients as well as change in claimed use.

Authorization of a plant protection product in accordance with the application or expansion of the individual claimed uses is not possible if:

1. already existing maximum residue limits are exceeded (Solution: amending the Residue Maximum Amount Ordinance) and
2. the proposed maximum residue limit is unacceptable from a toxicological point of view.

As long as residues of the plant protection product can be expected to be found in harvested plants, the pre-harvest intervals are to be set such that the maximum residue limits are guaranteed to be met at the time of the harvest.

3.1.5 Protection of users

Acceptability from a toxicological point of view is derived from the results of examinations of acute, subchronic and chronic toxicity as well as of the mutagenic, teratogenic, and carcinogenic impacts, influence on fertility and its behaviour in the metabolism of humans and animals.

User protection takes into account not only the toxicological characteristics of the active substances, including classification and labelling according to the Hazardous Substances Ordinance (Gefahrstoffverordnung - GefStoffV) as well as results of a prior risk assessment for the product. If necessary, information for the protection of the user shall be derived from the results of the comparison of the tolerable exposure with the user exposure to be expected under the pre-defined use conditions in mg per person per day. These shall be included in the instructions.

Information on the volume and the execution of the required experiments shall not be elaborated on here. Please refer to the following directives:

1. BBA Guideline Part 1, 3-3, "Labelling of Plant Protection Products - Health Protection";
2. OECD Test Directive for Testing of Chemicals, especially Section 4, Health Impact.

3.1.6 Fate and degradation in soil, water and air

<u>Fate in soil</u>

The residual active substances and/or biologically and/or toxicologically relevant metabolites and their degradation paths, especially with regard to the formation of bonded residues and their persistence, are evaluated. If, under the terms of the evaluation guidelines, the risk of unacceptable persistence is still present, then the use of the plant protection product shall be limited, or should this not suffice, then the plant protection product shall not be authorized.

Contamination of groundwater

In order to assess the risk of contamination of groundwater, it is necessary to test the leaching behaviour of the active ingredient and of the relevant metabolites as part of the authorization procedure.

In order to guarantee a very high level of protection, authorization shall not be granted if it turns out that the active ingredient can be expected in a concentration of more than 0.1 µg per litre of groundwater. To this end, the documents are evaluated on degradation and adsorption in the soil. If certain decomposition times are exceeded or defined adsorption values are not reached, model calculations for displacement into the subsoil under the assumption of so-called "most unfavourable practical conditions" is necessary. If the calculations show that the active ingredient and/or biologically and/or toxicologically relevant metabolites can be expected in percolation water in concentrations of more than 0.1 µg/l, then lysimeter studies shall be performed under correspondingly "most unfavourable practical conditions". Such studies are recognised worldwide as the most reliable method of estimating percolation behaviour of active substances. If, in the course of the lysimeter experiments, the active ingredient is found in percolate in a concentration of over 0.1 µg/l, then authorization is not granted. If relevant metabolites appear in percolate in a concentration of more than 0.1 µg/l, then it must be shown that these metabolites do not have a harmful effect on groundwater.

Assessment of movement into the subsoil shall take place on the basis of model calculations performed with the aid of physico-chemical parameters and on the basis of the leaching results from the lysimeter experiments performed according to BBA Directives IV, 4-2 and IV, 4-3.

Until there is clear information about leaching behaviour, a temporary authorization of short duration shall be given which:

a) permits the application of the plant protection product with such an active agent only outside of water catchment areas and mineral spring reserves.

b) makes it possible for the applicant to show the percolation behaviour through lysimeter experiments.

Volatilisation and behaviour in the air

The subject of the evaluation is the volatilisation behaviour of the active ingredients of formulations used in practice of plant and soil surfaces. In case of high losses, the persistence of the active ingredients in question is to be estimated (according to BBA Guideline IV, 6-1).

It is first tested whether the active ingredient is sufficiently stable towards hydrolysis and direct photolysis in water in order to also be able to reliably estimate the volatilisation of the active ingredients from their formulations as determined by indirect detection methods. In volatility tests, the volatilisation rate of the originally applied amount and, if relevant, the extent of photochemical- oxidative degradability of the pure active ingredients in the air, are determined.

Authorization is not granted if:

1) The active ingredient tends to volatilise (>20% in 24 hours) and is persistent in the air. Due to the application pattern and stability in/on plants, in soil and in water, a sufficient degradation of the active ingredient is not assured.

2) The active substance tends to volatilise, is persistent in air and also has the ability to accumulate.

3.1.7 Bioaccumulation

Here, the distinction must be made between direct bioaccumulation, where organisms acquire high concentrations of a substance from the ambient medium, and indirect bioaccumulation, where organisms acquire high concentrations of a substance out of their food.

All plant protection products are evaluated with regard to bioaccumulation (according to BBA Guideline IV, 5-1; BBA leaflet 55; OECD Draft Test Guidelines). Stability in water and air, lipophilic properties under observation of physical and chemical properties (molecule size, water solubility, degree of ionisation) and bioaccumulation in water organisms, e.g. fish, and terrestrial organisms, such as mammals and birds, are taken into account. If there is a tendency to accumulate in conjunction with the stability of the active substance, then the possibility damage to organisms shall be assessed. If necessary, authorization can be refused.

3.1.8 Side-effects on selected fauna and flora (water organisms, soil microflora, earthworms, bees, beneficial organisms, birds and wild mammals)

<u>Side-effects on water organisms</u>

The factors which form the basis for observations of the effects and risks of a plant protection product on water organisms are the exposure concentrations calculated from spray drift depending on the distance between the cultivated area and waters, its behaviour in water and sediment (degradation, adsorption/desorption, persistence) as well as its effect on water organisms. The basis for estimating possible effects in bodies of water are formed by the laboratory tests with selected water organisms conceived according to OECD guidelines. On the basis of the distance-related concentration in comparison with the effect concentration of the most sensitive species tested, in order to reduce risks to bodies of water, safety distance guidelines may be issued which require the user to adhere to a prescribed safety distance to bodies of water. If bodies of water are insufficiently protected by safety distance guidelines and if other spray drift-reducing measures do not exist, authorization may be withheld if necessary.
In some cases, further conditions for the use of the product can be issued as a result of the assessment which take into account toxicity to fish, algae and "fish-food animals". The conditions are phrased in accordance with BBA Directive I, 3-5.

<u>Side-effects on soil microflora and earthworms</u>

The soil, as a natural resource, is the basis for insuring the continuation of human existence. Therefore, soil protection and the conservation of its functions assume special meaning. Soil microflora and microfauna contribute to the maintaining of the soil’s fertility.

Since plant protection products must be used on areas in the open for agriculture, horticulture or forestry according to their intended purposes, they are tested with regard to their effect on activities of soil microflora (metabolism, nitrogen turnover) and on earthworms as typical soil fauna (acute toxicity, development in body weight, propagation). The risk of a limitation on the activities of the soil microflora and the length of the negative impact are measured. A similar study is made on earthworms, in which the intensity and the length of the effect are compared with the behaviour of the product in the soil. The earthworm is especially important with regard to a possible bioaccumulation resulting from the accumulation of plant protection products in animals which are eaten by birds.

If a toxicological impact is observed, then either a labelling requirement shall be given depending on the degree of risk, or the use of the plant protection product shall be limited, or, should the impact be unacceptable, its authorization refused. This insures that the risk to soil microflora and microfauna is minimised.

Side-effects on bees and other beneficial organisms

Bees and other beneficial organisms (parasites, predatory organisms) are directly beneficial to human beings (honey, pollination) or contribute to the stabilisation of the agricultural ecosystem and thus, in the end, to a limiting of the use of chemical plant protection measures. Bees can be harmed or killed by insecticides and in some cases by other plant protection products. This is especially true during blossoming, when the bees are directly exposed to plant protection products. The introduction of plant protection product residues to the beehive through pollen or nectar is a risk which must be avoided. Other beneficial organisms can also be affected by many horticultural measures, including through the use of chemical plant protection products.

As part of the authorization of plant protection products, bees and other beneficial organisms are tested during the evaluation of the impact of plant protection products. The goal is to minimise the risks of harming bees and other beneficial organisms to the greatest possible extent. In order to avoid risks, plant protection products which have proven to be hazardous to bees are not authorized if the intended use of the product makes the application in flowering crops necessary. In the case of other uses, plant protection products which are hazardous to bees are required to be labelled and to contain instructions for proper use. The user is thus informed about the risks of harm to bees and can, through authorized and proper use of plant protection products, help prevent damage to bees.

The use of plant protection products can also have an influence on other organisms which stay in, fly into or migrate into treated areas. In particular, the risks for beneficial organisms like syrphids and ladybirds in the use of plant protection products should be minimised. To this end, criteria such as mortality and reduction of beneficial capacity (reduction of feeding capacity of predators, reduction of parasitisation capacity of parasites) and fertility are taken into account in the authorization process. Should harmful impact appear, then either statements will be given or labels assigned which refer to the respective species examined.

Side-effects on birds and wild mammals

Birds and wild mammals migrate to treated areas; therefore, the intake of foodstuffs which have been treated with plant protection products may harbour special risks. In order to minimise risks, toxicity studies are necessary.

In particular cases, additional studies may become necessary, e.g.:

a) on the hazard of secondary poisoning (e.g. wandering into treated areas)
b) on reproduction toxicity (with regard to bioaccumulation potential)
c) to determine residues in food
d) field tests.

On the basis of the documents on the side-effects on birds and wild mammals which are to be presented in the authorization procedure, the risks can be estimated. If the ratio of exposure and toxicity shows that a hazard exists for birds or mammals, then it is examined whether or not exposure can be precluded or reduced by regulating the use (labelling requirements). If it cannot be prevented through restrictions of use or labelling requirements that birds or mammals with the intended application of the product will be harmed or restricted in their ability to survive or reproduce, then a decision shall be taken concerning the authorization of the relevant plant protection product, in the course of which the risks and benefits of using the plant protection product are weighed against each other. Risks for birds and wild mammals caused by plant protection products can be largely avoided through this internationally recognised procedure.

3.2 Risk reduction in the use of plant protection products and promotion of non-chemical measures

3.2.1 Plant inspection and regulations on the marketing of propagation material and plants

Plant inspection is intended to prevent the introduction and spread of harmful organisms. Moreover, regulations on the marketing of propagation materials serve to create uniform standards for the health and quality of plants.

New harmful organisms generally cause new plant protection problems. If non-endemic harmful organisms can successfully settle in an area and spread, then additional plant protection measures are necessary to ameliorate the economic and sometimes ecological consequences. Deterring the spread of harmful organisms through healthy plant and propagation material contributes to a reduction in the amount of plant protection products necessary and thus limiting chemical plant protection.

Quarantine measures are embodied in the Plant Inspection Ordinance of 10 May 1989 (Fed. Law Gazette I P. 905), last amended by the Ordinance Amending the Second Ordinance Governing the Amendment of the Plant Inspection Ordinance of 10 January 1995(Fed. Law Gazette I P. 19). The Plant Inspection Ordinance regulates the import, transportation and inspection of plants and plant products. For the transport of goods within the EU, phytosanitary inspections are carried out at the place of manufacture in order to guarantee healthy, non-infested plant material. Plants and plant products which are particularly at risk with regard to the introduction of harmful organisms are assigned a "Plant Passport". This requires frequent inspections, guarantees that the goods are not affected, and serves as a prerequisite for the reduction of the use of chemical plant protection products. Certain plants and plant products which come from third countries are inspected at the external borders of the EU countries and require a plant health certificate, the purpose of which is to insure that no harmful organisms are imported.

Should any introduction of harmful organisms take place despite all precautionary measures, then eradicative measures to stop their spread are unavoidable. When using chemical plant protection products, aspects of risk reduction are to be put aside temporarily

while weighing cost and benefit against one another. This means that intensive chemical treatment or other radical decontamination measures may also be taken. From the point of view of provisions for long-term plant health care and the plant protection measures against non-endemic harmful organisms being made no longer necessary, such a procedure is justifiable and internationally sanctioned.

Modern plant protection already begins with healthy propagation material. Phytosanitary requirements for the propagation material are to insure that the risk of introduction and transmission of harmful organisms through extensive trade in propagation material and young plants is extremely minimised. The provisions in the marketing directives set minimum standards for plant health, quality and authenticity of variety. The enterprises must take on a large share of responsibility by producing good source material as a basis for healthy plant stock which requires a minimum of plant protection measures. Risks caused by plant protection products are thus avoided at the beginning through the preventative measure of good plant hygiene.

3.2.2 Good professional practice/integrated plant protection

Article 6 of the Plant Protection Act stipulates that plant protection products may only be used according to good professional practice. This also includes observation of the principles of integrated plant protection. Plant protection products may not be used in cases where the user must expect that their use shall have harmful impact on the health of man or animals or on groundwater or any other major harmful impact, particularly with regard to the natural balance. Integrated plant protection is a combination of methods in which, with particular attention being paid to biological, biotechnical, plant-breeding and cultivation-related measures, the use of chemical plant protection substances is limited to the essential minimum (Article 2 of the Plant Protection Act). Thus, non-chemical plant protection measures are favoured, putting chemical plant protection measures at the end of a chain of preventative and non-chemical protective measures. Integrated plant protection is one of the most important methods of reducing and avoiding risks through plant protection products which might remain despite authorization. The further development and the widespread implementation of integrated plant protection have a high priority in the Federal Republic of Germany.

Integrated plant protection is promoted and realised through a large number of programmes and activities of the Federal Government, the states (Laender) and other organisations (Annex 1). In addition, there is also an initiative by various cultivation organisations (e.g. fruit, vegetables, wine, hops) which have the conduction of integrated plant protection procedures checked voluntarily.

3.2.2.1 Resistance breeding

The cultivation of resistant and tolerant plant varieties is a component of integrated plant protection.

With regard to a reduction of the use of chemical plant protection products, those crops which require intensive treatment are given first priority. That means that resistance breeding is concentrated primarily on economically important pathogens, viruses, bacteria and fungi. Success has been achieved in the producing of plant varieties showing multiple resistance.

Resistance breeding also makes an important contribution to risk reduction in conjunction with other plant protection measures. Genetic engineering shall also give a fresh impetus

to classical breeding, so that in the future the production of source material which is even more valuable from a cultivating point of view may be expected.

3.2.2.2 Damage thresholds and forecast

The principle of damage thresholds and the infestation and damage prognoses are elementary parts of integrated plant protection.

The idea of the damage threshold principle is to combat harmful organisms only when damage thresholds are exceeded. Harmful organisms which appear in economically insignificant numbers are tolerated, so that unnecessary plant protection measures can be avoided.

At present, in Germany there are already damage thresholds and control values for numerous harmful organisms, particularly weeds, in farming, fruit growing and horticulture. However, in practice, damage thresholds are accepted and applied differently depending on the organism, the crop and the available plant protection products.

On the one hand, this has to do with the relatively high cost and effort necessary to ascertain the damage thresholds; on the other hand, damage thresholds, especially for harmful fungi, still harbour a certain risk of miscalculation through unforeseeable infestational progress due to unpredictable weather conditions. The cost and effort of ascertaining damage thresholds can be partly limited, for example, through the use of counting frames for calculating the thickness of weeds, or yellow sticky traps or pheromone traps to control harmful animals.

The use of damage thresholds, often combined with situationally adjusted amounts of plant protection products used, generally leads to a reduction in the amount of plant protection products used.

The risk of harmful organisms acquiring resistance to plant protection products is especially present if preparations with the same active substances or active working mechanisms are used often and repeatedly against the same harmful organism. This risk can be lowered through the use of plant protection products according to the principle of damage thresholds, where the frequency of application is limited.

Through specific application of chemical plant protection products in place of routine applications which were sometimes practised in the past, the risks to the natural balance are reduced. Therefore, the development of flexible damage thresholds combined with situationally adjusted amounts of plant protection product as well as their implementation are promoted as part of integrated plant protection.

Diagnosis and Forecast systems similarly contribute to a well-considered decision whether or not to combat harmful organisms. The exact harvest losses due to certain harmful organisms cannot always be predicted at the last combating date. For example, often the epidemiological progress is often so strongly influenced by the weather as well as by the crop rotation, soil tillage, location and nitrogenous fertilisation that a precise infestation forecast is made more difficult. Despite these factors, forecast systems are used to predict as accurately as possible, on short notice, the course of the epidemic, the level of damage and primarily the economic necessity of disease control. Intelligent, computerised decision-making systems can largely reduce unnecessary strains on the natural balance through unjustified use of plant protection products and insure the economic effectiveness of production procedures to raise the amount of the harvest and

the quality. Since the farmer is not able to keep track of all relevant parameters in their complexity (such as the weather, state of infestation, population dynamics, course of an epidemic, biology of the harmful organism, antagonists, etc.), computer-assisted forecast and decision-making systems contribute to the minimising of risks of making wrong decisions.

3.2.2.3 Conservation and promotion of beneficial organisms

Beneficial organisms are a part of the agricultural ecosystem and contribute to keeping the population of harmful animals under control. They stabilise the ecological structure and lessen the risk of catastrophes. As the natural enemies of harmful organisms, they help us to reduce plant protection measures. The protection and promotion of beneficial organisms is therefore an important aspect of integrated plant protection.

One method is the preferential use of plant protection products with specific effects. The effect of plant protection products on beneficial organisms is tested as part of the authorization procedure and has been obligatory in the Federal Republic of Germany since 1 December 1989 (cf. Section 3.1.8.).

Cultivation of beneficial organisms takes place, among others, through near-natural regulatory areas. Some prime examples of retreat areas are hedges, bushes, baulks, fallow areas, protective strips and forest edges. Particular attention is paid to these aspects during structural development programmes. Fringe biotopes offer nourishment and opportunities to spend the winter. Many beneficial organisms need nourishment from flowering plants or need substitute hosts or substitute predators during certain periods. Moreover, there is a series of ways of promotion. Some examples are the installation of protective, nesting and breeding places, the building of perches for predatory birds and other ecologically oriented governmental measures. (Cf. Sec. 5.)

3.2.2.4 Physical and mechanical control measures

Physical and mechanical control measures form a part of integrated plant protection.

In the first place, mechanical procedures for the control of weeds are viable alternatives to chemical means for winter wheat, spring grain, sugar beets, potatoes, corn etc. If the prevailing local conditions (weather, danger of erosion) and economic considerations permit it, then they can reduce or replace the use of herbicides in many areas. The combination of mechanical weed control and chemical procedures also reduces the use of herbicides.

Mechanical procedures, like rotary cultivation, are also suited to local soil insect control, although beneficial and indifferent insects can also be harmed. Netting is used in horticulture as protection against insects and birds. In certain crops, foil which is used to cover the soil surface provides effective protection against weed infestation.

3.2.2.5 Biological control methods

One aspect of biological plant protection is the possibility, on a case-by-case basis, to supplement the already existing beneficial fauna or, if there are no natural enemies, to introduce them. This is especially practical when combating newly introduced pests, as pests are usually introduced without the natural enemies present in their country of origin.

These beneficial natural enemies, once they have been introduced, are often able to prevent mass reproduction of harmful organisms and thus prevent otherwise necessary chemical pest control measures. Besides this classical method of biological pest control, various beneficial organisms are increasingly being used for biological pest control . These organisms are commercially bred in special factories and marketed so that their buyers use them in high densities in greenhouses or out in the open.

Biological methods are generally known for their high degree of specific effectiveness. They can reduce the number of harmful animals without or with minimal direct impact on other organisms. Therefore, these methods present no danger to the user or the consumer. Biological methods are non-polluting and preserve the natural ecosystems. At the same time, they keep the already present natural enemies intact and are thus a suitable element of integrated plant protection.

In Germany, several preparations containing the bacterium *Bacillus thuringiensis* (*Bt*), which is pathogenic on insects, are sold. This highly selective bacteria is harmless to humans and animals. Bt preparations are especially used in fruit, vegetable and wine growing to combat phytophagious larvae of butterflies, as well to combat the larvae of the Colorado beetle in potatoes.

The use of insect pheromones in special traps serves to keep track of harmful organisms and thus facilitate a targeted control effort. In viticulture, substances are used in the so-called confusion method to control the larvae of certain harmful butterflies. The effect is that the male insects are not able to find and mate with the female insects due to the high concentration of scents in the air. This prevents propagation and thus usually eliminates the need for chemical measures.

Financial support and further research activities have proven necessary in biological plant protection and are therefore sponsored by the Federal Government, the State Governments and private organisations (Annex 1).

3.2.2.6 Cultivation measures

Cultivation measures form the basis for healthy, robust crops. Prior to pest control measures, a series of cultivation measures can help reduce or avoid plant protection problems.

In principle, the location should be used such that the quality of the soil and climate meet the needs of the plant, offering them optimal growth and thus keeping the risks of infestation with harmful organisms down.

Crop rotation should also be adjusted with regard to phytosanitary aspects. The share proportion of an individual crop in the rotation is to be set such that the risk of infestation is kept to a minimum. Crop rotation where the periods between crops are too short should be avoided (e.g. nematode propagation), and cultivation pauses (e.g. three to four years for sugar beets) should be stuck to. Catch crops (e.g. resistant oil radish versus beet cyst nematodes) and fallowness help diversify the crop rotation and can reduce the pressure of infestation. At the same time, they offer refuges for many beneficial insects (e.g. syrphids). In practice, however, economic constraints often put limits on the above-mentioned demands.

A protective tillage of the soil suited to the crop and the phytosanitary situation can also contribute to the lowering of the probability that chemical plant protection products

shall be needed. For example, proper soil tillage can lower the weed infestation, particularly infestation of quack grass.

When choosing planting and seeding times, the risk of appearance of harmful organisms is to be taken into account. In various crops, there are methods of determining the nutritive needs based on analyses of soil and/or plants. This prevents a one-sided or excessive fertilisation which, in the case of nitrogen, is known to promote spider mites, aphids and biotrophic fungi.

Care measures such as winter and summer pruning of apple trees help reduce apple mildew and bark diseases, thus eliminating the need for further control measures.

3.2.3 Duty of care of the user

As part of good professional practice, the user has a high degree of responsibility when handling plant protection products. Some important aspects of duty of care required of the user are, besides observing the use instructions, taking into account special risks to humans, animals, groundwater and the natural balance on his farm and avoiding drift.

Toxicity, flammability and the leaching tendency are important with regard to the careful storage and handling of plant protection products. The requirements stipulated in the Hazardous Substances Ordinance (Gefahrstoffverordnung) are to be observed regarding plant protection products classified according to the Chemicals Act (Chemikaliengesetz).

In principle, the storage and handling must be in such a way that humans, animals and the natural balance are not endangered in any way. In order to preclude abuse or wrong use, proper and acceptable measures must be taken (e.g. suitable warehouses or airtight closets). Plant protection products may not be kept or stored in receptacles which could cause them to be confused with foodstuffs. They must also be stored in an orderly, clear manner and not in the vicinity of human or animal foodstuffs. Outsiders may not have access to plant protection products classified as corrosive, less toxic or irritant; furthermore, toxic or extremely toxic plant protection products are to be kept in airtight receptacles or stored in places to which only experts or their delegates have access.

Valid special arrangements for certain amounts as well as for fluid, flammable plant protection products must be followed during storage.

<u>Consumer protection through regulations in other areas</u>

The legal basis for the protection of the consumer from residues of plant protection products in foodstuffs and drinking water is regulated by the Foodstuffs Act (Lebensmittel- und Bedarfsgegenständegesetz), the Ordinance for Maximum Residue Limits (Rückstands-Höchstmengenverordnung) and the Drinking Water Ordinance (Trinkwasserverordnung).

The limiting of the use of the product to the application areas laid out in the authorization, as well as the meeting of requirements with regard to the amount used, the maximum number of intended applications, and the pre-harvest interval all guarantee that the maximum residue limit is not exceeded and that no health risks for the consumer occur. Foodstuffs on or in which residues of plant protection products exceed the acceptable maximum residue limit may not be marketed.

In principle, drift to neighbouring plots of land is to be avoided in order to eliminate the risk of contaminating the crops cultivated there.

In order to rule out remaining risks of contamination of groundwater through plant protection products in water catchment areas or mineral spring reserves or other areas which are designated as water protection sites, the user must know if areas of his farm are located within these areas. Here, if necessary, special conditions as well as the conditions and use regulations in the user instructions apply. They inform the user about what is necessary to protect water.

User protection

The requirements regarding personal protective gear in the form of protective suit and gloves are regulated by a BBA guideline (3-3/2). The Hazardous Substances Ordinance (Gefahrstoffverordnung) lists the tasks of employers regarding the guarantee of work protection. Further guidelines contain the Accident Prevention Regulations of the Professional Associations (Unfallverhütungsvorschriften der Berufsgenossenschaften) which was conceived for employers and employees.

In order to avoid risks, the protective measures listed in the use instructions, especially regarding bodily and breathing protection, are to be observed during preparation and handling of the concentrate as well as during the entire process of application of the plant protection product. When making treatment fluids, the user must observe special safety precautions. Residual treatment fluids, unused plant protection products, dirty containers and instruments are not to be left unattended, in order to avoid danger to third parties.

In order to avoid contamination, proper use and suitable protective clothing must be maintained at all times. Sufficient hygiene after completion of work should contribute to keeping risks for the user as low as possible.

It is natural that the observance of work protection guidelines is largely dependent on the personality of the user. Therefore, the professional organisations link the maintenance of work protection directives with the granting or refusal of insurance payment. This assigns the user a high degree of personal responsibility with regard to the observance of protective measures.

3.2.4 Expert knowledge, education and further training

The Plant Protection Act provides that users of plant protection products in agricultural, horticultural or forestry enterprises as well as commercial users must have the necessary degree of reliability and possess the necessary specialist knowledge and skills. This also applies to persons who are charged with the instruction or supervision of persons undergoing vocational training in the above-mentioned speciality fields. Sellers of plant protection products must also possess the necessary knowledge for proper explaining to the buyer of the use of these products and their dangers. Proof of the necessary knowledge and skills must be furnished to the relevant authority upon request.

The Ordinance Governing Specialist Qualifications in Plant Protection of 1987 regulates the furnishing of proof of the necessary requirements for the user and seller of plant protection products (expert examination). The authorities which are competent in accordance with Land law are responsible for carrying out this ordinance.

The Hazardous Substances Ordinance and the Chemicals Banning Ordinance (Chemikalien-Verbotsverordnung), both based on the Chemicals Act, regulate the conditions - as well as expert knowledge - under which toxic or extremely toxic substances and preparations (approx. 7% of plant protection products) may be sold. Moreover, in accordance with the Chemicals Banning Ordinance, substances and preparations which are labelled corrosive, flammable, highly flammable or harmful to health and have the R rating R 40 ("irreversible damage possible") may generally only be sold by persons with expert knowledge. These rules are also valid for plant protection products labelled accordingly.

A great number of training programs (e.g. winter training courses in plant protection), events and meetings contribute to the further education of the user, also with regard to the chance of integrated plant protection.

3.2.5 Restrictions and bans on use

The Federal Ministry for Food, Agriculture and Forestry is empowered, acting in agreement with other Federal Ministries and the Bundesrat, to prohibit or limit the use of plant protection products or to make their use subject to the obtaining of a permit or to notification requirements, to the extent that this is necessary for the protection of human or animal health or for averting dangers, particularly where the natural balance is concerned (Art. 7 of the Plant Protection Act). The limits, prohibitions and permit and notification requirements apply for certain plant protection products or for plant protection products containing certain substances as well as for plant protection products where certain appliances or methods are used. Furthermore, the cultivation of certain crop species on plots where the soil has been treated with certain plant protection products, the selling of certain plant protection products or plant protection products with certain active substances, and the import of seed, plant material or crop substrates in or on which certain plant protection products or certain substances of plant protection products are present, are regulated.

The Plant Protection Use Ordinance completely prohibits or places strict limits on the use of certain substances as plant protection substances for the protection of health or the natural balance. This ordinance was first passed in 1971 and is regularly adjusted to the latest scientific knowledge. Since 1979, this ordinance has served to implement the prohibitions at the EC level.[1] At present, 44 active substances whose use in plant protection products is prohibited are listed. Furthermore, there are 60 active substances whose use in plant protection products is forbidden in water catchment areas and mineral spa areas. Moreover, the Laender, taking regional differences into account, may prohibit the use of certain plant protection products in certain marked-off areas which are sources of drinking water, mineral springs or other areas for the protection of groundwater.

In principle, plant protection products which are made of or contain active substances which are subject by ordinance to a limited ban on use or limited use may not be used in nature reserves and natural parks. Further regulations on prohibitions or general prohibitions of plant protection products in nature reserves or natural parks may be passed by the Laender in accordance with regional differences.

[1]Council Directive (79/117/EEC) of 21 December 1978 prohibiting the placing on the market and use of plant protection products containing certain active substances (OJ No L 33 of 08 January 1979, p. 36), last amended by Commission Directive (91/188/EWG) of 19 March 1991 (OJ No L 92 of 13 April 1991, p. 42).

3.2.6 Plant protection equipment testing

Plant protection equipment may only be marketed if they are made such that their proper and intended use in the application of plant protection products does not have any harmful impact on the health of humans and animals and on groundwater and has no other adverse impact, particularly with regard to the natural balance, which are avoidable on the basis of the current state of the art.

In order to guarantee proper plant protection and to avoid risks in the application of plant protection products, plant protection equipment must meet the following legal requirements:

1. Duty to declare that new types of equipment meet the official requirements.
2. Registering of like types of equipment.
3. Binding examination of field spraying equipment in use in regular periods of time.

In the declaration that new plant protection equipment meets the legal requirements, information which, among other things, allows a judgement of the equipment with regard to its proper and intended use in applying plant protection products, is necessary. This insures that no risks to humans and animals as well as to the natural balance arise during the application of plant protection products. If the plant protection equipment passes the examination, they are entered into the plant protection equipment list. However, should shortcomings be determined, conditions for their removal may be granted in slight cases. In the case of egregious deficiencies, the equipment shall not be entered in, or shall be deleted from, the equipment list, thus banning the marketing of such equipment.

Moreover, there is also a voluntary approval procedure for the testing of new plant protection equipment and equipment parts which here are subjected to comprehensive testing. In some Laender, financial support for the purchase of such equipment, especially for environmentally friendly application technology in, e.g. fruit growing and viticulture, is also granted.

The passing of examinations by plant protection equipment in use in large crop areas is to be indicated by an examination seal, on which the date on which the equipment is due for its next inspection must be given. Testing takes place every two years.

4. Monitoring of legal regulations on plant protection

In Germany, the monitoring of the observance of the Plant Protection Act as well as the legal regulations passed on the basis of this act and its conditions is left to the Laender.

One of the most important safety-relevant monitoring functions of the Laender is the monitoring of authorization and labelling during the marketing of plant protection products, the monitoring of the observance of the application directives and application prohibitions and restrictions, and the necessary expert knowledge of the plant protection product users. In addition, the Laender shall also monitor the necessary expert knowledge of plant protection product retailers, the ban on self-service in the purchasing of plant protection products, and the marketing and the observance of the examination obligation of plant protection equipment.

As part of the plant inspection, the Laender shall monitor the observance of phytosanitary requirements during import and export.

Foodstuffs which are to be marketed shall be tested for residues of plant protection products by the Foodstuffs Examination Institutes (Lebensmittel-Untersuchungsanstalten) of the Laender. Various private and official organisations as well as research institutes of the Federal Government and the Laender conduct examinations on plant protection products and important metabolites in the environment and in groundwater, soil water and drinking water. Regular examinations are also conducted by water supply enterprises to ensure that the legally required limits for plant protection products are observed.

5. Risk reduction through research and development

Intensive research in the field of plant protection is indispensable with regard to risk reduction in the use of plant protection products. Research is not only directed towards the further development of chemical plant protection products, e.g. either through the development of active substances with improved characteristics for the protection of plants or with fewer effects on the natural balance, but also towards usage-accompanying measures. This research is conducted both by the plant protection industry as well as by governmental organisations.

Besides research into the effects of the use of certain plant protection products on humans, animals and the natural balance, the investigation of non-chemical procedures and further procedures of integrated plant protection receive particular attention in Germany. These particularly include the following procedures:

- Biological plant protection
- Conservation and promotion of beneficial organisms
- Mechanical and physical procedures for weed control
- Biotechnical procedures for the control of harmful organisms and for monitoring
- Development of decision aids for a well-aimed and timely use of plant protection products
  = Diagnosis and Forecast systems
  = Control thresholds
  = Development of computer-assisted regression and simulations on the basis of weather information
  = Development of computer-assisted expert systems
- Resistance management

The procedures listed can lead to fewer uses of certain plant protection products compared with prophylactic routine spraying. They can also give the user tips for the correct, situationally adjusted choice of the most suitable plant protection product.

Another essential component of integrated plant protection is the cultivation of varieties of crops which are resistant to pests or disease. Since the spectrum of available species with satisfactory quality and yielding capacity is still too small in some subdomains, resistance research is a particular focal point in the Federal Republic of Germany. for the breeding of new varieties with the desired characteristics, methods of traditional cultivation as well as gene technology are currently being applied.

A further area which can contribute greatly to risk reduction is the researching of new procedures of application technology (e.g. further development of equipment, optimisation of spray deposits). As large a part of the plant protection products applied must reach the location where it is intended to have an effect. Losses which, for example, can result due to drift or applying the product onto the soil surface instead of hitting the plant, are to be minimised.

6. Risk reduction through related measures

The term "related measures" is used here to mean all measures and regulations beyond the confines of plant protection law which have an influence on the use of plant protection products. These are generally measures and regulations which limit or ban the use of plant protection products in certain areas or certain methods of cultivation. They generally lead to a reduction in risks with regard to the danger to the natural balance.

In particular, some of these related measures are:

1. Ban on the use of plant protection products on set-aside areas
2. Limits on the use of plant protection products in water catchment areas
3. Limits on the use of plant protection products on extensively farmed areas in accordance with Council Regulation (EEC) No 2078/92 of the of 30 June 1992 on agricultural production procedures which are environmentally friendly and conserve natural biotopes
4. Limits on the use of plant protection products in enterprises which produce according to the principles of ecofarming
5. The ban or limiting of the use of plant protection products through landscape conservation programmes.

6.1 Ban on the use of plant protection products on set-aside areas

Set-aside agricultural areas may not be treated with plant-protection products as long as they are not being used for the cultivation of regenerating raw materials. In 1994, approx. 1.4 million hectares of agriculturally used area in Germany was set aside. The farmers receive adequate compensation for the setting aside of these areas. The amount of set-aside area has increased by 32.5% over the previous year.

6.2. Limits on the use of plant protection products in water catchment areas

In 1992, 52,000 square kilometres of area in Germany were designated as water catchment areas, or approximately 15% of the total area of Germany. The number of water-protection areas in Germany has continued to grow up until today. In water-protection areas, plant protection products containing active substances may not be used if their active substances have a tendency to leach. These active substances are listed in the Plant Protection Products Use Ordinance, Annex 3, Section B. At present, this annex lists 60 banned active substances. Two further active substances are subject to a limited ban on use. Plant protection products with these active substances may not be used in water catchment areas, for example. Therefore, roughly 6% of the presently authorized plant protection products containing these active substances may not be used in water catchment areas. The economic disadvantages which could arise for farmers whose farms are located in water catchment areas and which go beyond proper agricultural and forestry

land use, are made up for through suitable compensation from the German Federal States (Laender).

6.3. Limits on the use of plant protection products on extensively farmed areas in accordance with Council Regulation (EEC) No 2078/92[2]

According to this ordinance, farmers who commit themselves to eliminating the use of herbicides or even all plant protection products entirely in the branch of arable farming and in permanent crops shall receive suitable compensation. Exceptions are made for authorized plant protection products containing the following substances:

- pyrethrum
- methaldehyde
- sulphur
- copper salts
- potassium soap
- pheromones
- *Bacillus thuringiensis*
- granulosis viruses
- oils of plant and animal origin
- paraffin oil

As early as 1993, the first Laender began to offer programmes on the basis of these ordinances. The compensatory payments are financed up to 50% (up to 75% in the new Laender) by the EU. These programmes are likely to be able to be offered on a nation-wide basis from the year 1995 on. Since the beginning of 1995, all Laender offer agricultural environmental programmes approved by the EU.

6.4 Limits on the use of plant protection products in enterprises which produce according to the principles of ecofarming

Enterprises which commit themselves to introduce a procedure of ecofarming in accordance with Council Regulation (EEC) No 2092/91[3] of 24 June 1991 on ecofarming and the corresponding labelling of agricultural products and foodstuffs, and to apply it for at least five years, may only use those plant protection products which are listed in Annex II, Section B of the Regulation. These enterprises shall receive suitable compensation.

At present, there are approximately 5,200 enterprises in Germany on an area of roughly 250,000 hectares according to Council Regulation (EEC) No 2092/91. About 1% of agricultural enterprises in Germany (about 1.5% of the area being used agriculturally) have accordingly committed themselves to this type of farming. The number of enterprises has more than doubled from 1991.

6.5. The ban or limiting of the use of plant protection products through landscape conservation programmes

Landscape conservation programmes are financed and conducted by the Laender. They include a series of measures to protect and conserve landscape elements worthy of conservation, including among other things stopping or at least limiting the use of plant protection products. The financial losses sustained by farmers through participation in these programmes are suitably compensated through payments based on the number of hectares.

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[2]Council Regulation (EEC) No 2078/92 of 30 June 1992 on agricultural production methods compatiple with the requirements of the protection of the environment and maintenance of the countriside (OJ No L 215 of 30 July 1992, p. 85).

[3]Council Regulation (EEC) No 2092/91[3] of 24 June 1991 on ecofarming and the corresponding labelling of agricultural products and foodstuffs (OJ No L 198 of 22 July 1991, p. 1), last amended by Commission Regulation (EC) No 2381/94 of 30 September 1994 (OJ No L 255 of 01 October 1994, p. 84).

Besides a series of other measures, a complete renunciation of the use of plant protection products is demanded in the following areas in which programmes are being conducted in various Laender:

- Meadows and pastures
  = moist meadows
  = marsh-marigold meadows
  = small sedge meadows
  = saline grassland
  = xeric grassland communities, oligotrophic grassland communities
  = mountain meadows
  = shepherding on recognised alpine pastures
  = meadows where birds breed

- field vegetation
- fallow land, fallow grassland, grassland renaturing
- field peripheries
- riverbank peripheries (no plant protection products in a strip of 10 metres' width)
- hump and arch fields, terraced fields
- conservation and promotion of particularly endangered animal and plant species in forests
- meadows with fruit trees
- care of agricultural areas which have been given up
- woody field plants, bushes

Programmes run by the Laender in which the use of plant protection products is extremely limited exist in the following areas:

- - steep-slope viticulture, extensive viticulture
- - extensive farming of grassland for reasons of nature conservation
- - farming of field areas in accordance with the conservation of nature

7. Results

In order to assess measures to reduce the risks of plant protection products with regard to humans, animals and the natural balance, a clearly defined system of references is necessary. The system of rates of reductions in amount constitutes an unsuitable system of references, as it leaves out important aspects such as:

- quality aspects of the active substances and agents
- the necessity of use in unpredictable circumstances (such as inclement weather), so that only relative assessments of the reduction of quantity can be made
- changed conditions in agricultural policy (such as lower prices) which influence production programmes and thus change the use of plant protection products
- technical process (e.g. the development of recycling apparatuses in plant protection equip-ment).

A reference system of indicators which point out changes in the protective goals of humans, animals and the natural balance is much better suited to such a form of assessment. With regard to the risk reduction to be assessed, the reference system should

encompass and give a closer look, from the point of view of quantity and quality, to the following areas:

I. High-quality plant protection products regarding efficaciousness as well as the avoidance of harmful effects on humans, animals and groundwater as well as impact on the natural balance which cannot be justified.

II. Responsible use of plant protection products through
- observing the use instructions laid out by the authorization
- good professional practice in plant protection
- optimal information (legal requirements, counselling)
- application of integrated plant protection
- optimal plant protection equipment

III. Further development of non-chemical plant protection measures.

In the following, the results in the above-mentioned fields will be elaborated on:

<u>on I.</u> High-quality plant protection products/Avoidance of harmful or unjustifiable effects

1. <u>Quality requirements for authorization</u>
The authorization procedure for plant protection products has a considerable influence on the quality of the plant protection products used in practice. In Germany, plant protection products are not authorized if they
a) are insufficiently efficacious in the application areas stated in the application;
b) are carcinogenic, mutagenic or teratogenic;
c) have other impacts, particularly on the natural balance, which are unjustifiable in the light of the latest scientific knowledge;
d) have such strong leaching tendencies that the active substance and/or biologically and/or toxicologically relevant metabolites are to be expected in concentration of 0.1 µg or more per litre in groundwater;
e) contain certain inactive substances or impurities;
f) endanger the user despite suitable safety precautions;
g) cannot be sufficiently analysed;
h) consist of isomer mixtures, with the effect being based on only one isomer whose production is technically possible.

2. <u>Reduction in the range of authorized plant protection products</u>
In January 1987, 1,695 plant protection products, based on 308 active substances, were authorized, in January 1995 only 917 products with 242 active substances. This reduction resulted in improvements in the quality of the range of plant protection products.

3. <u>Consumer protection</u>
Maximum amounts of residues of plant protection products in foodstuffs are determined according to the active substance; adherence to these is an indication that the relevant plant protection product was properly used. Since the maximum amounts are generally well below concentrations which could impact upon health, the exceeding of the maximum amount does not necessarily mean an endangerment to the health of the consumer.

The continual further development of analytical procedures has increased the

validity of experimental results on residues of plant protection products in foodstuffs. The routinely used multi-methods simultaneously measure the residues of 150 and more active ingredients, sometimes together with the main metabolites.

From 1988 to 1993, a nation-wide food monitoring programme was installed and tried out in the former West Germany (1991 to 1995 in the former East Germany) as a research project. The goal of this project was to gather nation-wide, regionally classifiable, representative and reliable information on the current level of contamination of important foodstuffs with residues and impurities.

With the setting up of a nation-wide system of constant measuring and observation to monitor the contamination of foodstuffs with unhealthy substances, the proven elements of the research project were continued and given the force of law through an amendment to the Foodstuffs and Daily Needs Act. Here, this system of measuring and observation is conducted as an independent task within the framework of the official foodstuffs monitoring of the Laender. The contamination of foodstuffs with substances such as plant protection products, heavy metals and mycotoxins is monitored.

The results so far indicate that preventive health protection is provided according to the principles of precaution and minimisation. According to the 1992 Food Report by the German Food Society (Deutsche Gesellschaft für Ernährung), 90 to 95% and more of potatoes and white cabbage tested were free of residue. The maximum amounts were exceeded in less than 1% of the cases. 20 to 50% of the lettuce, apples and strawberries tested were free of residue. In 3 to 6% of the cases, the maximum amounts were exceeded, yet at no time were values reached which could pose a danger to human health.

4. User Protection

Cases of harm where plant protection products were involved were almost entirely due to improper use, accidents or intentional abuse. Among the deaths caused by plant protection products, there were no cases where death was caused by the proper use of a plant protection product.

5. Soil protection

One of the main goals of the Plant Protection Act is to protect the natural balance from danger caused by plant protection products. The requirements made by the authorization procedure on new plant protection products, the reduction of the range of already authorized plant protection products, as well as restrictions on the use in the case of active substances which tend to leach, have all prevented an unjustifiable accumulation of plant protection products in the soil. This is also valid for very stable active substances such as paraquat.

6. Contamination of groundwater

Plant protection products in drinking water, according to the Drinking Water Ordinance, are subject to a flat-rate limit of 0.1 µg/l for each individual active substance and 0.5µg/l for the sum of all active substances and relevant products resulting from their degradation and reaction. These limits are also used for assessing the danger posed to groundwater, are precautionary in nature and not based on toxicological considerations. Lysimeter studies played a crucial role in the assessment of the leaching behaviour of plant protection products. Up until now, lysimeter studies have been begun or completed for a total of 40 active

substances including their relevant metabolites.

Since 1989, the Federal Environment Office has been recording measurement results of the contamination of various water types with plant protection products. Measurement results have so far only been evaluated for the Laender of Bavaria, Hamburg, and North-Rhine/Westphalia as well as for Baden-Württemberg in part. Despite the tests for the presence of plant protection products in groundwater performed in many places, it is apparent that the overall contamination situation in many Laender of the Federal Republic is still unclear. In 8.8% of all cases, active substances or metabolites of plant protection products were detected in water. In 2.4% of all cases, the concentration exceeded the maximum value of 0.1µg/l. Atrazine and its degradation product, desethyl atrazine, were found the most often. The use of active substances containing atrazine has been banned in Germany since 1991.

Despite the fact that testing for the presence of plant protection products in groundwater has been conducted in many places, the overall contamination situation in many Laender of the Federal Republic is still not sufficiently known.

7. Volatilisation and behaviour in the air

According to estimations by the German Research Association (Deutsche Forschungsgemeinschaft), the strain on the air and the transportation and depositing of active substances is generally not a problem. There is, however, still a need for research with regard to photochemical degradation and the distribution of substances carried by air over large distances. In the case of certain active substances which tend strongly towards volatilisation and are stable in air (e.g. Lindan), the authorized use was restricted to a justifiable extent.

8. Unjustifiable effects on water organisms

At present, there is no nation-wide biomonitoring scheme in the Federal Republic regarding possible effects of plant protection products on aquatic systems. The cause of fish deaths which are occasionally observed is accidental in most cases. No fish deaths are known to be linked to the proper use of plant protection products.

9. Unjustifiable effects on birds and terrestrial vertebrates

The BBA gathers reports of plant protection product poisoning in vertebrates and evaluates them. From 1988 to 1993, there were 30 reports of damages. In 20 out of 28 cases in which birds were affected, plant protection product poisoning was either probable or unquestionable, and in four of those cases the product had been used properly, when this could be determined. Although it must be assumed that not all damages are discovered and reported, there are also no clear signs that direct impact of plant protection products are occurring to an extent which could cause reductions in stands. The phenomenon of conspicuously reduced populations of field birds, a fact which cannot be denied, could, however, not be linked to the presence of chemical compounds, but only to general landscape encroachments due to changing agricultural farming measures.

10. Unjustifiable effects on honeybees

According to the results of the official examination agency for bee poisoning of the BBA, damage to bees resulting from uses of plant protection products has declined noticeably in the past 15 years. The main reason for this lay in the examination of numerous plant protection products which had been classified as

"not dangerous to bees" or as "dangerous to bees with the exception of use after the daily flight of the bees until 23.00 hrs.", and whose active substances, following chemical analyses, had been linked to damage to bee populations. Afterwards, some of these products were labelled "dangerous to bees". One example deserving particular mention was, substantial damage caused by insecticides which contained the active substance Carbaryl and which were used in viticulture in the 1970s; at times, they are responsible for around 40% of all reported damage to bees. In order to prevent this damage, the use of plant protection products containing Carbaryl was sharply restricted at first and then banned. These measures and increased awareness of bee protection have led to a noticeable decrease in damage to bees since 1980.

on II. Responsible use of plant protection products

1. Training/Specialist qualifications

The proper use of plant protection products contributes greatly to risk reduction. Trained persons who work in agriculture, horticulture and forestry are considered to have specialist qualifications. From the entry into force of the Ordinance Governing Specialist Qualifications in Plant Protection (Pflanzenschutz-Sachkundeverordnung) on 28 July 1987 until 1993, over 100,000 users and dealers of plant protection products in the Federal Republic of Germany have passed the specialist qualifications examination. This high number is an indicator of the great interest in further professional training in the field of plant protection.

2. Application of integrated plant protection

The further development and the widespread implementation of integrated plant protection enjoy a high priority in the Federal Republic of Germany. A variety of programmes and activities by the Federal Government, the Laender and other organisations serves to promote and implement integrated plant protection (Annex 1). Moreover, there are initiatives by various cultivation organisations (e.g. fruit, vegetables, wine, hops) which have the conduction of integrated plant protection procedures checked voluntarily.

In fruit and vegetable growing, a very large number of farmers operate according to the principles of integrated plant protection. Roughly 80% of seed fruits and 50% of vegetables are produced according to supervised integrated plant protection procedures.

Success in field cultivation through the introduction of integrated plant protection has already been visible for a long time. The use of damage thresholds, especially in the control of weeds and certain harmful insects, is now widespread, and a large percentage of farmers reduce the amount (of plant protection products) provided for in the authorization, depending on the degree of infestation. The use of herbicides can be reduced by 25 to 30%, with the level of safety remaining the same, through the use of damage thresholds and situationally adjusted amounts.

Computer-assisted prognosis and decision models are becoming increasingly important for a well-timed use of plant protection measures. At present, in Germany there are three large, extensive forecast system either already in use or about to be introduced. Through optimal use of this procedure, the amount of plant protection products used in specific crops can be reduced by anywhere from one-fourth to one-third without increasing plant cultivation risks. The frequency of

usage can also be reduced in some cultures. As far as the reduction of exposure is concerned, such forecast procedures, therefore, deserve high marks. The development and optimisation of computer-assisted forecast procedures will continue to be promoted for a long time.

3. Optimal plant protection equipment

The duty to have all field spraying equipment inspected at regular intervals insures that this equipment meets the requirements of proper plant protection. Undesirable strains such as drift or overdosage due to erroneous calibration of the equipment are thus avoided.

In viticulture and fruit growing (where the fruit is treated from all sides), special opportunities of avoiding waste are offered by modern plant protection equipment where part of the sprayed plant protection product is caught by an apparatus on the other side of the fruit before it can escape. Through the use of tunnel spraying equipment or the collector system, an average of 35% of the amount of plant protection product currently used in viticulture and fruit growing can be saved. If the leaves are still small in spring, then this rate can even reach up to 75%. In addition, drift is reduced tenfold. Thus the farmer saves considerable amounts ofplant protection products through these application techniques and also contributes to the preservation of the natural balance.

4. Integrated production processes

The possibility of using the instruments of integrated plant protection, including biological and biotechnical measures, in integrated production processes as comprehensively as possible, is especially present in those areas where the control of harmful animals is most important (such as in fruit growing and viticulture, vegetable growing and glasshouse floriculture).

Biological and biotechnical control measures against weeds and fungal diseases are not yet sufficiently developed. Therefore, in farming in general and in cereals and row crops in particular, where weeds and diseases play a dominant role and where the largest amounts of plant protection products could potentially be saved with the most widespread use of integrated plant protection, only plant cultivation and cultivation technology measures can be used as elements of integrated plant protection in order to reduce the amount of chemical plant protection products used.

One example of what readjustments must be made to the entire production process as a condition for the introduction of integrated plant protection is hops cultivation. In a five-year project being funded by the Federal Government, an attempt is being made to grow hops in a more environmentally compatible manner than in the past; instead of scaffolding which is 7 meters high, hops are now cultivated on scaffolding which is only 3 metres high, whereby the plants are spaced closer together and the conducting wires are permanent. The expected advantages for the natural balance are: a) reduction of drift by 50% through tunnel spraying equipment with a recycling function; b) the more successful application of useful organisms in fighting harmful organisms; the amount of fertiliser would be reduced due to longer periods of growth, thus potentially lowering the costs, labour and energy used. However, quick results cannot be expected. The yields of the varieties used in these experiments, for example, left much to be desired, and the adaptation of technology still involves considerable difficulties.

