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JOINT MEETING OF THE CHEMICALS COMMITTEE AND
THE WORKING PARTY ON CHEMICALS, PESTICIDES AND BIOTECHNOLOGY

# REPORT OF THE SEMINAR ON PESTICIDE RISK REDUCTION THROUGH SPRAY DRIFT REDUCTION STRATEGIES AS PART OF NATIONAL RISK MANAGEMENT

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# REPORT OF THE SEMINAR

# ON PESTICIDE RISK REDUCTION

# THROUGH SPRAY DRIFT REDUCTION STRATEGIES

# AS PART OF NATIONAL RISK MANAGEMENT

OECD Environment, Health and Safety Publications

Series on Pesticides

No. 46

# REPORT OF THE SEMINAR ON PESTICIDE RISK REDUCTION THROUGH SPRAY DRIFT REDUCTION STRATEGIES AS PART OF NATIONAL RISK MANAGEMENT

**12 June 2008, OECD, Paris, France**

IOMC

INTER-ORGANIZATION PROGRAMME FOR THE SOUND MANAGEMENT OF CHEMICALS

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**Paris 2009**

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No. 37 *Report on the OECD Pesticide Risk Reduction Steering Group Workshop "Pesticide User Compliance'* (2007)

No. 38 *Survey of the Pesticide Risk Reduction Steering Group on Minor Uses of Pesticides* (2007)

No. 39 *Guidance Document on Pesticide Residue Analytical Methods* (2007)

No. 40 *Report of the Joint OECD Pesticide Risk Reduction Steering Group EC-HAIR Seminar on Harmonised Environmental Indicators for Pesticide Risk* (2007)

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*OECD Guidance for Country Data Review Reports on Plant Protection Products and their Active Substances*-Monograph Guidance (1998, revised 2001, 2005, 2006)

*OECD Guidance for Industry Data Submissions on Plant Protection Products and their Active Substances*-Dossier Guidance (1998, revised 2001, 2005)

*Report of the Pesticide Aquatic Risk Indicators Expert Group* (2000)

*Report of the OECD Workshop on the Economics of Pesticide Risk Reduction* (2001)

*Report of the OECD-FAO-UNEP Workshop on Obsolete Pesticides* (2000)

*Report of the OECD Pesticide Aquatic Risk Indicators Expert Group* (2000)

*Report of the 2nd OECD Workshop on Pesticide Risk Indicators* (1999)

*Guidelines for the Collection of Pesticide Usage Statistics Within Agriculture and Horticulture* (1999)

*Report of the [1st] OECD Workshop on Pesticide Risk Indicators* (1997)

*Report of the OECD/FAO Workshop on Pesticide Risk Reduction* (1995)

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**or contact:**

**OECD Environment Directorate,**
**Environment, Health and Safety Division**

**2, rue André-Pascal**
**75775 Paris Cedex 16**
**France**

**Fax: (33-1) 44 30 61 80**

**E-mail: ehscont@oecd.org**

# FOREWORD

This document is the report of the OECD *Seminar on Pesticide Risk Reduction through Spray Drift Reduction Strategies as part of National Risk Management* that took place on 12 June 2008, at OECD, in Paris, France. It was chaired by Dr. Wolfgang Zornbach of the German Federal Ministry of Food, Agriculture and Consumer Protection.

This was the ninth in a series of Seminars organised by the OECD Pesticide Risk Reduction Steering Group, a sub-group of the OECD Working Group on Pesticides. These Seminars focus on key issues in pesticide risk reduction of concern to OECD governments. The Seminars are intended to provide an opportunity for OECD governments to discuss the issues together with non-governmental stakeholders and to develop recommendations for further OECD activities.

Following presentations reviewing the existing spray drift programmes in OECD countries and among various stakeholders (copies of all presentations are in Annex 3), the Seminar discussed several aspects concerning spray drift reduction and management. Common approaches towards spray drift reduction strategies are used in OECD countries, such as establishing buffer zones, encouraging drift reduction technologies, communicating on labels, and ensuring better education and training. The Seminar developed a number of recommendations for promoting spray drift reduction technologies and policies and also recommended the establishment of an international network of experts on spray drift (note: the OECD Network of Experts on Spray Drift was set up immediately after the Seminar and started its activities by developing an OECD public website on spray drift that can be found at: www.oecd.org/env/spraydrift).