5. Optimal information

The better the user is informed, the sooner recent developments, such as integrated plant protection, are put into practice. New findings and possibilities are developed at many institutes of research and higher learning. In the Federal Republic, the Federal Government and the Laender have created special facilities which process and publish this knowledge. Here, official counselling plays a crucial role; by practising this function, the plant protection services of the Laender contribute to the entry of innovative strategies such as integrated plant protection into practice.

on III. Further development of non-chemical plant protection procedures

1. Physical and mechanical procedures

Neither procedure plays an important role in the control of pathogens and harmful animals. However, physical and mechanical procedures have proven themselves as a part of integrated plant protection in the control of weeds. Through the combination of mechanical weed control with chemical procedures, the use of herbicides could be reduced by, for example, up to 60% in corn and by up to 50% in sugar and feeding beets, though the costs of pest control measures, according to the extent that herbicides are replaced by mechanical means, could increase manifold.

2. Resistance breeding

Through intensive resistance breeding during the past few years, numerous relatively resistant, yet competitive varieties of various crops could be developed. Thus, some plant protection problems regarding these varieties were largely solved (e.g. "RE" varieties in kernel fruits, mildew resistance in wine, sharka tolerance in plums, verticillium resistance in hops, phoma resistance in rapeseed, etc.), and the use of chemical plant protection products was either reduced or completely halted.

3. Biological plant protection

Biological plant protection has assumed greater importance in the control of harmful animals. Particular success has been achieved in the field of greenhouse growing, where, regarding some crops, biological plant protection has already surpassed chemical plant protection procedures in importance. In greenhouse growing of ornamental plants and vegetables, biological plant protection in the form of the introduction of useful arthropods and insectivorous nematodes was practised on around 320 hectares in 1993.

The use of biological plant protection in open-field crops is relatively limited. However, through the use of biological plant protection procedures in limited areas, the use of chemical plant protection means could be either eliminated or drastically reduced. This is especially true of the control of harmful butterflies in viticulture through the confusion method (area of use in 1993: 13,200 hectares) and through the use of preparations based on the insect pathogen Bacillus thuringiensis (area of use in 1993: approx. 9,000 hectares). In order to fight a species of harmful butterfly in corn, parasitic wasps were used in an area of 5,800 hectares in 1993.

Risk reduction through integrated plant protection measures

Example 1

Activity	Legal implementation of integrated plant protection
When did the activity begin and what prompted its initiation?	1986. Prompted by the Plant Protection Act.
What are its specific goals and/or targets?	Reduction of the use of chemical plant protection products.
Who is involved in carrying it out?	• Ministry of Food, Agriculture and Forestry in consent with the Ministries of Economy, Human Health, Environment and Nature Conservation • Plant protection services of the *Laender* • Farmers/growers
Is there a legal or regulatory mandate?	Plant Protection Act 1986
Is the activity monitored or enforced? If so, how?	Monitored by the competent authorities of the *Laender*
How are results and progress measured?	Partially
What specific progress/results have been achieved?	See report chapter 7: Results

Example 2

Activity	Regular technical inspection of field sprayers
When did the activity begin and what prompted its initiation?	1992 (art. 30 Plant Protection Act)
What are its specific goals and/or targets?	To reduce risks associated with the use of unsuited or inadequately adjusted field sprayers
Who is involved in carrying it out?	Inspection of field sprayers every two years by officially authorized service stations
Is there a legal or regulatory mandate?	Yes, specific regulations (Plant Protection Product Ordinance)
Is the activity monitored or enforced? If so, how?	Monitored and controlled by local plant protection authorities
How are results and progress measured?	By reports of the controlling service stations
What specific progress/results have been achieved?	Suitable and properly adjusted field sprayers

Example 3

Activity	Prohibition of application of plant protection products in surface waters and coastal waters or in the immediate vicinity of such waters
When did the activity begin and what prompted its initiation?	1986 (Plant Protection Act)
What are its specific goals and/or targets?	Reduction of contamination of waters
Who is involved in carrying it out?	Farmers/growers Competent authorities of the *Laender*
Is there a legal or regulatory mandate?	Plant Protection Act (art. 30 (2))
Is the activity monitored or enforced? If so, how?	Monitored by competent authorities of the *Laender*
How are results and progress measured?	Reports by the *Laender*
What specific progress/results have been achieved?	Avoidance and reduction of contamination of waters

Example 4

Activity	Prohibition of use of plant protection products with certain active substances in water catchment areas and mineral spring reserves
When did the activity begin and what prompted its initiation?	1974 (Plant Protection Act)
What are its specific goals and/or targets?	Reduction of ground water contamination
Who is involved in carrying it out?	• Ministry of Food, Agriculture and Forestry in consent with the Ministries of Economy, Human Health, Environment and Nature Conservation • Farmers/growers • Responsible authorities of the *Laender*
Is there a legal or regulatory mandate?	Ordinance for banned uses of plant protection products
Is the activity monitored or enforced? If so, how?	Responsible authorities of the *Laender*
How are results and progress measured?	Reports by the competent authorities of the *Laender*
What specific progress/results have been achieved?	Avoidance and reduction of water contamination

Example 5

Activity	Development and use of resistant varieties
When did the activity begin and what prompted its initiation?	1960
What are its specific goals and/or targets?	Reduction of the use of chemical plant protection products and relief of the natural balance
Who is involved in carrying it out?	• Federal Research Center for Breeding Research on Cultivated Plants • Federal Biological Research Center for Agriculture and Forestry • Federal Office of Plant Varieties • Plant breeding companies • Farmers/growers
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	Enforced by foundation of the Federal Research Center for Breeding Research on Cultivated Plants in 1992
How are results and progress measured?	Field trials on resistance level of varieties. Resistance level is considered in registration of new varieties.
What specific progress/results have been achieved?	Resistant varieties are increasingly being used by farmers.

Example 6

Activity	Research on and development of biological methods of plant protection and preservation and promotion of beneficials
When did the activity begin and what prompted its initiation?	1953
What are its specific goals and/or targets?	Reduction of use of chemical plant protection products
Who is involved in carrying it out?	• Federal and *Laender* research institutes • Plant protection authorities of the *Laender* • Producers of beneficials and biological products • Growers
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	No specific monitoring
How are results and progress measured?	• Reports from research institutes • Number of biological methods and products used in practice
What specific progress/results have been achieved?	A number of beneficials organisms and microbiological products are in practical use

Example 7

Activity	Promotion of biological methods of plant protection
When did the activity begin and what prompted its initiation?	1980
What are its specific goals and/or targets?	• Reduction of use of chemical plant protection products • Control methods in application fields in which chemical control is not possible
Who is involved in carrying it out?	• Ministry of Food, Agriculture and Forestry • Local plant protection services • Growers/farmers
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	• Partial financial support • Monitored by records of growers/farmers
How are results and progress measured?	Use in practice, e. g. number of hectares on which the beneficials organisms and biological products are being used
What specific progress/results have been achieved?	Beneficial organisms are used on 320 ha in glasshouses, > 5 000 ha in maize

Example 8

Activity	Development and use of methods for forecasting of harmful organisms (This project is part of programmes of research on IPP and introduction into practice. Different *Laender* are participating.)
When did the activity begin and what prompted its initiation?	1986
What are its specific goals and/or targets?	Optimal timing and targeted use of chemical plant protection products aimed at reduction of applications
Who is involved in carrying it out?	• Ministry of Food, Agriculture and Forestry • Local plant protection services • Research institutes • Farmers/growers
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	Enforced by the responsible authorities of the *Laender*
How are results and progress measured?	Acceptance by farmers and growers
What specific progress/results have been achieved?	• Broadly accepted • Reduction of use frequency and expenditure of plant protection products in specific crops

Example 9

Activity	Controlled, integrated production in different crops such as pome- and stone fruit (= Production according to guidelines based on the principles of IPP)
When did the activity begin and what prompted its initiation?	1990
What are its specific goals and/or targets?	• Environmentally friendly production • Preservation and promotion of natural antagonists • Use of biological methods of plant protection • Consideration of forecasting and threshold values
Who is involved in carrying it out?	• Responsible authorities of the *Laender* • Growers associations • Growers
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	Monitored by executive bodies formed of growers and members of the local plant protection service. Realization is regulated through contracts.
How are results and progress measured?	Number of participating growers and amount of production is recorded.
What specific progress/results have been achieved?	The majority of growers produce according to the guidelines and participate in these programmes Example: *Land* Thuringia % participating growers Fruit: 98.6 Vegetables: 70 Medicinal and herbal plants: 100 Grapes: 100 Mushrooms: 100

Example 10

Activity	Reduced use of plant protection products in • arable crops • fruit • vegetables • grapes • hops by implementation of Council Regulation (EEC) No 2078/92[4]	
When did the activity begin and what prompted its initiation?	1992	
What are its specific goals and/or targets?	Targeted use of plant protection products based on forecasting and threshold values	
Who is involved in carrying it out?	• Ministry of Food, Agriculture and Forestry • Responsible authorities of the *Laender* • Farmers/growers • Growers associations	
Is there a legal or regulatory mandate?	Programme is based on Council Regulation (EEC) No 2078/92	
Is the activity monitored or enforced? If so, how?	• Monitored by agricultural authorities of the *Laender* and/or growers associations • Based on records by farmers/growers • Participants producing according to guidelines receive financial support	
How are results and progress measured?	• Number of participating farmers/growers • % of cropping area covered	
What specific progress/results have been achieved?	Example: "Land" Saxony % of cropping area covered	Arable crops: 63 Fruit: 79 Vegetables: 47 Grapes: 11 Hops: 65

[4]Council Regulation (EEC) No 2078/92 of 30 June 1992 on agricultural production methods compatiple with the requirements of the protection of the environment and maintenance of the countryside (OJ No L 215 of 30 July 1992, p. 85).

Example 11

Activity	Reduction of the use of plant protection products in strawberries Project of the *Land* Hessen
When did the activity begin and what prompted its initiation?	1991 Prompted by reports on residues of plant protection products in strawberries
What are its specific goals and/or targets?	Reduction and targeted use of chemical plant protection products
Who is involved in carrying it out?	• Local plant protection service • Growers • Chemical laboratories
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	Monitored by local Ministry of Agriculture
How are results and progress measured?	• Acceptance by growers • Residues in strawberries
What specific progress/results have been achieved?	Maximum levels for residues are not exceeded

Example 12

Activity	Model farms for integrated plant production Programme of the *Land* North Rhine-Westphalia
When did the activity begin and what prompted its initiation?	1991
What are its specific goals and/or targets?	• To implement current knowledge on integrated plant protection into practice • To demonstrate the results to farmers
Who is involved in carrying it out?	• University • Agricultural chamber • 10 farms in different regions
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	No specific monitoring
How are results and progress measured?	Documentation in accompanying scientific surveys
What specific progress/results have been achieved?	Broad interest by visiting farmers

Example 13

Activity	Model farms for integrated plant production Project of the *Land* Baden-Württemberg
When did the activity begin and what prompted its initiation?	1978
What are its specific goals and/or targets?	• Implementation of measures of integrated plant protection in arable crops
Who is involved in carrying it out?	• *Land* Baden-Württemberg • Local plant protection service
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	Yes, by annual reports
How are results and progress measured?	Documentation in accompanying scientific surveys
What specific progress/results have been achieved?	Broad interest by visiting farmers

Example 14

Activity	Agreement on joint protection of waters Programme of the *Land* North Rhine-Westphalia
When did the activity begin and what prompted its initiation?	1989
What are its specific goals and/or targets?	Protection of ground and surface waters
Who is involved in carrying it out?	• Farmers • Public water suppliers • 35 additionally employed special advisers, jointly financed by the water suppliers and the agricultural chamber • Institute for Water Chemistry and Technology • Government (financial support for equipment)
Is there a legal or regulatory mandate?	No. Prompted by • maximum residue value of 0.1 µg/l • implementation of water protection act
Is the activity monitored or enforced? If so, how?	Primarily self-controlled
How are results and progress measured?	• Records of plant protection measures by farmers • Surveys on water quality by water suppliers
What specific progress/results have been achieved?	• Broadly accepted • Increased consciousness about potential risks. In some areas reduction of residues of plant protection products in waters

Example 15

Activity	Bordering strips along river banks and fields Programme of the *Land* North Rhine-Westphalia Bordering strips are spared from application of chemical plant protection products and fertilizers
When did the activity begin and what prompted its initiation?	1985
What are its specific goals and/or targets?	• Protection of flowing waters from substances used in agriculture • Protection of endangered plant species
Who is involved in carrying it out?	• Agricultural Chamber and wildlife protection authorities • Farmers
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	According to guidelines, financial support of the farmers
How are results and progress measured?	Surveys of plant populations by wildlife protection authorities and universities
What specific progress/results have been achieved?	• More than 2,200 km bordering strips under protection • Establishment of some endangered species

Example 16

Activity	Research on environmentally friendly and sustainable agriculture Programm of the *Land* North Rhine-Westphalia
When did the activity begin and what prompted its initiation?	1985
What are its specific goals and/or targets?	Further development of environmentally friendly and economically justifiable methods of production
Who is involved in carrying it out?	Research project by agricultural chamber, universities and associations of the *Land* Nordrhein-Westfalen. Involvement of local plant protection service.
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	No
How are results and progress measured?	By reports
What specific progress/results have been achieved?	Increased knowledge on • threshold values • biological control • forecasting

Plant protection legislation

a) Laws

Gesetz zum Schutz der Kulturpflanzen (Pflanzenschutzgesetz - PflSchG) vom 15. September 1986 (BGBl. I S. 1505), zuletzt geändert durch Artikel 10 des Gesetzes vom 27. Juni 1994 (BGBl. I S. 1440)

Act Governing the Protection of Crop Plants (Plant Protection Act) of 15 September 1986 (Fed. Law Gazette I P. 1505), last amended by Article 10 of the Act of 27 June 1994 (Fed. Law Gazette, I, P. 1440.)

Gesetz über das Inverkehrbringen und die Anwendung von Pflanzenschutzmitteln in dem in Artikel 3 des Einigungsvertrages genannten Gebiet vom 13. Mai 1993 (BGBl. I S. 693)

Act Governing the Marketing and Use of Plant Protection Products in the Area named in Article 3 of the Unification Treaty of 13 May 1993 (Fed. Law Gazette I P. 693)

Gesetz zur Änderung pflanzenschutzrechtlicher und saatgutrechtlicher Vorschriften vom 25. November 1993 (BGBl. I S. 1917)

Act Governing the Amendment of Plant Protection and Seed Regulations of 25 November 1993 (Fed. Law Gazette I P. 1917)

b) Ordinances

Pflanzenbeschauordnung vom 10. Mai 1989 (BGBl. I S. 905), zuletzt geändert durch die Verordnung zur Änderung der Zweiten Verordnung zur Änderung der Pflanzenbeschauverordnung vom 10. Januar 1995 (BGBl. I S. 19)

Plant Inspection Ordinance of 10 May 1989 (Fed. Law Gazette I P. 905), last amended by the Ordinance Amending the Second Ordinance Governing the Amendment of the Plant Inspection Ordinance of 10 January 1995(Fed. Law Gazette I P. 19)

Verordnung zum Schutz der Bienen vor Gefahren durch Pflanzenschutzmittel (Bienenschutzverordnung) vom 22. Juli 1992 (BGBl. I S. 1410)

Ordinance Governing the Protection of Bees from Hazards caused by Plant Protection Products (Bee Protection Ordinance) of 22 July 1992 (Fed. Law Gazette I P. 1410)

Verordnung über Pflanzenschutzmittel und Pflanzenschutzgeräte (Pflanzenschutzmittelverordnung) vom 28. Juli 1987 (BGBl. I S. 1754), geändert durch die Erste Verordnung zur Änderung der Pflanzenschutzmittelverordnung vom 11. Juni 1992 (BGBl. I S. 1049)

Ordinance Governing Plant Protection Products and Plant Protection Equipment (Plant Protection Product Ordinance) of 28 July 1987 (Fed. Law Gazette I P. 1754), amended by the First Ordinance Governing the Amendment of the Plant Protection Product Ordinance of 11 June 1992 (Fed. Law Gazette I P. 1049)

Pflanzenschutz-Sachkundeverordnung vom 28. Juli 1987 (BGB I S. 1752), geändert durch Artikel 2 der Verordnung vom 14. Oktober 1993 (BGBl. I S. 1720)

Ordinance of 28 July 1987 Governing Specialist Qualifications in Plant Protection (Fed. Law Gazette I P. 1752), amended by Article 2 of the Ordinance of 14 October 1993 (Fed. Law Gazette I P. 1720)

Verordnung über Anwendungsverbote für Pflanzenschutzmittel (Pflanzenschutz-Anwendungsverordnung) in der Fassung des Artikel 1 der Verordnung vom 10. November 1992 (BGBl. I S. 1887), zuletzt geändert durch Gesetz vom 25. Juli 1994 (BGBl. I S. 1700)

Ordinance Governing the Ban on the Use of Plant Protection Products (Plant Protection Use Ordinance) as amended by Article 1 of the Ordinance of 10 November 1992 (Fed. Law Gazette I P. 1887), last amended by the Act of 25 July 1994 (Fed. Law Gazette I P. 1700)

Regulations in other legal areas relating to risk reduction in plant protection products

a) Waste legislation

Gesetz über die Vermeidung, Verwertung und Beseitigung von Abfällen vom 27. September 1994 (BGBl. I S. 2705)

Act on the Avoidance, Management and Disposal of Waste (Waste Act) of 27. September 1994 (Fed. Law Gazette I P. 2705)

b) Chemical legislation

Gesetz zum Schutz vor gefährlichen Stoffen (Chemikaliengesetz - ChemG) i. d. F. der Bekanntmachung vom 25. Juli 1994 (BGBl. I S. 1703)

Act for Protection Against Hazardous Substances (Chemicals Act) as amended by the announcement on 25 July 1994 (Fed. Law Gazette I P. 1703)

Verordnung zum Schutz vor gefährlichen Stoffen (Gefahrstoffverordnung - GefStoffV) i.d.F. des Artikels 1 der Verordnung vom 26. Oktober 1993 (BGBl. I S. 1782), zuletzt geändert durch Gesetz vom 25. Juli 1994 (BGBl. I S. 1700)

Ordinance for Protection Against Hazardous Substances (Hazardous Substances Ordinance) as amended by Article 1 of the Ordinance of 26 October 1993 (Fed. Law Gazette I P. 1782), last amended by the Act of 25 July 1994 (Fed. Law Gazette I P. 1700)

Verordnung über Verbote und Beschränkungen des Inverkehrbringens gefährlicher Stoffe, Zubereitungen und Erzeugnisse nach dem Chemikaliengesetz (Chemikalien-Verbotsverordnung - ChemVerbotsV) vom 14. Oktober 1993 (BGBl. I S. 1720), zuletzt geändert durch Gesetz vom 25. Juli 1994 (BGBl. I S. 1700)

Ordinance on the Ban and Restriction of the Marketing of Hazardous Substances, Preparations and Products in Accordance with the Chemicals Act (Chemicals Banning Ordinance) of 14 October 1993 (Fed. Law Gazette I P. 1720), last amended by the Act of 25 July 1994 (Fed. Law Gazette I P. 1700)

c) Traffic legislation

Verordnung über innerstaatliche und grenzüberschreitende Beförderung gefährlicher Güter auf der Straße (Gefahrgutverordnung Straße - GGVS) vom 27. Juli 1985 (BGBl. I S. 1550), geändert durch Verordnung vom 21. Dezember 1987 (BGBl. I S. 2858)

Ordinance Governing Domestic and Cross-Border Transport of Hazardous Substances on Roads (Hazardous Goods Ordinance) of 27 July 1985 (Fed. Law Gazette I P. 1550), amended by the Ordinance of 21 December 1987 (Fed. Law Gazette I, P. 2858)

d) Immissions protection legislation

Gesetz zum Schutz vor schädlichen Umwelteinwirkungen durch Liftverunreinigung, Geräusche, Erschütterungen und ähnliche Vorgänge (Bundesimmissionsschutzgesetz - BImSchG) vom 14. Mai 1990 (BGBl. I S. 880)

Act for Protection Against Harmful Effects on the Environment Resulting from Air Pollution Noise, Vibrations and Similar Occurrences (Federal Immission Control Act) of 14 May 1990 (Fed. Law Gazette I P. 880)

e) Food Legislation

Gesetz über den Verkehr mit Lebensmitteln, Tabakerzeugnissen, kosmetischen Mitteln und sonstigen Bedarfsgegenständen (Lebensmittel- und Bedarfsgegenständegesetz) i. d. F. der Bekanntmachung vom 8. Juli 1993 (BGBl. I S. 1169), zuletzt geändert durch Zweites Gesetz zur Änderung der LMBG vom 25. November 1994 (BGBl. I S. 3538)

Act Governing the Handling of Foodstuffs, Tobacco Products, Cosmetics and Other Articles of Daily Use (Foodstuffs and Daily Needs Act) as announced on 8 July 1993 (Fed. Law Gazette I P. 1169), last amended by the Second Act on the Amendment of the Foodstuffs and Daily Needs Act of 25 November 1994 (Fed. Law Gazette I P. 3538)

Verordnung über Höchstmengen an Pflanzenschutz- und Schädlingsbekämpfungsmitteln, Düngemitteln und sonstigen Mitteln in oder auf Lebensmitteln und Tabakerzeugnissen (Rückstands-Höchstmengenverordnung - RHmV) in der Fassung der Bekanntmachung vom 16. Oktober 1989 (BGBl. I S. 1861), zuletzt geändert durch die Siebte Verordnung zur Änderung der Rückstands-Höchstmengenverordnung vom 22. Februar 1994 (BGBl. I S. 386)

Ordinance on Maximum Amounts of Plant Protection Products and Pesticides, Fertilisers and other Products in or on Foodstuffs and Tobacco Products (Residue Maximum Amount Ordinance) as announced on 16 October 1989 (Fed. Law Gazette I P. 1861), last amended by the Seventh Ordinance on the Amendment of the Residue Maximum Amount Ordinance of 22 February 1994 (Fed. Law Gazette I P. 386)

f) Nature conservation legislation

Gesetz über Naturschutz und Landschaftspflege (Bundesnaturschutzgesetz - BNatSchG) i. d. F. der Bekanntmachung vom 12. März 1987 (BGBl. I S. 889)

Act Governing Nature Conservation and Landscape Protection (Federal Nature Conservation Act) as announced on 12 March 1987 (Fed. Law Gazette I P. 889)

Verordnung zum Schutz wildlebender Tier- und Pflanzenarten (Bundesartenschutzverordnung - BArtSchV) i. d. F. der Bekanntmachung vom 18. September 1989 (BGBl. I S. 1677)

Ordinance for the Protection of Wild Animal and Plant Species (Federal Species Protection Ordinance) as announced on 18 September 1989 (Fed. Law Gazette I P. 1677)

g) Epidemics legislation

Verordnung über Trinkwasser und über Wasser für Lebensmittelbetriebe (Trinkwasserverordnung - TrinkwV) vom 22. Mai 1986 (BGBl. I S. 760) i. d. F. der Bekanntmachung vom 5. Dezember 1990 (BGBl. I S. 2612)

Ordinance on Drinking Water and Water for Foodstuff Producing Enterprises (Drinking Water Ordinance) of 22 May 1986 (Fed. Law Gazette I P. 760) as announced on 5 December 1990 (Fed. Law Gazette I P. 2612)

h) Water Legislation

Gesetz zur Ordnung des Wasserhaushalts (Wasserhaushaltsgesetz - WHG) i. d. F. der Bekanntmachung vom 23. September 1986 (BGBl. I S. 1529, S. 1654)

Act Governing the Water Balance (Water Balance Act) as announced on 23 September 1986 (Fed. Law Gazette I P. 1529, P. 1564)

GREECE

CONTACT PERSON(S):

Mr. C.A. LOIZOU
Department of Pesticides
General Directorate of Plant Produce
Ministry of Agriculture
3-5 Ippokratous Str.
G-10164 Athens

Tel: (30) 1 364 59 52
Fax: (30) 1 361 71 03

Mr. Costas G. MARKAKIS
Department of Pesticides
General Directorate of Plant Produce
Ministry of Agriculture
3-5 Ippokratous Str.
G-10164 Athens

Tel: (30) 1 364 59 52
Fax: (30) 1 361 71 03

I. Framework for Pesticide Risk Reduction Activities

1. Pesticides risk reduction as approached through a general program of national level.

2. The principal factors which prompted our country to make efforts in reducing pesticide risks are concerns about pesticide residues in food, water, soil, air and direct exposure during application.

3. There is no specific legal or regulatory mandate for risk reduction, although the pesticides registration law has provisions addressing such concerns.

II. Description of Activities

GREECE
Project or Activity: Registration
Risk Reduction Category: Replacing Hazardous with Safer Pesticides

What are the key elements of project/activity?	Several activities incorporated in the registration process have resulted in replacement of hazardous pesticides with safer ones. These include: • encouraging pesticide manufacturers to register safer formulations (e.g. water base instead of solvent base formulations, controlled release) • withdrawal of certain pesticides from the market • limiting use of certain pesticides • creating a more demanding registration procedure (e.g. supervised efficacy trials, improved labelling and packaging) • regulating pesticide distribution
When did the project/activity begin and what prompted its initiation?	Began in 1972 with the ban of organochlorides and gradually the other measures were introduced
What are its specific goals and/or targets?	The reduction of pesticide use when there are unacceptable risks for humans and the environment.
Who is involved in carrying it out?	Ministry of Agriculture (Department of pesticides)
Is there a legal or regulatory mandate?	Yes - regulatory mandate Law prohibiting the use of pesticides that do not fulfill the requirements of FAO (OJ 188/B/ 17-3-1995)
Is the activity monitored or enforced? If so, how?	Monitoring and regulation is done by the Ministry of Agriculture through the extension service
How are results and progress measured?	Not measured
What specific progress/results have been achieved?	Biopesticides have been registered for use in forestry, olive trees, fruit trees, citrus, grapes, corn, cotton, tobacco, vegetables, and stored products Withdrawal from the market of organochlorides, arsenic and mercury based compounds; use limitation for monocrotophos, lindane, antibiotics and mecarbam.

GREECE
Project or Activity: Distributing information to farmers/IPM in greenhouses
Risk Reduction Category: Promoting IPM

What are the key elements of the project/activity?	Distribution of information to farmers on the harmful effects of various pesticides. Information on IPM methods is distributed to farmers for tomatoes and cucumbers grown in greenhouses. Under this programme, which is based on specific guidelines for each crop/pest issued by the Regional Plant Protection Services, the use of pesticides is limited just to certain fungicides and only for the winter period. Insecticides are completely banned (except those containing *Bacillus thurigiensis* as an active substance)
When did the project/activity begin and what prompted its initiation?	1983
What are its specific goals and/or targets?	To persuade the most progressive farmers to reduce the use of pesticides by adopting IPM methods
Who is involved in carrying it out?	Ministry of Agriculture Extension service Private companies
Is there a legal or regulatory mandate?	A regulatory mandate exists for greenhouses in a pilot project of 100 hectares
Is the activity monitored or enforced? If so, how?	Participants in the programme are visited on a regular basis by extension service specialists (of the ministry of Agriculture) who give them details and advice on the programme. Participants who keep a register of their activities are granted a "green label" and their products have a better placement on the market.
How are results and progress measured?	The project is assessed every 3 months and at the end of each year by an expert group.

What specific progress/results have been achieved?	Progressive farmers have adopted IPM methods. The project was successful in the reduction of the use of pesticides for the benefit of consumers and the environment. In the first three years of the programme, participants were given a subsidy which was considered as a compensation for the economic risk involved. In these years, participation amounted to 4% of the total area of greenhouses. Now the programme is still on progress and the participation has raised to 7%. Results about the "green label": unfortunately, for marketing reasons, these products are placed only in certain shops and it is very difficult for the general public to have access to them.

GREECE
Project or Activity: Treatment thresholds and forecasting systems
Risk Reduction Category: Promoting IPM

What are the key elements of project/activity?	The Ministry of Agriculture issues pamphlets on a regular basis with pest forecasting information based on up-to-date meteorological data. The pamphlets are addressed to farmers and farmer organisations.
When did the project/activity begin and what prompted its initiation?	1985
What are its specific goals and/or targets?	
Who is involved in carrying it out?	Ministry of Agriculture Regional Plant Protection Services
Is there a legal or regulatory mandate?	
Is the activity monitored or enforced? If so, how?	
How are results and progress measured?	
What specific progress/results have been achieved?	This activity can be considered successful. The most spectacular result of this activity is on sultana grapes in the island of Crete for the control of *Lobesia botrana*, where a 35% reduction of the insecticide use was achieved (from 6 treatments/year down to 2 treatments a year).

III. Conclusions

1. The most successful activities are the use of IPM methods in greenhouses, mating disruption in cotton, and usage of *Bacillus thuringiensis* against lepidoptera.

2. The activity which has been least successful is solarization. The reason is that it cannot control nematodes and verticillium.

6. Projects at international level that could help us to reduce further the pesticide risk are:

   - reformed CAP (possibly the set aside programme);
   - DIR 93/3.60C EU (registration of active substances);
   - DIR 91/414 (registration of formulations).

HUNGARY

CONTACT PERSON(S):

Dr. Zoltán Ocskó
Ministry of Agriculture
Budapest 55 P.O.B. 1
H-1860

Tel: (36) 1 1129 091
Fax: (36) 1 128 087

I. Framework for Pesticide Risk and Use Reduction Activities

No special programme on pesticide risk reduction was implemented in the past, but it is the important part of our general pesticide regulation and control activities. The registration and use of pesticides are regulated by Statutory Law (No. 2 of 1988 on Plant Protection) and its enforcement by Ministerial Order (No. 5/1988 (IV.26) and 9/1993 (I.30)). (see Appendix)

Taking into account the importance of this question we are just planning to start next year with a 4 year programme on pesticide risk reduction. The main elements of this programme are as follows:

- revision of the old pesticide registrations (re-registration)
- revision of pesticide classifications
- worker protection
- training of farmers
- extension of IPM
- environmental protection (restriction of pesticide use in special areas)
- promotion of alternative plant protection methods

The human health and environmental protection authorities will be deeply involved in this programme, and we plan to co-operate with other organisations at state and local levels.

We think the public demand, the new national and international requirements, the new national and international informations on pesticide use are the main reasons to implement this programme.

At provincial and local levels there are not too much new initiations. Organisations like Biocultura Club and other “Greens”, the Associations on Plant Protection, or the local WWF office are quite active, but they have not had too much influence on this area yet. The main reason could be the very strict and centralised plant protection regulation with its advantages and disadvantages.

II. Description of Activities

HUNGARY
Project or Activity: 4-year programme
Risk Reduction Category: Reducing risk

What are the key elements of the project/activity?	Hungary is planning to begin a 4-year programme on pesticide risk reduction, starting in 1995. The main elements of the programme will be: • revision of old registrations (re-registration) • revision of pesticide hazard classifications • worker protection • farmer training • extension of IPM • environmental protection (restriction of pesticide use in special areas) • promotion of alternative plant protection methods
When did the project/activity begin and what prompted its initiation?	To begin in 1995 Public demand, new national and international requirements, and information on pesticide use are the main reasons for starting the programme.
What are its specific goals and/or targets?	To promote the safe use of pesticides; prevent pollution; reduce residue contamination in food.
Who is involved in carrying it out?	Ministry of Agriculture (Agroenvironment-management on Plant Protection Dept.) Human Health and Environmental Protection Authorities Other organisations at state and local levels
Is there a legal or regulatory mandate?	Official announcement of Secretary of State in international regional conference in October 1994; Announcement of Ministry of Agriculture on registration in official journal.
Is the activity monitored or enforced? If so, how?	Yearly evaluation and report on progress.
How are results and progress measured?	Monitoring the: pesticide use and structure; residue level in food; number of accidents; number of IPM farms.
What specific progress/results have been achieved?	The programme has started in 1995. Re-registration procedure was implemented; revision of classification is in progress; some preparation on training of farmers were made; regulation on worker protection is being prepared.

HUNGARY
Project or Activity: Economic incentives
Risk Reduction Category: Promoting IPM

What are the key elements of the project/activity?	Tax reduction of 50% for farmers using environmentally sustainable technologies. Farmers must meet criteria set out for environmentally sustainable pest management which include: use of forecasting, protection of natural regulating organisms (e.g. beneficial organisms), use of soil conserving cultivation and soil nutrition, and reporting (in a diary) of the farm production activity. (The Law No. LXXXIX of 1991 on Land Taxes was withdrawn in December 1994, so the above described prefenrency does not exist).
When did the project/activity begin and what prompted its initiation?	The activity began in 1991 on the initiations of plant protection experts After withdrawal of the Law on Land Taxes above, this programme has been suspended. New financial sources are required.
What are its specific goals and/or targets?	Spread of sustainable techniques: 1. control of water erosion; 2. control of wind erosion; 3. regulation of water management of secondarily flooded areas; 4. improvement of acid and sodic soils; 6. sustainable nutrition; 7. IPM; 8. organic growing.
Who is involved in carrying it out?	Agricultural co-operatives and individual farms.
Is there a legal or regulatory mandate?	Law No. LXXIX on Land Taxes (withdrawn in December 1994). Recommendation of Ministry of Agriculture on sustainable plant protection and bio production. (Official Journal, September 1993)
Is the activity monitored or enforced? If so, how?	Use of sustainable techniques is notified to the regional Plant Health Station The Plant Health Station controls the technology, giving a certification to the tax authority.
How are results and progress measured?	The number of participating farms and area involved.
What specific progress/results have been achieved?	1992: 259 farms with ≈ 455 000 ha* 1993 219 farms with ≈ 424 000 ha* * IPM was only a small part of this.

HUNGARY

Project or Activity: Various activities

Risk Reduction Category: Reducing risk

What are the key elements of the project/activity?	In addition to our new programme (see first table) the risk reduction was always an important part of our activity, in which the most important steps were: • establishing a plant protection network, with 20 stations throughout the countries and more than 1000 staff (advice to farmers) • based on the registration system, the regular revision and restriction or banning of dangerous products (DDT, HCH, arsenic and mercury compounds, captafol, dinoseb, 2,4,5T etc.) • monitoring of pesticide residue in surface and ground water (more than 10/year) • regulation on worker protection (the first in 1974, the new one is under preparation) • education at university, medium and ground level in special schools, training of farmers (from the 70s) • fish tox categories of pesticides (1983) 4 categories with different safety zones from water • bee tox categories (1981) 3 categories with different time limits in application • marketing categories of pesticides (1989) cat I for experts with university degree cat II for trained farmers cat III for free market and use • regulation of aerial application (1993)
When did the project/activity begin and what prompted its initiation?	It is not a special project, it is part of the activity of institutes involved in plant protection.
What are its specific goals and/or targets?	Ensure the safe use of pesticides in all aspects.
Who is involved in carrying it out?	Ministry of Agriculture, Ministry of Welfare, Ministry of Environmental Protection, their institutes, other organisations
Is there a legal or regulatory mandate?	Law and Ministerial Order on Plant Protection.
Is the activity monitored or enforced? If so, how?	Regular monitoring of plant protection practice, residue by official inspectors.
How are results and progress measured?	The general level of plant protection.
What specific progress/results have been achieved?	An effective and reliable plant protection network is operated in the country.

HUNGARY

Project or Activity: Programmes on environmentally-friendly use of pesticide

Risk Reduction Category: Promoting IPM

What are the key elements of the project/activity?	The environmentally-friendly plant protection methods were used in a number of farms by the 1980s. The IPM in apple and vegetables was extended by the end of the 1980s. 1. A project "Sustainable Plant Protection in Apples" was prepared and organised by County Plant Health and Soil Conservation Station (Szabolcs). The project was approved by the National Committee for Technological Development. 2. "Village Programme" was implemented on the initiation and assistance of Ministry of Agriculture.
When did the project/activity begin and what prompted its initiation?	These were begun 20 years ago in the knowledge of scientific results and because of international pressure and domestic public demand.
What are its specific goals and/or targets?	Introduction of sustainable technique, integration of individual growers; protection of beneficials; production of healthy food.
Who is involved in carrying it out?	Ministry of Agriculture, County Plant Health and Soil Conservation Stations, growers, processing companies.
Is there a legal or regulatory mandate?	Ministry of Agriculture declared priorities of research, development, introduction of sustainable systems.
Is the activity monitored or enforced? If so, how?	Annual monitoring/control, evaluations were made, professional competitions were organised for growers.
How are results and progress measured?	The number of participants and the quality of products.
What specific progress/results have been achieved?	Reduced number of spraying, reduced pesticide use, cost-effective technologies were promoted, and better product quality. 30 - 40 farms/growers participated in the programme with cc. 500 ha + 4 region in the "Village Programme". (No exact figures are available).

III. Conclusions

1. The most successful activities:

- establishing the institutional background of pesticide use control;
- implementation of new legislation on pesticide registration and use;
- regulation of pesticide usage (marketing, bee and fish tox. categories);
- IPM in apple and vegetable.

2. The least successful activities:

- worker protection in the practice.
- solving the problems (risk) of harmful pesticide waste (storage, recycling of empty containers);
- co-operation with other organisations (alternative production, greens, organic farms, etc. at state or local levels);
- to improve the technical level of pesticide application equipments.

Reasons:

- the lack of financial sources;
- long and unsuccessful discussions with other ministries and institutes in charge;
- the weak mass propaganda on the pesticide use;
- the changes in agricultural structure.

4. Because of the lack of a real risk reduction programme, it is hard to measure any progress, but the number of poisonings, pollutions, the general morals and the present level of pesticide use in the country can reflect the results of our efforts.

5. In principle our activity fits quite well to the programmes of other authorities (long term programme on public health protection - Ministry of Welfare or programme on environmental protection - Ministry of Environmental Protection), but practically there are not too much direct contacts between them. Certain harmonization would be necessary.

6. International projects help to achieve further progress:

- Information on the aim and the practical steps of such kind programmes
- Possibility for regular consultation bi- and multilateral levels
- Regular evaluation on results have been achieved
- To involve much more the countries of this region in these programmes

Summary

Our permanent effort is to eliminate hazardous pesticides (restriction, withdrawal, labelling) and replace them with safer products (though it is primarily a question of business and marketing). During the last 10-15 years pesticide use has been reduced,

partly because of changes in pest control practice (need-based application, restrictions in amount of pesticides used). We went ahead in education and training. The progress in worker protection wasn't satisfactory. We also use other tools to decrease the risks [lower taxes in IPM, restriction on distribution and use (special licenses are required)].

Appendix

8. Environmentally sustainable pest management in fruit and grape production

Environmentally sustainable pest management shall meet the relevant international requirements. It is appropriate, in case of integrated fruit and grape production, if the grower uses all technological elements to minimize any pesticide usage and applies only specified chemicals (safe to beneficial organisms). In order to improve control efficiency, the grower shall use forecasting, shall protect any natural regulating organisms in the vicinity of and within the plantation, shall improve their beneficial activities, shall make soil conserving cultivation and soil nutrition based on soil and plan tests. The grower shall report, in a diary, on his production activity as specified in regulations.

9. Organic farming

Organic farming means any plant production technology which meets the international measures (including the certification system) on organic farming. During organic farming any materials, equipment and techniques can be used as specified. Furthermore, the determined isolation distance from any other crops grown in a different way should be observed.

JAPAN

CONTACT PERSON(S):

Mr. Yoshihisa KAWAGUCHI
Deputy Director
Plant Protection Division
MAFF
1-2-1 Kasumigaseki
Chiyoda-ku
Tokyo 100 - JAPAN

Tel: (81) 3 3501 3964
Fax: (81) 3 3591 6640

I. Framework for Pesticide Risk and Use Reduction Activities

The Pest Forecasting System is enforced, to control pests effectively, by MAFF and prefectures, and this system also contributes to pesticide reduction. This system is enforced with close relationship to 47 prefectural governments. This activity began in order to control pests effectively, and recently, to protect the environment.

II. Description of Activities

JAPAN
Project or Activity: Agricultural chemicals safety precaution campaign
Risk Reduction Category: Increasing safety in pesticide use

What are the key elements of the project/activity?	The Agricultural Chemicals Safety Precaution Campaign was launched to prevent farmers from being poisoned by highly toxic pesticides. Now this campaign promotes safe use of pesticides. This campaign includes training, guidance and recommendations for people who sell and use pesticides. It also includes public information on safe use of pesticides. In order to promote safe use of pesticides, there is the system of agricultural chemicals operating managers who are leaders for pesticides dealers and/or advising farmers.
When did the project/activity begin and what prompted its initiation?	1953
What are its specific goals and/or targets?	To protect farmers' health and the environment To produce safe crops
Who is involved in carrying it out?	The Health and Agriculture Ministries (MAFF and MHW) along with 47 prefectures
Is there a legal or regulatory mandate?	This campaign is mandated by both the vice-Minister of MAFF and MHW
Is the activity monitored or enforced? If so, how?	The campaign about safe use of pesticides is enforced by MAFF and the 47 prefectures constantly The results of the campaign are reported annually by the 47 prefectures. The result include the content of training programme(s), training information, etc. We gathered number of poisoning cases from 47 prefectures at the end of the year.
How are results and progress measured?	Through reports from 47 prefectures.
What specific progress/results have been achieved?	Successful campaign: cases of poisoning have been gradually reduced

JAPAN
Project or Activity: Pest Forecasting System
Risk Reduction Category: Reducing pesticide use/Promoting IPM

What are the key elements of the project/activity?	The Pest Forecasting System was initially begun to control pests effectively. More recently, it has also focused on protecting the environment. The system includes (1) appropriate use of pesticides once pest damage has reached an economic threshold, and (2) other methods when pest damage is below the economic threshold. Japan previously concentrated on pest control at economic thresholds; Japan now believes it is necessary to reduce pesticide use.
When did the project/activity begin and what prompted its initiation?	
What are its specific goals and/or targets?	to control pests effectively to protect the environment to develop pesticides of low toxicity
Who is involved in carrying it out?	MAFF 47 prefectures
Is there a legal or regulatory mandate?	Plant Protection Law
Is the activity monitored or enforced? If so, how?	
How are results and progress measured?	
What specific progress/results have been achieved?	

JAPAN
Project or Activity: Projects for establishing various pest control methods
Risk Reduction Category: Promoting IPM

What are the key elements of the project/activity?	Generally, pesticides are almost used for pest control. The aim of these projects is to establish various pest control methods. Various pest control methods are as follows: (1) biological control methods (2) physical control methods (3) cultural control methods (4) chemical control methods This project includes financial support to industries for development of bio-pesticides.
When did the project/activity begin and what prompted its initiation?	1950
What are its specific goals and/or targets?	to control effectively to protect the environment to develop pesticides of low toxicity
Who is involved in carrying it out?	MAFF Prefectures the Industries for development of bio-pesticides
Is there a legal or regulatory mandate?	
Is the activity monitored or enforced? If so, how?	an annual meeting or a report
How are results and progress measured?	
What specific progress/results have been achieved?	to extend established methods (ex. pheromone)

JAPAN
Project or Activity: Product registration
Risk Reduction Category: Measures to eliminate hazardous pesticides more quickly

What are the key elements of the project/activity?	Cancellation of the registration of hazardous pesticides. It is provided by the Agricultural Chemicals Regulation Law (hereinafter referred to "the Law") that when pesticides may cause, through their practical use, damage to men, livestock, crops, aquatic animals and plants, the Ministry of Agriculture, Forestry and Fisheries (hereinafter referred to as "MAFF") can nullify their registration and prohibit their sale as appropriate in order to prevent such damage.
When did the project/activity begin and what prompted its initiation?	1948
What are its specific goals and/or targets?	elimination of the registration of hazardous pesticides
Who is involved in carrying it out?	MAFF, registrants and dealers
Is there a legal or regulatory mandate?	legal mandate
Is the activity monitored or enforced? If so, how?	The inspectors of the Agricultural Chemicals Inspection Station (hereinafter referred to as "ACIS") inspect dealers, etc. whether they sell such pesticides or not.
How are results and progress measured?	ditto
What specific progress/results have been achieved?	DDT, BHC, etc. shall not be sold in Japan.

JAPAN
Project or Activity: Measures to Reduce Workers Risks
Risk Reduction Category: Farmers training and education

What are the key elements of the project/activity?	1. Instruction to farmers by pest control instructor of the National Federation of Agricultural Co-operative Association. The National Federation of Agricultural Co-operative Association, a nation-wide purchasing and sales organ composed of agricultural co-operative societies, organizes all Japanese farmers, certifies pest control instructors who are knowledgeable about the safe use of pesticides, and can play a role in instructing farmers. 2. Activities on safe use of pesticide by the National Federation of Agricultural Co-operative Association. In order to teach farmers about the safe use of pesticides, the Association holds training meetings for farmers and distributes pamphlets, brochures, videos, etc.
When did the project/activity begin and what prompted its initiation?	
What are its specific goals and/or targets?	1. Using pesticides safely Storing pesticides properly 2. Using pesticides safely Storing pesticides properly Holding training meetings
Who is involved in carrying it out?	National Federation of Agricultural Co-operative Association, farmers, MAFF, Prefectural Governments and the National Agricultural Chemicals Wholesalers Union
Is there a legal or regulatory mandate?	Voluntary
Is the activity monitored or enforced? If so, how?	The results are reported to MAFF.
How are results and progress measured?	ditto
What specific progress/results have been achieved?	Farmers have acquired knowledge on the safe use of pesticides.

JAPAN
Project or Activity: Measures to Reduce Worker Risks
Risk Reduction Category: Accreditation of dealers and distributors

What are the key elements of the project/activity?	1. Report on business by dealers. It is provided by the Law that any dealer and pest control operator must report his name and address, business office, etc. within two weeks after starting his business to the Minister of MAFF or Prefectural Governor as the case may be. 2. Holding training meetings. The National Government, Prefectural Governments and related non-governmental organizations composed of farmers or dealers hold training meetings in order that dealers, pest control operators and farmers can obtain the knowledge on the safe use and proper storage of pesticides, etc. 3. Certification of managing instructor of pesticides Prefectural Governments certify, under the co-operating guidance of MAFF, the managing instructors of pesticide dealers and pest control operators as leaders for promoting safe use and proper storage of pesticides. 4. Promoting leaders for safe use of pesticides by the related non-governmental organization. The National Federation of Agricultural Co-operative Association promotes leaders who instruct farmers on the safe use of pesticides as mentioned above. The National Agricultural Chemicals Wholesalers Union promotes leaders who instruct retailers on the safe use and proper storage of pesticides
When did the project/activity begin and what prompted its initiation?	1948
What are its specific goals and/or targets?	1. To promote the safe use of pesticides 2. To obtain knowledge on the safe use, proper storage of pesticides, etc. 3. To promote safe use and proper storage of pesticides, etc. 4. Safe use of pesticides

Who is involved in carrying it out?	MAFF, Prefectural Governments, dealers and pest control instructors
Is there a legal or regulatory mandate?	Key element 1: legal mandate. Key element 2 to 4: voluntary
Is the activity monitored or enforced? If so, how?	MAFF or Prefectural Governments receive their report as the case may be
How are results and progress measured?	ditto
What specific progress/results have been achieved?	Preventing sale of unregistered pesticides Preventing misuse of pesticides

JAPAN
Project or Activity: Measures to Reduce Worker Risks
Risk Reduction Category: Distributing Information to Users

What are the key elements of the project/activity?	Information distribution by the National and Prefectural Governments and the related non-governmental organisations
When did the project/activity begin and what prompted its initiation?	Long time ago
What are its specific goals and/or targets?	Safe use of pesticides Proper storage of pesticides
Who is involved in carrying it out?	National Government: distributes to the Prefectural Governments the booklet on poisoning symptoms caused by pesticides to assist their activities to provide such information to farmers. Prefectural Government: distributes to farmers pamphlets, brochures, etc. on the safe use of pesticides. Society of Agricultural Chemical Industry: distributes to farmers pamphlets, brochures, etc. on the safe use of pesticides. National Federation of Agricultural Co-operative Association: distributes to farmers pamphlets, brochures, video films, etc. on the use of pesticides.
Is there a legal or regulatory mandate?	Voluntary
Is the activity monitored or enforced? If so, how?	
How are results and progress measured?	
What specific progress/results have been achieved?	Safe use of pesticides. Proper storage of pesticides. Proper treatment for poisoning cases.

JAPAN
Project or Activity: Measures to Reduce Workers Risks
Risk Reduction Category: Improving Label

What are the key elements of the project/activity?	Simple and readable labels
When did the project/activity begin and what prompted its initiation?	Long time ago
What are its specific goals and/or targets?	Preventing misuse of pesticides
Who is involved in carrying it out?	Pesticide registrants and MAFF
Is there a legal or regulatory mandate?	Administratively
Is the activity monitored or enforced? If so, how?	The inspectors of ACIS monitor the label and direct the registrants to improve the label.
How are results and progress measured?	ditto
What specific progress/results have been achieved?	The misuse of pesticides has been reduced.

JAPAN
Project or Activity: Measures to Reduce Worker Risks
Risk Reduction Category: Farm Worker Safety Regulations

What are the key elements of the project/activity?	Establishment of Directions for Safe Use of Agricultural Chemicals. To supplement safety instructions on pesticide labels, the National Government establishes Directions for Safe Use of Agricultural Chemicals for the pesticides to which farmers and other pesticide users should pay particular attention from the viewpoint of safe use. Directions are now established in the following four categories: 1. Direction concerning residues in crops. 2. Direction concerning prevention of damage to aquatic animals. 3. Direction concerning prevention of water pollution. 4. Direction concerning aerial application.
When did the project/activity begin and what prompted its initiation?	1968
What are its specific goals and/or targets?	Safe use of pesticides
Who is involved in carrying it out?	MAFF, pesticide registrants, farmers, and pest control conductors.
Is there a legal or regulatory mandate?	administrative regulation (Direction by the MAFF)
Is the activity monitored or enforced? If so, how?	The inspectors of ACIS investigate whether pesticides are used in accordance with the directions, where appropriate.
How are results and progress measured?	ditto
What specific progress/results have been achieved?	Accidents associated with pesticides use have been reduced.

JAPAN
Project or Activity: Measures to Reduce Worker Risks
Risk Reduction Category: Product packaging and formulation, etc.