The draft report of the Seminar was approved by the 24th meeting of the Working Group on Pesticides that took place on 29-30 June 2009.

The Joint Meeting of the Chemicals Committee and the Working Party on Chemicals, Pesticides and Biotechnology of the OECD agreed that this document be unclassified and made available to the public. It is being published on the responsibility of the Secretary-General of the OECD.

## THE 9TH RISK REDUCTION STEERING GROUP SEMINAR

# REPORT OF THE SEMINAR ON PESTICIDE RISK REDUCTION THROUGH SPRAY DRIFT REDUCTION STRATEGIES AS PART OF NATIONAL RISK MANAGEMENT

**Paris, 12 June 2008**

## TABLE OF CONTENTS

## INTRODUCTION

1. This report presents the results and recommendations of an OECD Seminar on ways to achieve pesticide risk reduction through spray drift reduction strategies as part of national risk management. This one-day Seminar, held on 12 June, 2008 was chaired by Wolfgang Zornbach (Germany), Chairman of the OECD Risk Reduction Steering Group (RRSG), and took place at the OECD Headquarters in Paris, France.

2. This Seminar was the ninth in a series of Seminars organised by the OECD Pesticide Risk Reduction Steering Group, a sub-group of the OECD Working Group on Pesticides (a group composed primarily of representatives of the 30 OECD governments but that also includes representatives of the European Commission and other international organisations, the pesticide industry, and the environmental community). The RRSG Seminars focus on key issues in pesticide risk reduction of concern to OECD governments. The seminars are intended to provide an opportunity for OECD governments to discuss these issues together with non-governmental stakeholders and to develop recommendations for further OECD activities. Topics discussed during past seminars included:

- Compliance (2003)
- Minor uses (2003)
- Good container management (2004)
- Good pesticide labelling (2005)
- Better application technology (2005)
- Harmonised environmental indicators for pesticide risk (held jointly with European HAIR group in 2006)
- Better worker safety and training (2007)
- Education/training the trainers (2007)

The reports from these Seminars are available on the OECD public web site at: http://www.oecd.org/env/pesticides, under "Risk Reduction."

3. The members of the RRSG selected "spray drift reduction strategies as part of national risk management" as the topic of this Seminar considering its significance for pesticide risk reduction in the fields of human health and the environment. The importance of adopting spray drift reduction technologies was noted during earlier OECD Seminars and surveys (i.e., the Seminar on Better Application Technology and the 2nd Risk Reduction Survey, carried-out in 2004-2005).

- The Seminar on Better Application Technology considered opportunities for risk reduction through better pesticide application technologies. It considered a variety of technology options with such opportunities, equipment and techniques for reducing spray drift being one of them. It also reviewed regulatory (e.g. equipment inspections) and voluntary (e.g. spray drift management guidelines) mechanisms that exist, which address the issue.

- The importance of reducing spray drift was also highlighted in the Second Risk Reduction Survey. Spray drift guidelines that address data requirements, assessment processes and risk mitigation strategies for spray drift have been developed by several OECD countries. Some others have enacted legal provisions that include the use of application equipment with reduced losses (50%, 75%, 90% and 99% less spray drift) published in a register in the official gazette.

## PARTICIPANTS

4. People attending the OECD Seminar included:
   - Representatives of the pesticide regulatory authorities of OECD countries (Australia, Canada, Czech Republic, Germany, Ireland, Japan, Mexico, the Netherlands, New Zealand, US) and Brazil;
   - Officials from the UN Food and Agriculture Organization (FAO);
   - Representatives of CropLife International (the international association of pesticide manufacturers) and of BIAC (Business and Industry Advisory Committee to the OECD); and
   - Invited experts engaged in spray drift programmes from other key stakeholder groups such as NGOs (Pesticide Action Network and Greenpeace), farmer associations (International Federation of Agricultural Producers) and drinking water providers (European Union of national Associations of Water Suppliers and Waste Water Services).