What are the key elements of the project/activity?	1. Improvement of product packaging and formulation to reduce worker exposure. A new soluble formulation has been developed and used. The application method involves pouring the formulation at the water inlet of a paddy field without spraying. Then immediately after the application, the active ingredient is uniformly diffused all over the paddy water. In this application, work is very light and there is no user exposure to pesticides. New soluble packaging is also developed and used. This package contains an easily diffusable formulation and is thrown into a paddy field by farmers (by hand). In this application system, the application work is very light and there is no user exposure to pesticides (because there is no spraying). 2. Improvement of application machinery. In order to reduce applicator exposure to pesticides in a greenhouse, operatorless and automatic application machines have been developed and are used. 3. Improvement of protective equipment. In order to protect applicators from pesticide exposure, more comfortable and protectable application clothing and masks have been developed and are used.
When did the project/activity begin and what prompted its initiation?	Recently
What are its specific goals and/or targets?	Reducing worker exposure
Who is involved in carrying it out?	MAFF, pesticides registrants and related companies/societies
Is there a legal or regulatory mandate?	Voluntary
Is the activity monitored or enforced? If so, how?	
How are results and progress measured?	
What specific progress/results have been achieved?	The number of poisoning cases has been reduced. Furthermore, the workload of application of pesticides has been reduced

JAPAN
Project or Activity: Measures to Protect the Environment
Risk Reduction Category: Protecting Water Resources (including drinking water)

What are the key elements of the project/activity?	1. Establishment of Quality Standards for Drinking Water. On the basis of the Waterworks Law, Drinking Water Quality Standards are established for 4 active ingredients of pesticides and Items Relating to Monitoring are established for 11 active ingredients of pesticides. Their standard values or monitoring values are established on the basis of each pesticide's chronic toxicities. 2. Establishment of Environmental Quality Standards for Water Pollution. Under the Basic Environmental Law, Environmental Quality Standards for Water Pollution are set as the target levels of water quality in public water areas for the water control administration, as a desirable level to be achieved and maintained. These standards are established for 4 active ingredients of pesticides. At the same time, the Items to be monitored are established for 12 active ingredients of pesticides. Their standard values or monitoring values are established on the basis of each pesticide's chronic toxicities. As for these pesticides, monitoring surveys in public water and ground water are carried out every year all over the country. So far, there has been no case in which the concentration of the pesticides concerned exceeded the values. 3. Establishment of Evaluative Guidelines for Water Quality on Agricultural Chemicals in Public Water Areas. Pesticides for aerial application and herbicides used at paddy fields have often been detected in public water. However, those other than included in EQS or Monitoring Items have no standards in public waters, which has caused public concern about the safety of the water. In order to deal with this matter, the Evaluative Guidelines for Water Quality on Agricultural Chemicals in Public Water Areas are established for 27 pesticides. Their guideline values are set on the basis of each pesticide's chronic toxicities. 4. Establishment of the Withholding Standards for Registration concerning Water Pollution. In order to prevent water pollution in public water areas which would be caused by pesticides applied in paddy fields, Withholding Standards for Registration concerning Water Pollution are established on the concentration of pesticides in paddy water before their registration, under the Agricultural Chemicals Regulation Law. The application for registration of a pesticide shall be rejected if the predicted concentration of the pesticide in paddy water exceeds the Standard value according to the proposed usage (application frequency, timing, etc.). Standards have so far been established for 53 pesticides on the basis of their chronic toxicities.

What are the key elements of the project/activity? **(Continued)**	5. Establishment of Guidelines for Prevention of Water Pollution by Agricultural Chemicals used at Golf Courses. Golf courses have drainage structures where applied pesticides can easily flow out to rivers and cause water pollution. In order to deal with this problem, the Guidelines for Prevention of Water Pollution by Agricultural Chemicals used at Golf Courses are established and monitoring levels of drainage are determined for 30 pesticides. According to the Guidelines, Prefectural Governments monitor the drainage from golf courses and direct golf course managers if necessary. Because of this measure, the concentration of pesticides in the drainage of golf courses is now below levels of concern. 6. Establishment of Directions for Safe Use of Agricultural Chemicals concerning Prevention of Water Pollution, etc. This Direction provides that users of the pesticides for which Environmental Quality Standards for Water Pollution are established shall pay particular attention not to let the pesticides drift over rivers and water purification plants. The Direction for Safe Use of Agricultural Chemicals concerning Aerial Application provides that the aerial application shall not be carried out in areas where rivers or water purification plants are located. 7. Designation of Agricultural Chemical Water Pollution and its Regulation. Pesticides which may cause water pollution in public water areas, and consequently pose risks to man and livestock when used in great quantity in an extensive area, may be designated by the National Government as agricultural chemicals of water pollution. As for such designated pesticide, the Prefectural Government may determine the area, if necessary, where any user of the pesticide shall not use the pesticide without obtaining the permission of the Prefectural Governor in advance.
When did the project/activity begin and what prompted its initiation?	item 1: 1992 items 2, 4: 1993 items 3, 5: 1994 item 5: 1990 item 7: 1971
What are its specific goals and/or targets?	Ensuring the quality of drinking water and public water. Prevention of Water Pollution.
Who is involved in carrying it out?	MAFF, EA, Ministry of Health and Welfare, pesticide registrants, pest control conductors and farmers.

Is there a legal or regulatory mandate?	items 1, 2, 7: legal mandate items 3, 4, 5, 6: administrative regulation
Is the activity monitored or enforced? If so, how?	Monitored annually
How are results and progress measured?	The authorities concerned monitor water pollution and, where appropriate, the results of the monitoring are published.
What specific progress/results have been achieved?	Cases where pesticides are detected in water have been reduced since these projects were started. None of the detected concentrations was higher than the value of the aforementioned standards.

JAPAN
Project or Activity: Measures to protect the Environment
Risk Reduction Category: Protecting Sensitive Species and Habitats

What are the key elements of the project/activity?	1. Establishment of Direction for Safe Use of Agricultural Chemicals concerning Prevention of Damage to Aquatic Animals. This Direction provides that users of designated pesticides shall pay particular attention not to let the pesticides drift over rivers, lakes, ponds, etc. 2. Designation of Agricultural Chemical of Water Pollution and its Regulation. Pesticides which pose risks to aquatic animals and plants, when used in great quantity in a considerably extensive area, may be designated as an agricultural chemical of water pollution. As for such designated pesticide, the Prefectoral Government may determine the area, if necessary, where any user of the pesticide shall not use the pesticide without obtaining the permission of the Prefectural Governor in advance. 3. Use restriction of pesticides of high toxicity to honeybees or silkworms The use area, time, etc. of a pesticide which is highly toxic to honeybees or silkworms is strictly regulated. 4. Protection of scarce wild plants and animals. In habitats of scarce wild plants and animals, it is provided by the law that aerial application for controlling pine bark and boring beetles in pine forests shall not be carried out.
When did the project/activity begin and what prompted its initiation?	items 1, 2, 3: 1971 item 4: 1977
What are its specific goals and/or targets?	Prevention of damage to aquatic animal sensitive species and habitats.
Who is involved in carrying it out?	MAFF. EA. Pesticide registrants, pest control conductors and farmers.
Is there a legal or regulatory mandate?	items 1, 2,3: Agricultural Chemicals Regulation Law item 4: Special Measures Law for Pine Sawyers Prevention
Is the activity monitored or enforced? If so, how?	Accidents have rarely been reported.
How are results and progress measured?	
What specific progress /results have been achieved?	Accidents have been reduced since this project started.

JAPAN

Project or Activity: Activities to Reduce Pesticide Use

Risk Reduction Category: National Programmes with Reduction Target

What are the key elements of the project/activity?	Environmentally friendly farming technique
When did the project/activity begin and what prompted its initiation?	Recently
What are its specific goals and/or targets?	Consideration of wildlife habitats and breeding grounds, and reduced use of agricultural chemicals
Who is involved in carrying it out?	MAFF, EA and farmers
Is there a legal or regulatory mandate?	The Basic Environmental Plan, based on the Basic Environmental Law
Is the activity monitored or enforced? If so, how?	
How are results and progress measured?	
What specific progress/results have been achieved?	

JAPAN

Project or Activity: Activities to Reduce Pesticide Use
Risk Reduction Category: Improving Application Technology

What are the key elements of the project/activity?	Low volume application machines and new formulations suitable for them are developed and used.
When did the project/activity begin and what prompted its initiation?	
What are its specific goals and/or targets?	Reducing total amount of pesticide use: MAFF and related companies
Who is involved in carrying it out?	
Is there a legal or regulatory mandate?	Voluntary
Is the activity monitored or enforced? If so, how?	
How are results and progress measured?	
What specific progress/results have been achieved?	

JAPAN
Project or Activity: Activities to Reduce Pesticide Use
Risk Reduction Category: Biological Control

What are the key elements of the project/activity?	1. Use of *Bacillus thuringiensis.* *Bacillus thuringiensis* is widely used for controlling lepidopteran pests of fruits, vegetables, etc. 2. Use of insect pheromones. Insect pheromones are widely used for forecasting of pests, monitoring pests, mating disruption, and mass control of pests by pheromone traps. 3. Eradication of melon fry by the sterile insect release method. This method involves the release of artificially mass-reared Melon fly (*Bactrocers cucurbitae*), sterilized by gamma irradiation, in the infested area. When sterile males mate with fertile wild females, the females do not produce progency, which reduces the population of the next generation. By repeating this, eradication of the target pest can be achieved without pesticides. This method is effective particularly in isolated areas such as small islands. By using the SIRM (Sterile Insect Release Method), the Melon fly was eradicated from the Kume Islands in 1987, Amami Islands in 1989, Okinawa Islands in 1990 and Yaeyama Islands in 1993. As a result of these projects, Melon fly was eradicated from Japan in 1993. 4. Introduction of natural enemies. Pest control by introducing natural enemies has succeeded in several cases. Examples are as follows: - control of pink wax scale (*Ceroplastes rubens Maskell*) by pink wax parasite *(Anicetus beneficius Isii* and *Yasumatsu*) - control of cottony cushion scale (*Iseria purchasi Maskell*) by vedaria ladybird *(Rodolia cardinalis (Mulsant*)) 5. Promotion of development of biological pesticide. In order to develop environmentally friendly pesticides derived from living organisms, the National Government subsidized the Research Technology Association, comprised of pesticide manufacturing companies for the promotion of such development. Further, the work of establishing test guidelines for studies necessary to an application for a registration is now progressing.
When did the project/activity begin and what prompted its initiation?	item 1: 1971 item 2: 1977 item 3: 1971 item 4: 1950 item 5: 1984

What are its specific goals and/or targets?	Reducing total amount of pesticide use.
Who is involved in carrying it out?	MAFF, Prefectural Governments, farmers and related companies.
Is there a legal or regulatory mandate?	Guidance
Is the activity monitored or enforced? If so, how?	Prefectural pest control stations monitor the results, etc.
How are results and progress measured?	The results have been reported to MAFF from Prefectural Governments, etc.
What specific progress/results have been achieved?	By using sterile insect release method, melon fly was eradicated from Japan in 1993, etc.

III. Conclusions

In Japan, the pest forecasting system and agricultural chemicals safety precaution campaign are successful. It is regarded that the reasons for this success are research, exchanging of pest outbreak information, and constant enforcement of the campaign on safe use of pesticides by MAFF and the 47 Prefectures.

Until now, the economic threshold levels are established for some pests and pests are controlled with these levels. Now, it is necessary to reduce pesticides.

THE NETHERLANDS

CONTACT PERSON(S):

Mr. Her de Heer
Ministry of Agriculture, Nature Management and Fisheries
PO Box 20401
NL-2500 EK The Hague

Tel: (31)-70-373 36 85
Fax: (31)-70-3476896

Mr. H.E. van de Baan
Ministry of Housing, Spatial Planning and Environment
PO Box 30945
2500 GX The Hague

Ph: (31)-70-339 45 76
Fax: (31)-70-339 12 89-

Mr. A.A. Vijlbrief
Ministry of Social Affairs and Employment
PO Box 90804
NL-2509 LV The Hague

Ph: (31)-70-333 53 06
Fax: (31)-70-333 40 23

I. Framework for Pesticide Risk Reduction Activities

1. At the national level, the Multi-Year Crop Protection Plan (MYCPP) was established in 1991. Implementation of the MYCPP takes place through an Administrative Agreement between the government and agricultural industry. A Co-ordinating Body, including representatives of both government and agribusiness, is responsible for the implementation of the MYCPP. Various agricultural sectors are responsible for developing action plans to meet the goals of the MYCPP. Furthermore, this year there has been established a general co-operation plan on labour protection in agriculture between the government and the agricultural industry.

2. Efforts to reduce pesticide risks were mainly prompted by the increasing agricultural and environmental problems due to a frequent and large-scale use of chemical pesticides as a result of intensive agriculture (see under II.1). Another reason was occupational exposure.

3. The Administrative Agreement between government and agricultural industry has a (limited) legal mandate. Various instruments have been put into action within a legal framework (see under II.4). Additionally, activities which have been put into action outside a legal framework include education, extension and research.

II. Description of Activities and Results

NETHERLANDS
Project or Activity: Multi-Year Crop Protection Plan (MYCPP)
Risk Reduction Category: Reducing use of, dependence on pesticides

What are the key elements of the project/ activity?	The Netherlands is implementing a national "Multi-Year Crop Protection Plan" (MYCPP) that aims to bring about drastic changes in crop protection during the period 1990-2000. The plan provides concrete policies and a structure for activities to reduce the use of and dependence upon chemical agents for crop protection. The activities include both regulatory measures (such as requirements for user training, restrictions on certain types of pesticides, and application methods) and efforts to promote the use of IPM. The goal is sustainability in agriculture. Implementation of the MYCPP occurs through an Administrative Agreement (covenant) between government and the agricultural industry.
When did the project/activity begin and what prompted its initiation?	Strategies for pesticide reduction activities were laid down in an Agricultural Structure Memorandum in 1989. These strategies were translated into concrete policies, measures and targets, which resulted in the MYCPP in 1991. In 1993, the government and agricultural industry concluded an Administrative Agreement on the implementation of the MYCPP. These efforts were prompted by concern about: • increasing agricultural and environmental problems caused by frequent and large-scale use of chemical pesticides in intensive agriculture • occupational exposure
What are its specific goals and/or targets?	1. Reduced dependence on chemical pesticides. 2. Reduced use of chemical pesticides, with specific targets for reduction (volumes used during 1984-88 as reference point) as follows: overall: by 1995: 30-35%; by 2000: 50% soil disinfectants: by 1995: 45%; by 2000: 68% herbicides, haulmkillers: by 1995: 31%; by 2000: 45% insecticides, fungicides and other substances: by 1995: 23%; by 2000: 36% 3. Reduced emissions to the environment (reference period 1984-1988) soil/groundwater: by 1995: 40%; by 2000: 75% surface waters: by 1995: 70%; by 2000: 90% air: by 1995: 30%-35%; by 2000: 50% 4. Withdrawal and / or regulation of environmentally harmful pesticides 5. Improvement of labour protection

Who is involved in carrying it out?	A Co-ordinating Body with representatives of government and agricultural industry is responsible for implementing the MYCPP. Various agricultural sectors are responsible for developing action plans to meet the plan's goals. <u>Government:</u> Ministry of Agriculture, Nature Management & Fisheries Ministry of Housing, Spatial Planning & Environment Ministry of Social Affairs and Employment Ministry of Welfare, Health and Cultural Affairs Ministry of Transport, Public Works and Water Management <u>Agricultural sectors/profession</u> Board for Agriculture Dutch Association of Agrochemical Industry Pesticide Sales and Distribution Organisation Various agricultural organisations
Is there a legal or regulatory mandate?	The Administrative Agreement between government and the agricultural profession has a (limited) legal mandate. The agricultural industry has subscribed to the objectives and targets in the MYCPP. Instruments which have been put into action within a legal framework are the following: • environmental and occupational criteria for the authorisation of pesticides • regulation of soil disinfectants • minimum skill and knowledge requirements for users, sellers, distributors, and professional application firms • required authorisation of sellers • rules for pesticide labelling with regard to worker protection • mandatory inspection of spraying equipment • regulations for disposal and rinsing of pesticide packaging Only on voluntary basis: • green labelling • research and extension programmes
Is the activity monitored or enforced? If so, how?	Aspects which have been put into action within a legal framework will be monitored according to regular enforcement activities by the appropriate agencies.

How are results and progress measured?	Progress is evaluated and reported yearly to Parliament. Results are measured as follows: <u>reduced dependence on chemical pesticides:</u> indicators are currently being worked out <u>reduced use:</u> information on pesticide sales (industry data), questionnaires (by the Agricultural Economics Research Institute), government data (collected by the Plant Protection Service and the Central Bureau for Statistics) <u>reduced emissions to the environment:</u> information on pesticide volume and on specific indicators per sector <u>withdrawal and/or regulation of environmentally harmful pesticides:</u> evaluation of industry proposals on regulation of these pesticides submitted to the Pesticide Authorization Authority
What specific progress/results have been achieved?	<u>Specific progress/results in pesticide use reduction to date include:</u> • reduction of total pesticide volume by 40% (reduction of soil disinfectants by 75%; of herbicides and haulmkillers by 27%) • an estimated reduction of pesticide emissions in general of about 40% <u>Progress in implementing the MYCPP:</u> • drafting of a general Decree laying out environmental criteria for pesticide authorisation • activity by agricultural industry and the pesticide industry to regulate the use of the most environmentally harmful pesticides on the basis of provisional criteria • regulation of soil disinfectants • initiation of courses for pesticide users and sellers (to enable them to meet the skill and knowledge requirements) • mandatory inspection of spraying equipment • a system to control cleaning and disposal of pesticide packaging • improvement of quarantine measures • initiation of research and extension programmes

Key elements of projects/activities

Reducing dependence on chemical pesticides	Strategies to reduce dependence on pesticide include: • promoting development and use of non-chemical crop protection methods (biological and integrated crop protection, mechanical pest control): to be supported by research, extension, subsidies, and procedures for the approval of biological control • encouraging change-over to integrated farming systems: supported by research, extension, training and subsidies • promoting change-over from conventional to biodynamic and ecological farming: supported by extension, training and subsidies • reducing dependence on chemical soil treatment: supported by regulations, use of a prescription system for soil disinfectants, and promotion of the use of resistant varieties.
Reducing overall pesticide use	<u>Soil disinfectants and soil treatment agents</u> The goal is to reduce use of these pesticides by accelerating the introduction of integrated farming systems. Regulations will be supported and supplemented by actions such as: • use and inspection of propagating material • reduction of outdoor crop applications • research into biological control • development of catch crops or resistant or tolerant varieties • wider crop rotations in favour of monocotyl crops <u>Herbicides</u> The goal is to reduce herbicide use through the introduction and promotion of integrated pest control (mechanical methods of weed control, growing measures such as timing, fertiliser rationing, use of cover crops, replacement of preventive by curative methods, etc.). A very restrictive policy will be pursued with regard to developments that can result in increased herbicide use, such as the enhancement of herbicide resistance in crops by means of genetic manipulation. Regulations for the use of herbicides in parks, countryside and embankments will be tightened. The introduction of integrated pest control will be underpinned by a number of actions in the area of research, extension and subsidies, including: • improvement of equipment for mechanical, physical and chemical weed control • improvement of spraying gear and spraying techniques for lower doses and optimum application within the rows

Reducing pesticide use (cont'd)	<u>Insecticides, acaricides, fungicides</u> The goal is to intensify the use of preventive and integrated pest control methods to control aerial diseases and pests, so that use of insecticides, acaricides and fungicides can be reduced. In addition to actions in the area of research, extension and subsidies, the efficacy of pesticide application will have to be improved by means of compulsory measures, including: • obligation to have a recognised certificate of competence for anyone applying pesticides professionally • introduction of minimum quality requirements and of a regular obligatory overhaul of application equipment elimination of application techniques / equipment which are relatively unfavourable from an environmental point of view.
Reducing emissions to the environment	<u>Emission to groundwater:</u> Pesticides will be regulated with regard to groundwater protection. • Any pesticide found to leach at concentrations exceeding 0.1µg/l at a depth of 10m below ground level (transport period of four years in the zone of saturation) will be withdrawn. • At 10m below ground level, the sum of pesticide concentrations must not exceed the limit of 0.5µg/l. • With the help of models, all pesticides will be tested for leaching potential. <u>Emission to surface water</u> • A policy will be pursued to get protected crops as a whole out of the soil and into substrate cultivation. In these substrate cultivations, closed systems will be introduced where waste water will be recirculated. Waste water will be treated either on the premises or in a waste water treatment plant before being discharged into surface water. • Substantial emission reductions are expected in outdoor crop production by implementation of measures to prevent waste and careless and inefficient usage • Additional measures include: - prohibition on planting fruit trees along ditches - obligation for fruit growers to plant shelterbelts and lay out paths or use shielded sprayers - obligation for outdoor crop growers to establish a spray-free zone along ditches <u>Emissions to the air:</u> • With regard to public health: testing of levels in air will be considered • With regard to worker safety: risks will consistently be taken into account.

III. Conclusions

1) Most succesful activities:

- regulation of soil fumigants
- reduction of pesticide volume (mainly soil disinfectants and herbicides/haulmkillers)
- purification of active substances (biologically active isomers, e.g. cis-dichloropropene and mecoprop-p)
- commitment of agricultural industry to pesticide risk reduction activities (through an Administrative Agreement)
- worker protection requirements on the label
- market incentives through greenlabelling a part of the food and flower products
- additional effort in research and extension.

Most succesful are those activities/actions which fit into farming activities or which can be demanded by regulation. Such activities could be considered a first step in meeting the goals of the MYCPP.

2) Least succesful activities:

- reduction of emission of pesticides, especially with respect to surface water
- reduction of volume of fungicides and other substances (especially mineral oil)
- withdrawal/regulation of environmentally harmful (applications of) pesticides.

Due to intensive agriculture and the presence of ample surface waters, goals for the reduction of emissions of pesticides are hard to meet because a financial input is needed from growers in a bad economic situation. With respect to fungicides, preventive spraying is difficult to reduce due to the risk perception of farmers and weather conditions.

A legal base for implementation of environmental criteria was not available in the Pesticide Act, which required adjustment of the law. In general it takes quite some time to place measures in a legal framework.

3) Difficulties encountered in measuring the progress/results of reduction of emission and dependence on pesticides are that the measuring is difficult and the reference/baseline is estimated for emissions (therefore, reaching agreement on principles of monitoring and monitoring instruments can be difficult). In general it is often not easy to determine the effects of specific activities because other factors could have had impacts as well.

With respect to volume, measuring progress/results has been successful for the total volume and groups of pesticides. For more specific data on use in each sector, the difficulty is that the reference/baseline data are based on estimates, which makes a comparison with monitoring data difficult.

4) Pesticide risk reduction can be hampered by economic factors in agriculture.

5) Projects within the framework of the EC as well as the OECD would help to achieve further progress in pesticides risk reduction. These would include:

- OECD anticipated risk reduction programs
- harmonisation of evaluation
- increase in common awareness of relevant environmental issues (e.g. internationally tuned greenlabelling of agricultural products)
- integration of environmental measures/goals within the EC Common Agricultural Policy.

NEW ZEALAND

CONTACT PERSON(S):

Ms Sue Thomas
Toxicologist, Environmental Health Unit
Ministry of Agriculture and Fisheries
Wallaceville Research Centre
Ward Street, PO Box 40063
Upper Hutt

Tel: (64) 4 528 6089
Fax: (64) 4 528 4675

II. Description of Activities and Results

NEW ZEALAND
Project or Activity: Providing education, information to farmers
Risk Reduction Category: Increasing safety in pesticide handling, use and disposal

What are the key elements of the project/activity?	The New Zealand Agrochemical Education Trust (NZAET) was established in 1992 with the object of educating both farmers and the general public about the safe, responsible and effective use of pesticides. NZAET has • adopted an Agrichemical Users' Code of Practice • established a training programme called GROWSAFE for all commercial agrichemical users. The programme covers the role of agrichemicals in pest management, properties and mode of action of commonly used chemicals, principles of application, potential impacts, and obligations of agrichemical users. The programme includes a 1-day standard course and a 3-day advanced course. The Agricultural Chemicals and Animal Remedies Manufacturers Association of New Zealand (AGCARM) recently joined NZAET. AGCARM has helped: • develop an accreditation programme (including a training course) for pesticide sellers • launch a "Take-Time User Awareness Campaign" (end of July 1994) aimed at raising user standards, reducing product misuse, encouraging triple rinsing of containers, and highlighting the importance of following label directions • provide sticker (more than 200,000) product containers for the promotional period August to November 1994 • prepare an educational kit for schools to coincide with the launch
When did the project/activity begin and what prompted its initiation?	1992, NZAET 1994, AGCARM
What are its specific goals and/or targets?	The Growsafe goal is to have 25% of NZ's agrichemical users qualified in the programme in 3 years.

Who is involved in carrying it out?	NZAET has representatives from: Federated Farmers of NZ NZ Fruitgrowers Federation NZ Vegetable & Potato Growers Federation NZ Berryfruit Growers Federation NZ Grape Growers Council NZ Forest Owners Association Lincoln University Forest Research Institute Ministry of Agriculture and Fisheries The Growsafe programme is directed at agrichemical providers, marketers, retailers, wholesalers, processors, exporters, service organisations and users.
Is there a legal or regulatory mandate?	No legal mandate for Growsafe or Agcarm, but under the Health and Safety in Employment Act (1992) workers must know the hazards of the products they use, e.g. via a material safety sheet.
Is the activity monitored or enforced? If so, how?	Auditing is conducted by MAF Quality Management.
How are results and progress measured?	Number of people attending programmes. In the future, by the (hopefully falling) number of residue violations, poisoning statistics, complaints to regulatory agencies from the public.
What specific progress/results have been achieved?	5000 people have attended the Growsafe standard course, 200 have taken the advanced course. The future measures are not yet in place.

NEW ZEALAND
Project or Activity: Label improvements
Risk Reduction Category: Increasing safety in pesticide handling, use and disposal

What are the key elements of the project/activity?	The Agricultural Compounds Unit (responsible for pesticide labelling) and the Occupational Safety and Health Service of the Department of Labour are working on an upgrade of the precautionary wording on pesticide labels.
When did the project/activity begin and what prompted its initiation?	Comments from users, manufacturers, and changes noted internationally have prompted this initiative to help end users use and dispose of chemicals and used containers safely.
What are its specific goals and/or targets?	User safety. Reduction in reported occupational illness related to pesticide use.
Who is involved in carrying it out?	Occupational Safety and Health Service of the Dept of Labour Agricultural Compounds Unit
Is there a legal or regulatory mandate?	The Health and Safety in Employment Act 1992 Pesticides Act 1979 Toxic Substances Act, 1979 and their regulations
Is the activity monitored or enforced? If so, how?	Through Registration of Pesticides, OSH inspectors at workplaces and Health Protection officers of local Crown Health Enterprises.
How are results and progress measured?	Proprietors are required to upgrade labels and submit them for approval. Limited surveys on label comprehension by users are conducted from time to time.
What specific progress/results have been achieved?	Not known yet - measure still to be taken

NEW ZEALAND
Project or Activity: Resource management plans
Risk Reduction Category: Protecting sensitive areas, species

What are the key elements of the project/activity?	Regional plans for managing resources, including limitations on pesticide use if relevant, are scheduled to be developed by NZ's Regional Councils under the Resource Management Act 1991 (RMA). District plans will be developed by District Councils for the same purpose. They have discrete legal meanings defined in the Local Government Act 1970. Within each area there are several districts. In each district there are several local councils.
When did the project/activity begin and what prompted its initiation?	Regional/District Plans have been around for many years; however, the environmental focus has increased since the introduction in 1991 of the RMA.
What are its specific goals and/or targets?	To manage and promote sustainability of resources for present and future generations
Who is involved in carrying it out?	Regional Councils District Councils
Is there a legal or regulatory mandate?	The Resource Management Act 1991
Is the activity monitored or enforced? If so, how?	Regional/District Councils will carry this responsibility. They need to develop suitable procedures for their area.
How are results and progress measured?	Plans are under development.
What specific progress/results have been achieved?	Too early to measure

NEW ZEALAND
Project or Activity: (various activities)
Risk Reduction Category: Promoting IPM

What are the key elements of the project/activity?	Activities include: • promotion of sustainable agriculture policies by the Ministry of Agriculture and Fisheries (MAF) (e.g. to use the land optimally to ensure future use and improve land where possible, therefore cutting out excessive use of pesticides; prudent use encouraged to avoid emergence of resistance) • use of media to advise farmers about new techniques. The media can get information via manufacturers, conferences, field days, etc. • annual field days to show farmers and the public new farming techniques and new uses. The field days are run by National Day Society. • research and development on alternative strategies – done by government-funded organisations such as MAF Agricultural Research, Cropcare, Crown Research Institute • development, use of networks for information exchange about alternative strategies. • contracts between growers and marketing companies to ensure that only certain pesticides are used and post-harvest treatment intervals are respected (e.g. supermarket chains contract growers who produce only for them, specifying growing and residue requirements)
When did the project / activity begin and what prompted its initiation?	Slow ongoing development since 1980's.
What are its specific goals and/or targets?	Reduction in use of pesticides.
Who is involved in carrying it out?	The Ministry of Agriculture and Fisheries (MAF) Media Research organisations Marketing companies
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	
How are results and progress measured?	Continued land use
What specific progress/results have been achieved?	

NORWAY

CONTACT PERSON(S):

Pesticide approval - re-evaluation

Dr. Terje Røyneberg
National Agricultural Inspection Service
BOX 3
N - 1430 Aas

Tel: (47) 64 94 35 60
Fax: (47) 64 94 23 50

Action plan to reduce pesticide use

Bente Føreid
Ministry of Agriculture
Box 8007
N - Dep.0030 Oslo

Tel: (47) 22 34 93 11
Fax: (47) 22 34 95 57

IPM program

Dr. H. Magnus
The Norwegian Plant Protection Institute
Fellesbygget
N - 1432 Aas

Tel: (47) 64 94 75 04
Fax: (47) 64 94 92 26

I. Framework for Pesticide Risk Reduction Activities

The Pesticide Act of 1963 requires five-year re-registrations of all pesticides on the market. The approval of pesticides is further based on a risk-benefit evaluation, and also use of the substitution principle. Since 1963 we have been able to eliminate the most hazardous pesticides and substitute them with less harmful ones.

In 1989 the Norwegian parliament adopted a 5-year Action Programme to "Reduce the Pesticide Use as Far as Possible". This programme was initiated partly as a result of public demands and environmental monitoring programmes, and was finally influenced by the ongoing risk reduction programs in other Scandinavian countries.

The risk reduction activities directed to farmers are voluntary, except for the licensing programme, and those use restrictions mentioned on the pesticide label.

On the following pages are tables which show the different activities.

II. Description of Activities and Results

Norway
Risk Reduction Category: Elimination of hazardous pesticides

Activity	The use of the substitution principle to ban/restrict those pesticides that may pose an unacceptable risk, and replace them with pesticides with lower risk.
When did the activity begin?	1963
What are its specific goals and/or targets?	Always keep on the market those pesticides with lowest risk
Who is involved in carrying it out?	The National Agricultural Inspection Service - Pesticide Division The Pesticide Board Norwegian Plant Protection Institute
Is there a legal or regulatory mandate?	This activity is regulated by the Pesticide Act, which requires 5-year re-registration of all pesticides on the market.
Is the activity monitored or enforced? If so, how?	The activity is based on the Pesticide Act
How are results and progress measured?	Total quantity sold, and how many pesticides/quantity sold in the different hazard classes
What specific progress/results have been achieved?	We have phased out many hazardous pesticides, and replaced them with less toxic ones. At present time we have about 120 active ingredients on the market.

Norway
Risk Reduction Category: Reducing pesticide use

Activity	a. Reduce overall pesticide use b. IPM programme included the use of threshold values c. Efficacy trials carried out under Norwegian conditions
When did the activity begin?	a. and b., 1980-82 c. since about 1950
What are its specific goals?	a. There is no specific target other than "The reduction should be as far as possible." b. Threshold values for disease and weeds in small grain, disease in potato, and insects in fruit production c. Minimise the dosage used. Special benefit to beneficial anthropods.
Who is involved in carrying it out?	Norwegian Plant Protection Institute and some other R&D organisations, supervisors at the regional level, and certainly the farmer.
Is there a legal or regulatory mandate?	a.,b.,c., Partly based on 5-year action plan for pesticide reduction
Is the activity monitored or enforced? If so, how?	The activity is monitored.
How are results and progress measured?	a. & c. The total quantity sold per year b. Number of farmers who attend the IPM Programme
What specific progress/results have been achieved?	a. The overall sales figures (tonne/year) for pesticide use was reduced 28% in the period 1989 to 1993 b. About 40% of small grain farmers, about 50% of potato growers, and 80-90% of fruit growers use the IPM advice. c. Difficult to measure: The result is part of the reduction in overall sales figures of pesticides.

Norway

Risk Reduction Category: Regulation, education and other policy tools to increase safety in pesticide handling, use and disposal

Activity	a. Licensing programme for farmers who use pesticides in the two upper hazard classes. (This activity is no longer relevant, ref. item b.) b. Licensing programme for all farmers, and other people who use pesticides in their profession. c. Certification programme for pesticide application equipment. d. Use restrictions (buffer zones) e. Campaign to collect left-over pesticide
When did the project/activity begin?	a. 1963 b. 1992-1997 c. 1990 d. since about 1990 e. 1994
What are its specific goals and/or targets?	b. All users of pesticides (about 40,000) need to be certified until July 1, 1997 c. All sprayers (about 15,000) should be tested d. Protect water living organism and/or other protective areas e. Collect old outdated pesticides
Who is involved in carrying it out?	b. The National Plant Protection Adviser c., d. The National Agricultural Inspection Service e. The Ministry of Agriculture
Is there a legal or regulatory mandate?	b. & d. yes c. & e. is voluntary at present time
Is the activity monitored or enforced? If so, how?	The activity is monitored
How are results and progress measured?	a.-c. Statistics d. At present time, not measured
What specific progress/results have been achieved?	b. About 15,000 users have been certified c. About 5,000 pesticide sprayers have been certified d. Probable better protection e. About 100 tonnes out of estimated 100 tonnes outdated pesticides were collected

Norway

Risk Reduction Category: Promotion of alternative pest management strategies such as integrated pest management or organic farming

Activity	a. Financial support for farmers making the transition to alternative methods/organic farming b. Programme to provide information to farmers on alternative strategies c. R&D activities on pest/disease-resistant crops, crop rotations, etc. d. Electronic data base (Bulletin Board) with up-to-date plant protection advice
When did the project/activity begin?	a. 1990 b. 1989-1991 c. 1980 d. 1989
What are its specific goals and/or targets?	a. To get more information on biological farming in practice b. To turn farmers' attention on IPM c. Increased tolerance/resistance against diseases in small grain and apple
Who is involved in carrying it out?	a. Ministry of Agriculture b. The National Plant Protection Adviser c-d The Norwegian Plant Protection Institute
Is there a legal or regulatory mandate?	Based on the action programme to reduce the use of pesticides
Is the activity monitored or enforced? If so, how?	yes
How are results and progress measured?	a. and d. statistics
What specific progress/results have been achieved?	a. About 500 farmers, representing about 6500 ha, or 0.5% of cultivated land in Norway b. A change in farmers' opinion. More concern about the environment c. New types/varieties of crop plants d. The system is widely used by local supervisors.

III. Conclusions

1. The Pesticide Act has had a major influence on pesticide risk reduction in Norway by using the substitution principle. The Action Plan to reduce pesticide use will be evaluated by the Ministry of Agriculture during the spring of 1995. So far, there is no official conclusion. However, the activity related to the IPM pesticide programme as well as the programme for education/licensing of users seems successful.

2. There is no comment on this at present time.

4. Risk reduction has until now been measured in quantity sold, total active ingredients on the market and so on, and we have statistics from the 50s. In 1991-1992 a survey was carried out among 1200 farmers in Norway with questions related to health, environment and safety concerning pesticides. Some questions were also related to farmers' attitude. The survey will probably be repeated later, in order to measure change over time.

5. To some extent, the North Sea Treaty related to the pollution of the marine environment has influenced the decisions made by regulating authorities.

6. OECD's ongoing activity is highly appreciated, and we are looking forward to the risk reduction workshop which will be hosted by Sweden in the autumn of 1995.

PORTUGAL

CONTACT PERSON(S):

Mr. Henrique Seabra
Director of Plant Protection Products Services
Quinta do Marquês
2 780
Oeiras, Portugal
Tel: (351) 1 443 5712
Fax: (351) 1 442 0616

I. Framework for Pesticide Risk and Use Reduction Activities

Pesticide registration is an obligatory process in Portugal since 1967, when public opinion and official services held that proper legislation on this matter was needed.

Within the scope of risk reduction policies, this registration process was developed in three general strategies:

1st: strict and demanding evaluation and decision criteria with regard to worker and consumer protection, as well as environment protection, to be observed when in registration process of Plant Protection Products (PPP);

2nd: development and implementation of the use of PPP according to the Portuguese good plant protection practices for different crops;

3rd: training and information programmes on the proper use of PPP and on ways of reducing risks.

There is a regulatory mandate for registration and approval of PPP which includes maximum residue level in agricultural commodities.

These activities have the support of the central services of the Ministry of Health and the Ministry of Environment. They are carried out by the Regional Services of the Ministry of Agriculture and the Technical Services of the Pesticide Industry.

The Toxicological and Ecotoxicological evaluation of PPP is the responsibility of the Commission of Pesticide Toxicology (CTP), created in 1969 and now being represented by members of the Ministry of Agriculture (Forestry and Veterinary boards), e Ministry of Health and the Ministry of Environment. The CTP has the duty to establish safety measures and eventual restrictions on the use of PPP on the basis of human (consumer and worker) health and environmental (including non-target organisms) protection.

It is then the Nacional Centre of Plant Protection (CNPPA) that has the responsibility to make the registration of the PPP and set conditions of use (crops/enemies, frequency of application, intervals and application rates), toxicological and ecotoxicological precautions, MRL (Maximum Residue Levels), and label authorisations.

II. Description of Activities

PORTUGAL
Project or Activity: Banning/Restricting certain pesticides
Risk Reduction Category: Eliminating, restricting hazardous pesticides

What are the key elements of the project/activity?	1. Prohibiting certain products to go to the market. 2. Banning certain products from the market. 3. Restricting the use of certain products due to toxicological and environmental problems: restricting use of very toxic products (e.g. methyl bromide) to authorised personnel; restricting the use of atrazine to maize with reducing application rates. 4. Restricting the use of certain products based on efficacy problems and on EEC Maximum Residue Levels (MRL).
When did the project/activity begin and what prompted its initiation?	1., 2. In 1967/1969 with the implementation of the registration of PPP. 3. 1993 due to the detection of atrazine residues in ground water. 4. 1967 for efficacy problems. 1986, need to follow internaitonal Maximum Residue Levels, EEC Directives.
What are its specific goals and/or targets?	- Reducing the risk to applicators, workers, consumers and environment. - Reducing efficacy problems.
Who is involved in carrying it out?	- Plant Protection Services (CNPPA) of Ministry of Agriculture. - Regional Services of Ministry of Agriculture. - Pesticide Toxicology Commission (CTP) (Ministries of Agriculture, Health and Environment).
Is there a legal or regulatory mandate?	There is a legal mandate for the specific goals and targets mentioned above.
Is the activity monitored or enforced? If so, how?	Most of the activities are enforced by law. It means that all PPP must be (re-) evaluated taking into account the national registration scheme. The monitoring of residue of PPP is being developed for environmental compartments, namely water bodies. For agricultural commodities, a monitoring scheme has been carried out since 1970s.
How are results and progress measured?	Through information given by the Fiscalization Service and Regional Services of the Ministry of Agriculture.
What specific progress/results have been achieved?	Many pesticides have been prohibited, banned or restricted during the 1970s, 1980s and 1990s.

PORTUGAL
Project or Activity: Public, farmer education programme
Risk Reduction Category: Increasing safety in pesticide use, disposal

What are the key elements of the project/activity?	An education programme titled "Use the Pesticides Carefully" was initiated in the early 1970s. The programme was aimed at informing the population in general, and pesticide users in particular, about the conditions of use of pesticides contemplated in the legislation (choice of pesticide, disposal, etc). The information was disseminated through the mass media. The education programme was not a training programme. But the information gave the pesticide users contributions for changing their line of conduct concerning the use of pesticides.
When did the project/activity begin and what prompted its initiation?	Early 1970s
What are its specific goals and/or targets?	To increase safety of pesticide use and disposal. To inform the public about how the government regulated pesticides.
Who is involved in carrying it out?	Plant Protection Services Regional Services of the Ministry of Agriculture
Is there a legal or regulatory mandate?	Yes. There is a general regulation concerning an education programme for farmers.
Is the activity monitored or enforced? If so, how?	By the Health Ministry, through the monitoring of the number of accidents involving pesticide users, pesticide users' family, children.
How are results and progress measured?	Analysing the evolution of the number of accidents with pesticides before and after the education programme.
What specific progress/results have been achieved?	Improvement of safety in selling, handling, transportation, storage, application, disposal of pesticides.

PORTUGAL

Project or Activity: Training and information for farmers

Risk Reduction Category: Increasing safety in pesticide use

What are the key elements of the project/activity?	Establishment of a national system that provides regular information to farmers on good plant protection practices for the major crops grown in Portugal (vineyards, fruit trees, potatoes). Initiation of training programmes for farmers and crop protection advisors.
When did the project/activity begin and what prompted its initiation?	1970s
What are its specific goals and/or targets?	
Who is involved in carrying it out?	The Ministry of Agriculture and its regional services. The Ministry of Social Affairs and its regional services.
Is there a legal or regulatory mandate?	
Is the activity monitored or enforced? If so, how?	
How are results and progress measured?	
What specific progress/results have been achieved?	

PORTUGAL

Project or Activity: Information, training, and incentives for farmers

Risk Reduction Category: Promotion of IPM, organic farming

What are the key elements of the project/activity?	A new programme will provide training, information, and economic incentives to farmers to improve their use of pesticides and increase their use of IPM and organic methods. The programme will be developed for pome fruits, stone fruits, citrus, vineyards, vegetables, and olive trees. Chemical control with advice and warning services will be implemented on 40,000 ha; IPM and organic methods will be applied on 6,000 ha. Funding for the programme will include 14.E8 (Portuguese escudos) for farmer training, and 20.E8 (Portuguese escudos) for economic incentives for farmers to adopt these strategies.
When did the project/activity begin and what prompted its initiation?	The programe will run from 1994 through 1999.
What are its specific goals and/or targets?	To reduce the adverse effects of pesticides, especially in areas of intensive agriculture.
Who is involved in carrying it out?	
Is there a legal or regulatory mandate?	
Is the activity monitored or enforced? If so, how?	
How are results and progress measured?	
What specific progress/results have been achieved?	

III. Conclusions

The approval and registration of PPP is a successful activity through which order in the Portuguese market was established. Some difficulties are linked with the application of PPP, and legislation with practical mechanisms for its implementation on application in the field is still needed. Another very important point is the monitoring of residue of PPP in the environment.

Projects at international level which could help our country's development would be those concerning models to predict the risk of exposure of those who apply PPP in Mediterranean conditions and the risk for the environment.

SPAIN

CONTACT PERSON(S):

Mr. Don Ramon Vazquez Hombrados
Subdirector General de Sanidad Vegetal
Subdirección General de Sanidad Vegetal
Velazquez 147
SP-28002 Madrid

Tel: (34) 1 347 8243
Fax: (34) 1 347 8248

Don José Ramon Martinez Cano Manuel
Jefe de Servicio de Registro de Fitosanitarios
Subdirección General de Sanidad Vegetal
Velazquez 147
SP-28002 Madrid

Tel: (34) 1 347 8274
Fax: (34) 1 347 8248

Don Eduardo Rosende Márquez (Survey answers writer)
Jefe de Sección de Información Fitosanitaria
Subdirección General de Sanidad Vegetal
Velazquez 147
SP-28002 Madrid

Tel: (34) 1 347 8236
Fax: (34) 1 347 8248

Doña Carmen Diaz Garcia
ATRIAS
Subdirección General de Sanidad Vegetal
Velazquez 147
SP-28002 Madrid

Tel: (34) 1 347 8287
Fax: (34) 1 347 8248

I. Framework for Pesticide Risk Reduction Activities

1. In Spain, pesticide use control is carried out by both the Central Administration and the Autonomous Governments, with the participation of the Ministry of Agriculture, Food and Fisheries, the Ministry of Health and Consumer Affairs, and the Agriculture Organisations in the Provinces and Regions.

2. The principal factors to reduce pesticide risks have been orientated to workers' health and residues of pesticides in edible crops, reduction in the use of toxic compounds, total consumption of pesticides, and the promotion of non-polluting products and biological control of pests.

Recently a monitoring study on drinking water contamination by pesticides has been initiated to evaluate the extension and degree of pollution of water resources in the most intensive pesticide use areas.

3. There is a legal regulatory mandate for risk reduction activities where:

3.1 The limitations and safety instructions for pesticide use are stated in the compulsory Official Authorisations before any pesticide commercialisation, and in several Pesticides Revision Programmes described below.

3.2 The legal framework for the pesticide use restriction was issued by the creation and promotion of Farmers' Associations for Integrated Treatments in Agriculture (ATRIAS).

The objective of these ATRIAS was to promote integrated pest management as an alternative to the traditional treatment systems, aiming:

- to rationalise the use of pesticides, avoiding unnecessary treatments;

- to promote the use of non-polluting biological and crop management methods for reducing the consumption of pesticides and their ecological impact in the environment.

II. Description of Activities

SPAIN
Project or Activity: Education for workers
Risk Reduction Category: Increasing safety in pesticide handling, use, and disposal

What are the key elements of the project/activity?	Activities to reduce worker risks were initiated in a programme sponsored jointly by government bodies and the pesticide industry. The programme aimed to promote the use of protective equipment. The programme made use of a variety of communication systems including TV, videos, radio, and presentations/demonstrations to farmers of protective material (masks, gloves, clothes, etc.), including the work of contracted staff to monitor its use and practical advice to the farmers and applicators on protective practices. The programme also gave farmers protective material.
When did the project/activity begin and what prompted its initiation?	Initiated in 1988. Implemented in 1988-89.
What are its specific goals and/or targets?	To promote the use of protective equipment in high risk areas, namely top fruit orchards and crops under glasshouse cultivation.
Who is involved in carrying it out?	The Ministry of Agriculture The Institute for Safety and Hygiene in the Workplace The Authonomous Governments (there are 17 in Spain) The Industrial Pesticide Association
Is there a legal or regulatory mandate?	The programme aimed at getting farmers to comply with the limitations and safety instructions stated on pesticide labels, or in official authorisations.
Is the activity monitored or enforced? If so, how?	Yes, by the competent authorities involved in implementation.
How are results and progress measured?	Results were measured by the reduction in intoxication reports from hospitals in the testing regions.
What specific progress/results have been achieved?	This programme has led to a high degree of acceptance of protective measures by farmers and workers. The reduction in poisoning reports shows its success.

SPAIN
Project or Activity: Research and Extension (farmer education and training)
Risk Reduction Category: Reducing Pesticide Use, Promoting IPM

What are the key elements of the project/activity?	Activities related to reducing pesticide use are carried out by farmer associations called ATRIAs (Farmers' Associations for Integrated Treatments in Agriculture), with technical and financial assistance from the government. The objective of the ATRIAs is to promote IPM as an alternative to traditional farming systems, aiming particularly at (1) rationalizing pesticide use/eliminating unnecessary treatments, and (2) promoting biological and other non-polluting crop management methods. The programme also includes an incentive plan to acquire and promote the use of innovative "soft" products (such as pheromones and biological insecticides) and application machinery. The plan includes a total subsidy by ATRIA of pesetas 150,000 and a subsidy for spraying equipment (selected and recommended models by the Ministry of Agriculture) of pesetas 200,000. There are currently 300 ATRIAs around the country, covering the most important crops grown in Spain and the crops where the highest pesticide consumption takes place. The Ministry of Agriculture assists with funding and recruitment of technical staff who work as advisers for specific crops. Technical support and training are also provided by the Plant Protection Authonomic Communities staff.
When did the project/activity begin and what prompted its initiation?	The ATRIAs appeared in 1979. At that time there was a subsidy to farmers as a help for pesticide use in the cotton growing area. As that subsidy was quite small, by hectare, it was decided to convert it to a technical help to the involved farmers to rationalise the use of pesticides. After two years of application, the use of pesticides was reduced among them by 50%. The success achieved in the cotton crop, led to legislation 1983 to expand this system to other crops.

What are its specific goals and/or targets?	• to update and apply IPM control systems and to promote the rational use of products and phyto-sanitary media (pesticides/fertilisers) • to train technical staff in the management and application of such techniques • to recruit new farmers into ATRIAs • to study the life cycle for the different insects or pathogens and pest incidents/outbreaks as a basis for treatment recommendations • to test under local conditions products and cultural systems aiming to reduce the input of phytosanitaries (pesticides/fertilisers)
Who is involved in carrying it out?	farmers belonging to the ATRIAs technical staff experts from the Plant Protection Authonomic Communities
Is there a legal or regulatory mandate?	The ATRIAs are voluntary farmers' associations with a minimum number of farmers and hectares. The ATRIAs establish their own rules and organisation under a general set of minimum official requirements.
Is the activity monitored or enforced? If so, how?	
How are results and progress measured?	The ATRIAs results, i.e. reduction of pesticide use, are assessed yearly by the Autonomous Governments.
What specific progress/results have been achieved?	There has been a clear impact on product use, and an increase in soft product use, has been appreciated in all areas where the ATRIAs are operative. At the end of 1993 there were 343 ATRIAs, covering a surface worth 543,000 ha. This acreage represents 4% of the total Spanish agricultural land, but a larger percentage of the total agricultural production, as the ATRIAs are located in the most intensive crop areas (citrus, top fruit, glasshouses, rice, cotton, vineyards, etc.) where the main use of pesticides takes place. There is a complete yearly study of the results achieved by every ATRIA. On average we could indicate that pesticide reduction could reach 40% in the case of some ATRIAs. The ATRIAs' unitary acreage ranges from some few hectares up to several thousands.

III. Conclusions

Conclusions could be derived from our comments above. The reasons for success mainly arise from an attitude of the Competent Authorities concerning the training and sponsoring of experts responsible for risk reduction.

The most difficult area to monitor is the control of farmers' use of products in the post-harvest intervals recommend to reduce residues of products on edible crops. The control of residues is handled in a national residue programme giving information on the degree of accomplishment of the authorisations' patterns.

The EC products revision, to start from 1995 onwards, will help achieve further progress in pesticide risk reductions.

SWEDEN

CONTACT PERSON(S):

Crop Protection Policies

Mr. Anders Emmerman
Swedish Board of Agriculture
Division for Crop Protection
S - 551 82 Jonköping
Tel: (46) 8 036 15 50 00
Fax: (46) 8 036 19 05 46

Pesticide Risk Assessments and Regulations

Ms. Vibeke Bernson
National Chemicals Inspectorate
Pesticide Approvals
P.O. Box 1384
S - 171 27 Solna
Tel: (46) 8 730 57 00
Fax: (46) 8 735 76 98

Worker Safety

Mr. Magnus Blomqvist
National Board of Occupational
Safety and Health
S - 171 84 Solna
Tel: (46) 8 730 90 00
Fax: (46) 8 730 19 67

Pesticide Residues in Food

Mr. Arne Andersson
National Food Administration
P.O. Box 622
S - 751 26 Uppsala
Tel: (46) 18 17 55 00
Fax: (46) 18 17 58 48

Pesticide Distribution and Disposal

Krister Ljungström
Environmental Protection Agency
S - 171 85 Solna
Tel: (1) 613 952 5330
Fax: (1) 613 952 6547
Tel: (46) 8 799 10 00
Fax: (46) 8 29 23 82

I. Framework for Pesticide Risk Reduction Activities

1. In 1986 three official agencies in Sweden (the National Chemicals Inspectorate, the National Board of Agriculture and the Swedish Environmental Protection Agency) were charged by a governmental commission to develop a scheme of actions on how to reduce the risks to health and the environment resulting from the agricultural use of pesticides. A co-ordinated programme at the national level has resulted.

The National Food Administration and the National Board of Occupational Safety and Health have also laid down relevant activities in joint reduction programmes.

In addition to these general actions at the national level, there has in recent years been an increase in pesticide activities at the local level. Many municipal authorities have, for example, banned their own use of pesticides (herbicides) in public areas.

2. The possible risks to human health and the environment from the use of pesticides are issues of public concern. The use of phenoxy acids in forests and treatment of railway embankments are examples of uses which occasionally have resulted in massive public reactions, national and locally, in Sweden. It is likely that these and other public reactions have given rise to several governmental committees and programmes during the 1980s, as well as the new legislation on pesticides in 1985. The reaction against forestry use of phenoxy acids did as a consequence lead to a total ban of the use of pesticides to control brushwood in forests.

3. The regulatory mandate for the forthcoming pesticide risk reduction activities in Sweden is expressed in the food production policy (prop. 1989/90:146, JoU25, rskr. 327) accepted by the Swedish Parliament in 1990.

SWEDEN
Project or Activity: National risk reduction programme on pesticides
Risk Reduction Category: Reducing pesticide use, risk

What are the key elements of the project/activity?	Sweden's national pesticide risk reduction programme began in 1986 and included: 1. changeover to pesticides with less risks 2. regulation of the handling of pesticides, training and information on safer handling 3. reduced use of pesticides
When did the project/activity begin and what prompted its initiation?	The main reason for initiating the programme (in 1986) was the great political and public concern about risks to human health and the environment posed by pesticide use.
What are its specific goals and/or targets?	The initial goal, for the 5-year period 1986-90, was to reduce by half the quantity of active ingredients used. A new goal set in 1990 was to achieve a further 50 % reduction by 1996, for a total reduction of 75 % compared with the average use during 1981-85. The overall aim of the programme was to reduce the risks to human health and the environment resulting from pesticide use in the agriculture
Who is involved in carrying it out?	The National Chemicals Inspectorate (KemI), The Swedish Board of Agriculture (SJV), and The Swedish Environmental Protection Agency (SNV) are responsible for the risk reduction programme. The County Boards are very important in carrying out the programme at the regional level. The National Food Administration and the National Board of Occupational Safety and Health are also involved. There is also a close cooperation with the Swedish University of Agricultural Sciences and the Federation of Swedish Farmers.
Is there a legal or regulatory mandate?	The regulatory mandate for the pesticide risk reduction activities is expressed in the food production policy (prop. 1989/90: 146, JoU25, rskr.327) accepted by the Swedish Parliament in 1990.

Is the activity monitored or enforced? If so, how?	Many of the activities related to the risk reduction programme are monitored.
How are results and progress measured?	In a yearly official report to the government from the responsible authorities (KemI, SJV and SNV). The report contains annual pesticide sales and use estimates, number of approved products, affected activities, etc., including analyses. There are also more detailed reports about different parts of the project (e.g. annual pesticide sales based on manufacturer surveys, use estimate based on farmer surveys, IPM and the five regional plant protection centres, research results, etc.)
What specific progress/results have been achieved?	A reduction of 50% was achieved by 1990, and of 65% by 1992, compared to the average use in 1985-85.

SWEDEN
Project or Activity: Elimination of hazardous pesticides
Risk Reduction Category: Reducing pesticide use, risk

What are the key elements of the project/activity?	Activities include: • mandatory re-registration of pesticides every 5 years • rejection or phase-out of pesticides failing Sweden's cut-off criteria (identified in "Principles for Identifying Unacceptable Pesticides"). Phase-out can include restrictions on use, lower doses, monitoring, changes to spray equipment and techniques, etc.
When did the project/activity begin and what prompted its initiation?	Mandatory 5-year re-registration began in 1986
What are its specific goals and/or targets?	
Who is involved in carrying it out?	National Chemicals Inspectorate (KEMI) Swedish Board of Agriculture (SJV) Swedish University of Agricultural Sciences County Boards Grower and industry (e.g. plant and wood protection) associations
Is there a legal or regulatory mandate?	Food production policy (prop. 1989/90: 146, JoU25, rskr.327) accepted by the Swedish Parliament in 1990
Is the activity monitored or enforced? If so, how?	Yes, monitoring is done to ensure compliance with use restrictions (e.g. for phase-out of EBDCs)
How are results and progress measured?	Progress and results of a phase-out plan are evaluated by a working group consisting of representatives of the involved organizations. One useful tool is the annual sold quantities of pesticides that are reported to KEMI.
What specific progress/results have been achieved?	From 1986-90, 250 old products, or about 80 active ingredients, were not re-registered because of health or environmental risks or lack of documentation. Some products were withdrawn by the manufacturer. Restrictions were imposed on many of the products that received prolonged approval. Phase-out plans or similar actions were carried out for: the EBDCs (maneb and mancozeb), captan, folpet, benomyl, permethrin, methyl bromide, pendimethalin, linuron. (Quantity of EBDCs sold/used has decreased approximately 35%.)

SWEDEN
Project or Activity: Farmer training programme
Risk Reduction Category: Increasing safety in pesticide handling

What are the key elements of the project/activity?	A programme of training started in 1988 for all farmers and farm workers who spray pesticides. • a 3-day training course is required for those using class 2 pesticides • an additional day is necessary for those using class 1 pesticides • (class 3 pesticides are available for amateur use). At the end, the farmers must pass a test to get a certificate which is valid for 5 years. An additional 1-day course is required for its renewal. Since 1990, all farmers and farm workers who carry out pesticide spraying professionally need the certificate.
When did the project/activity begin and what prompted its initiation?	1988 (but before 1988, mandatory training courses were necessary for all farmers using class 1 pesticides)
What are its specific goals and/or targets?	To increase awareness of the risks associated with pesticides and therefore promote safer handling and minimisation of health and environmental problems (e.g. knowledge of the optimal use of pesticides)
Who is involved in carrying it out?	The Swedish Board of Agriculture (SJV) and the County Boards
Is there a legal or regulatory mandate?	Legal mandate
Is the activity monitored or enforced? If so, how?	All farmers who spray pesticides professionally need a "knowledge" certificate to use class 2 pesticides and a license to use class 1 pesticides.
How are results and progress measured?	A test is given at the end of the training courses.
What specific progress/results have been achieved?	This is one of the most successful activities for risk reduction: almost all professional users of spraying equipment in agriculture have completed the 3 days of courses. There are today roughly 30,000 people with a certificate to use class 2 pesticides (most of them have also a license for class 1 pesticide). They are better informed of the risks in connection with pesticide use; they hopefully know better how to minimise health and environmental problems.

SWEDEN
Project or Activity: Use restrictions
Risk Reduction Category: Protection of sensitive areas, species

What are the key elements of the project/activity?	Use restrictions aimed at reducing risks include prohibitions on: • aerial spraying • the use of pesticides to control brushwood in forests • use of pesticides classified as toxic to fish and other aquatic organisms near lakes, wells, and watercourses • use of pesticides classified as toxic to honey bees and other pollinating insects on flowering plants • filling and cleaning of sprayers near lakes and streams.
When did the project/activity begin and what prompted its initiation?	
What are its specific goals and/or targets?	To reduce the environmental risks
Who is involved in carrying it out?	National Environmental Protection Board Swedish Board of Agriculture (SJV) County Boards
Is there a legal or regulatory mandate?	Yes
Is the activity monitored or enforced? If so, how?	
How are results and progress measured?	
What specific progress/results have been achieved?	

SWEDEN
Project or Activity: Programme to test sprayers
Risk Reduction Category: Increasing safety in pesticide handling

What are the key elements of the project/activity?	A special programme for the voluntary testing of sprayers has been in operation since 1988. Grants are given to farmers (about $175 per test) or companies (50% of approved cost, maximum about $9,000 per test equipment) for the costs of purchasing and rebuilding test equipment.
When did the project/activity begin and what prompted its initiation?	1988
What are its specific goals and/or targets?	The initial goal was to get about a quarter of existing spray equipment tested each year (i.e. about 5,000 a year). Now the budget allows testing of about 1500 a year.
Who is involved in carrying it out?	Swedish Board of Agriculture (SJV) County Boards
Is there a legal or regulatory mandate?	
Is the activity monitored or enforced? If so, how?	The programme is based on voluntary testing of sprayers
How are results and progress measured?	Numbers of tests
What specific progress/results have been achieved?	Between 1988 and 1992, 7,400 sprayers have been tested. This represents about 30% of the total number in agriculture or about 50% of the treated area. During 1993 and 1994, about 1400 tests were carried out each year. About 170 test examiners have been educated

SWEDEN
Project or Activity: Information and advice to extension officers, etc. and farmers
Risk Reduction Category: Promotion of IPM

What are the key elements of the project/activity?	Five regional plant protection centres have been established to promote integrated crop protection. They work on pest forecasting and warning services, strategies to combat pests and weeds, reports, development and some trials. An advanced information system has been established to handle the very large amount of data generated. The main group includes state, private and commercial field crop extension officers. There is close collaboration with staff at the University of Agricultural Sciences.
When did the project/activity begin and what prompted its initiation?	1986
What are its specific goals and/or targets?	To promote integrated crop protection with chemical control adjusted to their needs.
Who is involved in carrying it out?	Swedish Board of Agriculture Close collaboration with the University of Agricultural Sciences
Is there a legal or regulatory mandate?	
Is the activity monitored or enforced? If so, how?	
How are results and progress measured?	Comparison between the information and advice from the plant protection centres and the economically optimal use (shown in trials) and the real use of pesticides. Testing the work on the main group.
What specific progress/results have been achieved?	With relatively small resources, it is possible to get out information and advice to the main group and the farmers in a very effective and quick way. The work has had a big impact on the reduction of dose rates, especially of herbicides, and getting the chemical control of pests adjusted to the need.

SWEDEN
Project or Activity: Advice to farmers
Risk Reduction Category: Promotion of IPM

What are the key elements of the project/activity?	The Swedish Board of Agriculture has initiated activities to inform farmers of possibilities for reducing dose rates, new techniques, suitable handling of pesticides and flora and fauna. Especially the activities concerning reduced dose rates are and have been very important. These activities include demonstration trials, field courses, etc.; their goal is to convey information from research showing that it is possible, with a better economic result, to use low rates of herbicides applied annually (because of reduced stress on crops and for other reasons).
When did the project/activity begin and what prompted its initiation?	1988
What are its specific goals and/or targets?	To inform and give farmers advice on a more optimal and safer use of pesticides. To get farmers to accept and use it.
Who is involved in carrying it out?	Swedish Board of Agriculture County Boards Close collaboration with the University of Agricultural Sciences
Is there a legal or regulatory mandate?	
Is the activity monitored or enforced? If so, how?	
How are results and progress measured?	It is possible to follow the reduction of dose rates through pesticide use estimates based on farmer surveys.
What specific progress/results have been achieved?	It has been very effective to get out information quickly. Especially the use of lots of simple demonstration trials, combined with field courses, has been successful. Farmers have been very receptive to information, for example advice on reducing herbicide rates, because they find it is economically beneficial.

SWEDEN
Project or Activity: Research and development
Risk Reduction Category: Promoting IPM

What are the key elements of the project/activity?	Weed, pest and technical research and development are essential parts of the pesticide programme. Some of the activities in the programme are based on new findings, and others require new knowledge or new techniques. Research on ways to reduce herbicide use has constituted an important part. This work has been directed in equal parts at lower dose rates and alternative methods. Regarding pests, there is research and development concerning forecasting and warning systems, dose rates and intensity in use of pesticides, and alternative methods. Technique development is important in getting more effective use (reduced dose rates, etc.) and gives the basis for the activity with voluntary tests of sprayers and the possibilities to get a decreased transport by wind. Research has also looked at use of unsprayed edgezones and their effect on flora, fauna and poisoning of bees. Methods to analyse pesticides in the environment (e.g. water) and food is another important subject.
When did the project/activity begin and what prompted its initiation?	1987
What are its specific goals and/or targets?	To get new knowledge which will lead to a better and safer use of pesticides and to confirm some theories.
Who is involved in carrying it out?	Swedish Board of Agriculture County Boards Swedish University of Agriculture The main part of the research and development work is done by the University of Agriculture.
Is there a legal or regulatory mandate?	

Is the activity monitored or enforced? If so, how?	
How are results and progress measured?	All projects are shown and analysed in a yearly report.
What specific progress/results have been achieved?	Research results showing ways to reduce herbicide use while maintaining or increasing economic benefit have formed the basis of Sweden's pesticide reduction programme. Important knowledge on how to reduce wind transport of pesticides has been learnt. It has also been important to implement new forecasting systems. Development of several laboratory methods to analyse pesticides in water, etc. are valuable, for example in different monitoring programmes

SWEDEN
Project or Activity: Tax on pesticides
Risk Reduction Category: Promoting IPM

What are the key elements of the project/activity?	It is an environmental levy of 20 SKr per kg active ingredient on pesticides. There are discussions to replace this with a new levy based on a dosage rate per hectare (50 SKr per hectare and dose). A price regulation levy also existed before.
When did the project/activity begin and what prompted its initiation?	<u>Environmental levy:</u> 1984: 4 SKr per kg a.i. 1988: 8 " " 1994: 20 " " <u>Price regulation levy:</u> 1986: 29 SKr per ha. and dose 1990: 38 " 1991: 46 " 1992 (July) 29 " 1992 (Dec.) 0 "
What are its specific goals and/or targets?	To reduce the use of pesticides
Who is involved in carrying it out?	The taxation authorities
Is there a legal or regulatory mandate?	
Is the activity monitored or enforced? If so, how?	
How are results and progress measured?	
What specific progress/results have been achieved?	In an official report, the environmental levy (8 SKr per kg a.i.) and the earlier price regulation (46 SKr per ha. and dose) together account for about 10% of the reduction of pesticides.

SWEDEN

Project or Activity: Financial support for farmers making the transition to alternative methods

Risk Reduction Category: Promoting IPM

Note: This project and a lot of other activities concerning ecological methods (information, research and development) do not belong to the pesticide programme. This area of work is of course very important because it gives possibilities to reduce pesticide use.

What are the key elements of the project/activity?	Financial support is given to farmers who have made a transition from conventional to ecological farming. A subsidy of 700-2,000 SKr (depending on the cultivation region) is paid per hectare/year during a period of 3 years.
When did the project/activity begin and what prompted its initiation?	1989
What are its specific goals and/or targets?	To increase the acreage of ecological farming.
Who is involved in carrying it out?	Swedish Board of Agriculture County Boards
Is there a legal or regulatory mandate?	Regulation SFS 1989:11
Is the activity monitored or enforced? If so, how?	Monitored
How are results and progress measured?	Measurement of the acreage that has been converted into ecological farming.
What specific progress/results have been achieved?	Approximately 1800 farmers have received money under this programme. Acreage under ecological farming: 1988: 12,000 hectares 1989: 29,000 hectares 1993: 46,000 hectares

III. Conclusions

1. Some of the most successful activities are the reduced use of pesticides and the mandatory training programme. The success of reduced use is to a great extent due to increased use of lower dose rates and sulfonylureas in herbicides for cereals. This reflects the interest and co-operative ambition amongst farmers, as well as successful product development.

The mandatory training courses have been successful in the sense that almost every professional user of spraying equipment in agriculture has completed the 3-day course. The courses have implied an opportunity for farmers to come together and more deeply discuss environmental and health aspects of pesticide use. This has hopefully led to an increased consciousness of the risks of pesticides and will thereby result in safer handling and minimize health and environmental problems.

2. About half the products registered in 1986 were withdrawn during the subsequent six years. For many of those products the manufacturer chose not to apply for prolonged approval. Some of the withdrawals by the NCI were appealed by the manufacturer. A small portion of these products received prolonged approval in spite of having serious properties. The reasons for the latter decisions were a great plant protection need for these products, and the fact that no alternatives were available at that time. These problems were pronounced in the minor crop uses. The decisions did, as a consequence, often raise questions of political concern such as employment problems, possibilities to grow certain crops in Sweden, etc.

3. Quantification of risks is often problematic, due to great uncertainties and difficulties to calculate probabilities. These problems also appear when relevant results from different pesticide risk reduction activities are to be measured. It may be convincing that a certain activity has had considerable effect on risk reduction, but to quantify how much is often very difficult.

4. One of the main reasons for the realisation of the risk reduction programme in Sweden is probably that the commission was given to both agricultural and environmental authorities as a shared task. This co-operation has turned out to work very smoothly.

The Federation of Swedish Farmers has participated in the first reduction programme and stated that, in line with the latest Parliament decision, it wants another 50% cut-off. It has also adopted a programme with the slogan “on the way to the cleanest farming in the world”, in which the reduced use of pesticides plays an important role.

5. International joint actions against certain selected pesticides. There is a group of relatively old pesticides (such as the *dirty dozen*) that present unacceptable risks to both human health and the environment. The continuous use of these products is more a result of habit than of actual need. It would be very useful if national efforts could be part of common actions against these products at an international level.

SWITZERLAND

CONTACT PERSON(S):

Dr. A. Riggenbach

Dr. H.P. Bosshardt

Dr. H. Barben

c/o Swiss Federal Research Station for Fruit Growing,
Viticulture, and Horticulture
Section for Pesticide Chemistry
P.O. Box
CH - 8820 Wädenswil

Tel: (41) 1 783 61 11
Fax: (41) 1 780 63 41

I. Framework for Pesticide Risk Reduction Activities

1. In Switzerland the task of pesticide risk reduciton is approached/achieved within the frame, and by provisions of, the existing relevant legislation. Switzerland does not have one single, specific legal act to regulate pesticides. This subject matter, in particular the storage, transport, commercialisation and usage of pesticides, is dealt with, together with other chemical substances/products, within the frame of several types of legislations, the most important being the following:

- agricultural legislation }
- toxic substances legislation }laws and
- food legislation }depending executive
- environmental protection legislation }orders
- water protection legislation }

This legislation requests pesticidal products for use in agriculture and in related segments, such as in forestry and in ornamentals, to be as follows:

- suitable for the envisaged purpose(s), e.g. sufficiently effective, but without significant side-effects to crops and the environment — *agricultural and environmental protection legislation*
- safe for the user, i.e. without constituting health risks — *toxic substances legislation*
- safe for the consumer, i.e. without endangering the health of the consumer through toxicologically hazardous residues in food, drinking water included — *food legislation*
- safe for the environment, i.e. without constituting ecological/ecotoxicological risks to the environmental compartments, water, soil and air — *agricultural, environmental protection and water protection legislations*

Appraisal and approval of pesticides in accordance with the exigencies of the above-mentioned legislation invariably entail a balancing of interests, i.e. an appropriate benefit-risk evaluation by comparing the apparent/expected agronomic advantages with the inherent health and ecological disadvantages/risks.

Switzerland therefore and presently does not need a specific pesticide risk reduction programme. Pesticide risk reduction is already accomplished, in a continuous process, by various steps/measures as provided for within the context of the existing legislation, laws and executive orders.

2. Democratic public opinion and legal exigencies.

The public is much concerned about the various risks encountered in daily life, and also about the risks inherent in the manufacture, storage, transport and usage of chemicals in general and pesticides in particular. This public opinion, appropriately voiced through a broad range of political and institutional quaters and through the media, is reflected in political and legislative activities, but also in public votes on relevant issues-as described under point 1.1.

Violating the quality requirements in food, i.e. in agricultural produce and water, will lead to investigations into the cause(s) and eventually to appropriate corrective measures - see point II.3.

3. Yes. The existing legislation - as detailed under point I.1. effectively provides for appropriate and adequate pesticide risk reduction activities/measures.

II. Description of activities and results

SWITZERLAND Table 1

Project or Activity: Assuring the Availability of Pesticides without Detrimental Side-Effects on: Humans, Animals and the Environment

Risk Reduction Category: Minimisation of Risks due to the Exposure to Pesticides

What are the key elements of the project/activity?	Ensuring, by an appropriate legal registration procedure, the disposability to the trade and the user of - agricultural pesticides - non-agricultural pesticides, with appropriate efficacy but without detrimental side-effects on - humans - animals - the environment
When did the project/activity begin and what prompted its initiation?	• since 1955, for pesticides for agricultural uses, with the introduction of the relevant pesticide registration legislation, Consensus between social, political and economic parties to control the trade and use of agricultural pesticides • since 1986, also for pesticides for non-agricultural uses, with the introduction of the environmental protection legislation, notably the relevant executing order, Consensus between social, political and economic parties to control the trade and use of non-agricultural pesticides.
What are its specific goals and/or targets?	Minimisation of risks due to the exposure to agricultural and non-agricultural pesticides, for - humans users, consumers - animals livestock, poultry, fish, domestic animals, pets - the environment in water, soil, air
Who is involved in carrying it out?	Swiss federal agricultural authorities, essentially the *Swiss Federal Research Station for Arboriculture, Viticulture and Horticulture* (*Castle, CH-8820 Waedenswil)* in short, the *FAW* By legal mandate installed as the Swiss federal authority for the registration of pesticides.

Is there a legal or regulatory mandate?	Legal mandate: Swiss Federal Agricultural Legislation Compulsory This legal mandate is vested in the *Swiss Federal Research Station for Arboriculture, Viticulture and Horticulture* - for agricultural pesticides by virtue of the *"Ordonnance sur la mise dans le commerce des produits de traitement des plantes et de protection des récoltes"* *(Ordonnance sur les produits de traitement des plantes)* *26 January 1994 (superseding the executing order of 4 February 1955)* - for non-agricultural pesticides by virtue of the *"Ordonnance sur les substances dangereuses pour l'environnement" (Ordonnance sur les substances, Osubst), 9 June 1986*
Is the activity monitored or enforced? If so, how?	Legally enforced by reviewing the pesticide authorisations for risks due to detrimental side-effects
How are results and progress measured?	By supervision of the pesticide trade activities
What specific progress/results have been achieved?	Avoidance of the registration of agricultural and non-agricultural pesticides with detrimental side-effects, in particular to the environment.

SWITZERLAND Table 2

Project or Activity: Promotion of Ecological Farming Methods, in particular in Cereals

Risk Reduction Category: Reduction of the Use of Auxiliary Materials for Agriculture, such as Fertilisers and Pesticides

What are the key elements of the project/activity?	Promotion of extensive ecological farming systems. Financial recompensation of participating farmers
When did the project/activity begin and what prompted its initiation?	1 January 1992 with the enactment, on 2 December 1991, of the relevant executing order: *"Ordonnance sur l'orientation de la production végétale et de l'exploitation extensive"* Agroeconomic and agroecological considerations. Consensus between social, political, agricultural and economic parties on promoting ecological farming methods.
What are its specific goals and/or targets?	Making agricultural production, particularly production of cereals more ecological. In cereals, this scheme prohibits the application of growth regulators, fungicides and insecticides.
Who is involved in carrying it out?	Swiss federal and cantonal authorities such as: - the Swiss Federal Office for Agriculture - the Cantonal Offices for Agriculture with attached Extension Services
Is there a legal or regulatory mandate?	Legal position: Swiss Federal Agricultural Legislation Voluntary Participation Participating farmers are obliged to comply with the requirements of the scheme in order to qualify for financial recompensation.
Is the activity monitored or enforced? If so, how?	Monitored by legal delegation, by - cantonal agricultural offices with attached extension services - municipal authorities by supervising the compliance of participating farmers with the requirements of the scheme.

How are results and progress measured?	Financially, by budgetary control of the recompensation paid Statistically, by recording: - the number of farmers participating - the acreage covered by the scheme
What specific progress/results have been achieved?	In 1994 about - 56% of the fodder cereal acreage - 28% of the bread cereal acreage were cultivated in conformity with the requirements of this ecological farming scheme. This scheme will be merged in 1996 with the new, broader scheme for the promotion of ecological farming methods as covered by the executive order for ecological recompensation of 26 April 1993. In addition ecological farming methods have in the last three years, within the frame of a pilot ecological farming project, been carefully evaluated in various respects in comparison to conventional methods. The information and knowledge gained in the course of these investigations are promising.

SWITZERLAND Table 3

Project or Activity: Promotion of Ecological Farming Methods in General

Risk Reduction Category: Reduction of the Use of Auxiliary Materials for Agriculture, such as Fertilisers and Pesticides

What are the key elements of the project/activity?	Financial recompensation of farmers for using ecological farming/crop production methods
When did the project/activity begin and what prompted its initiation?	1 January 1993 with the retrospective enactment, on 26 April 1993, of the relevant executing order: *"Ordonnance instituant des contributions pour des prestations écologiques particulières dans l'agriculture" (Ordonnance sur les contributions écologiques, OCEco)* *Modifications*: *26 Jan. 1994*, *15 Feb. 1995* Reorientation of the Swiss agricultural policy, as agreed upon by various interested social, political, agricultural and economic parties, taking into account the growing public request for agricultural produce derived from ecological farming methods
What are its specific goals and/or targets?	• Promoting ecological crop and animal production methods • Increasing the supply of agricultural crop and animal produce derived through such production methods
Who is involved in carrying it out?	• Swiss Federal and cantonal authorities such as cantonal offices for agriculture with attached extension services • Crop-related farmer organisations such as *- Fruit-Union Suisse, FUS (Groupe de travail pour la production intégrée, GTPI)* *- Union Suisse du Légume, USL* *- Commission de la pomme de terre, CSP* *- Vinatura* The rules and regulations of the integrated crop management systems propagated by these specialised farmer organisations have to be approved and validated by the *Swiss Federal Office of Agriculture, OFAG*
Is there a legal or regulatory mandate?	Legal position**:** Swiss Federal Agricultural Legislation Voluntary participation Participating farmers are obliged to strictly comply with the stipulated rules, in order to qualify for financial recompensation.

Is the activity monitored or enforced? If so, how?	Monitored by legal delegation by - cantonal offices for agriculture with attached extension services - municipal authorities - relevant crop-related farmers association
How are results and progress measured?	Financially/statistically by budgetary control of the financial engagement. Statistically by recording: - the number of farmers participating - the acreage covered by the scheme
What specific progress/results have been achieved?	

SWITZERLAND Table 4

Project or Activity: Information Campaigns and Training Courses in Handling Noxious Materials

Risk Reduction Category: Improving the Safety Standards in Handling Noxious Materials

What are the key elements of the project/activity?	• Exchange of pertinent information - to improve the awareness of broad quarters of the public in respect of the inherent hazards of all sorts of noxious materials, substances and products alike, pesticides included • Appropriate training - to contribute toward a safer handling of such substances/products
When did the project/activity begin and what prompted its initiation?	Already in the late 1960's, with the drafting/enactment of the Swiss federal poison legislation, in particular the *"Ordonnance sur les toxiques"*, *23 Dec. 1971 (meanwhile superseded by the new order of 19th September 1983)* Public opinion Consensus between social, political, economic and industrial parties to significantly improve the safety standards in handling noxious materials by enacting appropriate legal rules and regulations.
What are its specific goals and/or targets?	To improve the safety standards of all concerned and at all trade levels, i.e. in manufacturing, transporting, storing/retailing and using/disposing of noxious materials. The specific goals of the Swiss poison legislation, in particular the "Ordonnance sur les toxiques", an executing order to the *Swiss Federal Law on Trade in Toxic Substances (Toxicity Law)* are the: - prevention/elimination of possible risks of noxious materials for humans and animals - promotion of exchange of information and training in respect of the handling/commercialisation of poisonous materials, with the aim of preventing intoxications or to redressing the effects of intoxications - improvement of the knowledge of manufacturers, traders, retailers and users regarding the hazards and risks of noxious materials, thus contributing towards the replacement of such materials by safer ones.

Who is involved in carrying it out?	Swiss federal and cantonal authorities, notably the: - Swiss Federal Office for Public Health - Division of Toxic Substances - Cantonal poison control authorities
Is there a legal or regulatory mandate?	Legal position: Swiss Federal Poison Legislation Compulsory, by the already above-mentioned Swiss federal executing order: *"Ordonnance sur les toxiques"* (*19 Sept. 1983*), in particular para 18 - 35. (The stipulated rules and requirements are explained and commented in *"Commentaire de l'ordonnance sur les toxiques"*).
Is the activity monitored or enforced? If so, how?	Monitored and legally enforced • Monitoring Intoxications are monitored by the *Swiss Toxicological Information Centre, STIC.* The medical profession is requested to report all cases of intoxication treated/brought to their notice. • Legal enforcement By supervision by the responsible governmental authorities, i.e. the Swiss Federal Office for Public Health Division of Toxic Substances or the Cantonal poison control authorities
How are results and progress measured?	Monitored by: • recording and evaluating of the intoxication cases The notified cases of intoxications, as well as the number of advices given are recorded, statistically evaluated and annually published by the *Swiss Toxicological Information Centre, STIC* • official supervision of all relevant activities at all commercial levels, and in cases of infringement of the rules and regulations, followed up by appropriate interventions/corrective measures
What specific progress/results have been achieved?	Significant reductions of the number of severe and fatal cases of intoxications. Within the last decade: no fatal cases with pesticides.

SWITZERLAND Table 5

Project or Activity: Monitoring of Pesticide Residues in Food and Drinking Water

Risk Reduction Category: Reduction of Pesticide Residues

What are the key elements of the project/activity?	Monitoring of pesticide residues in food commodities, drinking water included
When did the project/activity begin and what prompted its initiation?	Already since over three decades Public opinion Consensus between social, political and economic parties to improve the legal base for safeguarding/improving the health standard of food commodities, drinking water included.
What are its specific goals and/or targets?	Prevention in food commodities, drinking water included, of residues of substances, pesticides included, at levels which may pose health risks or which are considered to be of no technological necessity.
Who is involved in carrying it out?	Cantonal authorities The responsibility to enforce the food legislation is legally entrusted to the Swiss federal states, the cantons, in particular to the cantonal food control laboratories. These cantonal food control authorities are obliged to monitor the quality of the food commodities offered for sale. This task includes the monitoring of pesticide residues. The Swiss pesticide industry may, upon mutual agreement, cooperate in large scale monitoring programmes. The monitoring of pesticide residues in ground/drinking water in 1987/1988 is an example.
Is there a legal or regulatory mandate?	Legal position: Swiss Federal Food Legislation Compulsory, by mandate of the Swiss food legislation, in particular the *"Ordonnance sur les substances étrangères et les composants dans les denrées alimentaires" (Ordonnance sur les substances étrangères et les composants, OSEC), 27 Feb. 1986 (superseding the former order of 19 May 1969).*

Is the activity monitored or enforced? If so, how?	Legally enforced by the cantonal food control authorities In cases of infringement of the legal tolerance and/or limit levels these cantonal authorities are obliged to intervene and arrange for appropriate corrective measures. Such measures may imply confiscation and safe disposal of contaminated food consignments or, in case of drinking water, the disconnection of contaminated wells from the water supply network.
How are results and progress measured?	Monitored The cantonal food control authorities annually report their activities, the results of the pesticide residue monitoring programme included.
What specific progress/results have been achieved?	Food commodities on sale are of high quality, rarely containing pesticide residues above the legal tolerance levels. Residue concentrations which would actuate an official intervention are the exception. Within the years 1986-1988, the pesticide residue situation in drinking water caused some concern as in some areas the ground water/drinking water wells contained triazine residues at quantities infringing the tolerance level of 0.1 ppb and thus the legal quality requirements. Meanwhile this situation is under control and slowly but steadily improving, due to the of the following measures: - introduction, in 1986, of new legislation, i.e. of the *"Ordonnance sur les substances dangereuses pour l'environnement" (Ordonnance sur les substances, Osubst), 9 juin 1986*, allowing for the control of non-agricultural uses of pesticides. The application of triazines on railroads was found to be the worst source of water contamination. - restriction of the agricultural uses of triazines to application of a maximum of 1 kg/ha/year expressed in quantity of active ingredient - and in <u>corn only.</u> Other agricultural applications are no longer allowed. The mandate for the definition of the water protection zones is given by the Swiss federal water protection law *"Loi fédérale sur la protection des eaux" (LEaux), 24 Jan. 1991 (superseding the earlier law of 8 October 1971)* and related executing orders.

SWITZERLAND Table 6

Project or Activity: Information Campaigns and Training Courses Notably for Farmers

Risk Reduction Category: Improving the Safety Standard in Handling Pesticides at Farm/User Level

What are the key elements of the project/activity?	Improvement of the environmental safety standards, in the handling and applying of pesticides at farm/user level, in agriculture, horticulture, forestry, non-cropping and public areas, in particular in respect of: - transporting, storing, using and disposing of such products - appropriate handling/maintenance of the application equipment.
When did the project/activity begin and what prompted its initiation?	Early 90's In connection with the drafting of the Swiss federal environmental protection legislation, in particular the *"Ordonnance sur les substances dangereuses pour l'environnement" (Ordonnance sur les substances, Osubst), 9 June 1986.* Consensus between social, political and economical parties to strengthen the legislative base for an extended protection of the environment. Actually with the enactment of the below-mentioned relevant Swiss federal executing orders.
What are its specific goals and/or targets?	Improvement of: - the knowledge of pesticide users, in agriculture, horticulture, forestry non-cropping and public areas, regarding the hazards inherent to pesticides - the self-responsibility of pesticide users in handling pesticides, i.e. in selecting, transporting, storing, using and disposing. Reduction of: - number of inappropriate applications - number of accidents involving humans, animals and the environment.
Who is involved in carrying it out?	Cantonal authorities The requested educational measures are mandatorily to be enforced by the Swiss federal states, the cantons. These have largely entrusted their agricultural and forestry colleges with this task.

Is there a legal or regulatory mandate?	Legal position: Swiss Federal Environmental Protection Legislation compulsory, as detailed within the following five Swiss federal executing orders *- "Ordonnance relative au permis pour l'utilisation de produits de traitement des plantes dans l'économie forestière, OPerF", 17 May 1991* *- "Ordonnance relative au permis pour l'utilisation de produits de conservation du bois, OPerC", 17 May 1991* *- "Ordonnance relative au permis pour l'utilisation des produits de traitement des plantes en agriculture, OPerA", 16 April 1993* *- "Ordonnance relative au permis pour l'utilisation des produits de traitement des plantes en horticulture, OPerH", 16 April 1993* *- "Ordonnance relative au permis pour l'utilisation des produits de traitement des plantes dans des domaines spéciaux, OPerS", 16 April 1993*
Is the activity monitored or enforced? If so, how?	Legally enforced The responsibility for the enforcement rests, by legal delegation, with the cantonal authorities.
How are results and progress measured?	By examinations by the legally designated authorities
What specific progress/results have been achieved?	Increase of the educational standard of the end users, in particular of the farmers in respect of the knowledge of pesticides. First training courses and examinations have just been held.

SWITZERLAND Table 7

Project or Activity: Restricting/Prohibiting the Use of Pesticides in Sensitive Environmental Areas

Risk Reduction Category: Reduction of Pesticide Exposure

What are the key elements of the project/activity?	Restricting the use of pesticides in - forestry (with the exception of use in forest nurseries and in emergency cases) - environmentally protected areas (such as natural reserves and parks, moors, hedges, etc.) - water (i.e. in and around surface waters and wells) - water protection zones (as legally defined and delimitated)
When did the project/activity begin and what prompted its initiation?	In the early 80's, with the drafting/enactment of the Swiss federal environmental protection legislation, in particular of Annex 4.3 of the *"Ordonnance sur les substances dangereuses pour l'environnement" (Ordonnance sur les substances, Osubst), 9 June 1986.* Public opinion Consensus between social, political and economic parties to introduce/improve the legislative base for a more efficient protection of the environment. Actually with the enactment of the below-mentioned relevant Swiss federal laws and executing orders.
What are its specific goals and/or targets?	To limit the exposure of defined environmental areas to pesticides. Such areas are: • forests • natural reserves and parks • surface waters and wells with adjacent areas • water protection zones To restrict the use of herbicides on roofs, in non-cropping and public areas on roads and on railway tracks To protect endangered species of flora and fauna
Who is involved in carrying it out?	Cantonal authorities The enforcing of the stipulated requirements is mandatorily the responsibility of the Swiss federal states and the cantons, i.e. the cantonal offices for agriculture, forestry and/or environmental protection.

Is there a legal or regulatory mandate?	Legal position**:** Swiss Federal Environmental Protection Legislation compulsory, as detailed within the following Swiss federal laws and executing orders: *- "Loi fédérale sur la protection de l'environnement" (Loi sur la protection de l'environnement), LPE, 7 Oct. 1983* *- "Ordonnance sur les substances dangereuses pour l'environnement" (Ordonnance sur les substances, Osubst), 9 June 1986* *- "Loi fédérale sur la protection des eaux", 24 Jan. 1991 (superseding the earlier law of 8 October 1971) which allows for the definition and delimitation of the water protection zones*
Is the activity monitored or enforced? If so, how?	Legal enforcement, by the appropriate cantonal authorities
How are results and progress measured?	Appropriate control measures as e.g.: - supervision of the protected areas - monitoring pesticide residue levels in ground and drinking waters
What specific progress/results have been achieved?	Reduction of the exposure to pesticides of the defined protected environmental areas/water

SWITZERLAND Table 8

Project or Activity: Regulating the Aerial Application of Pesticides

Risk Reduction Category: Reducing/Preventing Undesirable Detrimental Effects by Aerial Applications of Pesticides

What are the key elements of the project/activity?	Regulating the aerial application of pesticides
When did the project/activity begin and what prompted its initiation?	In 1982, with the introduction of a legal base to regulate the aerial application of pesticides Public opinion Consensus between social, political and economic parties to introduce/improve the legislative base for a more effective protection of the environment
What are its specific goals and/or targets?	To ensure: - technically safe aerial application operations - utilization of authorised application equipment - usage of pesticides authorised for aerial application - appropriate public information To prevent: - detrimental effects/damage to humans, animals and the environment, such as e.g. infringements of non-target areas, environmentally protected zones, surface waters and water protection zones
Who is involved in carrying it out?	Swiss federal, cantonal and municipal authorities such as: - Swiss Federal Office for Civil Aviation - Swiss Federal Office for Agriculture - Swiss Federal Office for the Environment, Forests and Landscape - cantonal agricultural and environmental protection authorities - municipal authorities The permits for the aerial application of pesticides are granted upon request by the *Swiss Federal Office for Civil Aviation* in consensus with the other involved Swiss federal offices.

Is there a legal or regulatory mandate?	Legal mandate**:** Several Swiss Federal Legislations Compulsory The legal mandate to regulate the various aspects of the aerial application of pesticides is granted by several Swiss federal laws and executive orders. An overview of this legal base as well as of the requirements to obtain a permit for aerial application of pesticides is provided in *"Autorisation pour l'épandage par aéronef de substances, de produits ou d'objets. Notice explicative sur l'autorisation ordinaire", January 1990.*
Is the activity monitored or enforced? If so, how?	Legally enforced through supervision by the proper Swiss federal, cantonal and municipal authorities
How are results and progress measured?	Monitored by the proper, notably cantonal and municipal, authorities
What specific progress/results have been achieved?	Reduction/prevention of: - agronomically unjustified aerial applications of pesticides - use of unauthorised application equipment and pesticides - infringements of non-target areas Improvement of public information

SWITZERLAND Table 9

Project or Activity: Information Campaigns and Training.
Advisory Leaflets for the Farmer

Risk Reduction Category Improving the Safety Standards in Handling Pesticides

What are the key elements of the project/activity?	Making available appropriate documentation material for information and training in respect of the safe handling of pesticides at farm level
When did the project/activity begin and what prompted its initiation?	In 1992
What are its specific goals and/or targets?	To improve risk awareness and safety standards in handling pesticides at farm level
Who is involved in carrying it out?	• Swiss pesticide industry for voluntarily providing the documentation material • Cantonal Agricultural Offices and Colleges for using and distributing the documentation material
Is there a legal or regulatory mandate?	Legal position**:** Private, Voluntary, Non-commercial Scheme, realised by the *Société Suisse des Industries Chimiques, SSIC (Centre d'informations Agrar, Case postale 328, CH-8035 Zuerich)*, as the trade organisation representing the Swiss pesticide industry. In close collaboration and with the consent of interested official and private parties, in particular the *Office fédéral de l'agriculture, OFAG* *- Office fédéral de l'environnement, des forêts et du paysage, OFEFP* *- Union suisse des paysans, USP* *- Association suisse d'études et techniques agricoles avec les centrales de vulgarisations agricoles de Lausanne, SRVA, et de Lindau, LBL.* *- Service suisse pour la prévention des accidents dans l'agriculture, SPAA* This documentation material, formated as advisory leaflets, is recognised by all involved parties as appropriate for the envisage educational purposes. Presently available are six leaflets - in German and French – in this series of *"Guides pratiques pour l'agriculteur" (Elimination, Entreposage, Protection des eaux, Application et machines, Protection de l'utilisateur, Gestion des sols)*

Is the activity monitored or enforced? If so, how?	Monitored by the *SSIC* - by the number of leaflets distributed to * cantonal agricultural offices * cantonal agricultural colleges * other agricultural organisations * individual farmers - close contacts with all involved parties, in particular the cantonal agricultural offices and colleges
How are results and progress measured?	Monitored Accidents with pesticides at farm level are monitored - by the medical/veterinary profession, in cases of damages to humans and/or animals - by the cantonal agricultural and/or environmental protection authorities, in cases of agricultural misuses and/or environmental pollutions/damages. In cases of agricultural misuse, such as non-authorised applications and environmental pollution and damages, such as contamination of surface and ground waters, the poisoning of fish, the involved farmer is prosecuted.
What specific progress/results have been achieved?	So far these advisory leaflets have met with widespread interest and approval and are extensively used for the envisaged instruction purposes.

III. Conclusions

In Switzerland pesticide risk reduction is an institutional, continuous process.

Definition and simple, overall quantification of the entirety of risks of a specific pesticide prove to be difficult, if not impossible. Contrary to such an overall risk assessment approach, individual risk aspects of pesticides - such as, e.g., phytotoxicity, effects on beneficial organisms, acute toxicity, water contamination, etc. – can be defined, approached and tackled. Furthermore they have to be weighed against their agronomic benefits.

Policies and programmes to reduce agricultural production in general - as, e.g., required by the new GATT/WTO agreement - coupled with appropriate financial incentives, notably support the agricultural/environmental risk reduction endeavours.

Existing individual risk reduction measures as outlined - such as, e.g., efficiency screening, toxicological classification and labelling, residue monitoring in food commodities and in drinking water, promotion of integrated crop production - have proven successful.

TURKEY

CONTACT PERSON(S):

Mr. Hüseyin Aydinoglu
Head of Department
Department of the Official Registration and Certification
Protection and Control General Dir.
Akay Cd no. 3
Bakanlaklar-Ankara

Tel: (90) 312 425 3452
Fax: (90) 312 418 0005

Mr. Hüseyin Bulut
Head of Department
Plant Protection Research
Agricultural Research General Dir.
Istanbul Cd
Yeninialialle
Ankara

Tel: (90) 312 315 7620
Fax: (90) 312 315 3448

I. Framework for Pesticide Risk and Use Reduction Activities

INTRODUCTION

Registration, production, importation, exportation, sale in the country, usage and control of pesticides have been addressed in the Plant Protection and Quarantine Law no. 6968, published in Official Gazette on 24.05.1957, the Pesticides and Equipment Regulation which came into effect by Decree no. 4/11142, published in the Official Gazette on 04.02.1959 and the Regulation for Pesticide Retailers, Label Regulation for Pesticides, Prospectus Directive for Pesticides, Instructions for the Toxicological Classification of Pesticides, Criteria for the Prices of Pesticides, Regulation for the Control of Dealers and Residue Limits of Pesticides and Plant Growth Regulators.

Concerning registration of pesticides, a new "Directive about the Method and the Principles of Registration of Pesticides and Similar Products used in Plant Protection" was published in the Official Gazette on 08.09.1995, no. 22398.

A new regulation “Maximum Limits for Pesticide and Plant Growth Regulator Residues", is still under investigation.

There exist more than 400 pests of economic importance in Turkey's agriculture. Among these, 245 are insects, mites, nematodes, etc., 85 are disease agents (fungi, bacteria and viruses) and 70 are weeds.

Like most other countries faced with a constant pest threat to agricultural production, Turkey has become heavily reliant on pesticides to protect crops. Because of this, the government of Turkey has a firm commitment to reduce pesticide usage (whilst continuing to protect crops and commodities) through the development of alternative control measures embraced in the principle of integrated pest management (IPM).

A number of activities and measures are taken in Turkey to reduce the risks of pesticides such as elimination of hazardous ones, safe handling, better quality, giving more chance to environmentally safe products, etc. That is, there is a tendency of also using other control measures instead of pesticides when the conditions are suitable, particularly by determining thresholds, decreasing the application rates, using biological agents, using resistant varieties, and using cultural practices.

National agricultural policy can be summarized as to increase the crop production in a unit area by using new and modern agricultural methods, meanwhile protecting the environment, to meet the demands of the increasing population as well as export potential. Although studies related to minimizing fallow land and producing late season crops have given successful results, getting necessary measures to reduce pesticide consumption to optimum levels by maintaining alternative control measures, using pesticides at optimum doses and using them at the optimum time directed to the right targets, deserves more attention day by day. To improve studies related to the natural balance, effects of the pesticides on environment and human health, resistance in pests, and development of

better quarantine measures to hinder pest actions between countries or regions within the country always have great priority in planning and developing new strategies.

Pesticide use in Turkey is low, compared with that of the developed countries (0.4 kg/ha). Pesticide consumption averages about 32,000 tons on a product basis (12,000 tons in active ingredients) which is 0.8% of world use. This consumption is less than a sixth to a fifteenth that of Germany, France, Switzerland, the USA, Japan and other developed countries.

As regards 1994, 281 active ingredients (or 1,329 formulated products or PGRs) had been registered in Turkey, but only 27 active ingredients were consumed in amounts over 100 tons. They were 80% of the total. On a currency basis, Turkey's pesticide consumption is about 128 million US dollars yearly, of which 55.1 million US dollars worth is imported (as active ingredients and some formulated products).

Natural balance is still in good condition, except in some regions (for example, the Çukurova Region). Environmental pollution that comes from pesticide use does not seem so threatening. Nevertheless, several measures have been taken to reduce even this amount of pesticide consumption by developing alternative control methods, especially biological and biotechnological methods. On an administrative and legal basis, some other measures related to increasing supports and exclusions will be taken in the near future.

Our main strategies to implement these policies, are as follows:

- Reduction in the dependence on chemical pesticides,
- Reduction in quantitative use of pesticides,
- Reduction in releasing of pesticides to the environment,
- Withdrawal of chemical pesticides with negative effects on the environment.

The goal of all these activities and measures is safe, sustainable and competitive agriculture. In the meantime, organic farming is encouraged. The Regulation on Organic Production of Agricultural Products (dated 18.12.1994, no. 22145) is consistent with European Community Council Regulation no. 2092/91, dated 24.06.1991 and no. 2608/93, dated 23.09.1993.

There are some regulations and an act to monitor the usage of pesticides. There is a committee of government officers for these regulations. And restricted statistics are available on manufacturing, importing and exporting of pesticides (bases, product or active ingredient) by year.

Legal measures

Registration, production, importation, exportation, sale in the country, usage and control of pesticides have been addressed in the Plant Protection and Quarantine Act, dated 24.05.1957, no. 6968. The other legislation is:

- Regulation of Pesticides and Equipment, dated 27.12.1958, no. 4/11142
- Regulation on Registration of Pesticides and Similar Products Used in Plant Protection, dated 08.09.1995, no. 22398
- Regulation for Pesticide Retailers, dated 16.02.1985
- Regulation for Pesticide Application Operators, dated 19.03.1993
- Label Regulation for Pesticides, dated 01.09.1983, no. 18152
- Prospectus Directive for Pesticides, dated 28.09.1983

- Directive for Toxicological Classification of Pesticides, dated 28.09.1983
- Packaging Standards for Pesticides, dated 16.02.1985
- Regulation for the Control of Pesticides, dated 22.06.1995, no. 22321
- Maximum Residue Limits for Pesticide and Plant Growth Regulators in Turkey, dated 03.09.1990, no. 20624.

Under the National Registration Scheme, pesticide manufacturers or firms are responsible for their products' quality. The extension service controls these products at the retailers and their effectiveness through dialog with farmers. It performs a survey on the products for analytical control. During these control or research activities, if, e.g., its quality is poor, the product is rejected for retail sale and its registration may be canceled. The government has also undertaken to address systematically the safety of chemicals already registered.

Integrated Pest Management Activities

The main targets of Integrated Pest Management (IPM) activities are as follows:

- Increasing plant production and maintaining good quality production without pesticide residues,
- Protecting and supporting natural enemies,
- Controlling fields, gardens and vineyards periodically,
- Making farmers specialists on their own fields, gardens and vineyards.

IPM, as a concept, was presented in the 1960's all over the world but gained importance in the 1970's. The first IPM project in Turkey was started in 1970 with cotton and continued with apple, hazelnut, wheat, tobacco, vineyard, citrus and peach in the following years.

At the end of these studies, the situation with pests in apple, hazelnut and citrus orchards and cotton, wheat, tobacco and cabbage fields, as well as densities, distributions, lives of their natural enemies and control measurements, were improved.

Reduced rates of pesticide activities were based on pests, even on one special pest such as Codling moth, Sunn pest, hazelnut weevil. After these studies, the number of sprays, which were about 5-7 against Codling moth, were decreased to 3; also about 10-11 sprays for cotton pests was reduced to 4-5.

Based on the results obtained from IPM research activities on apple orchards, forecasting and warning projects against Codling moth and apple scab were applied in all regions in 1981-1988. In the following years, forecasting and warning projects against grape berry moth, vineyard downy mildew and pistachio leafhopper were carried out as well. Although these projects were carried out under the name of "forecasting and warning", they were in fact the first Practical Integrated Pest Management Projects. In these studies the best examples of the co-ordination between researchers-publishers-farmers were presented.

These studies completed, thousand of millions of Turkish lira in crop losses were prevented and pesticide consumption and spraying expenses decreased. For example, the number of sprays for apple scab and grape berry moth decreased from 7-8 to 1-3. Chemical consumption was decreased at the vineyard downy mildew control.

In 1994, with the assistance and support of the research institutes, control measurements according to the forecasting and warning principles were applied to 6.5 million apple trees around the 108 stations of 38 provinces and 83 counties; 1.1 million vineyard areas around 48 stations of 16 provinces and 37 counties; and 13.6 million pistachio trees in 2 provinces and 8 counties.

Integrated Control Research Projects for undercover vegetable and ornamental plants, potato, corn, cotton, sunflower, apple, cherry, olive, hazelnut and pistachio were prepared for being made effective as from 1989. The research related to diseases, pests and weeds, in projects prepared on the basis of crops and crop groups were taken into consideration together. However, they were carried out separately as sub-projects under the main project.

During all IPM research projects, there were many studies on the establishment, improvement and application of an integrated control model.

An FAO/UNDP project, "Establishment of a National Network for Integrated Pest Management in Turkey", began in 1994 to initiate the establishment of a national IPM network of formal co-operation and collaboration between research, training and extension entities to develop and apply IPM to be implemented by the farmer. It will last a year and six months.

Activities

Current activities fall broadly into four main program areas:

- A national registration scheme regulates the manufacture, supply, distribution and sale of pesticides up to the point of retail sale.
- Control of use programmes aim to ensure that pesticides are used safely and for the purpose for which they are intended and include both regulatory and educational type activities.
- A number of research and development activities run at both national and regional levels, with the general aim of improving the efficiency of pesticide use and reducing our dependence on chemical pesticides for plant protection.
- Residue monitoring activities ensure that agricultural products meet national and international standards with respect to residues and protection of the environment.

In addition, they will be carried out as sub-projects of the Agriculture Research Project supported by the World Bank on Integrated Pest Management and Residue Control subjects during 1995-1998.

Some activities were begun in response to drinking water contamination concern about worker health, international agreements, export market requirements and environmental factors.

The national policy is to increase agricultural production while protecting the environment, and we agree that IPM is the most important tool to achieve this target.

To achieve this, policy is needed for co-operating with government, farmers and pesticide manufacturers, and also for more education of farmers.