5. A participant list is provided in Annex 2.

## PURPOSE AND SCOPE OF THE SEMINAR

6. The main objectives of the Seminar included:

   - to identify key issues concerning pesticide risk reduction through reduction of spray drift;
   - to get a better overview of national and international legislative and non-legislative activities for promoting the adoption of spray drift reduction technologies by farmers and other pesticide users to reduce risks from using agricultural pesticides;
   - to exchange information on OECD countries' current activities in the areas of spray drift reduction;
   - to suggest options of further steps for OECD countries and key stakeholders in OECD and non-OECD countries to address the identified issues; and
   - to recommend possible further steps for OECD.

7. In particular the following issues were discussed during the Seminar:

   - spray drift models
   - buffer zones
   - application technologies
   - spray drift action plans
   - information of neighbours
   - good agricultural practices

## STRUCTURE OF THE SEMINAR

8. The first part of the Seminar in the morning was devoted to presentations from governments and other stakeholders. The second part in the afternoon consisted of roundtable discussions that built on issues that arose from morning presentations, and recommendations for the OECD. The Seminar Programme is provided in Annex 1.

## GOVERNMENT AND STAKEHOLDER EXPERIENCE & PERSPECTIVES WITH SPRAY DRIFT REDUCTION TECHNOLOGIES AND POLICIES

9. Government representatives of Canada, Germany, Czech Republic, the Netherlands, Australia and the US first presented their experiences with spray drift reduction strategies in their own countries. Then representatives of the industry (water and pesticide manufacturers), farmers, NGOs and the research area presented their actions and concerns related to spray drift. All presentations are available in Annex 3.

## ROUNDTABLE DISCUSSION

10. Following the presentations reviewing the existing spray drift programmes in OECD countries and among various stakeholders, the floor was opened to all Seminar participants for a roundtable discussion. The following points guided the discussion:

- Regulatory requirements that exist in different countries, and existing guidance and other voluntary measures concerning spray drift reduction
- Economic aspects related to innovation and adoption of spray drift reduction technologies
- Good practices and innovative approaches
- Barriers to and solutions for the development of spray drift reduction technologies
- Opportunities for further development for all stakeholders.

### Common approaches towards spray drift reduction strategies in OECD countries

11. The various presentations demonstrated that there were commonalities in the strategies developed and used for reducing risk from spray drift. The emphasis on some aspects could vary among countries, hence different risk mitigation measures.

12. There is a range of possible approaches that use and combine habitat protection considerations (buffer zones), technical aspects (drift reduction equipment, drift deposition modelling), regulatory aspects (label restrictions) and non-legislative activities (education & training programmes, including best practices). These policies also integrate the fact that spray drift occurs under non-controllable (e.g. wind speed and directions, temperature, humidity, crop structure) and controllable conditions (e.g. field practice, non-spray zones, nozzle type, spray pressure).

*Buffer zones*

13. Establishing buffer zones (where no spray is allowed) constitutes a common measure to protect the ecosystems (aquatic, but also terrestrial – as well as residential/suburban environments). In some countries, buffer zones are part of a mandatory system while in others they are listed among recommended practices. There are a number of parameters that could affect the determination of a buffer zone, including the nature of the crops, pesticide uses, wind directions. These parameters combined with drift deposition models and actual field data sets could help define buffer zones. It was also noted that depending on the country geography and land use (and thus on national risk mitigation policies), there could be important differences in buffer zone sizes, with for example the width of a buffer zone ranging from some centimetres to hundreds of meters.

*Drift reduction technologies*

14. Drift reduction equipment was also often presented as an effective way of reducing drift at its source. Such sprayers influence the droplet size (and thus the potential to drift) and use techniques such as stabilizers and air-inducted nozzles. When used, these technologies could lead to reduce buffer zone widths (with sometimes no more buffer zones necessary). Low- or anti-drift nozzle classifications (and standards) leading to a certain reduction (%) in spray drift appear to be well documented. However, while many countries indicated that they have available lists of reduced-drift equipment (e.g. published in national registers) the meeting took note that there may be some potential for more stakeholders' awareness of these techniques, through more advertising. In addition, it was reported that nozzle testing and equipment/sprayer inspections were also well in place.

*Labels*

15. Among the regulatory measures, labels are a direct communication tool towards users regarding buffer zone and drift reduction equipment recommendations, in addition to restrictions linked to rate, time of applications, wind speed, etc. The Seminar participants recognized that label directions were often complex and confusing for farmers. It was stressed that texts of the labels should remain simple to get farmers' wide acceptance.

*Education and training*

16. Education and training were seen as key factors that could lead to drift and risk reduction. Many participants indicated that it was important to guide and train farmers on newer and safer technologies. Extension services, advisors, industry stewardship programmes could all contribute to make farmers more aware of available techniques and best practices for limiting spray drift.

*Other approaches for spray drift reduction*

17. Industry mentioned the importance of additives in spray mix as drift control agents. Additives include adjuvants (such as spreaders, wetters, stickers or anti-evaporants), crop oils, fertilizers, drift retardants (polymers and thickeners). Additives play a role on water evaporation and sometimes on droplet size.

18. Some research is also carried out to use barrier vegetation and other edges to limit and modify drift deposition, in particular at the frontier between agricultural and residential areas.

19. Some participants stressed that one challenge faced with spray drift reduction technologies was the balance among economic aspects (e.g. cost of equipment at the farmer's level, but also consequences on international trade), agricultural sustainability (e.g. width of buffer zones) and environment protection.

## SEMINAR RECOMMENDATIONS AND FINDINGS

20. The Seminar developed a number of recommendations for promoting spray drift reduction technologies and policies. These included:

- **Education and training are key for spray drift reduction** (as in other pesticide risk reduction areas). All stakeholders are encouraged to communicate with users and farmers about available techniques (reduced-drift technologies) and existing standards, buffer zone implementation and other label directions.
- **Incentives and rewards should be developed and promoted for farmers that use and adopt drift reduction techniques.**
- **Use of non-chemical alternatives in plant protection and use of reduced risk products** should be promoted wherever practicable.
- **Messages (e.g. on labels) and tools (e.g. choice of specific drift reduction nozzles) should be simple**. It was recognised that the scientific background and the technical/political rationale behind these messages and tools could be complex; however, at the users'/farmers' level, they should be kept simple and readily understandable to get wide acceptance.

*Other important findings*

21. It was recognised that pesticide drift is not just spray drift. It also includes post-application drift, i.e. volatilization that is gaining a lot of attention in North America, in particular for the adverse health effects in residential areas.

*Recommendations for possible further OECD work*

22. One main recommendation for the OECD was the **establishment of a network of experts on spray drift**. It was suggested that this network could be informal in nature and propose innovative ideas in a proactive way. While it would be up to the OECD Risk Reduction Steering Group to set up this network[*], the following activities for the network were recommended:

- **develop a website** on spray drift information
- **collect available information** (through a survey/compilation e.g. on more countries' approaches, on activities carried out in other organizations, on existing standards/models/scenarios)
- **exchange experience** and documentation
- **provide a best practice framework on spray drift management.**

[*] The RRSG met on the following day and endorsed the Seminar recommendation to set up a network of experts.