II. Description of Activities

TURKEY
Project or Activity: Various
Risk Reduction Category: Pesticide Reduction Activity

What are the key elements of project/activity?	• There is a national programme to reduce pesticide consumption in Turkey. For this aim, a government committee, with no representatives from the pesticide industry, has formed and begun work on measures which should be taken to minimize consumption. • There are some research projects about re-determining thresholds of some insects and pathogens, and pest forecasting in order to lessen the number of pesticide applications. • A sub-project in the Agricultural Research Project supported by the World Bank will be carried out during 1995-1998. With this project, first government officials and then farmers will be educated about IPM. • Natural enemies of important citrus pests are bred in insectariums and released to citrus growing areas every year. • Using the bait-spray technique on olive fruit flies, with the attractive product evolved by the Ankara Plant Protection Institute, is successful. • The establishment of the *Trichogramma* spp. production units for some important harmful insects has begun.
When did the project/activity begin and what prompted its initiation?	• In the 1980's, the majority of the activities began. • Committee activities were begun in 1992 in response to drinking water contamination concern about worker health, international agreements, export market requirements and environmental factors. • Work on reducing consumption of pesticides in EU and other developed countries. • Activities required because of the Turkish application for membership in EU.
What are its specific goals and/or targets?	To protect the environment and human health by reducing pesticide consumption. To decrease consumption based on the number of active ingredients of pesticides in registration.
Who is involved in carrying it out?	Protection and Control General Directorate Agricultural Research General Directorate

Is there a legal or regulatory mandate?	There are some regulations not directly related to reducing pesticide use. These are: • In order to use a good qualified product, for both environmental pollution and economic reasons renewed "Regulation of Control of Pesticides" was published in the Official Gazette on 22 June 1995, 22321. • A regulation on classification in view of toxicology of pesticides, persistence, etc. and the usage of pesticides in Turkey (structure of soil, drinking water, catchment areas, lakes, dams, etc.) is being prepared. • Refund system applications for the farmer using the biological agents (parasites and predators) as 20%.
Is the activity monitored or enforced? If so, how?	The activity is not enforced. These activities have been thought of as a measure by the Ministry of Agriculture and Rural Affairs.
How are results and progress measured?	There is some progress.
What specific progress/results have been achieved?	• Reduced number of sprays, e.g. about 5-7 against Codling moth were decreased to 3, also about 10-11 for cotton pests to 4-5. • We have no pesticides in tea plants, few pesticides in citrus plants, and less pesticide consumption in apple orchards and olive plants.

TURKEY
Project or Activity: Education and Training
Risk Reduction Category: Increasing Safety in Pesticide Use

What are the key elements of the project/activity?	• Training and licensing of retailers and commercial operators, • Education and training extension service personnel each year, a training course is held for government officers; this education is carried to the farmers. In addition, written materials are distributed to them. Pesticide retailers have to take a course on pesticide use and other properties. • Education by World Bank experts on residues, toxicology and IPM to researchers (1995-1998). These activities will cover: diagnosis/taxonomy, pheromones and other biotechnological methods, pesticide and plant growth regulators, residue analysis, pesticide impacts on non-target organisms, pesticide resistance management and pesticide in the environment
When did the project/activity begin and what prompted its initiation?	The above mentioned activities, except the World Bank project education program, were carried out by plant protection research institutes since they were established in 1960's.
What are its specific goals and/or targets?	To ensure that pesticides are used safely and only when necessary according to the technical instructions. To ensure the safe and effective use of pesticides to minimize damage caused by aerial spray drift.
Who is involved in carrying it out?	General Directorate of Protection and Control General Directorate of Agricultural Researches Research institutes and extension service in provinces
Is there a legal or regulatory mandate?	• Plant Protection and Quarantine Act, dated 24.05.1957, and no. 6968 • Regulation of Pesticides and Equipment, dated 27.12.1958, no. 4/11142 • Regulation for Pesticide Retailers, dated 16.02.1985 • Regulation for Pesticide Application Operators, dated 19.03.1993
Is the activity monitored or enforced? If so, how?	Education of retailers is enforced by law; the others are monitored. Aerial applications are controlled by extension service personnel.
How are results and progress measured?	Although specific progress is achieved, this is not considered sufficient by the government. All activities are monitored seriously.
What specific progress/results have been achieved?	Prevented misuse of pesticides on a large scale. Recognition that there is a need for better training of pest control operators and aerial spraying contractors, and especially of farmers. Education has so far been the least successful of Turkey's various pesticide risk reduction activities.

TURKEY
Project or Activity: Various
Risk Reduction Category: Improvements to Regulatory Process

What are the key elements of the project/activity?	Various activities, including: • promoting pesticides that are less harmful to the environment • banning or restricting high risk pesticides • improving pesticide labels • restricting ULV formulations of insecticides and banning herbicides in aerial spraying • promoting IPM (Turkey's policy is that pesticides should be used according to principles of IPM, especially use of biological controls) • increasing education and training programmes for farmers and retailers • better calibration of atomizers (or nozzles) • increasing the number of institutions which control residues
When did the project/activity begin and what prompted its initiation?	Activities were begun in the 1950's in response to drinking water contamination, concern about worker health and environmental protection, international agreements, and export market requirements. But since the 1980's much more attention has been given to these activities. Activities were also required because of the Turkish application for membership in the European Union.
What are its specific goals and/or targets?	To protect the environment and human health
Who is involved in carrying it out?	General Directorate Protection and Control General Directorate Agricultural Researches

Is there a legal or regulatory mandate?	• Plant Protection and Quarantine Act, dated 24.05.1957, no. 6968 • Regulation of Pesticides and Equipment, dated 27.12.1958, no. 4/11142 • Regulation on Registration of Pesticides and Similar Products Used in Plant Protection, dated 08.09.1995, no. 22398 • Regulation for Pesticide Retailers, dated 16.02.1985 • Regulation for Pesticide Application Operators, dated 19.03.1993 • Label Regulation for Pesticides, dated 01.09.1983, no. 18152 • Packaging Standards for Pesticides, dated 16.02.1985 • Regulation for the Control of Pesticides, dated 22.06.1995, no. 22321 • Maximum Residue Limits for Pesticide and Plant Growth Regulators in Turkey, dated 03.09.1990, no. 20624
Is the activity monitored or enforced? If so, how?	The activity is enforced from time to time. Pesticide samples are taken from sellers for analysis for quality control. In addition, original plant samples are taken from greenhouses and fields to detect the residues of pesticides.
How are results and progress measured?	If the residue is high in response to tolerances, use of that product is banned. If the retailer's conditions and the pesticide's physical and chemical properties are not suitable, both retailers and firms are given different punishments.
What specific progress/results have been achieved?	Firms have been producing their products more carefully. Farmers are applying pesticides according to technical instructions.

TURKEY
Project or Activity: Risk Reduction Activity
Risk Reduction Category: Pesticide Reduction Activity/Promoting IPM

What are the key elements of the project/activity?	• Changes in prediction of pest control goals (establishing economic thresholds or other measures of acceptable pest damage) • Research on pesticide efficacy at reduced application rates • Reduced rates of pesticide activities were based on pests, even one special pest such as Codling moth, Sunn pest, hazelnut weevil.
When did the project/activity begin and what prompted its initiation?	Activities were started in the 1970's. Human and environmental health, cost of pesticide use, unconscious pesticide application prompted them.
What are its specific goals and/or targets?	To reduce the number of pesticide applications. To protect human and environmental health and to protect ecological balance, in a more economical way.
Who is involved in carrying it out?	General Directorate of Agricultural Researches General Directorate of Protection and Control
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	The activity is not enforced. It is still under investigation.
How are results and progress measured?	Studies on early warning systems were completed in fruits. A suitable model for condition in Turkey is being created.
What specific progress/results have been achieved?	After reduced rate research activities in the fruit plants, pesticide consumption decreased up to 1/6. Basic studies were completed on apple, citrus, vineyard, hazelnut, grain, potato, lentil, chickpea, cotton and plants grown in greenhouses. Prepared the IPM Technical Instructions for farmers on citrus, apple, hazelnut, cotton, and wheat.

TURKEY
Project or Activity: Pesticide Risk Reduction Activity
Risk Reduction Category: Elimination of Hazardous Pesticides

What are the key elements of the project/activity?	Turkey's registration legislatives empower authorities to impose additional restrictions on existing registered pesticides if new information comes to light which questions their safety. Re-registration system applicable every five years to all products.
When did the project/activity begin and what prompted its initiation?	Since the 1970's, from time to time specific or groups of chemical pesticides have either been withdrawn from use or had restrictions imposed on their use in response to genuine international community concern about their safety.
What are its specific goals and/or targets?	To protect human health and the environment.
Who is involved in carrying it out?	General Directorate of Protection and Control
Is there a legal or regulatory mandate?	• Plant Protection and Quarantine Act, dated 24.05.1957, no. 6968 • Regulation of Pesticides and Equipment, dated 27.12.1958, no. 4/11142 • Regulation on Registration of Pesticides and Similar Products Used in Plant Protection, dated 08.09.1995, no. 22398
Is the activity monitored or enforced? If so, how?	Monitored and enforced by General Directorate of Protection and Control by the legislation.
How are results and progress measured?	Surveys of the extension service
What specific progress/results have been achieved?	To date, more than 20 individual or groups of chemical pesticides have either been banned or had their use restricted. • Examples of banned chemicals by year: dieldrin in 1971; mercury compounds in 1976; DBCP and 2,4,5 T in 1978; aldrin, chlordane, endrin, heptachlor, chlordimeform, ethyl-parathion and leptophos in 1979; arsenic compounds, BHC and DDT in 1982; toxaphene, chlorobenzilate and lindane in 1985; cyhexatin in 1988; dinoseb and daminozide in 1989; zineb in 1992. • Examples of restricted chemicals: aldrin, dieldrin, heptachlor (1968), chlordane (1970), DDT (1972), aldicarb, methyl bromide.

TURKEY
Project or Activity: Pesticide Reduction Activity
Risk Reduction Category: Biological control

What are the key elements of the project/activity?	Turkey has been very active in the field of biological control of pests. Natural balance has to be protected because we need to benefit from it in preventing the pesticide risks.
When did the project/activity begin and what prompted its initiation?	As a concept, was presented in 1950's but gained importance in 1970's. It's prompted by deterioration of the natural balance especially in citrus plants.
What are its specific goals and/or targets?	To replace, wherever possible, chemical methods of pest control with biological ones in order to protect the natural balance.
Who is involved in carrying it out?	General Directorate of Agricultural Research General Directorate of Protection and Control Plant protection institutes and universities
Is there a legal or regulatory mandate?	Refund system for the farmers using the biological agents as 20%
Is the activity monitored or enforced? If so, how?	Monitored by plant protection institutes and extension service personnel
How are results and progress measured?	Extension service survey studies
What specific progress/results have been achieved?	Sustained activity of the biological control agent under normal environmental conditions is the indicator of the success of the activity. We have very little pesticide in citrus plants because of releasing *Cryptolaemus montrouzieri* and *Leptomastix dactylopii.* (Production of them yearly is 3 and 7 million). The other successful example is *Serangium parcesetosum* for *Dialeuroides citri*. Some research projects dealing with the use of biological products, e.g. *Bacillus thuringiensis* products against some important insect species such as fruit pests, potato tuber moth (*Phthorimae operculella* (Zeller)) and Colorado potato beetle (*Leptinotarsa decemlineata* (Say)), were carried out and achieved good results. After other research projects, the establishment of the *Trichogramma* spp. production units began this year for some important harmful insects such as Sunn pest.

TURKEY
Project or Activity: Pesticide Reduction Activity
Risk Reduction Category: Monitoring of pest and disease resistance to pesticides

What are the key elements of the project/activity?	Development of resistance to pesticides in pest strains is a reason for addressing pesticide consumption and risks to human health and environment. For this reason, resistance to pesticides in pest populations must be monitored.
When did the project/activity begin and what prompted its initiation?	In the 1960's. Research activities on monitoring the level of resistance to pesticides in some important pests and then diseases are going on.
What are its specific goals and/or targets?	To implement reduction in pesticide use and to prevent risks of pesticides.
Who is involved in carrying it out?	Plant protection research institutes.
Is there a legal or regulatory mandate?	Plant Protection and Quarantine Act, dated 24.05.1957, no. 6968.
Is the activity monitored or enforced? If so, how?	Monitored by General Directorate of Agricultural Research in collaboration with General Directorate of Protection and Control.
How are results and progress measured?	Investigations on this subject.
What specific progress/results have been achieved?	A number of pesticides were restricted or banned for use against important pests (e.g. white fly, cotton leafworm, hazelnut weevil, etc.) because of the development of resistance. So, useless products were not used and the environment was protected. Such studies are ongoing.

TURKEY
Project or Activity: Pesticide Reduction Activity
Risk Reduction Category: IPM Research

What are the key elements of the project/activity?	Turkey has a number of research activities addressing various aspects of Integrated Pest Management (IPM). The activities deal with the specific components of IPM (biological control, non-chemical means of control, cost effective rates, breeding for host resistance, improved application techniques, etc.)
When did the project/activity begin and what prompted its initiation?	Although many research activities concerning IPM have been going on since years ago, the first IPM project began in 1970 and the concept of IPM really took off in the late 1980's. Also, continuous and often excessive use of broad spectrum chemicals has resulted in problems such as the development of resistance strains of pests, residue problems, and environmental hazards. This led to the recognition that we need to reduce dependence on chemical pesticides by using non-chemical control methods where possible, in association with reduced rates.
What are its specific goals and/or targets?	To reduce dependence on chemical pesticides through the integrated use of all appropriate control mechanisms.
Who is involved in carrying it out?	Plant protection research institutes
Is there a legal or regulatory mandate?	N/A
Is the activity monitored or enforced? If so, how?	Monitored by General Directorate of Agricultural Research in collaboration with General Directorate of Protection and Control
How are results and progress measured?	Progress is measured by the number of successful IPM projects.
What specific progress/results have been achieved?	• Research studies on early warning systems were completed in apples and vineyards, also pistachio trees. A suitable IPM model for Turkish conditions is being created. • Pesticide consumption and spraying expenses were decreased. For example, number of sprays for apple scab and grape berry moth decreased from 7-8 to 1-3. • 16 IPM research projects are ongoing. • An FAO/UNDP project, "Establishment of a National Network for Integrated Pest Management in Turkey", began in 1994 to initiate the establishment of a national IPM network of formal co-operation and collaboration between research, training and extension entities to develop and apply IPM to be implemented by the farmer. It will last a year and six months.

III. Conclusions

1. If the work mentioned above is fulfilled, progress will be achieved.

2. The activity which has been least successful is educational training.

3. We have encountered difficulties in farmers' education.

4. There are no other policies or programmes in our country affecting the outcome of the pesticide risk/use reduction activities.

5. The Agricultural Research Project and Agricultural Extension and Applied Research Project help achieve further progress in this area.

UNITED KINGDOM

CONTACT PERSON(S):

Mr. T.J. DAVIS
Pesticides Safety Directorate
Mallard House, Kings Pool
3 Peasholme Green
GB-York YO1 2PX, North Yorkshire

Ph: (44) 1904 640 500
Fax: (44) 1904 455 733

I. Framework for Pesticide Risk and Use Reduction Activities

UK approach to pesticide risk reduction?

1. The Government has established five key principles to govern its policy on pesticides:

- The amounts of pesticides used should be limited to the minimum necessary for the effective control of pests compatible with the protection of human health and the environment;
- In making decisions on the use of pesticides, the government will take into account efficacy, human health and environmental factors;
- The Government will review all approvals at regular intervals and withdraw them if sufficient new information about harmful effects on man or the environment comes to light;
- Subject to essential commercial confidentially, the information supporting decisions on the use of pesticides should be available for public scrutiny; and
- Procedures for approving the use of pesticides must be fully independent of particular sectoral interest.

2. Central Government is responsible for making the legislation which governs the approval and use of pesticides. However, a wide variety of other organisations - including Government agencies, the agro-chemical industry, farming organisations and retailers - all contribute to the policy of minimising the use of pesticides. Some activities are national, others are local. In addition, the UK has an extensive system of monitoring pesticides. Data is collected particularly on residues in food, residues in water, pesticide usage and affects of pesticides on wildlife.

3. The Government's policy of minimisation of use is pursued through various mechanisms including the approvals process, monitoring, statutory Codes of Practice and a large Government funded R&D programme designed to achieve more effective application of pesticides and to investigate "gentler" systems of control through integrated pest management. In particular the statutory Code of Practice on the Safe Use of Pesticides on Farms and Holdings clearly states that pesticides should only be used when necessary and anyone without the necessary competence to decide this should take advice from an expert.

Factors prompting risk reduction policy?

4. The current regulatory regime was established by a legislation introduced in 1985. Prior to that date pesticide approvals relied on voluntary, industry supported arrangements. The policy of minimising pesticide use has evolved since 1985. A major factor behind its development was the application of the precautionary principle in relation to the environmental implications of pesticide use. In the case of pesticides, because there is a

potential risk of damage to the environment the Government is prepared to take precautionary action to limit their use, even where scientific knowledge is not conclusive, if the balance of likely costs and benefits justifies it. Other factors, such as a need to comply with EC drinking water standards and concern over consumer exposure, also played a part in formulating this policy.

Is there a legal or regulatory mandate for your country's pesticide risk reduction activities?

5. The Control of Pesticides Regulations 1986, which implements provisions in the Food And Environment Protection Act 1985, prohibits the advertisement, sale, supply, storage and use of any pesticide unless Ministers in six Government Departments have approved that pesticide and consented to that activity. The purpose of the legislation is to safeguard the health of humans and the environment and to ensure that pesticides are safe, effective and, where appropriate, humane. This legislation will be superseded by EC Directive 91/414/EEC which sets out the broad framework for the approval of pesticides and which sets common health and environmental standards as well as encouraging freedom of movement of authorised plant protection products. Other UK legislation aimed at protecting human health (the Control of Substances Hazardous to Health Regulations 1988) requires that users consider whether it is necessary to use a pesticide at all, or if it is necessary to consider whether a less hazardous pesticide can be used instead. Some risk reduction activities - such as those relating to pesticides approvals - rely on such legislation. Others - such as research and development to investigate the possible use of biological control agents - do not.

II. Description of Activities

UNITED KINGDOM
Project or Activity: Participation in North Sea Declaration, Montreal Protocol
Risk Reduction Category: Reducing Pesticide Use

What are the key elements of project/activity?	Commitments under the North Sea Declaration to reduce inputs of certain pesticides to the North Sea.
When did the project/activity begin and what prompted its initiation?	1985. The third North Sea Conference in 1990 strengthened and added to the earlier commitments for a substantial reduction of pesticides reaching the North Sea.
What are its specific goals and/or targets?	Under the North Sea Declaration: to achieve between 1985 and 1995 a reduction of at least 50% of named pesticides to the North Sea.
Who is involved in carrying it out?	The Pesticides Safety Directorate regulate the approval and use of agricultural pesticides while the Health and Safety Executive are responsible for the non-agricultural use of pesticides. The National Rivers Authority are responsible for monitoring.
Is there a legal or regulatory mandate?	The use of any pesticide is subject to statutory approval.
Is the activity monitored or enforced? If so, how?	All pesticides listed in the 1990 Declaration are included in the determinants within the UK National Monitoring Plan. This plan provides for annual monitoring of contaminants by various agencies at a network of estuarine, intermediate and offshore sites around the UK
How are results and progress measured?	UK reports inputs in accordance with PARCOM standard methodology agreed in 1988 - “Principles of the Comprehensive Study on Riverine Inputs”.
What specific progress/results have been achieved?	For those pesticides identified in the Intermediate Ministerial Statement of Conclusions, UK usage was already at relatively low levels and there has been a generally downward trend in recent years. For example, there has been a reduction in use of atrazine and azinphos-methyl of approximately 50% and 60% respectively since 1989.

UNITED KINGDOM
Project or Activity: Participation in North Sea Declaration, Montreal Protocol
Risk Reduction Category: Reducing Pesticide Use

What are the key elements of project/activity?	Commitments under the Montreal Protocol/draft EC Regulation to reduce the production and use of methyl bromide.
When did the project/activity begin and what prompted its initiation?	Methyl bromide was added to the Montreal Protocol following a review in November 1992 when methyl bromide was identified as a potential ozone depleter.
What are its specific goals and/or targets?	A freeze on the production and consumption of methyl bromide at 1991 levels by 1995. In addition an EC Regulation requires a 25% cut in the production and use of methyl bromide by 1998.
Who is involved in carrying it out?	An EC Regulation implementing the provisions of the Montreal Protocol will shortly be published.
Is there a legal or regulatory mandate?	Implemented by Council Regulation 3093/94 on substances that deplete the ozone layer.
Is the activity monitored or enforced? If so, how?	Controls are on the production and import of methyl bromide. There are no UK producers of methyl bromide. Import licenses will be issued by the European Commission and policed by Customs and Excise.
How are results and progress measured?	Progress will be measured against the number of import licenses issued for methyl bromide. The development of possible alternatives to methyl bromide together with improved application practices which will require the use of less methyl bromide for the same effective control will also be important factors to consider.
What specific progress/results have been achieved?	Too early to tell. The EC Regulation which implements the provision of the Montreal Protocol comes into effect on 1 January, 1995.

UNITED KINGDOM

Project or Activity: Promoting use of treatment thresholds, forecasting systems

Risk Reduction Category: Minimising Pesticide Use

What are the key elements of the project/activity?	Government-funded research over many years has led to the establishment of treatment thresholds for many pests and pathogens. These thresholds help farmers/growers determine when pest/pathogen levels in crops are sufficiently high to warrant pesticide treatment. Extension services encourage the use of thresholds and crop assessment over the practice of routine pesticide treatment. Where prophylactic pesticidal application is required or pest levels difficult to assess, research has led to the development of forecasting systems to enable a well-targeted or well-timed application. Forecasting systems often use meteorological data along with pheromone traps or other monitoring devices.
When did the project/activity begin and what prompted its initiation?	No specific starting date. Much of the work was started in the 1970's in response to the wider availability of pesticides. However, the minimisation objective was addressed more formally in R&D projects after 1986 when the Food and Environment Protection Act came into effect.
What are its specific goals and/or targets?	No quantitative goals, and no goals for pesticide use reduction, per se. Rather, the goal is to ensure that pesticides are used only when necessary and that they are targeted appropriately to efficiently control the pest.
Who is involved in carrying it out?	Extension services transmit information to farmers.
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	Regular pesticide usage surveys are conducted (e.g., arable crops are surveyed every other year).
How are results and progress measured?	Results are published in pesticide usage survey reports, which include comparisons to previous years.
What specific progress/results have been achieved?	We cannot quantify the precise contribution of developments in this area. However, there has been a general downward trend in pesticide use since the mid 1980s. For instance, between 1990 and 1992, there was a 22% reduction in the amount of active ingredients applied to cereals in Great Britain.

UNITED KINGDOM
Project or Activity: Improving application technology
Risk Reduction Category: Pesticide Use/Research & Development

What are the key elements of the project/activity?	(1) Research has led to **development** of **low volume application techniques** which enable the UK to have standard spray recommendations (200 litres spray/hectare) lower than the European average (300 litres spray/ha), and to achieve satisfactory pest control at lower doses than those on product labels. (2) The government is funding **work to better understand the physics of spray transport and spray nozzle and equipment performance**. This is aimed at improving control of droplet size distributions, reducing drift, and advancing techniques consistent with biological efficacy. Considerable effort is taken to ensure the results of this research are passed on to farmers, growers. (3) **Systems to detect weeds and apply pesticides** are being developed to reduce herbicide use on arable land. Research has shown that distribution of some weeds is patchy within a crop and that such patches are stable within a season and from season to season. Work is underway to match the delivered dose and mix of herbicides to local needs, so as to reduce pesticide use while maintaining sufficient control. Other work is pursuing reintroduction of weeding machines in combination with low dose herbicide applications.
When did the project/activity begin and what prompted its initiation?	1)) 2)) Began 1980s 3))
What are its specific goals and/or targets?	Minimising pesticide use
Who is involved in carrying it out?	Various Government (and industry funded) independent research institutes.
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	R&D activity is assessed against specific targets and milestones.
How are results and progress measured?	Publications in academic and farming press. Take up by manufacturers. Take up by growers.
What specific progress/results have been achieved?	Considerable knowledge has been gained in the process of atomisation and the cause of drift. A system for detecting weed patches and spraying just those areas is currently under commercial evaluation.

UNITED KINGDOM
Project or Activity: Guidance Documents for Users
Risk Reduction Category: Increasing Safety in Pesticide Use

What are the key elements of the project/activity?	**Code of Practice on the Safe Use of Petsicides on Farms and Holdings** -- states that pesticides should only be used when necessary and that people with the competence to decide this should take advice from an expert. **Guidelines for the Use of Herbicides in or near Watercourses and Lakes** -- provides information on: alternative methods of weed control, including biological and cultural techniques; the importance of preparing sites to minimise the need for subsequent weed control; and how to avoid polluting water when the use of chemicals is unavoidable.
When did the project/activity begin and what prompted its initiation?	CODE: S17 of the Food and Environment Protection Act 1985 provides the preparation of Codes of Practice in respect of Pesticides legislation. Code first issued in 1990. WEEDS: First booklet issued in 1985 following concern about the use of pesticides near water.
What are its specific goals and/or targets?	CODE: To provide practical guidance to farmers and growers engaged in commercial crop production. WEEDS: To ensure those using herbicides are aware of current legislation and practical alternatives to weed control.
Who is involved in carrying it out?	CODE: MAFF[1] and Health and Safety Executive are responsible for the issue of the code. WEEDS: MAFF[1] publishes this booklet.
Is there a legal or regulatory mandate?	Only for the Code of Practice under S17 of FEPA.
Is the activity monitored or enforced? If so, how?	The code is statutory and can be produced in court as evidence. The Health and Safety Executive are responsible for enforcement.
How are results and progress measured?	Not applicable.
What specific progress/results have been achieved?	Not directly measurable, both sets of guidance are being revised to take account of developments.

[1] MAFF - Ministry of Agriculture, Fisheries and Food

UNITED KINGDOM
Project or Activity: Training: Certificates of Competence
Risk Reduction Category: Increasing Safety in Pesticide Use

What are the key elements of the project/activity?	The Control of Pesticides Regulations 1986 (COPR) requires employers to ensure that all employees involved in the sale, supply, storage or use of pesticides receive adequate instruction and guidance and are competent for the duties they are required to perform. COPR also requires certain users of agricultural pesticides (those providing a commercial service and those born after 31-12-64) to hold a certificate of competence or work under the supervision of a certificate holder. A certificate is also required for persons who market agricultural pesticides and those who store them in large quantities for sales purposes.
When did the project/activity begin and what prompted its initiation?	In 1987, following the introduction of COPR, which made the need for training a statutory requirement.
What are its specific goals and/or targets?	To ensure that all those who use, sell, supply or store pesticides are competent for the duties they are required to perform.
Who is involved in carrying it out?	Certificates of competence in pesticide application are issued by government services in England, Wales and Scotland; certificates for storage and sale are issued by British Agrochemicals Standards Inspection Scheme - BASIS (Registration) Ltd.
Is there a legal or regulatory mandate?	COPR requires all employees to be trained and certificates of competence to be recognised by Ministers.
Is the activity monitored or enforced? If so, how?	The Health and Safety Executive carry out routine safety inspections on farms and holdings which would include a check on whether the appropriate training has been given and that certificates of competence are held where necessary.
How are results and progress measured?	The Health and Safety Executive publish annual reports covering enforcement activities but training and certificates of competence are not specifically addressed.
What specific progress/results have been achieved?	N/A

UNITED KINGDOM
Project or Activity: Label restrictions
Risk Reduction Category: Protecting Sensitive Areas

What are the key elements of the project/activity?	Label restrictions are used to (1) enforce buffer zones to protect water sources from overspray and spray drift, and (2) create unsprayed headlands that can serve as a refuge for beneficial insects around the edge of crops. This is part of the normal registration process.
When did the project/activity begin and what prompted its initiation?	Buffer zones to protect water started in 1989 via the production of internal PSD Guidance Document. Unsprayed headlands to protect insects was first introduced for dimethoate during the review 1991/2
What are its specific goals and/or targets?	Protection of water sources. Protection of insects.
Who is involved in carrying it out?	PSD and Advisory Committee on Pesticides (ACP)
Is there a legal or regulatory mandate?	Yes.
Is the activity monitored or enforced? If so, how?	Not actively monitored or policed - but is enforceable.
How are results and progress measured?	Not measured.
What specific progress/results have been achieved?	N/A

UNITED KINGDOM
Project or Activity: Water monitoring and management
Risk Reduction Category: Protecting Sensitive Areas

What are the key elements of the project/activity?	The National Rivers Authority (NRA) monitors ground and surface water for pesticides. When local contamination is identified, the NRA takes steps to address the problem, e.g. advising farmers to change the pesticide used. The NRA are also developing a policy of water management on a catchment area basis. This involves identifying local problems including pesticide contamination, and developing appropriate strategies to counter them.
When did the project/activity begin and what prompted its initiation?	The first catchment management plans were prepared in 1991/92. These adopt an integrated approach to the water environment and recognise the need to influence and work in partnership with others
What are its specific goals and/or targets?	The individual plans adopt their own specific goals depending on their particular concerns, for example, the steps which need to be taken when a pesticide exceeds the environmental quality standard set for that pesticide.
Who is involved in carrying it out?	The National Rivers Authority is the principal agency responsible for safeguarding and improving the water environment in England and Wales. The NRA work in conjunction with other Government Departments, farmers and local communities to achieve their objectives.
Is there a legal or regulatory mandate?	Mainly advisory but statutory power could be used if warranted.
Is the activity monitored or enforced? If so, how?	For each catchment the NRA will produce a monitoring plan. This plan will include an update on the status of the water environment and report progress achieved on earlier action plans.
How are results and progress measured?	After 5 years (or sooner if circumstances dictate) the NRA will review each catchment plan beginning with a consultation exercise.
What specific progress/results have been achieved?	The catchment management process has only recently begun. However, key areas of concern have been identified and effort is being directed towards resolving these problems.

UNITED KINGDOM
Project or Activity: National Pesticide Retrieval Scheme
Risk Reduction Category: Increasing Safety of Pesticide Storage, Disposal

What are the key elements of the project/activity?	The National Pesticide Retrieval Scheme, carried out from September 1991 to June 1992, collected leftover stocks of old (non-approved) pesticides which farmers had been keeping in storage because they had no safe and cost-effective way to dispose of them.
When did the project/activity begin and what prompted its initiation?	The programme was initiated so as to help farmers clear out their old pesticide stores and dispose of them safely.
What are its specific goals and/or targets?	Not able to quantify the actual amount of old pesticides being stored and had no specific target.
Who is involved in carrying it out?	The programme was run by the British Agrochemical Association and the UK Agricultural Supply Trade Association, with disposal carried out by reputable contractors. The government fully supported the project.
Is there a legal or regulatory mandate?	The scheme was run voluntarily by the trade organisations. However, the Control of Pesticides Regulations 1986 were amended temporarily to allow farmers to clear out pesticides stores within the law.
Is the activity monitored or enforced? If so, how?	Monitored by the trade organisations.
How are results and progress measured?	Monitored by trade organisations.
What specific progress/results have been achieved?	Over 300,000 litres of chemicals were collected.

UNITED KINGDOM

Project or Activity: Environmentally Sensitive Area Scheme (ESA)

Risk Reduction Category: Protecting sensitive areas, species

What are the key elements of the project/activity?	Various schemes have been developed to protect vulnerable wildlife habitats and preserve environmentally sensitive areas and moorlands. All these schemes have placed restrictions on the use of pesticides. Under the Environmentally Sensitive Area Scheme (ESA), farmers are funded to practice traditional farming techniques for the benefit of the environment.
When did the project/activity begin and what prompted its initiation?	ESA Programme was started in 1987, following political concern over agricultural intensification leading to environmental damage.
What are its specific goals and/or targets?	There are no specific goals or targets involving reduced pesticide use. Targets relate to environmental protection and/or enhancement, including restrictions on pesticide use.
Who is involved in carrying it out?	Occupiers of agricultural land, under supervision of MAFF[1] and its agency ADAS[2]
Is there a legal or regulatory mandate?	Provision for funding ESA agreements is based on Section 18 of the Agricultural Act 1986.
Is the activity monitored or enforced? If so, how?	Environmental impact and compliance with agreements are monitored by MAFF[1] and ADAS[2]
How are results and progress measured?	There are no specific measurements or progress monitoring of reductions in pesticide usage.
What specific progress/results have been achieved?	None specifically on pesticide usage.

[1] MAFF - Ministry of Agriculture, Fisheries and Food

[2] ADAS - Agricultural Development and Advisory Service

UNITED KINGDOM
Project or Activity: Grants for conversion to organic farming
Risk Reduction Category: Promoting IPM

What are the key elements of the project/activity?	ORGANIC AID SCHEME 1) A voluntary scheme offering financial assistance to farmers to convert land to organic production. 2) Aims to encourage a threefold increase in organic production in England. 3) Also designed to stimulate a form of production emphasising soil improvement and control of pests/diseases using alternative methods.
When did the project/activity begin and what prompted its initiation?	Organic Aid Scheme launched on 1 July 1994 with applications being accepted from 1 August 1994. Scheme negotiated and developed following 1992 CAP Agri-Environmental package (2078/92/EEC)
What are its specific goals and/or targets?	To encourage a threefold increase in organic production in England.
Who is involved in carrying it out?	MAFF is responsible for operating the scheme in England. Farmers in Wales, Scotland and Northern Ireland are able to apply for aid under similar schemes.
Is there a legal or regulatory mandate?	The Organic Farming (Aid) Regulations 1994 (SI 1721/94).
Is the activity monitored or enforced? If so, how?	Participants must register proposed land for conversion to organic farming with one of the private organic sector bodies or United Kingdom Register of Organic Food Standards (UKROFS).
How are results and progress measured?	Progress will be measured against number of applications received and accepted and area of land converted to organic farming methods.
What specific progress/results have been achieved?	Too early to tell. Modest uptake in England by end of November (46 applications received representing some 2,500 hectares).

UNITED KINGDOM
Project or Activity: Demonstration Farms
Risk Reduction Category: Promoting IPM

What are the key elements of the project/activity?	So far over 20 demonstration farms have been established under various schemes to illustrate the principles of integrated crop management. These include Linking the Environment and Farming (LEAF), which involves industry (including the NFU and the British Agrochemicals Association); Less Intensive Farming and the Environment (LIFE), part of a European network of integrated farming systems research; LINK:IFS (Integrated Farming Systems) and Focus on Farming Practice (FOFP) investigating the integration of conventional and organic farming methods
When did the project/activity begin and what prompted its initiation?	LIFE started in 1989, LEAF in 1991, LINK:IFS in 1992 and FOFP in 1994. Broadly the purpose of each project is to look at integrating crop management with a view to providing information on the economic viability and environmental benefits to be had from such farming methods.
What are its specific goals and/or targets?	To promote farm practices which combine care and concern for the environment with the responsible and economic use of modern methods.
Who is involved in carrying it out?	Many different organisations are taking part including government, research institutes, the crop protection industry and individual farmers.
Is there a legal or regulatory mandate?	No.
Is the activity monitored or enforced? If so, how?	Projects each have an executive committee to oversee their respective activities.
How are results and progress measured?	It is intended that results of research should be made available to farmers, teachers, opinion formers, media, etc. Farms participating in LEAF arrange training visits throughout the year. FOFP and LIFE have also arranged training visits in the past.
What specific progress/results have been achieved?	Generally it is too early into the life of each project for there yet to be specific results. Nevertheless, LEAF is preparing a guide entitled 'A Practical Guide to Integrated Crop Management', which will set out the aims of LEAF farms and provide a guide to sustainable Integrated Crop Management, ICM. LEAF has also produced an environmental audit for non-participating farmers to complete, to assess for themselves the sustainability of their own farming methods. Under LIFE, two demonstration farms have been set up with EU funding to assess the commercial viability of putting into practice the results of research.

UNITED KINGDOM

Project or Activity: Several projects aimed at minimising pesticide use, increasing safety

Risk Reduction Category: Research and Development (R&D)

What are the key elements of the project/activity?	The government supports various programmes of research and development aimed at minimising pesticide use and increasing safety. Such research is required by the Food and Environmental Protection Act 1985 (FEPA) and the Control of Pesticides Regulations 1986 (COPR). In 1994/95 projects included: • investigation of alternative biological means of pest and disease control. In 1994/95, government-funded research (£3.3M) is exploring the range of semiochemicals, pheromones and elicitors which may be used in crop protection as well as exploiting natural enemies. • use of integrated pest and disease management strategies. For example, in 1994-95, MAFF-supported research (£5 M) is examining the use of forecasting and thresholds to reduce inputs of conventional pesticides on a range of arable and horticultural crops. • improving pesticide application technology. • understanding the effects of pesticides on non-target species. • modelling risks associated with pesticide application to agricultural land including effects on microbial biomass and leaching to surface waters.
What specific progress/results have been achieved?	MAFF funded R&D is strategic research the results of which are taken up by a variety of other research organisations funding more 'near market' R&D. R&D results are published in a large number of peer reviewed research papers in scientific journals and more general articles in trade journals. In many cases the information produced by the research is used directly in the assessment of pesticides submitted for approval under COPR. In other cases it contributes more generally to scientific understandings and minimisation of pesticide use. The summary of results provided identifies only a few examples of the results/achievements of the work funded. These include: • the development of the VENTEM™ and other associated disease forecasting systems for top fruit growers; • development of laser interferometry methods for the analysis of spray characteristics such as droplet size and distribution; • the development of 'patch spraying' systems which have the potential to dramatically reduce the amounts of herbicide; • development (in collaboration with other interested organisations) of SEISMIC and other models for the movement of pesticides in soils. SEISMIC contains data on soil types, average weather conditions and crop cover across England, Northern Ireland and Wales and can be used for a variety of purposes including, for example, the assessment of areas where application of specific pesticides to specific crops may result in surface water contamination; • work on forecasting and thresholds has focused on the development of Integrated Disease Risk (IDR) approach using as a model system the use of fungicides in winter wheat. Work is funded both centrally by MAFF and on a collaborative basis with the relevant levy funded body the HGCA (Home Grown Cereals Authority), the Agrochemical Industry and UK Universities; anddevelopment and validation of EPPO Risk Assessment Guidelines taken up by the EU.

UNITED KINGDOM
Project or Activity: Development of Crop Protocols
Risk Reduction Category: Minimising Pesticide Use

What are the key elements of the project/activity?	A consortium of major retailers and the National Farmers Union have begun an initiative to develop crop protocols that lay down guidelines for using integrated crop and pest management in the production of all major crops grown in the UK.
When did the project/activity begin and what prompted its initiation?	Both growers and retailers recognise that pesticide use is of major concern to consumers and seek to reassure consumers about UK food production methods. A partnership was, therefore, formed in the early 1990s between the NFU and some multiple retailers to develop **product husbandry** protocols for individual crops which would include the promotion of viable integrated crop management systems.
What are its specific goals and/or targets?	The production of safe, good quality food at affordable prices, while maintaining a profitable and competitive UK horticulture industry. This is to be achieved by the application of scientifically-based good horticultural practices with emphasis on reducing, whenever possible, the use of chemical pesticides.
Who is involved in carrying it out?	Growers and retailers with inputs from other organisations such as the Ministry of Agriculture, Fisheries and Food and various research associations.
Is there a legal or regulatory mandate?	No, but it is intended that adherence to the relevant protocol will become part of the basis of the supply agreement between grower and retailer.
Is the activity monitored or enforced? If so, how?	No
How are results and progress measured?	By growers and retailers agreeing to conform to the requirements of the protocols. To date over 200 protocols have been sent out to suppliers of multiple retailers
What specific progress/results have been achieved?	The first of these protocols (fresh carrots and cauliflowers) were published in July 1993. Since then, many more have been published or are in preparation.

III. Conclusions

26. The UK Government remains committed to a policy of minimisation of pesticide use as distinct from a policy of reducing use. Minimisation of use may not be incompatible with increases in tonnage applied, although over time it is likely to lead to an overall reduction.

27. Minimisation is fully compatible with "risk reduction" and is pursued through the following main mechanisms:

- a rigorous approvals process
- a Statutory Code of Practice for the Safe Use of Pesticides on Farms and Holdings
- a substantial research and development programme.

28. The UK sees a rigorous approvals process as key to any risk reduction strategy. Within this process the toxicological profile of the product in relation to risk to users, consumers and the environment is considered together with efficacy. We believe effective assessment is crucial to ensure risks are at an acceptable level. However, as this summary indicates, many other components go to make up a comprehensive risk reduction policy.

29. In Western European terms UK use of pesticides per area of cultivated land is at or slightly below average levels. Broadly speaking, therefore, risks are likely to be lower than in countries where intensive horticultural practices lead to high pesticide usage. Against this background, whilst the Government remains committed to following its policy of minimisation, there are no plans to adopt policies designed solely to achieve quantitative reductions in use.

UNITED STATES

CONTACT PERSON(S):

The overall US survey response was developed by Kennan Garvey of U.S. EPA with input from Carol Whitman of USDA. Their addresses are:

Mr. Kennan Garvey
Policy and Special Projects Staff
Office of Pesticide Programs/OPPTS
(7501C)
401 M Street S.W.
Washington, D.C. 20460
Tel: (703) 305-7106
Fax: (703) 305-6244
Internet: garvey.kennan@epamail.epa.gov

Dr. Carol Whitman
Office of the Assistant Secretary for
Natural Resources and Environment
U.S. Department of Agriculture
14th and Independence Ave., S.W.
Washington, D.C. 20250
Tel: (202) 720-7173.
Fax: (202) 720-4732

In addition, the following people may be contacted directly for the following areas of interest:

EPA IPM and Pesticide Pollution Prevention Activities:

Ms. Janet Andersen, Director
Biopesticides and Pollution Prevention Division
Office of Pesticide Programs (7501C)
Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

USDA Extension IPM Coordinator:

Dr. Michael Fitzner
National Program Leader, IPM
USDA/ES
Ag Box 0909, Room 3347-S
Washington, D.C. 20250-0909
Tel: (202) 720-2471
Fax: (202) 720-4395

USDA Sustainable Agriculture Research and Education Program:

Dr. Alice Jones
SARE Program
USDA/CSRS/SP
Ag Box 2260
Washington, D.C. 20250-2260
Tel: (202) 401-6861
Fax: (202) 401-5179

I. Framework for Pesticide Risk and Use Reduction Activities

The U.S. has a coordinated risk regulation program at the national level, as well as diverse state and local programs. The U.S. first started regulating pesticides in 1910. The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) was passed in 1947 to govern the registration (licensing) of pesticides. The Federal Food, Drug and Cosmetic Act (FFDCA) was amended in 1954 to add the regulation of pesticide residues. FIFRA authorities were strengthened through the 1970s in response to increasing public concern about the toxic effects of chemical pesticides. Pesticide residues in food, farmworker exposure, and pesticide contamination of ground water have all contributed to a growing concern over the widespread use of pesticides. In 1988, FIFRA was amended substantially to accelerate the review and reregistration of older pesticides. The U.S. has begun a special initiative to reduce pesticide risks, both through legislative/regulatory proposals and actions, as well as voluntary efforts, in response to the 1993 report of the National Research Council, "Pesticides in the Diets of Infants and Children." The initiative focuses particularly on risk/use reduction strategies and increased use of Integrated Pest Management (IPM).

Statutory mandates for pesticide regulation at the federal level are contained in FIFRA and FFDCA. Regulatory mandates are stated in Title 40 Code of Federal Regulations (CFR) Parts 150-189. These mandates address risk reduction through licensing restrictions on individual pesticide products, and the establishment of tolerances (maximum residue levels) for chemical/use combinations. No pesticide may be legally sold in the U.S. unless it bears an EPA registration number. It is a violation of the law for any person to use a pesticide in a manner inconsistent with its label, including the specified uses. FIFRA imposes civil as well as criminal penalties for violations. A number of other U.S. statutes, such as the Endangered Species Act, Migratory Bird Treaty Act, Coastal Zone Management Act, Clean Air Act, and Clean Water Act also affect use of pesticides.

EPA has the statutory authority to regulate the use of pesticides and balance the risks and benefits posed by pesticides. The USDA, in cooperation with EPA, assesses the benefits of pesticides and works with farmers and other pesticide users on the proper use of and alternatives to pesticides. EPA and USDA signed a Memorandum of Understanding in August 1994 on research, technology transfer, and registration of new alternatives for important pesticide uses that may be lost. The Food and Drug Administration (FDA) and USDA (for meat, milk and eggs) enforce tolerance levels on both domestic and imported foods. The States generally assume responsibility for enforcement of pesticide distribution and use requirements.

Past approaches to pesticide regulation focused on careful analysis and evaluation of discrete pesticides. These approaches are insufficient to deal with new issues, such as multiple residues, differential sensitivities of infants and adults, and the need to manage pests. The U.S. is beginning to look at risk concerns more comprehensively, finding faster and more intelligent ways to reduce real risks and share resources and expertise. The most effective, least costly solution is prevention - preventing problems rather than trying to fix them retroactively. While EPA and FDA retain a primary focus on regulatory action, they also, in concert with USDA, are working to create non-regulatory programs which encourage voluntary efforts to prevent or mitigate the human health and environmental impacts of pesticide use.

The primary focus of U.S. risk reduction activities is higher risk pesticides. Appropriate reductions in the use of highly toxic pesticides will help reduce risks. Since risk

reductions are the product of regulatory action as well as decisions and actions by producers on their farms, producers must be actively involved with regulators in the planning and implementation of risk reduction strategies. Federal and State agencies must then provide users with the knowledge and technologies needed to reduce the risks associated with pesticide use. Just as important is the need for establishing a public consensus on the goals and process for risk reduction strategies, requiring a renewed focus on the needs of agriculture and the general public.

II. Description of Activities

United States
Project or Activity: Identifying hazardous pesticides
Risk Reduction Category: Eliminating hazardous pesticides

What are the key elements of the project/activity?	The U.S. EPA has two programmes (supplementary to the standard registration and re-registration processes) to identify hazardous pesticides: • Section 6(a)(2) Notifications -- by law, pesticide registrants must notify EPA of any information about adverse effects of pesticides already registered or proposed for registration. • Special Review -- when new information is discovered about adverse effects of existing (registered) pesticides, these pesticides may be subjected to an intensive examination which can result in their being banned or restricted.
When did the project/activity begin and what prompted its initiation?	6(a)(2) - 1972: concern that registrants would learn of potentially adverse effects and not notify EPA in a timely manner. Special Review - 1976: need for a systematic process for in-depth review of pesticides of concern
What are its specific goals and/or targets?	Identify "unreasonable" risks and take appropriate regulatory action
Who is involved in carrying it out?	EPA's Office of Pesticide Programs
Is there a legal or regulatory mandate?	Both activities are authorised by federal pesticide law and/or regulation.
Is the activity monitored or enforced? If so, how?	6(a)(2) submissions are screened by a multi-disciplinary scientific/regulatory team. Non-submission has resulted in enforcement actions. New regulations increase enforceability. Special Reviews are extensively monitored and may result in suspension/cancellation actions.

How are results and progress measured?	6(a)(2) has received close scrutiny within EPA and by Congress. EPA strives for rapid decisions on which data needs immediate review, and quick review of high priority data. Special Review: (see next section)
What specific progress/results have been achieved?	6(a)(2) notifications have been required by law since 1972. However, registrants were not uniformly notifying EPA of potentially unreasonable risks, and EPA was not systematically reviewing 6(a)(2) data in a timely manner. Since 1991, EPA has implemented a special screening process to identify high priority submissions and review them, and has issued an interim rule strengthening submission requirements and enforceability. A final rule will be issued in 1995. 6(a)(2) has served to expedite regulatory reviews and decisions on hazardous pesticides. Special Review: This programme has been used successfully as the mechanism to ban or restrict many hazardous pesticides, including diazinon, dinoseb, 2,4,5-T/Silvex, ethylene dibromide, granular carbofuran and chlordane. The principal problem with the programme is that it can be extremely slow (years to review a pesticide) and expensive (if the pesticide registrant demands a court hearing on the decision). In recent years, EPA has been cutting the special review process short, or circumventing it altogether, by negotiating agreements with registrants on ways to reduce the risks of problematic pesticides.

United States
Project or Activity: Identifying and registering lower-risk alternatives
Risk Reduction Category: Eliminating hazardous pesticides

What are the key elements of the project/activity?	EPA has initiated several activities aimed at registering less-hazardous pesticides that could substitute for more-hazardous ones already registered. 1) EPA has streamlined the data requirements for biopesticides and reduced the time needed for registration (including, in some cases, waivers for tolerances). 2) EPA recently began a (Voluntary) Reduced-Risk Pesticide Initiative as a pilot programme to encourage the registration of lower-risk chemical pesticides. Under this program, registrants may submit additional information outlining how their active ingredient presents opportunities for risk reduction or pollution prevention. EPA evaluates this information and, if the Agency agrees with the registrant's position, expedites the science review. Submission of the reduced risk rationale is voluntary. Biologicals are not included because they already receive expedited treatment.
When did the project/activity begin and what prompted its initiation?	Biopesticides Registration process streamlined in the mid 1980's; data requirements issued in the late 1980's. Reduced-risk pesticide initiative -- July 1993
What are its specific goals and/or targets?	• register safer products that can replace more hazardous pesticides • provide tools for integrated pest management
Who is involved in carrying it out?	EPA's Office of Pesticide Programs
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	The EPA tracks the number of applications for which expedited review is requested, the number passing the reduced risk screen, and the number registered. EPA also tracks registrations and is beginning to track review times for biopesticides.
How are results and progress measured?	Numbers of products registered
What specific progress/results have been achieved?	EPA has registered more than 200 biopesticides (microbials and biochemicals, such as pheromones). EPA has received registration applications for 14 new chemicals claimed to be reduced-risk pesticides; EPA has registered three of these chemicals and expedited the science reviews of four others. (See *Progress Report on the BPPD Pilot Program*, after the tables)

United States
Project or Activity: Creation of Biopesticides and Pollution Prevention Division
Risk Reduction Category: Promoting IPM

What are the key elements of the project/activity?	EPA's Office of Pesticide Programs has created a new Biopesticides and Pollution Prevention Division to promote lower-risk pest management systems in both agriculture and other areas. This division is intended to streamline further the biopesticide review process, advocate the development and use of safer pesticides, and provide leadership in the development of sustainable pest management strategies. The division will operate on a pilot basis for one year.
When did the project/activity begin and what prompted its initiation?	The division was created in October 1994, and should operate until September 1995. After the first year, the division will be evaluated to determine if it should be continued.
What are its specific goals and/or targets?	• to make IPM tools -- both pesticides and information about methods -- available, accessible • to promote the use of IPM and other low-risk pest management techniques in all sectors.
Who is involved in carrying it out?	EPA's office of Pesticide Programs
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	See next section
How are results and progress measured?	Number of pesticide registrations and review times are being tracked.
What specific progress/results have been achieved?	EPA has registered more than 200 biopesticides. The new division will place even greater priority on these generally safer pesticides, and facilitate processing of applications for biopesticides.