**ANNEX 1**

# PESTICIDE RISK REDUCTION SEMINAR

## RISK REDUCTION THROUGH SPRAY DRIFT REDUCTION STRATEGIES AS PART OF NATIONAL RISK MANAGEMENT

**12 June 2008, Paris, France**

## SEMINAR PROGRAMME

| | |
|---|---|
| 9.00 a.m. | **Introduction by Chair (Wolfgang Zornbach, Germany)**<br>• Purpose and structure of the Seminar<br>• Tour de table to introduce participants |
| | **Government Experience and Perspectives**<br>• **Canada:** *Habitat protection from pesticide spray drift: Canadian Approach* (Peter Delorme, Director, Product Evaluation, Environmental Assessment Directorate, Pest Management Regulatory Agency, Health Canada)<br>• **Germany**: *Testing, listing of spray-drift reducing application technique and use as risk mitigation measure to protect the environment in the authorisation procedure* (Martin Streloke, Federal Office of Consumer Protection and Food Safety)<br>• **Czech Republic:** *Drift reduction possibilities in the Czech Republic* (Petr Harasta, Head of the Application Technique Department, Harmful Organisms Section, State Phytosanitary Administration)<br>• **Netherlands**: *Spray drift mitigation measures and the authorisation of pesticides: the Dutch Approach* (Ynze Stienstra, Scientific assessor for environmental aspects, CTGB - Board for the authorisation of plant protection products and biocides)<br>• **Australia**: *Spray drift risk assessment at the APVMA* (Alan Norden, Australian Pesticides and Veterinary Medicines Authority)<br>• **USA:** *EPA's plan to address spray drift* (Susan Lewis, Special Review and Reregistration Division, Environmental Protection Agency) |

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|---|---|
| | **Stakeholder Experience and Perspectives**<br><br>**Industry:**<br>• **Water industry**: *The drinking water sector's perspective on pesticides* (Durk Krol, Deputy Secretary General, EUREAU (European Union of National Associations of Water Suppliers and Waste Water Services))<br><br>• **CropLife International***: Influence of Additives on Drift Reduction (*Bernhard Johnen, Manager, International Regulatory Policy, CropLife International)<br><br>**Farmers associations:**<br>• **Bureau Français de Coordination du Machinisme Agricole:** *Application of pesticides - How to bring knowledge and expertise to good agricultural practices with plant protection products* (Philippe van Kempen, Agro-equipment engineer)<br><br>**Non-Governmental Organisations:**<br>• **Pesticide Action Network:** *Monitoring, modelling and urgent mitigations for airborne pesticide driftt* (Brian Hill, Director, Science Department, PAN North America)<br><br>**Research:**<br>• **University of Queensland and Lincoln, Australia:** *Spray drift management* (Mark Pace, Director, Centre for Pesticide Application and Safety, University of Queensland) |
| | **Round-table Discussion**<br><br>• Regulatory requirements that exist in different countries, and existing guidance and other voluntary measures concerning spray drift reduction<br><br>• Economic aspects related to innovation and adoption of spray drift reduction technologies<br><br>• Good practices and innovative approaches<br><br>• Barriers to and solutions for the development of spray drift reduction technologies<br><br>• Opportunities for further development for all stakeholders |
| | **Summary of the Discussion, Ideas for Follow-up, Recommendations for possible further OECD work** |
| 5.30 p.m. | End of the Seminar |

**ANNEX 2**

**PESTICIDE RISK REDUCTION SEMINAR**

**RISK REDUCTION THROUGH SPRAY DRIFT REDUCTION STRATEGIES AS PART AS NATIONAL RISK MANAGEMENT**
**12 June 2008, Paris**

# LIST OF PARTICIPANTS

| | |
|---|---|
| **Australia/Australie** | Alan NORDEN<br>Australian Pesticides and Veterinary Medicines Authority (APVMA)<br><br>Mark PACE<br>Director, Vocational Education Centre<br>Faculty of NRAVS |
| **Canada/Canada** | Peter DELORME<br>Acting Director, Product Assessment Division, Environmental Assessment Directorate<br>Pest Management Regulatory Agency<br>Health Canada<br><br>Mary MITCHELL<br>Director General<br>Environmental Assessment Directorate<br>Pest Management Regulatory Agency |
| **Czech Republic/République Tchèque** | Petr HARASTA<br>Head of the Department<br>Application Technique Dept.<br>State Phytosanitary Administration<br><br>Josef SVARICEK<br>Plant Protection Products Senior Specialist<br>State Phytosanitary Administration<br>Plant Protection Products Section<br>Methodological Unit |