United States
Project or Activity: Pesticide Use/Risk Reduction Initiative
Risk Reduction Category: Reducing use and risk

What are the key elements of the project/activity?	The U.S. EPA, Department of Agriculture (USDA), and Food and Drug Administration (FDA) initiated in summer 1993 a joint programme to reduce pesticide use and risks. The programme will include: • development of ecological and human health risk indices • baseline measurements of pesticide use. EPA, USDA and FDA have formed voluntary partnerships with a number of groups and companies representing agricultural and non-agricultural users to promote environmental stewardship in pesticide use. Partnerships are commodity or sector specific (e.g. corn, power line rights of way).
When did the project/activity begin and what prompted its initiation?	The programme was begun in summer 1993 following publication of a report by the U.S. National Academy of Sciences which stated that current regulatory approaches do not adequately protect children from risks associated with pesticide residues on food. The first partnerships were announced in December 1994.
What are its specific goals and/or targets?	Grower groups have committed to more research and demonstration of IPM techniques and educational programs, including work with equipment manufacturers to improve application equipment.
Who is involved in carrying it out?	U.S. agencies (EPA, USDA, FDA) Initial partnerships cover the following commodities/sectors: potatoes, corn, apples, pears and citrus (California), and electrical utilities.
Is there a legal or regulatory mandate?	The agencies are not bound by law to implement the programme, but they have signed a formal agreement to do so. Participation by the growers and other organisations is voluntary.
Is the activity monitored or enforced? If so, how?	The three federal agencies are establishing long-term relationships with the grower groups to achieve the joint commitments.
How are results and progress measured?	Measures and baselines being developed.
What specific progress/results have been achieved?	December 1994 announcement of partnerships with commitments from grower groups.

United States
Project or Activity: Great Lakes Agricultural Pollution Prevention Project
Risk Reduction Category: Reducing pesticide use/Protecting sensitive areas

What are the key elements of the project/activity?	The Great Lakes Agricultural Pollution Prevention Project was begun in 1993 by the World Wildlife Fund to advance pest management methods that reduce risk from and reliance on synthetic chemical pesticides. The project draws on experience in Denmark, the Netherlands, Sweden and Indonesia. The project includes three phases: 1/ Working with all stakeholders to develop policy recommendations that would motivate reduced pesticide use 2/ Refining policy recommendations through demonstration projects with growers in the region 3/ Encouraging decision-makers to implement policy recommendations by building on and improving coordination among existing state and regional/ bi-national programs
When did the project/activity begin and what prompted its initiation?	1993
What are its specific goals and/or targets?	Reducing risk from and reliance on pesticides. Stakeholders have recommended basing crop-specific quantitative goals on pest management practices used on profitable farms that rely less on pesticides than practices used by other producers of the same crop.
Who is involved in carrying it out?	WWF State and regional authorities Other stakeholders
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	The project is just entering its second phase. Stakeholders have completed evaluations of meetings convened in the first phase to develop policy recommendations. A system for gathering data on pesticide use, yields, costs, and other information necessary to measure progress will be an essential element of the demonstration projects

How are results and progress measured?	See above
What specific progress/results have been achieved?	Meetings of stakeholders have agreed on policy recommendations which will motivate pesticide reduction. A network of producers of tart cherries, university researchers and non-governmental organizations has been established. Initially, the network will exchange information about practices which rely less on pesticides, and test measurable goals, a data collection system, and other policy tools for promoting pesticide reduction. The bi-national International Joint Commission is convening a series of workshops to explore a strategy for pesticide reduction in the Great Lakes basin.

United States
Project or Activity: Regulations to protect farm workers
Risk Reduction Category: Increasing safety of pesticide use

What are the key elements of the project/activity?	In 1992 EPA issued new rules to protect the health of farm, forest, nursery and greenhouse workers. The rules are intended to prevent or reduce pesticide exposure by: • setting post-application re-entry intervals during which workers can not enter treated fields, except under limited situations • requiring protective equipment • requiring availability of soap and water, emergency transportation, and information • requiring worker safety training, safety posters, and access to information about pesticides. To date, EPA has initiated a large "outreach" effort to educate employers and workers about the rules. Material has included: 810,000 worker protection compliance manuals, nearly 2 million handbooks for handlers and workers, and 475,000 safety posters.
When did the project/activity begin and what prompted its initiation?	EPA developed the rules to amend a 1974 worker protection regulation that was considered inadequate. The rule was finalized in August 1992, although full implementation was delayed until January 1, 1995.
What are its specific goals and/or targets?	Goal is to provide 80% reduction in more than 10,000 to 20,000 physician-diagnosed acute pesticide poisonings per year.
Who is involved in carrying it out?	EPA and State pesticide regulatory agencies.
Is there a legal or regulatory mandate?	Yes, the rule is required under FIFRA label provisions.
Is the activity monitored or enforced? If so, how?	Yes, the rule will be monitored at State and Federal levels and will be enforced primarily at State level.
How are results and progress measured?	Number of workers trained. Number of incidents reduced. Number of enforcement actions taken, etc.
What specific progress/results have been achieved?	Full implementation was delayed until January 1, 1995. It is too soon to assess progress.

United States
Project or Activity: Programmes for applicators
Risk Reduction Category: Increasing safety of pesticide use

What are the key elements of the project/activity?	Two programmes aimed at increasing safety of pesticide use are: • certification and training of workers who apply the most toxic ("restricted use") pesticides • mandatory record-keeping of pesticide applications by commercial applicators and private applicators.
When did the project/activity begin and what prompted its initiation?	1972: Statute required applicators of restricted use pesticides to be certified in accordance with rules promulgated by EPA.
What are its specific goals and/or targets?	Train applicators in safe use of restricted use pesticides. Maintain records of restricted use pesticide applications for two years.
Who is involved in carrying it out?	EPA's office of Pesticide Programs for certifications EPA delegates responsibility for administering State Certification programs to the States. USDA extension Service has responsibility for training applicators through State Extension.
Is there a legal or regulatory mandate?	Yes. Legally required for use of restricted use pesticides.
Is the activity monitored or enforced? If so, how?	Yes. Violation of law to use restricted use pesticides without certification.
How are results and progress measured?	Number of trained applicators. Compliance and enforcement actions. States submit annual goals to EPA as part of EPA's grant process. EPA Regions conduct mid- and end-of-year reviews of States' progress.
What specific progress/results have been achieved?	1.3 million applicators currently certified. Record-keeping requirement for commercial applicators strengthened - 1993. Record-keeping requirement for private applicators initiated - 1993.

United States
Project or Activity: Various projects
Risk Reduction Category: Increasing safety of pesticide use, container disposal

What are the key elements of the project/activity?	Industry groups in the U.S. have developed a number of ways to increase the safety of pesticide use and container disposal. These include: • new mixing techniques to reduce worker exposure: 1) soluble packaging: This is one of the most innovative ways of minimizing worker exposure, while reducing the disposal dilemma. The system uses pre-measured packages containing dry chemical formations that are sealed in a dissolvable pouch. The pouch is dropped into the spray tank where it dissolves. The product is never touched. The pouches are carried in a moisture-proof bag or box that can be easily discarded since it never comes in contact with the product. 2) effervescent tablets: Tablets containing the pesticide completely dissolve when dropped into a spray tank. The mixer does not come into contact with the product, nor is there any dust or left-over debris or pesticide container to rinse. • state-level container recycling programmes supported by the Agricultural Container Research Council. ACRC works with contractors to granulate and transport flaked containers from state-approved sites. ACRC also does research on end uses for recycled container plastic.
When did the project / activity begin and what prompted its initiation?	
What are its specific goals and/or targets?	Reduced exposure Container recycling
Who is involved in carrying it out?	Industry groups
Is there a legal or regulatory mandate?	Not at this time
Is the activity monitored or enforced? If so, how?	N/A
How are results and progress measured?	See next section
What specific progress/results have been achieved?	Most states have container collection for recycling. In 1993, more than 2.6 million pounds of containers were taken from approved sites for recycling.

United States
Project or Activity: Pesticide disposal
Risk Reduction Category: Increasing safety of pesticide use, container disposal

What are the key elements of the project/activity?	EPA Regulatory Initiative: 1988 amendments to FIFRA significantly expanded EPA's authority to regulate the packaging, storage, transportation, and disposal of pesticides. EPA may now require pesticide producers to submit data on storage and disposal methods, and may also establish labelling requirements for transportation, storage and disposal of pesticides and their containers. Registrants will have significant new responsibilities to ensure that pesticide wastes are minimised and that any eventual disposal is carried out in an environmentally sound manner.
When did the project/activity begin and what prompted its initiation?	1992: EPA study on a variety of container issues (e.g. return, refill, reuse of containers; pesticide formulations facilitating removal of residues, etc.)
What are its specific goals and/or targets?	• To minimize human exposure to pesticides during the handling of non-refillable containers • To ensure that the containers can be emptied, rinsed, and disposed of properly • To encourage increased use of refillable containers, reducing the number of containers requiring disposal. • To minimize contamination of soil and water from bulk storage and container and container refilling operations of retail agrichemical dealerships and for-hire applicators of agricultural pesticides.
Who is involved in carrying it out?	EPA's Office of Pesticide Programs
Is there a legal or regulatory mandate?	Not at this time (EPA issued proposed regulations in February 1994).
Is the activity monitored or enforced? If so, how?	
How are results and progress measured?	
What specific progress/results have been achieved?	

United States
Project or Activity: Ground water protection initiatives
Risk Reduction Category: Protecting the environment

What are the key elements of the project/activity?	Various projects have been initiated to prevent ground water contamination by pesticides. These include: • a 1991 EPA survey of pesticide levels in both community and rural domestic drinking water wells (to establish baseline information) • development (by EPA) of a national "pesticides and ground water strategy" that requires states to develop plans for managing (which may mean prohibiting) pesticide use in areas where ground water is vulnerable • development of a rule for five pesticides frequently detected in ground water to require local management plans • development (by EPA) of ground water risk criteria and identification of pesticides that meet these criteria (i.e. are sufficiently likely to contaminate ground water) and then require restricted use • development (by USDA) of a model to estimate the leaching potential of pesticides • distribution (by industry) of information to farmers, through radio broadcasts and magazines, on proper pesticide management practices to protect water resources, as part of the Alliance for Clean Rural Development A Gallup Poll found that 53% of farmers are familiar with the industry Alliance, and 72% of these farmers report that the Alliance has improved their pesticide use.
When did the project/activity begin and what prompted its initiation?	Mid 1980s in response to increasing detections of pesticides in ground water
What are its specific goals and/or targets?	Prevention of further contamination
Who is involved in carrying it out?	State agencies will have the lead for managing the worst contaminants
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	Yes. EPA will review progress of management plans and continue to collect monitoring data.
How are results and progress measured?	Not yet determined
What specific progress/results have been achieved?	States are already managing some pesticides ahead of EPA requirements. Specific environmental results are difficult to measure.

United States
Project or Activity: Endangered species programme
Risk Reduction Category: Protecting the environment

What are the key elements of the project/activity?	In 1989, EPA along with the US Fish and Wildlife Service and the USDA developed a program to protect federally listed endangered and threatened species from potentially harmful exposure to pesticides. Once enforceable, EPA's program will depend upon generic labelling of affected pesticide products which will direct pesticide users to follow use limitations found in a "County Bulletin" developed for their county. A toll-free phone number is available which will tell people if their county has a County Bulletin and how to obtain one. EPA's County Bulletins will include an explanation of pesticide use limitations which will protect the species and a map outlining the species' habitat in which the use limitations apply. Interim Pamphlets, the voluntary form of County Bulletins, are currently being distributed and used. States also have the opportunity to develop programs suited to their own specific local needs. State programs include landowner agreements, local advisor councils, pamphlet distribution, and various training for pesticide applicators.
When did the project/activity begin and what prompted its initiation?	1989: Implementation of endangered species Act requirements
What are its specific goals and/or targets?	To protect species vulnerable to pesticide exposure
Who is involved in carrying it out?	EPA US Fish and Wildlife Service USDA and State agencies
Is there a legal or regulatory mandate?	Yes - the U.S. Endangered Species Act
Is the activity monitored or enforced? If so, how?	Monitoring and enforcement via inspections. County Bulletins are a continuance of the pesticide label, and violations of the County Bulletin's use limitations will be considered a label violation.
How are results and progress measured?	See above
What specific progress/results have been achieved?	250 Interim pamphlets covering individual countries 32 state-initiated plans in various stages of development

United States
Project or Activity: Green labelling of produce
Risk Reduction Category: Organic farming

What are the key elements of the project/activity?	Organic labelling is underway at both the federal and state levels. Several states including California have organic certification programmes in place. The Department of Agriculture (USDA), in response to a 1990 law, is developing federal standards for certifying farms, producers, and processors as organic.
When did the project/activity begin and what prompted its initiation?	1990 at federal level
What are its specific goals and/or targets?	Development of organic standards to promote consistent food labelling
Who is involved in carrying it out?	USDA and interested groups
Is there a legal or regulatory mandate?	Yes
Is the activity monitored or enforced? If so, how?	No. Regulations are not final
How are results and progress measured?	N/A
What specific progress/results have been achieved?	Federal Advisory Committee established

United States
Project or Activity: Research/extension projects and programmes: examples of programmes
Risk Reduction Category: Promoting IPM

Projects run jointly by EPA and the Department of Agriculture (USDA)	• EPA and USDA have set a goal of implementing IPM on 75% of the total U.S. crop acreage by the year 2000, through programmes such as those listed below: • The Agriculture in Concert with the Environment programme offers grants for projects that develop "whole-farm" production systems, considering all crops, soils, and economic factors, using sustainable practices that reduce pesticide use. • Integrated Farm Management Systems projects conduct research to improve or find alternatives to nutrient management, pest management, and animal husbandry practices that have the potential to pollute critical watershed areas. EPA monitors nonpoint source pollution, and provides data to measure the "impact of integrated farm management systems on nonpoint source pollution". • The Midwest Agrichemical Surface/Subsurface Transport and Effects Research programme examines the interaction between farming systems and adjacent terrestrial and aquatic ecosystems (both ground and surface water). It looks at rates and pathways of chemical movement, exposure of biological systems to agrichemicals, and effects of exposures. The project will recommend ways to change land use and farming practices to reduce environmental impacts.
USDA projects (done with support of state agricultural experiment stations and state co-operative extension service staff)	• The Sustainable Agriculture Research and Education programme, initiated in 1988, funds projects on whole-farm systems and farm economics, and evaluates the progress of these projects through site visits. The projects generally involve farmers and ranchers. From 1988-1991, SARE funded 164 regional and 31 national projects at a total of $17.7 million. A programme called Integrated Farm Management Program Option seeks to reduce commodity programme barriers to adoption of sustainable agricultural practices. The programme protects farm payments to farmers who rotate crops on acreage covered by government crop subsidy programs, where payments would otherwise be reduced by resource-conserving crop rotations. Up to five million acres can be enrolled in the programme. To qualify, farmers must plant at least 20% of their base acreage in resource-conserving crops and must develop a plan to reduce soil erosion, improve soil tilth and fertility, protect surface and ground water, interrupt pest cycles, and conserve water.

USDA projects cont'd	• The Integrated Crop Management Cost-Share Programme provides financial assistance to farmers who develop a comprehensive management program incorporating sustainable practices. The program is available in five counties per state for up to twenty farms per county, and for all farms within USDA-designated water quality areas at each State's discretion. Practices may include soil and tilth testing, field scouting, cover crops, green manure, improved rotations, composting and manure management, and other techniques for reducing the use of agrichemicals. Farmers must maintain pesticide and nutrient records and document increased nutrient use efficiency, enhanced environmental benefits, etc. Individual farmers are eligible for cost-share assistance up to $3,500/year for three years. • The Sustainable Agriculture Network, co-ordinated by the USDA's national library, is a network of people from agricultural universities, private organisations, and extension services, who want to communicate about sustainable agriculture. The network uses electronic mail to provide a directory of experts, computer-linked discussion groups, information and help.
EPA projects	• The Chesapeake Bay Program aims to prevent pollution and reduce toxic emissions in the Bay watershed. The programme is completing a survey of pesticide use basinwide, developing IPM recommendations for farmers in the region, developing pollution prevention activities, analysing data from watershed studies, and recommending pesticides to be monitored. • The Farmstead Assessment Program provides grants and agreements to support state and regional pollution prevention activities.

Projects, activities of private and non-profit groups (note: this represents only a small sample of activities nation-wide)	• The Rodale Institute Research Center: conducting extensive research and outreach programmes on sustainable agriculture, publishing a magazine and technical materials, and organizing farmer-directed projects. Rodale has run a large research and demonstration farm in the state of Pennsylvania for a number of decades. • The Bio-Integral Resource Center maintains a database of least-toxic pest management strategies and offers technical publications, newsletters, advice and assistance on all aspects of environmentally-sound pest management. • Agricultural chemical dealers and independent crop consultants provide IPM information in many areas of the U.S. • The National Food Processors Association and its members work with farmers and academic scientists to develop/consolidate information and techniques on IPM. As an example, Gerber Products has adopted a policy that its baby food products will have no detectable pesticide residues, and works with suppliers on pesticide management plans to achieve this goal. • The National Coalition on Integrated Pest Management represents public and private groups who want to work with government agencies to advance IPM. • The Henry A. Wallace Institute for Alternative Agriculture researches technological and policy issues and publishes a monthly newsletter and a quarterly journal.

United States

Project or Activity: Research/extension projects and programmes: examples of progress achieved

Risk Reduction Category: Implementing IPM

The following examples, taken from a 1994 report (Pesticide Use Reduction Assessment) by a staff member of the U.S. Senate Committee on Agriculture, Nutrition, and Forestry, show the range of IPM practices being adopted by U.S. farmers:

- 2,300 cotton growers [in Alabama], farming on 420,000 acres, are using crop rotation, pest scouting, biological controls and resistant varieties to control insect pests. These farmers have reduced their use of pyrethroid and carbamate insecticides by 40%, compared with non-IPM pest control practices. Insecticide costs have been reduced by $6,000,000 and the value of yield increases as a result of reduced insect damages is estimated at $12,000,000.

- Oriental fruit moth is now being controlled on about 8,000 acres of California peaches using pheromone based mating disruption. This has resulted in a reduction in the number of organophosphate insecticide applications for this pest from five to none each year, with comparable quality and yield.

- Growers on more than 1,000,000 acres of cotton in California's San Joaquin Valley use some form of monitoring for lygus bugs to make pest control decisions. As a direct result, average pesticide use decreased by 85% (from 10.5 applications to 1.5 applications per year) between 1970 and 1993, with estimated savings of $60 per acre. Yield has increased during the same period by 12.7 lb. per year.

- Soybean cyst nematode (SCN) was rated as the second most important disease of soybeans during the 1992 growing season. Education programs on SCN management, stressing integrating nonhost crops and planting of resistant varieties in recommended rotations, were directly responsible for the elimination of nematicides for the control of SCN in Illinois. The savings to Illinois producers are estimated at $23,400,000 in 1992.

- 200 apple growers, farming on 25,000 acres in Michigan, use tree row volume calculations to reduce pesticide spray rates. The adoption of this practice has resulted in a 25% reduction in pesticide use, and net farm income has increased by $50 per acre.

- At least 35% of Nebraska's corn acreage (approximately 2,500,000 acres) is rotated to soybeans, which reduces the need for insecticides to control corn rootworms. Use of crop rotation for corn rootworm control has resulted in a reduction of soil insecticide use of over 1,000,000 lbs. of active ingredient per year, saving farmers at least $10,000,000 annually in production costs, with no loss in yield.

- 500 peanut growers, farming on 30,000 acres in Oklahoma, have adopted a disease forecasting system which has reduced pesticide applications by 60%. These efforts have increased profits by an average of $50 per acre and resulted in an additional $1,500,000 in income for a 5 county region.

More than 19 million pounds of insecticide was applied to Texas cotton in the late 1960's prior to intensive IPM education programs conducted by the Texas Agricultural Extension Service. In less than ten years, insecticide use dropped to about 2.3 million pounds (about an 88% reduction) and remains there today as a direct result of multiple tactic cotton IPM programs.

Progress Report on the BPPD Pilot Program

Biopesticides and Pollution Prevention Division
U.S. Environmental Protection Agency

June 1995

For a number of years, there has been a growing interest at EPA and a variety of outside organizations in the principles of integrated pest management (IPM), reduced use of toxics, improved resource management, and sustainable agriculture. In 1992, EPA and USDA co-hosted a National IPM Forum at which 500 participants from throughout the agricultural community identified the lack of a strong national commitment as the major constraint to further adoption of IPM.

Testifying before Congress in 1993, EPA, USDA, and FDA jointly committed to a goal of placing 75 percent of U.S. acreage under IPM programs by 2000, and reducing the risks from the use of pesticides.

In order to reduce the risks from the use of pesticides and encourage the use of IPM, new safer pesticide products must be provided in a timely manner. EPA's lengthy process of pesticide registration was designed to safeguard public health and the environment, but some of the policies and regulations involved delayed entry of newer, safer products from the market - leaving users with older, often more toxic pesticides to use.

In early 1993, EPA announced a priority-setting policy for new chemical active ingredients. Under this “Reduced Risk Initiative”, pesticide registrants that could show that their new product was safer than other products being used on the same crop and pest could receive an accelerated review.

Biological pesticides were already being given special attention. For a number of years, staff within OPP’s Registration Division, Health Effects Division, and the Ecological Fate and Effects Division have been handling registration actions for biological pesticides. In 1994, a decision was made to co-locate these staffs and have them work in teams to resolve issues and accelerate progress.

The resulting organization, the Biopesticides and Pollution Prevention Division (BPPD) in EPA's Office of Pesticide Programs, was designed to respond to the reinventing government concerns of Vice President Gore’s National Program Review. This paper is a mid-course progress report on BPPD - what the division has done since its creation, where it is headed, and how well this pilot project is doing.

The Biopesticides and Pollution Prevention Division was set up in November 1994 as a one-year pilot to streamline the registration process for biological pesticides and to advocate for pesticide pollution prevention through the use of IPM and safer pest control methods. BPPD is also testing process changes: whether a redesigned office can work faster and smarter; how the streamlining goals of the Reinventing Government initiative work in practice; how to open up lines of communication with industry and the public; and how to incorporate pollution prevention into the Office of Pesticide Programs on a long-term basis.

BPPD's mission is to accelerate the registration of new biological pesticides, reduce pesticide use, and encourage the development and use of safer pesticides. Although there are no measurable environmental results yet in any of these areas, the groundwork has been laid for a great deal of progress. The next two sections describe BPPD's activities in accelerating registration of biological pesticides and motivating growers to use these alternatives.

Accelerated Registration of Biological Pesticides

New Biologicals

In April 1995, EPA registered *Beauveria bassiana* Strain GHA (trade name Mycotrol Biological Insecticide) to control the silverleaf whitefly on vegetable crops and cotton. This insect has caused annual crop losses of over $200 million in the Southwest and Florida since 1991. By now the whitefly is resistant to many conventional pesticides.

Mycotrol was developed by Mycotech Corp. of Butte, Montana in cooperation with USDA' s Agricultural Research Service. Mycotrol consists of fungal spores which invade the whitefly's skin or cuticle and feed on its body. The pesticide has performed well in small-plot field trials in Texas and Arizona.

BPPD is responsible for registration and reregistration activities relating to biological pesticides, which include microbial pesticides, biochemical pesticides with a non-toxic mode of action, and plant pesticides.

In just six months, BPPD has finished registration decisions on eight new biological pesticide active ingredients. These include:

- pheromones — a class of biochemical pesticides that disrupt the mating of insects that infest agricultural crops;

- microbial pesticides — to replace fungicides used in the post-harvest treatment of fruit to prevent spoilage in storage; and

- the first plant-pesticide — a pesticidal substance genetically introduced into potatoes so that the plant protects itself. This technology does not harm beneficial insects and is likely to be widely used in the future. For potatoes, the technology way save 1 million pounds of chemical pesticides per year.

"The exceptional speed with which these products were reviewed and approved by the Biopesticide and Pollution Prevention Division of the EPA clearly demonstrates its firm commitment to bring effective reduced risk products to the market."

— Donald Aiello, Acting Chief Operating Officer, EcoScience, speaking about the registration of EcoScience's Bio-Save 10 and Bio-Save 11 biofungicides for the control of post-harvest diseases on apples, pears and citrus.

Our common sense approach to regulating biological pesticides eliminates unnecessary data requirements for products with low risks. It reduces the time to market and saves money, which is especially important for the many small biological pesticide producers. The registration process for a new chemical pesticide has taken 5-10 years and $16 millions. The goal for registration review of a biological pesticide is less than 6 months

and less than 10 percent of the cost for a chemical pesticide. The shorter, less expensive process means that more products will become available to IPM practitioners, and more producers will be encouraged to develop biological alternatives.

BPPD has also experimented with flexibility as a means of offering regulatory relief. For example:

- We waived data requirements for particular biopesticides depending on their use patterns or a knowledge of their safety.

- In the case of pheromones, which are considered reduced-risk pesticides, we anticipate expanding the limit for field testing from 10 to 250 acres without requiring an experimental use permit, for all broadcast spray formulations.

- Exemptions from registration have been proposed for three types of low risk plant-pesticides.

The Pesticide Environmental Stewardship Program

Current PESP Partners

Agricultural:
National Potato Council
American Corn Growers Association
California Citrus Research Board
California Cling Peach Advisory Board
California Pear Growers
California Pear Advisory Board
California Tomato Board
International Apple Institute
Mint Industry Research Council
Northwest Alfalfa & Seed Growers
Pear Pest Management Research Fund

Non-Agricultural:
Appalachian Power
Atlantic Electric
Carolina Power & Light
Columbus Southern Ohio Power
Delmarva Power
Duke Power
Golf Course Superintendents' Association of America
Indiana Michigan Power
Kentucky Power
Kingsport Power
New York State Gas & Electric
Pennsylvania Electric
Pennsylvania Power & Light
Pennsylvania Rural Electric Association
Professional Lawn Care Assn. of America
Virginia, Maryland & Delaware Association of Electric Cooperatives
Wheeling Power
Wisconsin Public Service Corporation

The Pesticide Environmental Stewardship Program (PESP) is the name of EPA's new effort to instill a pollution prevention approach into the pesticide arena. Its centerpiece is a voluntary partnership program to bring government, industry, academia, and science together to find safer pest control technologies and educate pesticide users to less them. Current PESP Partners (see above) represent a broad array of agricultural and non-agricultural groups, selected on the basis of their pesticide usage.

PESP has taken a slightly different twist than other voluntary EPA-industry partnership programs. Partners in PESP are not asked to commit to a percentage use reduction goal, since use reduction does not necessarily translate into risk reduction. Instead, Partners agree to develop and implement an environmental stewardship plan tailored to their own pesticide usage. The plans contain specific pest management goals and strategies that emphasize source reduction in the use of pesticides and a shift to less toxic products.

In turn, EPA provides a liaison to assist the partner in developing comprehensive, achievable goals. Liaisons also act as "customer service representatives" for EPA, providing the partner with access to information and personnel. Forty individuals in five OPP divisions and one EPA region have already taken on the liaison assignment. Computer networking and e-mail are already in place to help liaisons stay in touch with one another and exchange information.

Also as part of the partnership agreement, EPA will attempt to integrate the environmental stewardship plans into its agricultural and environmental policies and programs. EPA will also award cooperative agreement funds to the charter partners to carry out their efforts. BPPD has taken over the Management of the ACE grant program (Agriculture in Concert with the Environment), a joint grant program of USDA and EPA to fund agricultural pollution prevention research, education, and demonstration. ACE awarded $1.4 million in grants for programs in pesticide risk reduction this year.

Commitments

What commitments have been forthcoming from PESP Partners? Grower groups are committing to conducting more research into IPM techniques, developing computer prediction models for more precise pesticide applications, education programs for their members, and cooperative efforts with equipment manufacturers to fine-tune application techniques. Utility companies have committed to work toward a national environmental stewardship plan for utility rights-of-way, worker training on pesticide use, and IPM research.

Specific examples of PESP Partners' commitments include:

- The American Corn Growers will be promoting and expanding its "bottom-line" corn growing contest, which seeks to maximize a grower's profit from corn production while reducing production inputs such as pesticides.
- The California Pear Growers and California Pear Advisory Board are funding — through grower and processor check-offs — the Pear Pest Management Research Fund and research into safer pest management techniques.

The California Citrus Board has committed $750,000 to research into safer pest control.

- A consortium of East Coast and Midwest utilities is training their pesticide users in techniques to lower risks from pesticide application.

BPPD is pursuing partnerships with other organizations. We anticipate that there will be over 40 PESP partners by the end of the year.

EPA Regional offices are already involved in PESP, with a PESP contact appointed in each region. BPPD is working with Region 6 and the State of Texas to increase IPM implementation in the schools using satellite conferences with school administrators. Region 5, the University of Illinois, and the Farm Bureau have launched a project to compare “safer” herbicides to triazine. And funding is going toward Region 9's BIOS Program (Biologically Integrated Orchard Systems), a demonstration program which emphasizes the use of cover crops, beneficial insects, and other biological practices.

Getting the word out on environmental stewardship and alternative pest management is a major part of the PESP process, and BPPD is working on brochures, displays for conventions, a PESP InfoLine, occasional bulletins (PEST SMART Update), and a video segment for the “Today's Environment” program.

Why is BPPD working so well?

An accelerated registration process that works, a major new voluntary partnership program in full swing -- BPPD has been operating on all cylinders and moving forward rapidly -- and all in six months! Part of the reason for this great start is that all the staff volunteered to be a part of this pilot. Staff commitment is high; the enthusiasm palpable. Many of the staff had been working in OPP for a number of years, but leaped at the chance to reinvent the pesticide regulatory process.

Another factor is the sleek, streamlined management structure. BPPD began with two managers to 33 staff. This works out to about a 17:1 staff to management ratio, exceeding EPA's goal (which is 11:1). Instead of creating management bottlenecks, though, the opposite has happened. BPPD staff teams are empowered to make decisions that normally have to go through several layers of management.

Still, the first six months have revealed that changes are needed to better direct workflow and set long-term priorities. BPPD is now modifying the structure but it will keep its high staff to management ratio.

BPPD combines scientists doing risk assessments with regulators managing the registration process. Although that doesn't sound unusual, in fact it is. Traditionally, the pesticide registration process has been handled by scientists and regulatory analysts working in different divisions. In BPPD, staff with different backgrounds are working in close-knit teams, cross-training each other to understand and get involved in the total picture, and taking responsibility for decision making within the team's area-of expertise.

The fact that this system is working well comes as no surprise -- it is based on the same idea that American businesses have been learning over the last 10-15 years, and that was championed by Japanese automakers. Teams that work together and gain familiarity with all parts of the process work better, more efficiently, and with more enthusiasm and output than conventional work arrangements.

The enhanced empowerment of staff is also taking place in the context of other improvements. EPA is “working smart” with its partners -- other federal agencies and states. On biologicals, USDA and EPA have been coordinating their efforts: EPA and USDA have identified priority needs where there are few alternatives to high risk pesticides. USDA has contributed research funds to find safer pest control methods and given EPA research results on reduced-risk pesticides. EPA will expedite the registration of these pesticides.

Partnership is also working between EPA and the states. The registration of the biological pesticide Bio-Save in March 1995 was a "concurrent affair,” with both EPA and California EPA announcing the registration on the same day, the anniversary of their agreement to share information and harmonize federal and state pesticide registration activities. That harmonization should now move into full gear, with target dates set for achieving a common method of doing risk assessment, and with a final goal of arriving at standardized review procedure for all studies.

Looking Ahead

BPPD is looking forward to an equally busy next six months. Major goals for the remainder of the pilot year include:

- Registering an additional 5 to 7 biological pesticides (new active ingredients).
- Signing up organizations that represent large commodities as PESP partners.
- Negotiating strategies of charter PESP partners and funding their projects.
- Developing a Charter Supporters program for organizations that support the concept of PESP but are not direct pesticide applicators (such as supermarkets, food processing companies, equipment manufacturers, etc.).
- Pushing forward on publicity efforts, including the brochure, Discovery Channel program.
- Pursuing Federal Partnerships in PESP.
- Measuring the environmental results achieved by BPPD's efforts.

Looking beyond the first pilot year, we are convinced that both the program initiated in BPPD and the division's mode of operating are worth pursuing. This is a new role for EPA, an exciting new way of interacting both externally and internally. BPPD is starting to influence the market, even though that influence is more subtle and less easy to point to than any of us is used to. Nevertheless, the sense is growing that BPPD’s programs are getting at the heart of the matter -- the welter of pest management decisions faced by every grower and pesticide user -- and shifting those decisions in the direction of environmental stewardship. Even with a barebones staffing level, BPPD’s teams and liaisons are being listened to and are making inroads among groups that have not in the past been receptive to these messages. EPA’s support of BPPD's programs and approach will send a signal inside and outside EPA that the Agency is seriously committed both to reinventing government and to obtaining environmental results.

III. Conclusions

The traditional approach to the regulation of individual pesticides and uses in the U.S. has created many safeguards to ensure that the public is protected from unreasonable risks, including the risks of eating pesticide-treated foods. The food supply of the U.S. is among the safest in the world. However, as pointed out in the 1993 report from the National Academy of Sciences on special sensitivities of children to pesticide risks, it is very difficult, time-consuming, and expensive to characterize fully all the risks from pesticides. Risk reduction, including pollution prevention and reduced use of the higher risk pesticides, is a preferable strategy, instead of continued primary emphasis solely on careful analysis and evaluation of discrete pesticides. The strong traditional regulatory approach for individual pesticides in the U.S. supports the transition to this new approach. Data development costs imposed by the ongoing U.S. reregistration process, and sometimes the risk concerns being raised as a result of this process, are driving many uses or entire chemicals off the market. Agricultural producers want to explore alternative pest control strategies as the availability of many conventional pesticides declines. Their primary interest is in determining the most effective, least costly pest control strategies for the near and long term.

It is too early to identify which risk reduction activities are the most or least successful. It is our belief that the most successful activities will have the following elements:

- Have risk reduction strategies based on commodity or whole systems approaches;
- Actively involve producers, since reductions can only take place as a result of their decisions and actions;
- Provide users with the knowledge and technologies needed to reduce the risks associated with pesticide use; and
- Foster a public consensus on the goals and process for risk reduction strategies.

Risk reduction activities meeting these criteria are very resource-intensive, including extensive consultations with both producers and consumers. The U.S. is fortunate in having well organized commodity grower groups, and an extensive USDA/State agricultural research and extension network extending to the county level throughout the country. These organizations are becoming agents of change, based on the emerging national consensus in favor of IPM, sustainable agriculture, and use/risk reduction.

The Sustainable Agriculture Research and Education (SARE) grant program operated by USDA is an example of a program that embodies the key elements for success: producer representation on regional management councils; meaningful involvement by producers in most funded projects; special emphasis on whole-farm systems research and economic impact assessment.

The Administration has faced a number of issues in the implementation of its use/risk reduction initiative. The initiative places significant responsibility on grower groups, working with public research and education agencies, to identify the risk/use reduction levels that are feasible, rather than mandating a fixed national percentage reduction.

Commodity grower groups are beginning to step forward to meet this challenge. In addition to the need for voluntary cooperation, the initiative raises significant implementation needs, including: (1) development of ecological and human health risk indices; and (2) obtaining accurate baseline measurements for pesticide use. Accurate risk indices for individual pesticides are essential to determine risk trade-offs and desirable use/risk reduction strategies. Accurate baseline measurements are needed to measure progress. This initiative is the most far-reaching national risk reduction activity currently undertaken by the U.S., and its success will be more apparent within a year.

As mentioned previously, many U.S. policies and programs directly or indirectly affect risk reduction activities. In many cases, these policies and programs discourage reductions in pesticide use. The 1995 Farm Bill discussion will include a consideration of the linkages between pesticide use and agricultural policies.

The U.S. looks forward to reviewing other countries' responses to this risk reduction survey, and anticipates that successful approaches developed by other countries will be useful in shaping both new and ongoing U.S. initiatives. The U.S. has supported the development of a pesticide program activity within the OECD, and believe it is important for the OECD to identify its role in pesticide risk reduction. The Intergovernmental Forum on Chemical Safety (IFCS), established at the May 1994 Stockholm meeting, will ensure coordination of risk reduction activities among all the involved international organizations.

EUROPEAN COMMISSION

CONTACT PERSON(S):

Mr. Marc Debois
Chemicals Notification Unit
DG XI / A / 2
Commission of the European Communities
Rue de la Loi 200
B - 1049 Brussels
Belgium

Tel: (32) 2 299 0349
Fax: (32) 2 295 6117

I. Framework for Pesticide Risk Reduction Activities

Co-ordination with all Member States and internally with all directorate generals

1. How does the EC approach risk reduction?

- Programme activities are at a regional level, with several countries as leads.

- legislative - EC has different legislation dealing with risk reduction but no specific project that goes beyond these. Of note is latest Common Agriculture Policy reform (2078 / 92), which provides for grants to farmers who use environmentally friendly methods, decrease their use of pesticides.

2. What principal factors prompted initiation of efforts to reduce pesticide risks?

- environmental concerns
- especially water issues
- public demand.

3. What is the legal/regulatory mandate for the EC's pesticide risk reduction activities?

- Fifth Action Programme (Appendix 1). This is regulatory; was officially adopted by the Commission and endorsed by the Council. (Has some legal status although it's not legally based.) All environmental activities in DG XI are based on this. Went into effect in March 1992. (Note that this is the Fifth Action Programme. The EC has had environmental action programmes since 1981 - each lasts about 4-5 years.)

II. Description of Activities and Results

1. CAP Reform 1992, Reg 2078/92, Agri-Environmental Measures (dealt with more by DG VI than by DG XI)

   - Measures foresee possibility to give direct grants to farmers if they use environmentally friendly methods - using less pesticide than normal in their country. Participation is voluntary.

   - Process - each Member State has to set up action plans, then farmers can ask for money

     – All countries have an action plan which specifies criteria for environmentally-friendly farming.

     – Farmers have tapped this but funds are somewhat limited.

2. Registration and re-registration (re-registration started at end of 1992 and is mentioned in the Fifth Action Programme)

   Accomplishments:

   - positive list of active ingredients. It is agreed and authorised.
   - rules for authorisation of ppp by Member States

   New risk reduction components:

   - Directive sets up new criteria for authorisation of ppp - described in Annex 6, Uniform Principles (bad actors will disappear).
   - Review programme to review all active ingredients one by one to see if they comply with the new criteria. Again, bad actors will disappear.

3. Setting of residue levels (doesn't come under 5th Action Programme)

   There are many different directives dealing with different food stuffs

4. Directive 79/117 EC - Restrict or ban use of some pesticides ("negative list")

5. Research project with the Dutch government (shared-cost project)

Main goal is to implement 5th Action Programme in the area of pesticides, to tackle risk reduction by measures other than those just mentioned. Goal is to reduce use of pesticides as specified in 5th Action Programme. Since 1992, the idea has shifted from reducing quantity to reducing impact.

- 1st phase of implementing 5th Action Programme has been information collection
  2 booklets published:
  LEI - statistics on current ppp use; quantities used in different countries
  CLM - inventory of facts, figures showing negative impact of pesticides in the EU, e.g. in water. Also, a catalogue of possible measures which the EC could take to reduce the use of pesticides (10-12 measures, e.g., better control of use, distribution, economic instruments like taxes, training/education, improving enforcement).

- 2nd phase (EC has redrafted terms of ref.) EC is now in process of launching 5 projects in phase 2. These are derived from the conclusions of the EC workshop (held at the end of phase 1). The 5 projects are:

1. Further analysis of use patterns for ppp. They selected several regions in the EC to determine patterns of use by interviewing farmers (first result by the end of this year).

2. Trying to make link between residues in environment (water, soil) and impact. Selected same regions for analysis of ppp presence and impact.

3. Further elaboration of arguments for an EC policy. First a review of activities already done at EC level (in countries). To try to have a better background - what's successful and what's not. Will select 1-2 regions where there's no specific action but has been a reduction of use, to see why this happened.

4. Analysis of current EU legislation and instruments to see whether they affect pesticide use (CAP reform, agri-env measures, regis/re-regis).

5. Investigate in detail other possible instruments and best possible combination.

The EC has begun with the 1st project - expects results at the end of 1995.
The entire effort - all 5 projects - is expected to be done by end of 1996/beginning 1997.

At this stage it's more information-gathering. They have a steering committee for monitoring. They inform industry and Member States of the progress of the project.

III. Conclusions

Successful activities:

- residues (in place for years, works well)

Less successful:

- negative list of active ingredients. Positive list works better.

Most important:

- project with the Dutch - collection of data on use patterns. The difficulty will come at end of 2nd phase (measuring progress...)

International projects:

- interested in having more information gathered on a wider scale. This would help the EC take decisions later. Experience from others will be helpful.

Appendix 1

COMMISSION OF THE EUROPEAN COMMUNITIES

Extract from COM(92) 23 final - VOL. II

Brussels, 27 March 1992

TOWARDS SUSTAINABILITY

A European Community Programme of Policy and Action in relation to the Environment and Sustainable Development

VOLUME II

4.4 The Agriculture Sector

Agriculture, together with forestry, occupies more than 80% of the territory of the community. Traditionally, the farmer is the guardian of the soil and the countryside. By careful husbandry, including integrated crop and livestock farming and waste management, farmlands are passed in sound condition from one generation to the next. Agriculture has shaped and indeed continues to shape the European countryside and has set much of the foundation of European culture.

Just as in the case of manufacturing industry and transport, however, the agricultural sector and farming practices have undergone significant modernisation and change during this century, and more particularly over the last forty years. Among the factors which have brought change are the drift of rural populations to cities and towns, increased mechanisation, improved transport, improvements in seed quality, crop protection and animal strains, international trade and competition in food products and feed-stuffs.

Against this background, the Community's Common Agricultural Policy (CAP) has been developed and adapted so as to fulfill the objectives of the Treaty of assuring the availability of food supplies at reasonable prices, the stabilisation of markets and a fair standard of living for the agricultural Community. However, while the achievement of these objectives has been greatly promoted by the CAP's price support mechanisms, the same instruments are now seen to be having some less positive side-effects.

One of these effects has been an over-emphasis in some areas on production levels with consequential over-intensification. This, in turn, is leading to overexploitation and degradation of the natural resources on which agriculture itself ultimately depends: soil, water and air. In crop production, systematic use of plant protection products has led to a relative resistance in parasites increasing the frequency and the cost of subsequent treatments and causing additional soil and water pollution problems. In certain areas of the Community, large quantities of fertile top soil are lost every year because of erosion due to inappropriate management of the land. In livestock farming, animal diseases have become more difficult to deal with, as genetic uniformity and concentration in space of holdings have increased. Animal wastes create more and more problems of water and soil pollution. Ground clearance and drainage are causing depletion of wetlands and reducing biodiversity. Excessive use of nitrogenous and phosphate fertilisers causes eutrophication in surface waters in many regions of the Community; the resulting algal blooms disturb the oxygen levels of the water with dramatic consequences for fish, feeding matter and the ecosystem in general as well as the use of the water for drinking and recreation purposes. Even in cases where specific regional or horizontal measures are introduced for soil protection their success is often compromised under the pressure of other market or structural measures. For example, efforts to protect heatherland and combat erosion in northern countries can fail because of overgrazing as a result of the headage payment schemes, particularly in the sheep sector.

Apart from the environmental degradation incurred, the present system generates surpluses at high costs to the Community budget without improving the income situation of the European farmers. Given all of these circumstances, it is not only environmentally desirable, but it also makes sound agricultural and economic sense to seek to strike a more sustainable balance between agricultural activity and the natural resources of the environment.

This appreciation is clearly reflected in recent deliberations on the reform of the Common Agricultural Policy, which, interalia, have indicated that "producing more" cannot be any longer considered as the central point of Community policy. The Commission's 1991

Reflection Paper on the development and future of the CAP[5] recognised the need to encourage extensification with the object of not only reducing surplus production but also of contributing to an environmentally sustainable form of agricultural production and food quality and formalising the dual role of farmers as food producers and guardians of the countryside. The Commission's subsequent proposals[6] include an agri-environmental action programme which encompasses several types of financial assistance designed to encourage farms to operate their land holding in an environmentally-friendly way.

Forestry

In many regions of the Community, forests are not only a determinant factor for the environment, with different ecological and social functions, but are also a matter of considerable importance. The Community as a whole is the second greatest consumer of timber in the world. Of a total annual consumption of some 200 million m^3, Community production yields approximately 100 million m^3 i.e. it is only 50% self-sufficient at present.

Notwithstanding this situation, the Community forests have long been neglected. Today, nearly 40% of the total is suffering various degrees of ill-health caused mainly by acidification; IIASA studies[7] indicate EC (excluding Spain) harvest-loss attributable to air pollution of the order of 30 million m^3 per annum, with an estimated value of some 10 billion ECU. In addition, about 1% of total forest area is destroyed each year by forest fires, the vast bulk of this being in the Mediterranean Region.

Against this background the Community, in 1989, adopted a forestry policy[8] designed to:

- protect the forest heritage against threat from acidification and fire;
- improve the productivity of forests;
- develop forest and forest-related activities, especially in rural areas;
- promote afforestation on agricultural land.

However, over the period covered by this Programme, it will be necessary to look beyond the concerns and actions referred to above and to draw a closer link between the Community's internal timber production and consumption patterns and its moral and political obligations to work towards the solution of global concerns about deforestation.

Long term objectives, medium term targets and measures needed in relation to agriculture and forestry are given in Table 4.

[5] COM(91) 100 final of 1 February 1991
[6] COM(91) 258 final of 11 July 1991
[7] IIASA: International Institute for Applied Systems Analysis, Austria; Executive Report 17, February 1991
[8] COM(88) 255; O.J. N° L165, 15.6.1989

Table 4: AGRICULTURE AND FORESTRY

OBJECTIVES	TARGETS UP TO 2000	ACTIONS	TIME - FRAME	ACTORS
Maintenance of the basic natural processes indispensable for a sustainable agricultural sector notably by conservation of water, soil, and genetic resources	Standstill or reduction of nitrate levels in groundwaters.	Strict application of the nitrates directive	1994⇒	*MS* + AGR
	Reduced incidence of surface waters with a nitrate content exceeding 50 mg/l. or giving rise to eutrophication of lakes and seas.	Setting of regional emission standards for new lifestock units (NH_3 and silos (silage)	Ongoing	*MS* + LAs
		Reduction programme for phosphate use	1995	EC + *MS*
	Stabilisation or increase of organic material levels in the soil	Allocation of premiums and other compensating payments to be subject to full compliance with environmental legislation	1995⇒	EC *MS* + LAs + AGR
Decrease in the input of chemicals to the point that none of these processes be affected Equilibrium between input of nutrients and the absorption capacity of soils and plants	Significant reduction of pesticide use per unit of land under production and conversion of farmers to methods of integrated pest control, at least in all areas of importance for nature conservation	• Registration of sales and use of pesticides	Ongoing	EC + *MS* + AGR
		• Control on sale and use of pesticides	1995	EC + *MS* + AGR
		• Promotion of “Integrated Control” (in particular training activities) and promotion of bio-agriculture	1992⇒	EC + *MS* + AGR
Rural environment management permitting the maintenance of biodiversity and natural habitats and minimising natural risks (e.g., erosion, avalanches) and fires	15% of agricultural area under management contracts	Programmes for agricultural / environment zones with premiums co-financed by FEOGA	1992	*MS* + EC
		Protection of all endangered domestic animal races	Ongoing	*MS*
	Management for all rural areas in danger	Re-evaluation of license conditions for irrigation and of state aids for drainage schemes	1995	*MS* + EC
		Training of farmers, promotion of exchange visits between regions with comparable environment management situations	1992⇒	EC + *MS* + LAs
Optimisation of forest area as to fulfill all their functions	Increase of forest plantation, including on agricultural land;	New afforestation and regeneration of existing forest, favouring the most adequate means for the environment (slow growing trees, mixed afforestation);	Ongoing	EC + *MS* + LAs + forest-owners
	Improved protection (health and forest - fires)	Further action against forest - fires	id	id

FAO
Countries' Responses

ECUADOR

I. Framework for Pesticide Risk and Use Reduction Activities

1. How does your country approach pesticide risk reduction?

The Environmental Advisory Commission attached to the Ecuadorian Presidency of the Republic (Comisión Asesora Ambiental de la Presidencia de la República, CAAM) has organized a National Programme of Training on Safe and Judicious Use of Pesticides. This Programme is aimed at minimizing human health risks and adverse effects on the environment, through intensive train-the-trainers subprogrammes on the safe and efficient use of pesticides for aerial and terrestrial applicators, distributors, medical personnel and farmers. Farmers are urged to learn procedures on appropriate management of pesticides to avoid contamination, as well as first aid measures in case of poisoning. Thus we are developing everything possible to reduce unnecessary risk to man and the environment from exposure to pesticides.

The Ministry of Agriculture has also been involved in this programme through the Ecuadorian Animal and Plant Protection Health Service, which is responsible for the registration and control of pesticides. The Ministry of Public Health, the Ministry of Industries, the National Association of Producers and Importers of Pesticides, and the Ecuadorian Committee of Defence of the Nature and the Environment, which represents all NGOs in Ecuador, are equally sharing with this endeavour.

Our goal is to reach a figure of at least 2000 trainers who in turn will train others. Appropriate manuals for technicians, physicians, applicators and distributors have been designed, to make it easier to follow instructions and train other pesticide users.

2. What principal factors prompted your country to initiate efforts to reduce pesticide risks?

Our government has always been concerned with all matters related to adverse effects of pesticides, especially on: workers' health, especially in flower plantations; contamination of water streams by pesticides residues, which have already caused a considerable damage to our shrimp productivity, which has affected the national economy. This crisis was called "Sindrome of Taura".

3. Is there a legal or regulatory mandate for your country's pesticide risk reduction activities?

Yes, our government issued a Decree Nº 1832 dated June 1994 which covers the policy on environment issues; stating that the government will give the highest priority to the control of contamination, with the use of pesticides in agriculture as the first target. Therefore, the Government and Agencies involved in this purpose will support all activities to control the proper use of pesticides.

II. Description of Activities

ECUADOR
Project or Activity: Integrated Control of Nematodes
Risk Reduction Category: Implementing IPM

What are the key elements of the project/activity?	In 1989, our Government initiated the integrated control of nematodes, due to their devastating action on several crops such as the banana fields, potatoes and sweet tomatoes. We must enphasize that the catastrophic mishap was credited to the excessive mishandling and excessive use of pesticides.
When did the project/activity begin and what prompted its initiation?	1989
What are its specific goals and/or targets?	Technical control of pesticides use through the combination of organic and chemical fertilizers and pesticides, coupled with the implementation of appropriate regulations and procedures to overcome past errors and ensure success.
Who is involved in carrying it out?	The Agriculture and Livestock Ministry, the National Institute for Agriculture and Livestock Investigation, likewise have the responsibility of monitoring pesticide application and recommending feasible alternatives.
Is there a legal or regulatory mandate?	The current law at the national level is based on the Legislative Decree #73 and its implementing rules and regulations, covers the formulation, manufacturing, importation, distribution, trading and the application of pesticides and related products for agricultural use.
Is the activity monitored or enforced? If so, how?	Those activities are not subject to follow-up
How are results and progress measured?	Notwithstanding the lack of statistics which will confirm concrete results obtained to date, in general it is fair to gauge that the results have been encouraging. It must be stressed that our main interest for the near future is to organize appropriate controls to provide reliable data on this matter.
What specific progress/results have been achieved?	The following support the explanation given above: <u>Nematicides Imports:</u> 1990: 876,212 kg 2,551,610 US$ 1991: 953,040 kg 2,987,266 US$ 1992: 786,874 kg 5,003,527 US$

ECUADOR

Project or Activity: Biological control of *Icerya purchasi* Maskell with predator *Rhodolia cardinalis*

Risk Reduction Category: Implementing IPM

What are the key elements of the project/activity?	In view of the extensive damage done by the *Icerya* on parks and trees in Quito, the Ecuadorian Capital, where it was not possible to use pesticides as a control measure, biological control methods had to be introduced, necessitating the importation of the predator (*Rhodolia cardinalis*).
When did the project/activity begin and what prompted its initiation?	
What are its specific goals and/or targets?	The introduction of biological control methods as an alternative to reduce the excessive use of pesticides.
Who is involved in carrying it out?	Use of biological control methods by all of those governmental institutions responsible for parks, city streets, play grounds and also private gardens.
Is there a legal or regulatory mandate?	The law for the formulation, manufacturing, importation, distribution and trading of pesticides and related products for use in agriculture, stipulates that: “Pesticides should be used only after all alternatives included in the integrated pest management (IPM) have been exhausted."
Is the activity monitored or enforced? If so, how?	The maintenance and reproduction of *Rhodolia cardinalis* is under close supervision and is distributed to all those interested at no cost.
How are results and progress measured?	Results indicated that the damage done by *Icerya* was under control. Due to close surveillance programme, this pest has not come back to attack with the same severity as at the onset.
What specific progress/results have been achieved?	The impact of this control measure among several users was outstanding. They used the predator insect and promoted the use of biological agents as the primary alternative to pesticides. This resulted in a large demand for samples of the predator insect by farmers.

ECUADOR

Project or Activity: The biological control of *Hypothenemus hampei* Ferrari in coffee utilising the Uganda wasp (*Prorops nasuta* Waterston).

Risk Reduction Category: Promoting IPM

What are the key elements of the project/activity?	Because of the inefficiency of control by pesticides of the attack of *Hypothenemus* in coffee, farmers were forced to look for some biological control agents. Thus the Uganda wasp was introduced and now there is a reproduction center which provides a sufficient supply to meet the national demand for this predator.
When did the project/activity begin and what prompted its initiation?	
What are its specific goals and/or targets?	Introduction of the concept of biological control.
Who is involved in carrying it out?	All Departments involved in coffee production, such as the Plant Protection Programme of the Ministry of Agriculture and Livestock, the National Institute for Agriculture and Livestock Investigations, the National Programme of Coffee, and all coffee growers promoted the use of biological control.
Is there a legal or regulatory mandate?	Yes, the law #73 mentioned before.
Is the activity monitored or enforced? If so, how?	Yes, through the control of the production and increase of the production.
How are results and progress measured?	
What specific progress/results have been achieved?	The increase of coffee production is one of the results, as well as the high demand for the Uganda wasp.

III. Conclusions

1. All activities have been successful because of:

   a) Reduced use of extremely and highly toxic pesticides
   b) Reduced cost of production
   c) Reduced risk to farmers, to users, and to the environment.

2. Least successful activities:

   Biological control because the unavailability of these organisms, which must be applied in large scale.

3. We have had difficulties to ensure continuity of this progress, due to budgetary constraints for follow-up activities.

4. Other policies/programmes that have affected the outcome of pesticide risk reduction activities:

   The health programmes, where the high use of pesticides applied indoors or by plane creates confusion among the users of pesticides and the programmes to reduce the high use of these compounds.

5. What international projects would help:

   An IPM Project to control the main phytosanitary problems of the main crops which demand high amounts of highly toxic pesticides.

JAMAICA

CONTACT PERSON(S):

Mr. Paul Whylie
Registrar
Pesticides Control Authority
10 Caledonia Avenue
Kingston 5, Jamaica W.I.

Tel: (809) 960 0775 or 926 9220/30
Fax: (809) 960 0775 or 926 3857

I. Framework for Pesticide Risk and Use Reduction Activities

Awareness about hazardous effects of pesticides is extremely low, and harmful poisonings of farm workers as well as contamination of water, soil and foodstuff are some of the undesirable consequences. In some cases, crops exports have even been rejected due to pesticide residues. At present the control of import, registration and use of pesticides in Jamaica is unsatisfactory.

The **PESTICIDES CONTROL AUTHORITY (PCA)** as a corporate body is now facing this issue. Since the Pesticides Act was promulgated in 1987, a legal framework for the development of the PCA has been established. Detailed Regulations of the Acts are currently being vetted by the PCA in order to reinforce its role as the governing body for pesticide control in the country.

In June 1993, a Project Agreement was signed with the German Government in order to strengthen effectiveness and efficiency of pesticide control in Jamaica. Within the first phase (1993-1996) of the bilateral project, the **German Technical Co-operation (GTZ)** will provide a seconded expert for pesticide control and additional short-term international expertise. Further resources are committed to the training of Jamaican staff and to the procurement of equipment and materials in order to establish an appropriate infrastructure for PCA.

The objectives of the 93-96 phase are the following:

1. Registrar's office is functional.
2. Inter-agency linkage of PCA member organisations is established.
3. **Public awareness about safe use of pesticides has been improved.**
4. Monitoring of adverse effects of pesticides on the environment has been initiated.
5. Autonomous financing systems for PCA have been initiated.
6. Public awareness about safe use of pesticides has been strengthened.

The goal for the current three-year phase is:

PCA fulfils its legally instituted tasks

which contributes to the overall goal:

Import, handling and application of pesticides meet international standards

Currently the full duration of this project is scheduled for six years.

II. Description of Activities

Country: **Jamaica**
Project or Activity: Public awareness campaign on the safe handling of pesticides
Risk Reduction Category: Education

What are the key elements of the project/activity?	Development of a public awareness campaign focused at the user level (farmers or rural folk) using a range of audio-visual approaches to reach all levels of the rural community, from children to adults. To educate farmers on the safe use of pesticides and increase awareness on the dangers of pesticides.
When did the project / activity begin and what prompted its initiation?	This campaign was initiated in 1995 as part of a larger project to improve pesticides management in the country. Improper handling, use and storage of pesticides, incidents of poisoning were catalysts in the development of this campaign.
What are its specific goals and/or targets?	Targeting the agricultural sector, to increase public awareness of the potential hazards of pesticides and to the safe use of these chemicals. The play is to be performed three times in each of the 13 parishes in small farming communities over a nine month period. A video of the play will be made and issued to agricultural agencies and interest groups to be presented on a wider scale to the farming communities. One of the longer term goals is to have the video presented at farmer training workshops that are put on by the extension agency on pesticide management. These workshops are expected to reach approximately 4000 farmers annually.
Who is involved in carrying it out?	The Pesticides Control Authority is the lead agency co-operating with the Extension Agency of the Ministry of Agriculture. Professional actors are used in the play. The print and audio media, various community groups, and the pesticide trade assist in disseminating posters and pamphlets. The programme is funded by the German Technical Assistance Agency (GTZ) with the intention that the PCA will be able to carry on the activity after the initial phase is complete.
Is there a legal or regulatory mandate?	No. However, the PCA has sweeping powers and has decided that public awareness on pesticides requires priority attention.

Is the activity monitored or enforced ? If so, how?	As this project is short term in the first instance, the effect will be measured in a follow-up survey. A long-term strategy will be devised including periodic monitoring.
How are results and progress measured?	A pre-evaluation survey was done and a post-evaluation survey is now being done by professional pollsters using a random stratified design interviewing 1000 farmers.
What specific progress/ results have been achieved?	• The centrepiece of the campaign is a full length play targeted to rural users. It is divided into a series of nine short skits, each of which highlights a different aspect of the safe use of pesticides. The play may be performed with minimal props. • A series of brief radio messages based on characters in the play and emphasizing the same nine points regarding safe pesticide use have been aired. • Posters using the characters in "comic book" style illustrate nine different scenes from the play with the appropriate message highlighted under each. • Pamphlets which follow the poster have been prepared and have been distributed widely, especially after the play has been performed in a particular community. • T-shirts are distributed to the farmers attending training sessions, with the message "if you spray don't delay wear protective gear". To date three performances in each of the 13 parishes have been given. Approximately 20,000 persons have attended. As the post-evaluation is not yet complete, it is difficult to say which aspect of the campaign has been most effective. The general impression gained is, as expected, that the play had the most impact.

KOREA

CONTACT PERSON(S):

Mr Min-Jae Kim, Director
or Dr. Yang-Won Kim, Assistant Director
Plant Protection Division
Ministry of Agriculture, Forestry and Fisheries
Kyungido, Kwacheonsi,
Seoul, South Korea

Tel: 0082-2-503 7255
Fax: 0082-2-507 3963

I. Framework for Pesticide Risk and Use Reduction Activities

1. How does your country approach pesticide risk reduction? For example, is there a co-ordinated programme at the national level? Are there programmes or activities at the regional, state, provincial, or local levels? Rather than having one general programme, does your country have a range of activities carried out in different places by different organizations or authorities?

Korea has co-ordinated programmes at the national level. There are several authorities at the national level for regulating pesticides. The Plant Protection Division (PPD) in the Ministry of Agriculture, Forestry and Fisheries (MAFF) has the overall co-ordinating abilities in pesticide regulation.

There may be several goals for pesticide risk reduction activities. First, only safe products should be introduced in the market. Second, pesticide products should be dealt with with care for storage and display in the retailer's shop. Third, the farmers should use pesticide safely with good agricultural practice (GAP). Fourth, agricultural products should not have pesticide residue problems.

The PPD of MAFF is responsible for the first 3 goals. The Ministry of Health and Social Affairs (MOHSA) establishes the maximum residue levels for most agricultural products.

2. What principal factors prompted your country to initiate efforts to reduce pesticide risks? For example, were activities begun in response to drinking water contamination, concern about worker health, public demand, international agreement, or export market requirements?

Mostly governments (MAFF, NAMIO, ACRI, etc.) initiate pesticide risk reduction activities. Information from Environmental Protection Agency (EPA)(USA), Japan, international organizations, etc. are very important in product notification and re-evaluation processes. Fifty-eight pesticide products have been revoked since the late 1960s. US EPA sends information on their activities such as pesticide registration progress, maybe within the framework of FAO-initiated PIC procedures.

This information from US EPA is critical in the decision making-process for the revocation of the notified products. Public demand becomes more important year by year. Public demand may appear as a consumer's union campaign, headlines in the newspaper, etc.

3. Is there a legal or regulatory mandate for your country's pesticide risk reduction activities?

Most works are based on the Agrochemicals Management Law (AML). The AML was originally established in 1957. There have been two major revisions. The most recent major revision was done in 1980. Under the AML 1980, the pesticide product notification and registration system was introduced. Under the pesticide product notification system, only the pesticide products notified by the Minister of MAFF can be formulated, imported or distributed. Also, the formulators can only formulate, import, or distribute notified products if they first register each notified product. The system ensures that several formulators may register one product simultaneously. In a different sense, notified products are co-owned by several formulators. This notification system may be discarded in the near future because of some intellectual property rights implications.

For pesticide trade, PIC procedures will be introduced in the new law, which is planned to be revised in 1994. In particular, exported formulations will be subject to prior review by the PPD of MAFF if everything goes smoothly.

Good Agricultural Practices (GAPs) are mandated in the AML. The number of applications, amount, and the last applicable date before harvest are defined in the Product Notification Scheme. Also, depending on the acute toxicity, distributors should follow rules on how to store or display relevant pesticide products.

II. Description of Activities

Country: **KOREA, REP OF** TABLE 1
Project or Activity: Identification and banning/restricting of hazardous pesticides
Risk Reduction Category: Elimination of Hazardous Pesticides

What are the key elements of the project/activity?	De-registration of highly toxic pesticides
When did the project/activity begin and what prompted its initiation?	Programme introduced in 1994. Consumer organizations criticized the continued use of highly toxic pesticides. Also the General Inspection Office urged a complete or partial elimination of highly toxic pesticides after 1991 general inspection of the pesticide related government works.
What are its specific goals and/or targets?	Initial plan was to reduce production by 10% annually from 1994 production levels for the next 10 years, with the goal of a complete phase out by 2004. This proved too ambitious and was modified,so that highly toxic pesticides for which re-evaluation has been completed will have a production ceiling limited to the level produced in 1991. Highly toxic pesticides, pending re-evaluation, will have the production amount limited to that produced in 1994.
Who is involved in carrying it out?	The Sustainable Agriculture Division (SAD) of the Ministry of Agriculture Forestry and Fisheries (MAFF)
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	Korea Agricultural Chemicals Industry Association (KACIA) collects data on pesticide production and reports to the SAD of MAFF, which imposes the limit on production amounts of highly toxic pesticides. The KACIA usually holds a meeting to allocate the production amount for each formulator, so that the total production amount will not exceed the limited amount imposed by the SAD of MAFF.
How are the results and progress measured?	The SAD of MAFF evaluates the reports prepared by KACIA.
What specific progress/results have been achieved?	Only 22 highly toxic formulations (according to the WHO hazard classification) remain in use out of 568 formulations registered in Korea. The rest are classified as moderately toxic or less. Extremely and highly toxic formulations are not notified anymore.

Country: **KOREA, REP OF** TABLE 2
Project or Activity: UNDP technical co-operation project for IPM development in Korea
Risk Reduction Category: Promoting IPM

What are the key elements of the project/activity?	IPM activities in Korea were initiated with the application to participate in the FAO project for the Asian region on IPM technique development and training in 1991. Activities include: - training of government officials and farmers - developing techniques on how to train farmers - reinforcing research on IPM technique development
When did the project/activity begin and what prompted its initiation?	1993
What are its specific goals and/or targets?	- less use of pesticides for pest control - less residue problems in agricultural products - less contamination of land and rivers The long-term goal is to incorporate IPM concepts into the existing plant protection system.
Who is involved in carrying it out?	Rural Development Administration (RDA)
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	A master plan on IPM activities in Korea is usually set up at the RDA. The activities are monitored through administrative supervision.
How are the results and progress measured?	Usually the number of IPM trainees and the cultivated areas using IPM techniques may be the criteria on the progress of IPM activities.
What specific progress/results have been achieved?	81 Government officials and 750 farmers have been trained.

Country: **KOREA, REP OF** TABLE 3
Project or Activity: Protective clothing
Risk Reduction Category: Increasing Safety of Pesticide Handling, Use and Disposal

What are the key elements of the project/activity?	In conjunction with training activities to decrease accidental death from intoxication or poisoning, MAFF established a plan for the free distribution of protective clothes, masks and detoxifying tablets for organophosphates
When did the project/activity begin and what prompted its initiation?	The programme was initiated by MAFF in the early 1980s.
What are its specific goals and/or targets?	To prevent poisoning from the application of pesticides
Who is involved in carrying it out?	Ministry of Agriculture, Fisheries and Food (MAFF)
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	No
How are the results and progress measured?	
What specific progress/results have been achieved?	In 1993, 110,000 sets of protective clothing were distributed, 2.8 million masks and 1.5 million detoxifying tablets.

Country: **KOREA, REP. OF** TABLE 4
Project or Activity: Certification of pesticide retailers
Risk Reduction Category: Increasing Safety in Pesticide Handling, Use and Disposal

What are the key elements of the project/activity?	Retailers must have training in pesticide safe use in order to be permitted to sell highly toxic pesticides
When did the project/activity begin and what prompted its initiation?	In 1992, when the Pesticide Retailers Association (PRA) was officially established, PRA took the legal authority to issue a certificate to retailers who take pesticide safety education administered by the MAFF
What are its specific goals and/or targets?	To promote the safe use of pesticides. Every retailer should take education for pesticide safe use once a year. Depending on the acute toxicity, distributors should follow rules on how to store or display relevant pesticide products
Who is involved in carrying it out?	Pesticide Retailers Associations, MAFF and provincial governments
Is there a legal or regulatory mandate?	Yes, Agrochemicals Management Law (AML)
Is the activity monitored or enforced? If so, how?	Officials from the ASRI and local governments are responsible for occasional monitoring.
How are the results and progress measured?	Usually at the end of the year the number of certificates issued will be reported to MAFF by the PRA.
What specific progress/results have been achieved?	

Country: **KOREA, REP OF** TABLE 5
Project or Activity: Safe use of pesticides
Risk Reduction Category: Providing Education, Information to Farmers

What are the key elements of the project/activity?	- The Rural Development Administration has several organized programmes for training farmers in safe use of pesticides - Distributing educational materials on safe pesticide handling (guidelines, brochures, posters, etc.)
When did the project/activity begin and what prompted its initiation?	Ongoing from the 1960s
What are its specific goals and/or targets?	To promote the safer use of pesticides and to prevent poisonings due to pesticide application
Who is involved in carrying it out?	Rural Development Administration (RDA), Korea Agricultural Chemicals Industry Association (KACIA), Pesticide Retailers Association (PRA), MAFF and local governments
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	No
How are the results and progress measured?	Through administrative supervisory activities. The number of copies of guidelines, brochures, etc. distributed is an indication of the extent of the activity. These statistics are collated by the SAD of MAFF.
What specific progress/results have been achieved?	- In 1993, 421,000 copies of guidelines on pesticide use were distributed along with 1.6 million copies of brochures, leaflets and posters. - To date, approximately 1.2 million farmers (out of 6 million) have taken lessons in safe pesticide use

Country: **Korea** TABLE 6
Project or Activity: Green labelling
Risk Reduction Category: Implementation of Integrated pest management

What are the key elements of the project/activity?	Production of food commodities according to specified production methods in order to be certified as pesticide free or organically grown.
When did the project / activity begin and what prompted its initiation?	The programme was initiated in 1993-94 in response to surveys which indicated consumer preference for agricultural products labelled organic.
What are its specific goals and/ or targets?	To develop food commodities which are grown according to specified methods in order to be labelled pesticide free or organic.
Who is involved in carrying it out?	National Agricultural Products Inspection Office (NAPIO) of the Ministry of Agriculture, Forestry and Fisheries (MAFF) is responsible for the implementation of the system. Korean Organic Farming Association (KOFA)
Is there a legal or regulatory mandate?	Yes, the Promotion of Agricultural Products Processing and Quality Control Act (PAPPQC, 1993 6.11); Presidential Decree (1993.12.14) and Ministerial Decree (1994.1.19).
Is the activity monitored or enforced? If so, how?	NAIPO supervises the production process and labelling and does market basket surveys for pesticide residues.
How are the results and progress measured?	The number of farmers who have been certified for participation, the area of land used, and the range of products approved for the programme.
What specific progress/results have been achieved ?	Approximately 200 farmers have been approved for participation in 1995, with some 100 hectares under cultivation according to the programme requirements. Twenty-five products including rice, lettuce, sesame leaves and Chinese cabbages have been approved. A further programme initiated by KOFA has its own certification system and has more than 20 groups of producers with a membership of about 20,000 farmers.

MALAYSIA

CONTACT PERSON(S):

Mr. Tan Soo Hian
Secretary, Pesticides Board

Ms. Shamsiah Mohamad
Head of Pesticide Registration Section
Pesticide Control Branch
Crop Protection Division

Ms. Nursiah Mohamad Tajol Aros
Pesticide Toxicologist
Toxicology Section
Pesticide Control Branch
Crop Protection Division

Mr. Halimi Mahmud
Pesticide Toxicologist
Toxicology Section
Pesticide Control Branch
Crop Protection Division

All the above can be contacted at:

Department of Agriculture
Jalan Gallagher
50480 Kuala Lumpur
Malaysia

Tel: 03-298 3077
Fax: 03-298 3646

I. Framework for Pesticide Risk and Use Reduction Activities

1. Malaysia has a range of activities carried out in different places by different organisations or authorities, all aimed at pesticide risk reduction based on their own scope of responsibilities. Not all these programmes are co-ordinated at the national level.

2. The risk reduction activities began due to concern about the reported and potential adverse effects of pesticides, especially indiscriminate use; also international marketing requirements for export of agricultural commodities.

3. There are several regulatory mandates governing the country's pesticide risk reduction activities. These include the Pesticides Act 1974, Poisons Act 1952 (Revised 1989), the Food Regulations (1985) under the Food Act (1983) covering pesticide residues, pollution and effluent control under legislation such as the Environmental Quality Act 1974 (Amendment 1985) and the recently gazetted Occupational Safety and Health Act 1994.

II. Description of Activities

Country: **MALAYSIA**
Project or Activity: Identification and banning/restricting of hazardous pesticides
Risk reduction Category: Elimination of hazardous pesticides

What are the key elements of the project/activity?	Pesticides with unacceptable properties are identified and safer alternatives registered and controlled under the Pesticides Act 1974.
When did the project/activity begin and what prompted its initiation?	Registration of pesticides began in 1976. The aim was to establish a proper legislative control of the growing pesticide industry in the country. Before the Act was enforced, there was no comprehensive legislation to control the different aspects of pesticides.
What are its specific goals and/or targets?	1) To ensure pesticides are effective for the intended uses 2) To ensure that pesticides used have no unacceptable effects on crops to be treated 3) To minimize unwanted or adverse effects of pesticides on man and the environment
Who is involved in carrying it out?	There is a Pesticides Board with members from different government agencies/departments, which is responsible for the implementation of the Pesticides Act 1974. The Department of Agriculture, as the secretariat to the Board, carries out the day-to-day functions of the activities under the Act.
Is there a legal or regulatory mandate?	Under the Pesticides Act 1974, pesticides must be registered before they are allowed to be imported, manufactured or sold in the country.
Is the activity monitored or enforced? If so, how?	Enforcement of the Act is provided for and carried out under the Pesticides Act. Enforcement Officers are appointed and are responsible for enforcement of the existing Regulations under the Act, which at present covers registration, labelling, licensing and import permit of pesticides. Powers of the enforcement officers include prosecution of cases in the court.
How are the results and progress measured?	There are specific yearly targets determined for the activities under the Act.
What specific progress/results have been achieved?	Generally, the number of registered pesticides would indicate awareness among those in the trade for proper stewardship and approval of their products. Checks have shown that pesticides have improved in quality and packaging, also in the quality of information on the pesticides. Improvement of aspects such as labels and promotional campaigns has increased user awareness of the beneficial yet potentially hazardous properties of pesticides.

Country: **MALAYSIA**
Project or Activity: Improvements in pesticide application technology
Risk Reduction Category: Reduction in Pesticide Use and exposure

What are the key elements of the project/activity?	Improvement of methods in the field to reduce exposure and contamination.
When did the project/ activity begin and what prompted its initiation?	There is a Pesticide Application Technology (PAT) Committee with the DOA and also a joint PAT Committee with members from the DOA, universities and agricultural bodies, which have functions relating to methods to improve efficient use of pesticides while at the same time reducing exposure of the applicators to the pesticides.
What are its specific goals and/or targets?	The main aim of this activity is to ensure that pesticides are effectively applied while at the same time reducing exposure to the applicators.
Who is involved in carrying it out?	This activity is carried out by the relevant government agencies/departments including the DOA, MARDI, MACA, UPM and MAPPS, both in co-operation with each other as well as under their own separate programmes.
Is there a legal or regulatory mandate?	There is no legal mandate under the Act, but all pesticides used must be registered with the Pesticides Board.
Is the activity monitored or enforced? If so, how?	No specific monitoring
How are the results and progress measured?	According to targets of each agency
What specific progress/ results have been achieved?	For example, weaknesses in design of spraying equipment have been identified and the manufacturers informed; subsequently the equipment has been improved upon.

DOA: Department of Agriculture, **MARDI**: Malaysian Agricultural Research and Development Institute, **MACA**: Malaysian Agricultural Chemicals Association, **MAPPS**: Malaysian Plant Protection Society.

Country: **MALAYSIA**
Project or Activity: Control of Aerial Spraying of Pesticides
Risk Reduction Category: Protecting Man and the Environment

What are the key elements of the project/activity?	Aerial spraying of pesticides is allowed only if the operator has obtained approval from the Department of Civil Aviation (DCA) and the Pesticides Board.
When did the project/ activity begin and what prompted its initiation?	A set of procedures for aerial spraying of pesticides was first issued in 1987; subsequently it was reviewed in 1993. In the latest procedure issued thereafter, an aerial applicator now requires written approval from the Department of Civil Aviation (DCA) and the Pesticides Board to carry out an aerial spraying operation. The procedures were initiated due to concern over the safety of people in the vicinity of the spray area as well as contamination of the environment.
What are its specific goals and/or targets?	The goal is to ensure that aerial spraying of pesticides is carried out effectively with minimum adverse effects to man and the environment.
Who is involved in carrying it out?	Pesticides Board; Department of Civil Aviation (DCA)
Is there a legal or regulatory mandate?	All aerial pesticide applicators must obtain a certificate from the DCA to carry out the spraying operation, as well as written approval from the Pesticides Board.
Is the activity monitored or enforced? If so, how?	Aerial applicators are required to submit a report of the spray operation to the Pesticides Board. In addition, officers from the Board make visits to the site to check on the operations.
How are the results and progress measured?	By monitoring reports of successful applications and visits by the Board's officers.
What specific progress/ results have been achieved?	There is no specific monitoring of progress/results; however, since the guidelines were implemented, spray operators have been following the procedures in the guidelines and from this it can be said that aerial spraying is carried out in a proper manner.

Country: **MALAYSIA**
Project or Activity: Education and training on the safe handling of pesticides
Risk Reduction Category: Providing education and information to farmers/users of pesticides

What are the key elements of the project/activity?	Pesticide users are made aware of the benefits and risks of pesticides and are taught about their proper and judicious use and handling. The programme includes talks, courses, exhibitions, farmer group activities, demonstrations, distribution and application of materials (booklets, posters, etc.). On-going campaigns incorporating these are also carried out.
When did the project/activity begin and what prompted its initiation?	This activity is on-going under the programmes of the Department of Agriculture (DOA). It was initiated due to concern over likely mishandling, misuse, poisoning, etc. among users. There are also other agencies in the country, including the pesticide industry, which carry out similar activities, with their own individual programmes.
What are its specific goals and/ or targets?	The aim is to develop and increase user awareness and ensure that pesticides are maximally used for their effectiveness while at the same time they are used properly so as to minimise the hazards.
Who is involved in carrying it out?	DOA, farmer/worker groups/associations, employer groups and the pesticide industries
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	There are specific targets set by each of the groups involved in these activities. The DOA, for example, keeps records of courses/seminars, etc. carried out yearly.
How are the results and progress measured?	There is no specific procedure or mechanism to measure the progress and results. In-house reports kept by the different groups may give an indication of this.
What specific progress/results have been achieved?	Generally there is now greater awareness among users of the need to use and handle pesticides correctly and safely.

Country: **MALAYSIA**
Project or Activity: Promotion of Rain Shelters
Risk Reduction Category: Reducing use of pesticides and other chemicals such as fertilizers etc.

What are the key elements of the project/activity?	Encouraging farmers to grow crops, e.g. vegetables, under structures which protect crops from rain damage and excessive solar radiation; at the same time reduce pesticide residues, thereby giving quality vegetables and also achieving more efficient utilisation of fertilizers, chemicals and labour.
When did the project/ activity begin and what prompted its initiation?	This could be said to be a recent development and is part of the integrated pest management (IPM) activity.
What are its specific goals and/or targets?	To minimise use of pesticides and reduce problems of residues on crops.
Who is involved in carrying it out?	Department of Agriculture (DOA), Malaysian Agricultural Research and Development Institute (MARDI) and farmer organizations
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	The small-scale projects presently being carried out by the different organizations are being monitored on many aspects, such as crop performance under different types of rain shelter and soils.
How are the results and progress measured?	By number of rain shelters established, which implies acceptance of the activity.
What specific progress/ results have been achieved?	A study by MARDI showed that about 41% less insecticide was used on crops grown under rain shelters compared with those grown outside the netted structure. It is a potentially viable and practical method in the production of quality vegetables, particularly the temperate types, in the lowlands. Further research, however, needs to be conducted on certain areas such as cost of construction, identification of suitable vegetables, and development of more efficient crop management practices.

Country: **MALAYSIA**
Project or Activity: Licensing of pesticide sales outlets and storage facilities
Risk Reduction Category: Increasing safety in pesticide handling, use and storage

What are the key elements of the project/activity?	All premises where pesticides are sold or stored for sale have to be licensed with the Pesticides Board. A licence is issued only if the premises have been inspected and found to comply with all the conditions specified for its issuance.
When did the project/ activity begin and what prompted its initiation?	This activity is provided for under the provisions of the Pesticides Act 1974.
What are its specific goals and/or targets?	To reduce unauthorised sale of pesticides. To ensure proper storage of pesticides in licensed premises, to minimize contamination of foodstuffs and minimize the hazards.
Who is involved in carrying it out?	Pesticides Board (Pesticide Licensing Officers and Pesticide Licensing Committees in the various states)
Is there a legal or regulatory mandate?	Pesticides (Licensing for sale and/or storage for sale) Rules 1988 under the Pesticides Act 1974
Is the activity monitored or enforced? If so, how?	Licensed premises are inspected prior to and also after issuance of a licence to ensure that the conditions are complied with. This includes checking for unlicensed premises.
How are the results and progress measured?	The Board keeps reports of premises checked, licences issued, renewed and/or revoked, etc.
What specific progress/ results have been achieved?	Since the Regulations were enforced, premises where pesticides are sold or stored for sale have been issued with licences to carry out such activities.

Country: **MALAYSIA**
Project or Activity: Use of predators or natural enemies of pests (biocontrol)
Risk Reduction Category: Promotion of Integrated Pest Management (IPM)

What are the key elements of the project/activity?	Breeding of barn owls and placement of their nests in areas such as rice and oil palm, also cocoa.
When did the project/ activity begin and what prompted its initiation?	In the early 1970s, due to a need for more effective ways of controlling rodent pests.
What are its specific goals and/or targets?	To carry out biocontrol through the use of predators, particularly barn owls, as a primary component in the control of rodent pests in IPM in the country.
Who is involved in carrying it out?	Department of Agriculture (DOA), Palm Oil Research Institute of Malaysia (PORIM)
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	Monitoring of the activity is carried out in the areas where it was initiated. This includes ensuring survival of the owls and hatching, maintenance of the nests, counts in owl/rodent population, etc.
How are the results and progress measured?	By acceptance of the method in relevant areas
What specific progress/ results have been achieved?	Studies by PORIM have shown that 10-15% of the total 2.4 mil ha under oil palm has implemented this activity and that it has been successfully practised in many plantations. For rice the early indications are that this method is also successful in the areas where it was implemented. Monitoring and surveillance is still continuing in order to substantiate the results.

Country: **MALAYSIA**
Project or Activity: Implementation of IPM in rice, cocoa and vegetables
Risk Reduction Category: Promotion of Integrated Pest Management (IPM)

What are the key elements of the project/activity?	Training and demonstration, pest forecasting and surveillance, pesticide application, biological control, IPM, integrated weed control and implementation.
When did the project/ activity begin and what prompted its initiation?	The IPM programme on rice began in mid-1980 and was later followed by that on vegetables and cocoa. It was initiated through concern about the negative consequences of excessive use and misuse of pesticides.
What are its specific goals and/or targets?	Successful adoption of IPM by farmers so that they are better able to control pests based on economic threshold legal values, also to instil awareness of environmental conservation and sustainable agriculture.
Who is involved in carrying it out?	Department of Agriculture (DOA), Malaysian Agricultural Research and Development Institute (MARDI) and the private Research and Development sections of the major plantations. Other institutions such as the universities also carry out research in this area but on a small scale, for more specific purposes.
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	IPM in Malaysia is co-ordinated by the DOA and MARDI. Presently two National IPM Committees have been formed to oversee the development and implementation of IPM on rice and vegetables. IPM programmes are formulated, implemented, monitored and evaluated by those responsible in these two committees.
How are the results and progress measured?	Reports on the activities mentioned under the programme made by the committees would provide information on this aspect.
What specific progress/ results have been achieved?	IPM on rice has shown success, whereby rice farmers are able to control their pests and diseases and the programme has been successfully adopted. IPM on vegetables, which focuses primarily on the problem of the diamond backmoth (DBM), has also been successful due to good establishment of biological control agents and utilisation of biological insecticides. IPM on cocoa is still at the initial stage, and more research is required to incorporate other control tactics into workable IPM packages.

Country: **MALAYSIA**
Project or Activity: Specifications for pesticide production
Risk Reduction Category: Reduction of exposure/contamination/injuries due to pesticides

What are the key elements of the project/activity?	Pesticide production activities must comply with all related legislation, e.g. the Pesticides Act 1974, the Occupational Safety and Health Act 1994, and the Environmental Quality Act (Amendment) 1985.
When did the project/ activity begin and what prompted its initiation?	This is an on-going activity.
What are its specific goals and/or targets?	To ensure pesticides are of good quality and that their production will not cause adverse effects to workers and the environment.
Who is involved in carrying it out?	The Pesticides Board, Department of Occupational Safety and Health, Department of Environment.
Is there a legal or regulatory mandate?	Yes, mainly three pieces of legislation, i.e. the Pesticides Act 1974, Occupational Safety and Health Act 1994, and the Environmental Quality Act (Amendment) 1985.
Is the activity monitored or enforced? If so, how?	Under the Pesticides Act 1974, there is sampling and analysis of pesticides. The activity is monitored. Occupational Safety and Health Act 1994 - inspection of factory sites and workplaces. Environmental Quality Act (Amendment) 1985 - inspection of factory sites (waste disposal, etc.)
How are the results and progress measured?	Measurement of progress is done by monitoring compliance with the various pieces of legislation.
What specific progress/ results have been achieved?	Generally, manufacturers of pesticides have complied with registration requirements under the Pesticides Act. Discharge of wastes is better controlled and regular inspections have resulted in cleaner and safer factory environments.

Country: **MALAYSIA**
Project or Activity: Liaison between research and agricultural extension agencies
Risk Reduction Category: Providing education, information to farmers

What are the key elements of the project/activity?	To utilize research findings for the benefit of the agricultural sector.
When did the project/ activity begin and what prompted its initiation?	This is an on-going activity within the agencies/departments involved. The aim is to ensure that new findings/strategies are made known to pesticide users and others involved in pesticide control. It was initiated to ensure that the results of new techniques/developments/concepts would be effectively channelled down to the users.
What are its specific goals and/or targets?	To disseminate new developments in pesticides.
Who is involved in carrying it out?	Department of Agriculture (DOA), research institutions such as the Malaysian Agricultural Research and Development Institute (MARDI), universities and others.
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	Activity is monitored through meetings held by the parties involved.
How are the results and progress measured?	Reports (e.g. notes/minutes of discussions, research findings, etc.) for the different activities are routinely made by the various groups/individuals concerned and this would be a measure of progress.
What specific progress/ results have been achieved?	There is more effective flow of information from research to the ground.

III. Conclusions

1. Implementation and enforcement of the various Acts and their various legal regulations have been the most successful in promoting pesticide risk reduction. This is due to the legislative nature of these activities, administered and regulated by the authorities at all times.

2. Changing the attitude of the people towards more judicious use of pesticides and persuading them to adopt proper safety precautions have generally presented the most difficulties. Although in general the knowledge and awareness of the pesticides user has risen due to continuous educational efforts of various parties including the government, many still do not pay sufficient attention to safety and health aspects during use of these chemicals. Even if the farmer takes precautions to protect himself from pesticide exposure and poisoning, contamination of the environment due to these same pesticides is more often than not disregarded. Socio-economic situations could be said to be the main factor. The hot, tropical climate, too, also presents problems where it is impracticable to use protective clothing although this should be encouraged, to reduce exposure.

The attitude of pesticide companies and retailers also needs to be addressed, since some of them come across as overzealous salespersons bent on selling and promoting their products without considering the safety aspect. Their activities need to be controlled, perhaps by self-regulation, for even though they may bring a service by providing badly-needed pesticides, they could also be indirectly encouraging farmers to use pesticides excessively.

3. Activities carried out under the various Acts and Regulations are documented and regularly assessed, thus measuring the progress and results is not a major problem. Voluntary programmes such as those not specifically legislated, however, may be expected to pose some difficulty in monitoring and assessment.

4. In general, there has been very good co-operation between the different agencies in the implementation of the policies and programmes in the country, including those involving pesticides. Decisions are made in consideration of everyone's needs and views.

5. We would like to make the following proposals:

   5.1 International organizations should develop a simple methodology for performing hazard and risk assessments, which can be referred to and followed by developing countries.

   5.2 International organizations could also provide a form of service, e.g. make available a pool of experts, where developing countries can refer to them on certain aspects (such as toxicology) of certain pesticides, etc. Assistance should be provided to governments in order that they may improve their capability to conduct "risk assessments" relevant to the conditions in their respective countries.

   5.3 Further work is required on rapid methods of assay, e.g. monitoring of environmental samples and crop produce, assays to detect poisoning, etc., which should then be publicised and be made cheaply and easily available.

   5.4 International organisations should establish or strengthen environmental aspects of legislative measures especially for the guidance of developing countries.

SOUTH AFRICA

CONTACT PERSON(S):

Dr J.B. Vermeulen
Department of Agriculture
Private Bag X343
0001 Pretoria
Tel: 0027-12-319 7303
Fax: 0027-12-319 7179

Dr T. van de Venter
Department of Health
Private Bag X828
001 Pretoria
Tel: 0027-12-312 0511
Fax: 0027-12-325 5706

Mr J.H. Kleynhans
AVCASA
P.O. Box 1995
1685 Halfway House
Tel: 0027-11-805 2000
Fax: 0027-11-805 2222

I. Framework for Pesticide Risk and Use Reduction Activities

1. The most important Act of Parliament governing pesticides in South Africa is the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act Nº 36 of 1947) which is administered by the National Department of Agriculture. According to the above-mentioned Act, no pesticide may be sold in South Africa unless it has been registered in terms of the Act. All Pest Control Officers (PCOs) must also be registered in terms of the said Act.

The Act makes provision for a Registrar who is responsible to carry out the stipulations of the Act, the regulations promulgated thereunder and registration guidelines.

The Registrar is advised on all policy issues by the Standing Interdepartmental Advisory Committee for Safeguarding Man against Poisonous Substances (INDAC), e.g. approvals of new active ingredients, new end-uses, withdrawals, restrictions, banning, etc. All cases of poisoning (human and animal) and environmental problems are also reported to INDAC.

Numerous instances of restrictions, withdrawals or banning were instigated upon the advice of INDAC.

The following governmental departments are represented at INDAC:

- Department of Agriculture
- Department of Health
- Department of Environment Affairs and Tourism
- Department of Water Affairs and Forestry
- Department of Labour

The Medicines Control Council (MCC) and the Agricultural Research Council (ARC) also have representation at INDAC.

There is close co-operation between the Departments of Health and Agriculture in the registration procedure, labelling requirements, hazard classification and risk-reduction steps (e.g. education and training). Personnel from both departments are also involved in the training of PCOs.

As already mentioned, the legal mandate for registration is embodied in Act Nº 36 of 1947 which is administered by the Department of Agriculture. Many of the risk-reduction activities engaged upon by the Department of Health fall under a number of other Acts administered by that department. Details of these Acts and activities can be found in the separate submissions submitted by the Department of Health.

A third role player in risk-reduction activities is the Crop Protection and Animal Health Association (AVCASA). AVCASA members promote the responsible use of pesticides nationally through a Code of Conduct, training programmes, guidelines, and the reduction in use of crop protection products and alternative pest management strategies. Although there is no legal mandate as such for these activities, they are always undertaken in close collaboration and consultation between the Department of Agriculture (including INDAC members) and the Agricultural Research Council (ARC). Full details can be found in the submission by AVCASA.

2. Various factors may influence policy decisions on pesticides. The most important ones are the following:

- Environmental concerns
- Worker health
- Safe food

3. One of the requirements of the Act is that the registration of a pesticide may not be contrary to the public interest. This has enabled the Registrar to take steps (upon the recommendations of INDAC) to restrict or ban pesticides in order to reduce the risk to humans and the environment.

II. Description of Activities

Country: **South Africa** Table 1
Project or Activity: STOP project; Safety Towards Our People a national primary health care educational project.
Risk Reduction Category: Education

What are the key elements of the project/activity?	Aim is to inform young people on the potential hazards of chemicals and in doing so foster a positive attitude in the adults of the future. In the short term parents can be reached through their children at school. Education targets children who can then responsibly look after their younger brothers and sisters. The programme is based on community involvement and relies on co-operation between the public and private sector for its implementation.
When did the project / activity begin and what prompted its initiation?	Initiated for a six-month trial period in one region in 1993. Since then it has been extended to other regions. Prompted due to concern about the number of poisonings through the misuse of chemicals and the fact that most of those involved or responsible did not know about the dangers of chemicals.
What are its specific goals and/ or targets?	To increase public awareness of the safe handling of pesticides and to lower the incidence of poisoning, the project will be extended to all regions of South Africa by 2010.
Who is involved in carrying it out?	Officers in the Department of Health, school teachers and principals, inspectors of the Department of Education, Officers from the provincial Departments of Health and the private sector, the Crop Protection and Animal Health Association (AVCASA) are all involved. The child to child approach to learning has worked very well. Communities become involved through the children. The importance of community involvement in the successful implementation of this project has been emphasized.
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	Follow-up visits are undertaken by the provincial environmental health officers to ensure the continuation of the project.

How are the results and progress measured?	To determine the initial level of knowledge and understanding of the safe handling and storage of pesticides of farm workers and teachers, questionnaires were completed. Pupils completed another questionnaire. After the initial survey the teachers in the schools involved were trained in the safe handling and use of pesticides by training officers of the Department of Health. After the project was completed in a school, a follow-up survey of pupils, farm workers and teachers was done and the improvement in knowledge measured.
What specific progress/results have been achieved ?	The project has been implemented in five regions (of a total of nine in South Africa) Since its initiation approximately 225 teachers from 154 schools have been trained, with a total of 9,400 students having participated in the programme to date. A syllabus, "The safe handling and storage of pesticides", has been prepared for the teacher. A reader, "Don't fool be cool with pesticides", has been prepared for the pupils, and a pamphlet, "What you should know about the safe handling and storage of pesticides", for the parents. The pamphlet is translated into the dominating language of the region where the project is being implemented. It is difficult to measure the success of training and education on risk reduction. Although numbers are available on the people trained, there is at present no way to measure the actual impact of training. The STOP programme is aimed at teachers, Standard 3-5 pupils, and their parents.

Country: **South Africa** Table 2

Project or Activity: Developments in application technology and changes in pest control practices including Integrated Pest Management (IPM)

Risk Reduction Category: Reduction in pesticide use

What are the key elements of the project/activity?	The development of improved application techniques and transfer of this knowledge to farmers.
When did the project / activity begin and what prompted its initiation?	Initiated in the 1970's and is ongoing.
What are its specific goals and/ or targets?	To improve the effectiveness of application methods and to lessen the negative effects of pesticides on the environment. **Cotton** considered as it received intensive insecticide treatments, e.g. up to 14 in a season. **Quelea** earlier programmes resulted in a number of unfortunate environmental disruptions. Goal was to ensure efficacy, reduce environmental contamination, and minimize risk to wildlife through the use of repellents and lower doses of avicides. The research undertaken by ARC is transferred to farmers, by extension done by the Departments of Agriculture in the nine provinces. No quantitative goals such as reduced tonnage used are set. However, the qualitative goals of fewer reports of resistance to pesticide, of residues on food stuffs, and of environmental mishaps are actively monitored.
Who is involved in carrying it out ?	The Plant Protection Research Institute (PPRI) of the Agricultural Research Council (ARC); Non-governmental environmental organizations, such as the Endangered Wildlife Trust.
Is there a legal or regulatory mandate?	Yes, Acts 104 and 86 of 1990 Acts on Agricultural Research.

Is the activity monitored or enforced? If so, how?	Endangered Wildlife Trust are involved in the monitoring of results.
How are the results and progress measured?	Reduced frequency of pesticide application and overall quantities used.
What specific progress/results have been achieved ?	**Cotton:** Through the development of threshold values, the number of sprays was reduced from 14 to 5. Improved application techniques (drop arms, droplet size, volume rates per ha and application timing) also made the applications more effective. In cotton the volume of pesticide used has been drastically reduced with the introduction of integrated pest control. Overall, it is estimated that 30% less insecticides are currently used on cotton compared with 20 years ago. **Quelea:** Guidelines established to ensure that applications will only take place under the most suitable meteorological conditions, to ensure efficacy and minimize effects on the environment and wildlife. **Citrus and deciduous fruit:** Changes in 1985 from preventative spray programmes in citrus and deciduous fruit industries to integrated control programmes achieved notable success in reducing the amount of pesticide used. Both industries are highly organized, and members themselves police the improved and less hazardous control operations through, for example, regular inspections on farms of fruit destined for markets.

Country: **South Africa** Table 3
Project or Activity: Biological control
Risk Reduction Category: Promotion of alternative pest management strategies

What are the key elements of the project/activity?	The control of introduced pests (insects and alien plants).
When did the project / activity begin and what prompted its initiation?	Economic reasons and safety to the environment. The first initiatives were taken towards the end of the previous century (1888) to control *Iceria purchasi*
What are its specific goals and/or targets?	The goal is to find lasting solutions to imported pests, e.g. prickly pear, jointed cactus, scale insects, etc.
Who is involved in carrying it out?	Specialist research institutes of the Agriculture Research Council (ARC); promotion is also undertaken by the ARC.
Is there a legal or regulatory mandate?	Yes, Acts 104 and 86 of 1990 on Agricultural Research.
Is the activity monitored or enforced? If so, how?	Monitored by the ARC.
How are the results and progress measured?	Scientific methods, field evaluations by researchers.
What specific progress/results have been achieved ?	*Cytobagous salvinia* to control *Salvinia molesta.* *Putasson nitens* to control *Goniptenis scutellatus.* *Zeuxidiplosis giardi* to control *Hypericum perforatum.* *Uromycladium teperidnum* to control *Acacia saligna.* *Radolia cardinalis* to control *Iceria purchasi.* *Aphelinus mali* to control *Eriosoma lanigerum.* Various parasitoid and predators to control *aonidiella aurantii.*

Country: **South Africa** Table 4
Project or Activity: Restricting the availability of hazardous pesticides
Risk Reduction Category: Elimination of hazardous pesticide use

What are the key elements of the project/activity?	1. Pesticides classified as extremely and highly hazardous are identified for stricter control regarding selling, labelling and disposal of empty containers and are all restricted only to be sold by a licensed general dealer engaged in retail trade or a licensed co-operative. 2. Pest Control Officers (PCOs) including applicators (ground and aerial), who apply pesticides in agriculture for remuneration as well as structural pest control, are subject to special training and licensing requirements.
When did the project - activity begin and what prompted its initiation?	1. Initiated in 1977 and amended in 1990 and 1994; 2. Initiated in 1983. • Both activities were undertaken in response to concerns for workers and public health.
What are its specific goals and/ or targets?	1. Dealers in retail trade or responsible officer in a co-operative agricultural society or company must apply for a license for the supply or sale of products of any Category B Group 1 Hazardous Substance, which includes pesticides classified (WHO Classification) as extremely hazardous and highly hazardous. 2. All PCOs must have undergone specialized training and be registered with the Department of Agriculture.
Who is involved in carrying it out?	1. General dealers engaged in a retail trade or the responsible officer of a co-operative agriculture society or company, or a co-operative trading society; Provincial health authorities. 2. Department of Agriculture.

Is there a legal or regulatory mandate?	1. Hazardous Substances Act, 1973 (Act No 15 of 1973); 2. Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act N°36 of 1947).
Is the activity monitored or enforced? If so, how?	1. Authorised officers of provincial health authorities review stock records, at least annually and on an ad hoc basis when necessary.
How are the results and progress measured?	1. Dealers or responsible officers of a co-operative agricultural society or company, etc. must keep stock records showing the name and quantity of the substance, the date of supply, the name of the recipient, and if the recipient is required to hold a licence. The record book shall be balanced by the last day of April and September of each year.
What specific progress/results have been achieved ?	1. The distribution of extremely and highly hazardous pesticides is restricted to permitted outlets. 2. All Pest Control Officers (PCOs) must be registered with the Department of Agriculture. A special course has been developed to provide prospective PCOs with the necessary training. At present there are more than 1,800 PCOs registered. This has resulted in a certain degree of control in the main cities and in the commercial farming sector. Problems still exist in the parts of the country. Ongoing problems involve unauthorized sale or resale of pesticides by street vendors.

III. Conclusions

In the submission from the Department of Health, a conclusion is given for each activity. The submission from AVCASA did not draw any conclusions, but requested the Department of Agriculture to include it in their submission. The following conclusions should thus be considered to be inclusive for all the submissions and activities.

1. The most successful activity is the control exercised over pesticides by Act Nº 36 of 1947. Due to the wide range of controls that can be exercised in terms of this act, this has enabled the Registrar to withdraw, prohibit and to restrict many high-risk pesticides. Coupled with strict labelling requirements and an effective inspectorate, it has been possible to regulate pesticides adequately in South Africa. Great store is set on reaching consensus between all interested parties before policy decisions are taken. INDAC plays a major role to ensure that all decisions are taken. INDAC plays a major role to ensure that all the relevant government departments can contribute to the process. The necessary mechanisms also exist to ensure proper communication between industry (AVCASA), the Department of Agriculture and the ARC. If a pesticide must be prohibited or restricted the department will consult industry beforehand and try to reach agreement on the issue. The success of this approach can be seen in the number of voluntarily withdrawals of pesticides by industry. Input can also be received from the farming community through the South African Agricultural Union.

The development and promotion of biological control and IPM strategies has been highly successful in some instances. This has been made possible by the expertise available in the ARC and its activities in this field over many years. ARC representation on INDAC and on the Agricultural Liaison Committee of AVCASA and the Department of Agriculture has resulted in a holistic approach to risk-reduction. The ARC has also played a major role in the development of better control strategies for pests (brown locust and Quelea).

Education is generally accepted to be very important in the management of risk. A number of training and education programmes have been initiated over the last decade. Much progress has been made but much more should be done.

2. The monitoring of residues of pesticides in foodstuffs has been successful with the limited number of tests done. Although there is a need to expand the monitoring programme, this is not possible due to the high costs involved and budget constraints.

The notification of pesticide poisonings is presently unsatisfactory due to lack of reporting. Steps are being taken to improve the reporting and to establish a central data bank with details of human and animal poisonings. As the reporting of pesticide poisoning is also a problem in many other countries, dramatic improvements in this area are not expected in the near future.

3. It is at present very difficult to measure the success of training and education on risk-reduction. Although numbers are available of the number of people trained, there is at present no way to measure the actual impact of training (e.g. whether there is a drop in the number of poisoning cases reported over a number of years, fewer cases of misuse or incorrect applications, etc.). One of the problems is that there is no person with the specific

task of co-ordinating and advancing education and training on a full-time basis. The personnel involved all have other tasks and functions and are only involved on an *ad hoc* basis.

5. As already indicated, INDAC plays a very important role in the formulation of policy. INDAC provides other government departments with an opportunity to help identify problem areas to formulate policy. Every effort is thus made to co-ordinate and harmonise risk reduction programmes and policies between state departments, nature conservation and industry.

6. Empty containers and hazardous formulations pose a big problem in all countries. This problem is much more severe in developing countries due to unsophisticated users and lack of suitable training. There is currently great interest in developing less hazardous formulations and a move towards easily disposable packaging materials. This will also alleviate the problem in developing countries where empty containers are regularly used to store water or food.

The higher cost involved for these less hazardous formulations and packaging materials may actually result in these products being more readily available in developed countries than in developing countries, while there is actually a greater need for safer products in developing countries. Much of agriculture in southern Africa falls in the latter category (although there is a very well developed commercial farming sector). It is necessary to identify the pesticide needs of small-scale farmers and to supply products that are less hazardous to handle the packaging materials that are disposed of easily. Industry should be encouraged and helped in any possible way to develop products that conform to these criteria.

SRI LANKA

CONTACT PERSON(S):

Dr. G.K. Manuweera
Senior Assistant
Registrar of Pesticides
Box No. 49 Getambe
Peradeniya
Sri Lanka

Tel / Fax: (+94 8) 88135

I. Framework for Pesticide Risk and Use Reduction Activities

The focus of activities for promoting pesticide risk reduction lies mainly in the Federal Department of Agriculture, as agriculture policy formulation and pesticide legislation are vested in the Department of Agriculture (DOA).

Even though the policy aspects of risk reduction are satisfactorily conducted, implementation in the peripheral areas has not been extensive, due to inadequate financial and manpower resources to contend with existing social perceptions and attitudes of farmers. Where necessary, the promotion of these measures has been carried out with the assistance of the allied Provincial Departments, the pesticide industry and non-governmental organizations, such as CARE International.

Concerns on health hazards and environmental damage due to pesticide use promoted the passing of a law to regulate pesticides. The legal framework was instituted with the enactment of the Control of Pesticide Act in 1980. Though the Law does not specifically provide for risk reduction surveillance, it requires the control of pesticides to ensure protection of human health and the environment, while safeguarding the interests of end users.

II. Description of Activities

Country: **SRI** LANKA TABLE 1
Project or Activity: Identification and validation of safer alternatives
Risk Reduction Category: Eliminating hazardous pesticides

What are the key elements of the project/activity?	Identification of hazardous pesticides and their phased withdrawal pending the identification of effective and safer alternatives.
When did the project/activity begin and what prompted its initiation?	Surveys conducted in 1982 and 1986 which indicated that 17% and 1.9%, respectively, of pesticide poisoning episodes were due to occupational exposure.
What are its specific goals and/or targets?	a) Removal of pesticides in WHO Hazard Classification 1B b) Similar targets have been established for the use of atrazine (currently only used in a sugarcane project), which is under investigation for accumulation in groundwater. After the first across-the-board cut on imports, annual decisions are based on the pest species for which alternates were not available and the crop area targeted for the year.
Who is involved in carrying it out?	Pesticide Registrar (ROP) as advised by the Pesticide Technical and Advisory Committee in co-operation with the Research Division of the Department of Agriculture (DOA), for screening of safer alternatives for specific applications.
Is there a legal or regulatory mandate?	Control of Pesticides Act No. 33 of 1980, section 11.
Is the activity monitored or enforced? If so, how?	a) Imports of hazardous pesticides are specially monitored and their distribution limited. Enforcement is effected by means of issuing approvals for import of formulations and tech grade material on a quota system based on each registrant ‘s market share of such products. No field activities have been undertaken, but alternates as recommended by the DOA are being publicised to the industry so that existing labels could be amended before the total withdrawal of the class 1B products.

How are the results and progress measured?	Only on the basis of volumes estimated and approved by ROP. Actual import information at times indicates lower volumes than approved quotas.
What specific progress/results have been achieved?	Parathion de-registered 1985. Omethoate withdrawn 1989. Methamidophos and monocrotophos: • Use levels in 1993 were 35 and 50%, respectively, of 1988 use levels; as of 1994, they are no longer recommended by DOA and further imports for general use will not be permitted after 1.6.95. (A 600 litre requirement may still be imported for coconut cultivation, as an alternate has not been identified by CRI to date.)

Country: **SRI LANKA** TABLE 2
Project or Activity: Restriction of import, sale and distribution of hazardous pesticides
Risk Reduction Category: Reduction in Pesticide Use

What are the key elements of the project/activity?	a) Restricting use of highly hazardous pesticides to special outlets, e.g. (i) all fumigants and (ii) the chlorinated hydrocarbon insecticides gamma BHC, chlordane and aldrin are registered only for use by institutions with trained applicators. b) Quantity restrictions: Other than the above-mentioned highly hazardous pesticides, where the annual total imports are monitored and their distribution limited, certain other less hazardous pesticides are also placed under quantity restrictions. The total quantity imported is dependent on the extent of cultivation and geographical local location of the crop host, (i) e.g. pyrethroids for onion and brinjal crops.
When did the project/activity begin and what prompted its initiation?	a) I) increased protection of workers ii) 1985-87 restrictions world-wide on chlorinated hydrocarbon b) I) 1986 reports of pyrethroid resistance within 2-3 years of use in cole crops in Malaysian highlands ii) 1991 new regulatory actions on atrazine, concerns of groundwater contamination
What are its specific goals and/or targets?	a) i) Prevent/reduce occupational poisoning by highly hazardous pesticide. ii) Reduce environmental impacts. b) i) Prevent rapid build-up of cross-resistance potentiated by pyrethroids and flare-up of white fly and brown plant hopper (BPH) populations.
Who is involved in carrying it out?	The ROP regulates the imports, while the Sugar Research Institute studies/collects groundwater data and researches for alternate weed control measures.
Is there a legal or regulatory mandate?	• The law provides for the enforcement of quantity restrictions.

Is the activity monitored or enforced? If so, how?	• Import restrictions enforced. Compliance for distribution appears to be satisfactory where fumigants, organochlorinated pesticides and atrazine are concerned. • Market distribution of pyrethroids within the country is not monitored.
How are the results and progress measured?	Indirect evidence: no reported poisoning incidents for fumigants.
What specific progress/results have been achieved?	• Infiltration of products into non-designated areas has occurred. In spite of this, as the usage is small, crop resistance or pest outbreaks have not been reported. • No evidence of direct link to reduced pesticide poisonings, as the bulk of cases of pesticide poisoning are by impulsive ingestion.

Country: **SRI LANKA** TABLE 3
Project or Activity: Reducing frequency of treatments and dosages
Risk Reduction Category: Reducing Pesticide Use

What are the key elements of the project/activity?	Investigate use of new/alternative formulations and methods of application a) Granular formulations (BHC, diazinon) were first introduced onto the local market in the 1970s; they were mainly used for control of yellow stem-borer in rice as alternatives to the existing insecticide sprays. b) (i) Promotion of a locally produced wiper applicator for use in pesticide application in row. planted high value crops and chilli pepper. (ii) Phytotoxicity reduction by replacing sprays of butachlor or oxyfluorfen with a mix of product and sand.
When did the project/activity begin and what prompted its initiation?	a) Availability of a suitable new formulation for manual application in the 1970s to control a major pest of rice, with reduced environmental impact than sprays. b) Promotion of easy application methods is an ongoing programme in plant protection since the 1970s, as low income farmers do not own spray equipment.
What are its specific goals and/or targets?	a) Reducing environmental impact of pesticides. Routine spray schedules on rice replaced by timed treatments. b) Reducing seasonal load of herbicide in soil for high value crops. c) Adaptation of existing liquid formulations for specific uses to new methods of application.
Who is involved in carrying it out?	DOA (Research, Extension, PP Divisions)
Is there a legal or regulatory mandate?	No

Is the activity monitored or enforced? If so, how?	No, but the following is given as an example: The yellow stem-borer of rice receded from major pest status, confined to localised areas of highland paddy. Research data indicate egg parasitism consequent to the replacement of routine insecticidal sprays by broadcast granules at timed pest incidence as recommended by DOA.
How are the results and progress measured?	Receding importance of the rice stem borer
What specific progress/results have been achieved?	a) Two applications of the granular formulations gave sufficient control to replace the 5-6 insecticide sprays used previously. The use of granules to standing water promoted the natural regulation of stem-borer by egg parasites, which cause up to 90% parasitization of egg masses. b) Local wiper application, developed for post-emergence rhizomatous weed in row-planted crops, reduces quantity applied and eliminates spray drift. c) Mixing of liquid formulations with sand for broadcast application to standing crop avoids problems of seeding phytotoxicity, reduces need for multiple herbicide applications.

Country: **SRI LANKA** TABLE 4
Project or Activity: Improvement in Pesticide labels
Risk Reduction Category: Increasing safety in pesticide handling and effective application

What are the key elements of the project/activity?	a) The incorporation of mandatory information in the two local languages, with the specific items such as trade name, common name, antidote and first aid sufficing for the English text. This measure was necessitated mainly for small packs (100/200 ml and 50/100 g) as the label surface was not sufficient for three complete texts. b) Use of colour bands relevant to WHO Classification.
When did the project/activity begin and what prompted its initiation?	Legal amendments passed in April 1994 prompted its initiation.
What are its specific goals and/or targets?	a) To enable easy reading of labels text for small-time farmers who require small pesticide packs. Sri Lankan literacy rate is > 80%. b) Facilitate recognition of hazard level of individual pesticides.
Who is involved in carrying it out?	Draft labels submitted by the industry are approved by the ROP - a mandatory requirement.
Is there a legal or regulatory mandate?	Yes, Control of Pesticide Act as amended in April 1994.
Is the activity monitored or enforced? If so, how?	An ongoing programme for monitoring contraventions is systematically carried out every three years, i.e. at the time that the validation of registration falls due.
How are the results and progress measured?	Surveys have not been undertaken.
What specific progress/results have been achieved?	No relevant survey data are available on occupational poisonings.

Country: **SRI LANKA** TABLE 5
Project or Activity: Dealer certification programme
Risk Reduction Category: Increasing safety of pesticide handling and use

What are the key elements of the project/activity?	• Training to improve knowledge of pesticides and the management of pesticide stocks to avoid accumulation of outdated pesticides • Increase awareness of their responsibilities under the law
When did the project/activity begin and what prompted its initiation?	Dealer training programme undertaken before the legal amendments (which mandated certification of outlets for pesticide sales) was poorly attended and was an empty exercise. Since April 1994 this has been very active.
What are its specific goals and/or targets?	• Issuing of certificates for the sale of pesticides, improve quality of information available to farmers • Limiting number of dealers in a given locality to those having required facilities to prevent food and feed contamination and risks to environment • Prevention of accumulation of outdated/obsolete pesticides; ensure minimum safety standards of storage facilities
Who is involved in carrying it out?	DOA and DOA through authorized officers (AUOO) who are required to educate, advise and monitor outlets and Enforcement Officers (ENOO) mandated to prosecute those contravening the COP Act in respect of sales without a certificate for sale and unauthorized packaging
Is there a legal or regulatory mandate?	Control of Pesticides (COP) Act No. 33 (1980), new amendments of April 1994, No. 6
Is the activity monitored or enforced? If so, how?	Yes, by requiring that the trade licence to carry on business with pesticides shall be issued by the local authorities only on the production of a certificate of sale issued by the ROP
How are the results and progress measured?	The evidence of a certificate for sale of pesticides required by law to be prominently displayed for the benefit of farmers and Enforcement Officers
What specific progress/results have been achieved?	These mandatory requirements were passed only in 1994. Progress can be judged only after AUOO and EUOO have been trained, nominated and gazetted. While AUOO are from DOA and PDOA, the ENOO are from other ministries, but already having prosecuting powers. Distribution/supply of pesticides is limited to "certified" dealers

Country: **SRI LANKA** TABLE 6
Project or Activity: Development and distribution of materials on safe pesticide handling
Risk Reduction Category: Providing education, information to farmers

What are the key elements of the project/activity?	Safe handling of pesticides, their storage and disposal as it relates to legal provisions
When did the project/activity begin and what prompted its initiation?	In 1994, two workshops were held to develop three modules for the training of trainers (officer grade), dealers and farmers. This was adjudged to be essential for uniformity in coverage and a baseline for the scope of the training.
What are its specific goals and/or targets?	Target: Training of all pesticide dealers currently in business within 15 months. The goals are to prepare and provide each district with the necessary training materials, handouts, visuals, etc. on the responsibilities under the pesticide laws, and to give the basics in pesticide classification and IPM techniques to farmers. It is envisaged that the Pesticides Association of Sri Lanka (PASL) and provincial staff would duplicate the material as required for field programmes.
Who is involved in carrying it out?	• Extension staff of Central and Provincial Departments of Agriculture with a special input from Plant Protection Division of the Department of Agriculture on IPM • CARE International and Pesticides Association of Sri Lanka (PASL) on safe handling in collaboration with the provincial training staff • All training connected with law enforcement would be under the guidance of the ROP.
Is there a legal or regulatory mandate?	Only as far as dealers are concerned, as they are required to sell only under a certificate of sale
Is the activity monitored or enforced? If so, how?	Training and certification of dealers is monitored by authorized officers (provided for under the Control of Pesticides Amendments Act of 1994).

How are the results and progress measured?	The authorized officers are required to submit seasonal reports to the ROP.
What specific progress/results have been achieved?	a) Training of dealers, trainers and industry personnel has been undertaken by the Registration Unit and provincial staff. b) Additional training by PASL, in collaboration with central and provincial staff, includes: Farmers: 1073 Agricultural Extension personnel: 1098 Schoolchildren: 1094 Teachers: 15 Agrochemical dealers: 232

Country: **SRI LANKA** TABLE 7
Project or Activity: Disposal of empty containers
Risk Reduction Category: Increasing safety of pesticide handling, use and disposal

What are the key elements of the project/activity?	a)	From 1989, in collaboration with the Central Environmental Authority, triple-washed 20 l drums have been either recycled by the steel corporation or, after the ends of the drums were punctured, empties were disposed for use by local smiths for the manufacture of hardware items for construction purposes.
	b)	In 1990 action was taken with the Ceylon Glass Company (government monopoly) to emboss on the shoulder of the glass bottle the word "poison" in 3 languages in use. However, as the embossing was minimal, in the smaller retail packs (100 ml and 200 ml), the safety message was further enlarged with the words "do not re-use" in bolder font with thermoplastic printing. In the absence of laws or regulations to deter the use of such bottles, the precautionary measure advocated by the DOA to crus and burry is observed in the breach.
	c)	A joint programme is being contemplated in collaboration with the Ministry of the Environment and the Pesticide Manufacturing Association of Sri Lanka for the collection and recycling of empty pesticide bottles which currently find their way to bottle merchants, who sell them for refilling not only with spurious pesticides but also medicinal oils and other household products, by pasting on labels to hide the cautionary messages printed on the bottles.
When did the project/activity begin and what prompted its initiation?	a)	1989 steel drum programme - based on concerns of reuse of inadequately cleaned drums for consumer products such as medicinal oils.
	b) and c)	1990 and 1994 projects focused on glass bottles initiated due to bottle merchants buying empty bottles and their reuse for household products and poor quality pesticides.
What are its specific goals and/or targets?	To prevent accidental poisoning episodes that could arise from packing of food commodities and traditional medicinal products in reused containers.	

Who is involved in carrying it out?	a) Central Environment Authority and DOA b) Registrar of Pesticides (ROP), Ceylon Glass Company (CGC), Pesticide Association of Sri Lanka (PASL) c) PASL, Ministry of Environment, NGOO (still at proposal stage)
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	a) The activity is monitored by CEA. b) The activity is monitored by ROP in co-operation with pesticide industry. c) Funding for proposal not yet sourced.
How are the results and progress measured?	
What specific progress/results have been achieved?	a) Steel drums recycled into hardware items for construction. b) and c) Glass containers embossed with word "poison" in 3 languages, and "Do not re-use".

Country: **SRI LANKA** TABLE 8
Project or Activity: FAO Intercountry Rice Programme and New programme on IPM training with CARE International
Risk Reduction Category: Promoting IPM

What are the key elements of the project/activity?	FAO-sponsored intercountry rice programme which trains farmers in all aspects of growing healthy rice crop through a train-the-trainers programme on pest surveillance and monitoring for IPM decision-making based on Economic Threshold Limits (ETLs). Farmers are also trained to assess beneficials, pest species, plant health and soil-planting environment relationships.
When did the project/activity begin and what prompted its initiation?	Intercountry Rice Programme 1984 (New Programme 1994). Impact of pesticides on non-target organisms and the availability of information on ETLs and some pest-resistant/tolerant rice varieties from the Rice Breeding Programme
What are its specific goals and/or targets?	To build farmer confidence to make rational judgements on the need for pesticides, reduce cost of cultivation of rice and health and environmental effects
Who is involved in carrying it out?	DOA FAO Farmers'/growers' associations Care International, Sarvodaya (NGOs) Maharwali Economic Agency (Govt.)
Is there a legal or regulatory mandate?	No legal mandate or national mandate or national policy for IPM in rice
Is the activity monitored or enforced? If so, how?	Activity is not monitored, but periodic monitoring is done through special surveys conducted by Economists/Research Officers/Extension Staff of MEA and DOA.
How are the results and progress measured?	Progress has been measured by parameters involving production costs, yield and frequency of application.
What specific progress/results have been achieved?	Results of studies on impact assessment of IPM field programmes and economic benefits to farmers adopting IPM techniques substantiate that the technology is effective, safe and cheap. Though number of pesticide applications was reduced, yields were not affected, hence the cost of production was reduced. To date 105,000 farmers have been trained, covering 2/3 of the island.

Country: **SRI LANKA** TABLE 9
Project or Activity: Research and Development
Risk Reduction Category: Promoting IPM

What are the key elements of the project/activity?	a) A database for extending IPM on high value crops such as vegetables, beans and chillies is being generated. b) Breeding programmes are focused on incorporating pest resistance into rice varieties or selection for tolerant strains in local and imported varieties. c) The performance of IGRs, biopesticides and botanical extracts to control various pest species is being investigated. d) Evaluating traditional practices for pest management performance.
When did the project/activity begin and what prompted its initiation?	a) 1990 b) 1970 for rice, 1994 Bringal shoot and fruit borer c) 1989-90 IGR on cabbage, whitefly on guava (introduced - NKWE),1993-1994 for legume pod borers and tomato fruit worm d) 1990
What are its specific goals and/or targets?	a),b),d) Reducing high pesticidal inputs, cost of production and health/environmental risks c) Reduction of pesticide residues
Who is involved in carrying it out?	DOA Research Division
Is there a legal or regulatory mandate?	None as yet
Is the activity monitored or enforced? If so, how?	When available, DOA Training, Extension and Communications Divisions promote the released information on varieties and pest control management practices for extension by the Provinces.
How are the results and progress measured?	Trends would be seen on demand for planting material or import of specific pesticidal components, as the latter is monitored by the Registrar of Pesticides.
What specific progress/results have been achieved?	b) Several tolerant varieties for bacterial wilt of Solanacae have been identified and 3 released for seed production by the DOA (Tomato T146, T246, KWR) and Bringal SM164 which is moderately resistant to fruit and shoot borer of bringal.

Country: **SRI LANKA** TABLE 10
Project or Activity: Biocontrol of pests
Risk Reduction Category: Promoting IPM

What are the key elements of the project/activity?	a) To control aquatic weed *Salvinia,* which is detrimental to rice cultivation as it clogs irrigation canals, waterways and water bodies through the use of a predator weevil. b) There is an on-going programme to control rhinoceros beetle in coconut. *Metarhizium anisopliae* cultured on locally available media is issued to coconut cultivators. c) Use of parasitic mites in tea under investigation. d) Granular formulations promoted for certain rice pests: stem-borers, gall midge BPH and Thrips conservers beneficials of leaf-eating caterpillars and egg parasites of rice stem borers.
When did the project/activity begin and what prompted its initiation?	a) 1987, in co-operation with the Government of Australia, initiated in response to the loss of productive rice paddies due to *Salvinia* infestation b)-d) On-going research efforts to control pest problems ranging over 3 decades
What are its specific goals and/or targets?	a) To restore *Salvinia*-infested paddies to productive use b) To improve plant stands in coconut nurseries and young plantations in areas endemic to the pest c) To replace dicofol as tolerances of DDT-related residues have been revoked in dried tea d) Ease of activity and lends itself to IPM
Who is involved in carrying it out?	a) DOA with the initial assistance of the Australian Government. Now promoted by provincial extension staff. b) Coconut cultivators assisted by the Coconut Research Institute c) Tea Research Institute d) Research and Plant Protection Divisions of the DOA monitor fields where IPM rice programmes have been effected by DOA, by PDOA staff for in-house use.
Is there a legal or regulatory mandate?	No
Is the activity monitored or enforced? If so, how?	d) Monitoring is not routine. Programmes are initiated by trainers at field level and only economic impacts are recorded.
How are the results and progress measured?	a) Reports of the Irrigation Department a) and b) Downward trend in demand for biocontrol agent
What specific progress/results have been achieved?	a) Spectacular results in some areas, in others the survival of the predator weevil was adversely affected as water temperature, pH and salinity are limiting factors.

THAILAND

CONTACT PERSON(S):

Activity I

Director of Agriculture Regulatory Division
Department of Agriculture
Bangkok 10900

Tel: (662) 5798576

Activity II

President Thai Pesticide Association
(Mr. Sompong Jinanon)
50 Pahonyothin Road
Bangkok 10900

Tel: (662) 5792419
Fax: (662) 5795091

or Mr Wyn Ellis, Safe Use Project Leader, Thailand
GIFAP Representative Office
3F, Kasetsart University Alumni Building
50 Pahonyothin Road
Bangkok 10900

Tel: (662) 5799914
Fax: (662) 5799914

Activity III

Director of Planning and Technical Division
Department of Agriculture
Bangkok 10900

Tel: (662) 5795246
Fax: (662) 5615024

I. Framework for Pesticide Risk and Use Reduction Activities

Activity I *Regulation and elimination of hazardous pesticide use*

A new pesticide registration system has been developed to control or restrict pesticides which cause high risks. The system is divided into 3 steps or phases, namely; first, Trial or Experimental Clearance; second, Provisional or Limited Clearance; and third, Commercial or Full Registration. A guideline of data or information required has been sent, which should be submitted for the registration of each phase.

The Department of Agriculture is responsible for this task through the Division of Agricultural Regulatory and Division of Agricultural Toxic Substances.

Activity II *Education and tools to increase safety in pesticide handling, use and disposal*

A Safe Use Project is implemented through the co-operation between public and private sectors in promoting safe use of pesticides in Thailand.

According to the FAO International Code of Conduct on the Distribution and Use of Pesticides of 1990, GIFAP played an active role in raising safety standards in production, distribution and use of agrochemicals. A 3-year pilot Safe Use Project was started in Thailand, Kenya and Guatemala. In Thailand the project is implemented through the Thai Pesticide Association (TPA) in co-operation with the Thai Government.

The project has been conducted with a wide range of organizations including government departments, universities, hospitals, international agencies and NGOs, as well as private sector companies.

Activity III *Reduction in Pesticide Use*

The Department of Agriculture (DOA) has been carrying out a project which aims at reduction in pesticide use. The project is under the co-operation of many Divisions in the DOA, i.e. Entomology and Zoology Division, Agricultural Toxic Substances Division (ATSD), Plant Pathology and Microbiology Division, Botany and Weed Science Division, Office of Co-ordination for Agricultural Research and Development, and Planning Technical Division.

II. Description of Activities

Country: **THAILAND** TABLE 1
Project or Activity: Phased registration and review of pesticides
Risk Reduction Category: Eliminating hazardous pesticides

What are the key elements of the project/activity?	A three-phase system of review/registration of pesticides was established in 1991, one year before the Hazardous Substances Act (1992) was promulgated. According to the Act, hazardous compounds are classified into 4 categories: - Type 1: the production, import, export or possession must comply with specified criteria and procedures; - Type 2: the production, import, export or possession must first be notified to the authority and must also comply with specified criteria and procedures; - Type 3: the production, import, export or possession must first be registered and obtain a permit; - Type 4: the production, import, export or possession is prohibited. This was applied retroactively to the pesticides currently on the market in 1992. When the permit of the pesticide which was registered before the phased registration system expires, it must be re-registered following the new system - About 270 hazardous substances registered before its implementation; - About 50 hazardous substances registered after its implementation.
When did the project / activity begin and what prompted its initiation?	1991
What are its specific goals and/or targets?	To control or restrict pesticides which may cause high risks, and to limit the number of new imported pesticides.
Who is involved in carrying it out?	Department of Agriculture - Division of Agricultural Regulatory - Division of Agricultural Toxic Substances Committee on Hazardous Substances Sub-Committee on Registration of Agricultural Toxic Substances

Is there a legal or regulatory mandate?	Under the Poisonous Article Act 1967, a regulation of phased registration scheme was mandated in 1991. Hazardous Substances Act (1992)
Is the activity monitored or enforced? If so, how?	The activity is enforced. All pesticides in type 2 and type 3 compounds must be registered.
How are the results and progress measured?	
What specific progress/results have been achieved?	- About 50 pesticides have been registered under the phased registration. - The Committee has evaluated 44 pesticides whose use may pose unacceptably high risks and classified 10 compounds as Type 4 - production, import-export or possession are prohibited. They are pentachlorophenol, pentachlorophenate sodium, mercury compounds, ethylene chloride, aminocarb, bromophos, bromophos ethyl, demeton, fentin and nitrofen.

Country: **THAILAND** TABLE 2
Project or Activity: Safe use project
Risk Reduction Category: Increasing safety in pesticide handling, use and disposal

What are the key elements of the project/activity?	A three-year pilot project implemented through the Thai Pesticide Association (TPA) in co-operation with the Thai government. Specific activities include: a) training of trainers, retailers and farmers b) education or school programme, increase in awareness via students through curriculum materials and informal methods c) medical programme, training programme for medical profession in the diagnosis and treatment of pesticide poisoning d) protective clothing e) industry standard f) model farm.
When did the project/activity begin and what prompted its initiation?	1991
What are its specific goals and/or targets?	Overall goal is to promote the safe use of pesticides in Thailand. Some specific goals include: b) to increase awareness via high school students c) to eventually link all hospitals to the poison control centre in Bangkok d) to encourage farmers to see the benefits of protective clothing and be prepared to pay for it e) to ensure that pesticide manufacturers, formulators and repackers meet the standards laid out in the FAO Code, GIFAP Guidelines and national law, and to establish appropriate disposal activity for pesticide waste and bulk packaging f) the model farm project is aimed at minimizing pesticide use through improved application technology, training of farmers, monitoring of residues in fruit, workers, soil and water to demonstrate that pesticides are safe for the user, consumer and environment when used properly.

Who is involved in carrying it out?	Co-operative project between the public and private sector, including: - Department of Agriculture and Department of Agricultural Extension - Ministry of Public Health, Food and Drug Administration and Toxicological Society of Thailand - Thai Pesticides association and GIFAP - universities - hospitals - international agencies - non-governmental organisations.
Is there a legal or regulatory mandate?	No legal or regulatory mandate.
Is the activity monitored or enforced? If so, how?	The activity is monitored.
How are the results and progress measured?	
What specific progress/results have been achieved?	a) 750 trainers, 700 retailers and 330,000 farmers trained. b) More than 250 schoolteachers have been trained with follow-up for 65,000 students. c) Approximately 1,300 doctors, paramedics and nurses have been trained; doctors are provided with reference texts, a medical newsletter, trade name common name reference index and databases. d) Available materials and designs have been improved and promoted; about 300,000 items have been distributed. e) A disposal facility (incinerator, scrubber, water and ash treatment units) is planned for completion by the end of 1995.

Country: **THAILAND** TABLE 3
Project or Activity: Biocontrol of pests
Risk Reduction Category: Reducing pesticide use

What are the key elements of the project/activity?	The objective is to reduce the amount of pesticide use. Relevant activities include: a) - research on the use of natural plants and micro-organisms - identification and preparation of microbial pest control agents b) - introducing and increasing natural enemies such as predators and parasites for pest control c) - development of integrated pest management programmes.
When did the project/activity begin and what prompted its initiation?	Project was initiated in 1992 for a period of 5 years.
What are its specific goals and/or targets?	*Bt* production: introduce *Bt* to replace or reduce the quantity of pesticides used in vegetable plantation = 300 hectares. NVP: - Introduce NVP into the IPM programme which will reduce pesticide use by about 30% - Introduce NVP to about 500 farmers for self-production and use in their own farms. Neem production: Introduce neem extract to reduce pesticide use in various agricultural areas, about 30% of the total use.

Who is involved in carrying it out?	Department of Agriculture: - Entomology and Zoology Division - Agricultural Toxic Substances Division - Plant Pathology and Microbiology Division - Botany and Weed Science Division - Office of Co-ordinator for Agricultural Research - Planning and Technical Division.
Is there a legal or regulatory mandate?	No legal or regulatory mandate.
Is the activity monitored or enforced? If so, how?	The activity is monitored.
How are the results and progress measured?	The acceptance of farmers in the use of biocontrol techniques. The expanse of farm areas using biocontrol technique.
What specific progress/results have been achieved?	a) Three pilot plants have been constructed: • Produce and formulate pesticides from natural plants, e.g. neem. The target is 10,000 L/year for use on vegetables and several kinds of plants. • Produce nuclear polyhedrosis virus (NPV) from *S. exigua* to use in grapes, about 50 hectares; NPV from *H. armigera* for cotton fields, about 16 hectares under IPM programme. • Produce *Bacillus thuringiensis (Bt)* for use on cabbages in several provinces in northern Thailand. b) The introduction of: • Diamond back moth parasite *Cotesia plutela* for vegetables, e.g. cabbage, kale; • *Leueneuma psyllid* predator, *Curinna cocrulena* for *lencaena* and *Trichogramma* sp for cotton and vegetables.

Country: **THAILAND** TABLE 4
Project or Activity: IPM in rice
Risk Reduction Category: Promoting IPM

What are the key elements of the project/activity?	- In each phase, a group of about 20 farmers in the central province of Thailand joined this activity. - The group was convinced, educated in IPM techniques through frequent meetings at the village. e.g. - seed preparation before planting - pest monitoring - selection of pesticides used.
When did the project/activity begin and what prompted its initiation?	Phase 1 1982-1984 - in Patumthani Province Phase 2 1985-1987 - in Ayuthaya Province Phase 3 1988-1990 - in Nonthaburi Province
What are its specific goals and/or targets?	- About 500 Rai (>80 hectare) of farms or about 20 farmers were set to be using IPM within each phase
Who is involved in carrying it out?	Department of Agriculture Department of Agricultural Extension FAO
Is there a legal or regulatory mandate?	No legal or regulatory mandate.
Is the activity monitored or enforced? If so, how?	The activity is monitored.
How are the results and progress measured?	Reduction of pesticide use. Change in agricultural practice.
What specific progress/results have been achieved?	About 60 farmers trained and practising IPM techniques, i.e. • reduced pesticide use • farmers perform better agricultural practice: survey of pests before pesticides are applied, and better application of pesticides.

Country: **Thailand** Table 5
Project or Activity: IPM in fruit trees
Risk Reduction Category: Promoting IPM

What are the key elements of the project/activity?	Phase 1: Orientation phase (1990-1992) • Baseline survey, survey growers' practices • Review existing research • Develop recommendations on need-based direct control and indirect control adapted to IPC needs • Know-how for plant production and protection personnel: extension agents, growers and others • Project management system functioning. Phase 2: IPM in selected fruit trees (1993-1996) Fruit trees selected: durian, pomelo, tangerine and mango • Dissemination of information and know-how to fruit growers • Mother garden and demonstration unit for disease - free material established • Application techniques extended to fruit growers.
When did the project - activity begin and what prompted its initiation?	
What are its specific goals and/ or targets?	Overall goal is to reduce adverse effects of pesticides to users, consumers and environment and to improve the economics of fruit production • Develop IPM system and technology adaptation • Fruit growers practice IPM in selected fruit trees.
Who is involved in carrying it out?	Department of Agriculture Department of Agricultural Extension GTZ: Thai-German Plant Protection Programme

Is there a legal or regulatory mandate?	No legal or regulatory mandate.
Is the activity monitored or enforced? If so, how?	The activity is monitored: • Monitor regularly the selected chemical parameter in IPM and conventional plots • Monitor regularly the selected bio-indicators in IPM and conventional plots • Monitor pesticide residue in/on fruits.
How are the results and progress measured?	
What specific progress/results have been achieved?	• Demonstration plots of disease-free planting material established at Pathumthani, Chiang Rai and Rayong province • About 15% of fruit growers received information and practice for IPM technology • Extend application techniques to fruit growers • Manuals in application techniques (4 crops) were published.

III. Conclusions

Activity I has presented the most difficulties, since the new registration system has just been set up. The system is based on careful examination of the benefit/risk ratio and requires quite a large amount of data and information, which makes manufacturers and importers feel uneasy. However, the importer may submit available data which were generated from credible laboratories in developed countries. The programme needs understanding and co-operation between the private sector and registration authority.

Activity II, the Safe Use Project has been the most successful since it is carried out through the co-operation between various organizations, including public and private sectors, NGOs and international agencies. The project has been closely supervised and financed. Moreover, the project which was started in 1991 and ends in June 1994 is such a success that GIFAP Brussels has decided to continue its support for the Safe Use Project Phase 2.

ZAMBIA

CONTACT PERSON(S):

Besides the Director of ECZ, who is the co-ordinator, the following persons are also key players in Zambia's risk reduction programmes:

Dr. E. Sakufiwa (alternatives, IPM programmes)
Chief Agricultural Research Officer (Plant Protection)
Mt Makulu Agricultural Research
Dept of Agriculture
P.O. Box 7
Chilanga, Zambia

Mr. L. Mwanamwenge (training and awareness)
Natural Resources Development College
P.O. Box CH Chelston, Lusaka, Zambia

Mr. Steve Mwansa (safety, use and awareness)
Chairman
Zambia Agrochemicals Association
Farmchem Services
Lusaka, Zambia

Mr. Johan Morner
Swedish University of agricultural Sciences
Dept of Entomology and Plant Pathology
P.O. Box 7044 - 750 07, Uppsala, Sweden

(Useful data source on IPM (natural plant) pesticides in Zambia, Botswana and Tanzania)

Director
(attention J. S. Phiri)
Environmental Council of Zambia
P.O. Box 35131, Lusaka

(Mainly legislation/enforcement, monitoring and awareness or training programmes and also co-ordinator and facilitator of pesticides risk reduction programmes in Zambia.)

The Chief Conservator of Forests
(Att. Mr. Banda)
Dept. of Forests
Ndola, Zambia
(natural pesticides use in tree nurseries)

I. Framework for Pesticide Risk and Use Reduction Activities

1. Zambia's approach to pesticides risk reduction: currently there is no co-ordinated single national programme. However, sectoral programmes do exist, e.g. Ministry of Agriculture Extension Dept. The Environmental Council has developed and initiated training programmes on Safety and Use of pesticides. This programme involves all key participants or players in pesticides programmes, including representatives of industry, government and research organisations.

There are some risk reduction programmes of one form or another at almost all levels, although weak.

Zambia's various risk reduction programmes are carried out by different organisations in different areas with varying degrees of success. For example, the Agrochemicals Association as part of its sales services has in the past organised farmer training programmes, the Ministry of Agriculture, FAO, the WWF, agricultural colleges. The University of Zambia and the Environmental Council have conducted different activities of one form or another.

2. The principal factors which prompted Zambia to initiate risk reduction programmes include concerns about worker health, abuse, wrong handling, and disposal problems.

3. The Environmental Protection and Pollution Control Act No. 12, 1990 and the Pesticides and Toxic Substances Regulations No 20. 1994 are the principal or regulatory mandates for pesticides risk reduction activities in Zambia.

II. Description of Activities

Country: **Zambia**
Project or Activity: Education awareness
Risk Reduction Category: Measures to Reduce Workers' Risks

What are the key elements of the project/activity?	Increase public awareness of hazards of pesticides, training of retailers and extension staff.
When did the project / activity begin and what prompted its initiation?	In the early 1980s, but was not co-ordinated until 1993 when the Environmental Council of Zambia (ECZ) started co-ordinating. Activity began due to concerns about workers' health and abuse.
What are its specific goals and/or targets?	To reduce cases of poisonings and deaths, and to train retailers and agricultural extension and crop protection staff in pesticide safety.
Who is involved in carrying it out?	Involves ECZ, Ministry of Agriculture, Ministry of Labour, University of Zambia and Agricultural College, Ministry of Health and agrochemicals association, and the Ministry of Broadcasting.
Is there a legal or regulatory mandate?	Yes, the EPPCA (12) 1990, the PTSR (20) 1994 and the Factories Act.
Is the activity monitored or enforced? If so, how?	Conducted when ECZ has enough financial resources. Target is 3 courses per year for different target groups.
How are the results and progress measured?	Very difficult, but generally based on change of people's attitude towards pesticides. Number of institutions providing information and protective material for their workers. Number of requests for more awareness programmes and seeking safety information.
What specific progress/ results have been achieved?	Since 1993, when ECZ started co-ordinating, one seminar/workshop has been conducted every year (so far three workshops held). ECZ has received several requests to hold more training workshops. Radio and print programmes have proved very popular, with several requests for more.

Country: **Zambia**
Project or Activity: Formulation and Enforcement of Legislation
Risk Reduction Category: Product Registration

What are the key elements of the project/activity?	
When did the project / activity begin and what prompted its initiation?	Specific legislation on pesticides was formulated in 1990 and 1994 (regulation). Enforcement started in 1992, but regulations effected only in 1994. Legislation formulated to control types of pesticides imported and used in Zambia.
What are its specific goals and/or targets?	To reduce dangers/risks arising from pesticide use. To stop and eventually ban some pesticides causing health and environmental problems. To promote safer pesticides and pest control methods.
Who is involved in carrying it out?	Environmental Council of Zambia (ECZ), but soon to involve Customs Department.
Is there a legal or regulatory mandate?	Yes, responsibility of ECZ under the umbrella of Environmental Act.
Is the activity monitored or enforced? If so, how?	Yes, by means of registrations and certificates and monitoring by physical inspections. The system not yet perfect.
How are the results and progress measured?	Gazetting of regulations as law. The number of individuals and companies applying for registration. Improvement in pesticide trade practices. Results of physical inspection reports by ECZ inspectors.
What specific progress / results have been achieved?	Legislation is being enforced. There is over 80% compliance with pesticides registration and over 60% of major pesticides companies registered within one year of enforcing legislation.

Country: **Zambia**
Project or Activity: Restriction on Traders
Risk Reduction Category: Measures to Reduce Workers' Risks

What are the key elements of the project/activity?	Restriction on pesticide traders.
When did the project / activity begin and what prompted its initiation?	Started in 1994 to ensure only competent and trained persons handled/sold pesticides.
What are its specific goals and/or targets?	To reduce workers' exposure and risks. To reduce accidents due to wrong storage or handling. To ensure users are given appropriate information.
Who is involved in carrying it out?	The Environmental Council of Zambia (ECZ) and the Labour Inspectorate.
Is there a legal or regulatory mandate?	As Activity I.
Is the activity monitored or enforced? If so, how?	As Activity II.
How are the results and progress measured?	Reduction in numbers of unregistered traders.
What specific progress / results have been achieved?	Too early to measure because we have not yet registered all the major traders.

Country: **Zambia**
Project or Activity: **Provision of safer methods, IPM and green pesticides**
Risk Reduction Category: **Increasing Pest Control Efficiency and Effectiveness**

What are the key elements of the project/activity?	
When did the project / activity begin and what prompted its initiation?	Scientific and institutionalised work began in 1986, although traditional small-scale farmers have practised non-chemical pesticide methods for a long time.
What are its specific goals and/or targets?	To promote safer pesticides or pest and pesticide management. To provide poor small-scale users with cheaper effective pest control alternatives.
Who is involved in carrying it out?	Ministry of Agriculture Crop Protection section, National Council for Scientific research (to evaluate toxicity), Forestry Dept. and the ECZ and PIPP (SIDA).
Is there a legal or regulatory mandate?	Same as activities 1 and 2.
Is the activity monitored or enforced? If so, how?	Not really, because activity still in infancy but major players have been identified (refer to PIPP).
How are the results and progress measured?	Number of farmers and institutions accepting alternative methods.
What specific progress/ results have been achieved?	Registered institutions in Zambia have taken keen interest in this area and are carrying out "on farm" site research. The farmers involved with this work have welcomed this work and are participating eagerly.

III. Conclusions

1. The most successful activities include: (a) the registration exercise (or licensing). The success is generally attributed to high level co-operation from industry and other government institutions. (b) Education and awareness, whose success has been due to the great enthusiasm to learn by different institutions and individuals. The demand for this activity is so high that we are unable to keep pace.

2. Restricting numbers of pesticides traders (illegal, unqualified) has proved extremely difficult due to their large numbers and distribution throughout the country. The major reason for this is lack of adequate resources to monitor or inspect international border points. This is likely to change soon, because the customs Department is soon to get involved. This also explains the difficulties of implementing the FAO-PIC scheme, due to lack of capacity to physically control imports at international border points.

3. Measurement of success or failure requires statistics which involved data gathering and processing. Although we have limited facilities for data processing, we do not have adequate capacity to collect/gather data, hence one big problem faced for all the activities.

4. Fortunately, no other pesticide policy is directly in conflict with the environmental Act, but is in fact supportive and supplementary to ECZ's risk reduction programmes. However, this has been largely due to the role ECZ has taken as facilitator and co-ordinator of pesticides risk reductions. Notably the Factories Inspectorate programmes which ECZ supports materially when requested, the Food and Drugs programmes of the Ministry of Health, and the Swedish-funded "Natural Pesticides Programme" under the Ministry of Agriculture, to name a few.

5. Zambia accepts and appreciates the following:

(a) The FAO-PIC, which Zambia is implementing (although without necessary training). Perhaps the PIC should even go to the extent of providing support in its implementation.

(b) The UNEP APELL Awareness programmes.

(c) The International Programme on Chemical Safety (IPCS) and activities of the Inter governmental Forum on Chemical Safety (IFCS).

(d) The UNITAR programmes on implementation of London Guidelines, including the FAO-PIC.

ENVIRONMENTAL HEALTH AND SAFETY PUBLICATIONS

As of July 1996

OECD ENVIRONMENT DIRECTORATE,

ENVIRONMENTAL HEALTH AND SAFETY DIVISION

2 rue André-Pascal
75775 Paris Cedex 16
FRANCE

Fax: (33-1) 45 24 16 75

E-mail: ehscont@oecd.org

For more information, and the full text of some of these publications, consult the OECD's World Wide Web site (http://www.oecd.org/ehs/)

Contents

***Please note*:**

[F] indicates that the entire publication is available from the OECD in a separate French translation. The other publications listed are available in English only, but they often include a French summary.

[GLP] indicates that the publication is part of the OECD Series on Principles of Good Laboratory Practice and Compliance Monitoring. Translations of this series into German, Russian, Polish, Czech, Slovak, Hebrew, Spanish and Italian exist or are planned. For more information, please contact the Environmental Health and Safety Division.

[BIO] indicates that the publication is part of the OECD Series on the Harmonization of Regulatory Oversight in Biotechnology.

The Environment Monograph Series:

Since 1988, the Environment Monograph Series has made technical documents prepared by the OECD Environment Directorate available to the public. The Environment Monographs on this list were prepared by the Environmental Health and Safety Division. Copies are available upon request at no charge, in limited quantities.

No. 14, *Final Report of the Expert Group on Model Forms of Agreement for the Exchange of Confidential Data on Chemicals* (1988)[F]

No. 15, *Final Report of the Working Group on Mutual Recognition of Compliance with Good Laboratory Practice* (1988)[F]

No. 17, *The Use of Industry Category Documents in Source Assessment of Chemicals* (1989)[F]

No. 24, *Accidents Involving Hazardous Substances* (1989)[F]

No. 25, *A Survey of Information Systems in OECD Member Countries Covering Accidents Involving Hazardous Substances* (1989)[F]

[superseded by the *Users Guide to Information Systems Useful to Emergency Planners and Responders Available in OECD Member Countries* (1991)]

No. 26, *Report of the OECD Workshop on Ecological Effects Assessment* (1989)[F]

No. 27, *Compendium of Environmental Exposure Assessment Methods for Chemicals* (1989)[F]

No. 28, *Workshop on Prevention of Accidents Involving Hazardous Substances: Good Management Practice* (1990)[F]

No. 29, *Workshop on the Provision of Information to the Public and on the Role of Workers in Accident Prevention and Response* (1990)[F]

No. 30, *Workshop on the Role of Public Authorities in Preventing Major Accidents and in Major Accident Land-Use Planning* (1990)[F]

No. 31, *Workshop on Emergency Preparedness and Response and on Research in Accident Prevention, Preparedness and Response* (1990)[F]

No. 35, *A Survey of New Chemicals Notification Procedures in OECD Member Countries* (1990)[F]

No. 36, *Scientific Criteria for Validation of In Vitro Toxicity Tests* (1990)[F]

No. 39, *International Survey on Biotechnology Use and Regulations* (1990)[F]

[no number] *Users Guide to Hazardous Substance Data Banks Available in OECD Member Countries*, OCDE/GD(91)102 (1991)[F]

[Also translated into Spanish by the United Nations Environment Programme's Industry and Environment Office (UNEP IE).]

[no number] *Users Guide to Information Systems Useful to Emergency Planners and Responders Available in OECD Member Countries*, OCDE/GD(91)103 (1991)[F]

[Also translated into Spanish by UNEP IE.]

No. 43, *International Directory of Emergency Response Centres* (1992)[F]

[The International Directory is a co-operative project of OECD and UNEP IE. The emergency response centres listed in this Directory are located in both OECD and non-OECD countries.]

No. 44, *Workshop on Prevention of Accidents Involving Hazardous Substances: The Role of the Human Factor in Plant Operations* (1992)

No. 45, *The OECD Principles of Good Laboratory Practice* (1992)[F, GLP]

No. 46, *Guides for Compliance Monitoring Procedures for Good Laboratory Practice* (1992)[F, GLP]

[superseded by No. 110, *Revised Guides for Compliance Monitoring Procedures for Good Laboratory Practice* (1995)]

No. 47, *Guidance for the Conduct of Laboratory Inspections and Study Audits* (1992)[F, GLP]

[superseded by No. 111, *Revised Guidance for the Conduct of Laboratory Inspections and Study Audits* (1995)]

No. 48, *Quality Assurance and GLP* (1992)[F, GLP]

No. 49, *Compliance of Laboratory Suppliers with GLP Principles* (1992)[F, GLP]

No. 50, *The Application of the GLP Principles to Field Studies* (1992)[F, GLP]

No. 51, *Guiding Principles for Chemical Accident Prevention, Preparedness and Response: Guidance for Public Authorities, Industry, Labour and Others for the Establishment of Programmes and Policies related to Prevention of, Preparedness for, and Response to Accidents Involving Hazardous Substances* (1992)[F]

[The Guiding Principles are also available in Russian. They are being translated into Spanish, and may also be translated into other languages. For more information, please contact the Environmental Health and Safety Division.]

No. 52, *Report of the OECD Workshop on Monitoring of Organisms Introduced into the Environment* (1992)

No. 58, *Report of the OECD Workshop on Quantitative Structure Activity Relationships (QSARS) in Aquatic Effects Assessment* (1992)

No. 59, *Report of the OECD Workshop on the Extrapolation of Laboratory Aquatic Toxicity Data to the Real Environment* (1992)

No. 60, *Report of the OECD Workshop on Effects Assessment of Chemicals in Sediment* (1992)

No. 65, *Risk Reduction Monograph No. 1: Lead* (1993)

No. 66, *Report of the OECD Workshop on Strategies for Transporting Dangerous Goods by Road: Safety and Environmental Protection* (1993)

[The OECD's Chemical Accidents Programme and Road Transport Research Programme co-operated in organising this workshop.]

No. 67, *Application of Structure-Activity Relationships to the Estimation of Properties Important in Exposure Assessment* (1993)

No. 68, *Structure-Activity Relationships for Biodegradation* (1993)

No. 69, *Report of the OECD Workshop on the Application of Simple Models for Exposure Assessment* (1993)

No. 70, *Occupational and Consumer Exposure Assessments* (1993)

No. 73, *The Application of the GLP Principles to Short-term Studies* (1993)[F, GLP]

No. 74, *The Role and Responsibilities of the Study Director in GLP Studies* (1993)[F, GLP]

No. 76, *OECD Series on the Test Guidelines Programme No. 1: Guidance Document for the Development of OECD Guidelines for Testing of Chemicals* (1993; reformatted 1995)[F]

No. 77, *Data Requirements for Pesticide Registration in OECD Member Countries: Survey Results* (1993) ***[Series on Pesticides No. 1]***

No. 81, *Health Aspects of Chemical Accidents: Guidance on Chemical Accident Awareness, Preparedness and Response for Health Professionals and Emergency Responders* (1994)[F]

[Four international organisations collaborated in the preparation of this publication: the International Programme on Chemical Safety (IPCS), OECD, UNEP IE, and the World Health Organization – European Centre for Environment and Health (WHO-ECEH).]

No. 88, *US EPA/EC Joint Project on the Evaluation of (Quantitative) Structure Activity Relationships* (1994)

No. 90: *Ottawa '92: The OECD Workshop on Methods for Monitoring Organisms in the Environment* (1994)*****

No. 91: *Compendium of Methods for Monitoring Organisms in the Environment* (1994)*****

[*****Monographs No. 90 and 91 are companion documents.]

No. 92, *Guidance Document for Aquatic Effects Assessment* (1995)

No. 93, *Report of the OECD Workshop on Chemical Safety in Port Areas* (1994)

[This Workshop was co-sponsored by OECD, the International Maritime Organization (IMO) and UNEP.]

No. 94, *Report of the OECD Special Session on Chemical Accident Prevention, Preparedness and Response at Transport Interfaces* (1995)

No. 95, *Report of the OECD Workshop on Small and Medium-sized Enterprises in Relation to Chemical Accident Prevention, Preparedness and Response* (1995)

No. 98, *OECD Series on the Test Guidelines Programme No. 2: Detailed Review Paper on Biodegradability Testing* (1995)

No. 99, *Commercialisation of Agricultural Products Derived through Modern Biotechnology: Survey Results* (1995)[BIO]

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No. 101, *Risk Reduction Monograph No. 2: Methylene Chloride* (1994)

No. 102, *Risk Reduction Monograph No. 3: Selected Brominated Flame Retardants* (1994)

No. 103, *Risk Reduction Monograph No. 4: Mercury* (1994)

No. 104, *Risk Reduction Monograph No. 5: Cadmium* (1994)

No. 105, *Report of the OECD Workshop on Environmental Hazard/Risk Assessment* (1995)

No. 106, *Data Requirements for Biological Pesticides* (1996) ***[Series on Pesticides No. 3]***

No. 107, *Report of the OECD Workshop on the Commercialisation of Agricultural Products Derived through Modern Biotechnology* (1995)[BIO]

No. 108, *Final Report on the OECD Pilot Project to Compare Pesticide Data Reviews* (1995) ***[Series on Pesticides No. 2]***

No. 110, *Revised Guides for Compliance Monitoring Procedures for Good Laboratory Practice* (1995)[F, GLP]

No. 111, *Revised Guidance for the Conduct of Laboratory Inspections and Study Audits* (1995)[F, GLP]

No. 115, *Guidance for the Preparation of GLP Inspection Reports* (1995)[F, GLP]

No. 116, *The Application of the Principles of GLP to Computerised Systems* (1995)[F, GLP]

No. 117, *Industrial Products of Modern Biotechnology Intended for Release to the Environment: The Proceedings of the Fribourg Workshop* (1996)[BIO]

No. 118, *Guidance Concerning Chemical Safety in Port Areas*

[Prepared as a joint effort by the OECD and the International Maritime Organization (IMO)]

No. 120, *Consensus Document on the Biology of* Brassica Napus L *(Oilseed Rape)*
(in preparation)

No. 121, *Consensus Document on Virus Resistance through Coat Protein–Mediated Protection* **(in preparation)**

Priced Publications:

OECD Guidelines for Testing of Chemicals (updated 1995)[F]
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Consensus Document on Information Used in the Assessment of Environmental Applications Involving Rhizobiacea

Consensus Document on Information Used in the Assessment of Environmental Applications Involving Bacillus

[*] Proposed for publication in the "OECD Documents" series.