| | |
|---|---|
| **Germany/Allemagne** | Wolfgang ZORNBACH<br>Federal Ministry for Food, Agriculture and Consumer Protection (BMELV)<br><br>Martin STRELOKE<br>Federal Office for Consumer Protection and Food Safety (BVL)<br><br>Bernd HOMMEL<br>Julius Kühn-Institut (JKI) |
| **Ireland/Irlande** | Dermot SHERIDAN<br>Head of Registration Division, Pesticide Control Service<br>Department of Agriculture, Fisheries & Food Laboratories |
| **Japan/Japon** | Atsuko HORIBE<br>Associate Director<br>Ministry of Agriculture, Forestry and Fisheries<br>Plant Products Safety Division, Food Safety and Consumer Affairs<br>Agricultural Chemicals Office<br><br>Masanobu KIMURA<br>Deputy Director<br>Ministry of the Environment |
| **Mexico/Mexique** | Ana Patricia PINEDA ZAVALETA<br>Manager<br>Federal Commission for the Protection against Sanitary Risks |
| **Netherlands/Pays-Bas** | Ynze STIENSTRA<br>Board for the Authorisation of Plant Protection Products and Biocides |
| **New Zealand/<br>Nouvelle-Zélande** | Warren HUGHES<br>Programme Manager (Standards)<br>Approvals and ACVM Group<br>New Zealand Food Safety Authority |
| **United States/États-Unis** | Elizabeth BEHL<br>Chief, Environmnetal Risk Branch 4<br>Environment Fate and Effects Division<br>Office of Pesticide Programs<br>US Environmental Protection Agency |

| | |
|---|---|
| **United States/États-Unis** (continued) | George HERNDON<br>Deputy Division Director<br>US Environmental Protection Agency |
| | Jane HOPKINS<br>Field and External Affairs Division<br>US Environmental Protection Agency |
| | Richard KEIGWIN<br>Director<br>Biological and Economic Analysis Division<br>Office of Pesticide Programs<br>US Environmental Protection Agency |
| | Susan LEWIS<br>Branch Chief, Special Review and Reregistration Division<br>US Environmental Protection Agency |
| | Anne LINDSAY<br>Deputy Director for Programs<br>Office of Pesticide Programs<br>US Environmental Protection Agency |
| | Lois ROSSI<br>Director, Registration Division<br>US Environmental Protection Agency |
| **Brazil/Brésil** | Luis Eduardo PACIFICI RANGEL<br>General Manager for Pesticides<br>Input Inspections Department<br>Ministry of Agriculture |
| **Food and Agriculture Organization (FAO)/Food and Agriculture Organization (FAO)** | Theodor FRIEDRICH<br>Senior Officer<br>Crop and Grassland Service<br>Food and Agriculture Organization (FAO) |
| **Business and Industry Advisory Committee (BIAC)/Comité consultatif économique et industriel (BIAC)** | Brenda HARRIS<br>Regulatory & Government Affairs Manager<br>Dow AgroSciences Canada Inc |
| | Peter HORNE<br>Global Regulatory Affairs Manager<br>DuPont Crop Protection Products/Croplife |

| | |
|---|---|
| **BIAC** (continued) | Bernhard JOHNEN<br>Director<br>CropLife International |
| **European Union of national Associations of Water Suppliers and Waste Water Services (EUREAU)/ European Union of national Associations of Water Suppliers and Waste Water Services (EUREAU)** | Durk KROL<br>EUREAU European Federation of National Associations of Water Suppliers and Waste Water Services |
| **International Federation of Agricultural Producers (IFAP)/Federation Internationale des Producteurs Agricoles (FIPA)** | Philippe VAN KEMPEN<br>Ingénieur Agro-équipement<br>FIPA |
| **Pesticide Action Network North America (PANNA)/ Pesticide Action Network North America (PANNA)** | Brian HILL<br>Director<br>Science Department<br>Pesticide Action Network North America |
| **Greenpeace/Greenpeace** | Manfred KRAUTTER<br>Greenpeace E.V. |
| **OECD/OCDE** | Sylvie PORET<br>Principal Administrator<br>Environment Directorate<br><br>Richard SIGMAN<br>Principal Administrator<br>Environment Directorate<br><br>Béatrice GRENIER<br>Environment Directorate |

**ANNEX 3**

**PESTICIDE RISK REDUCTION SEMINAR**

**RISK REDUCTION THROUGH SPRAY DRIFT REDUCTION STRATEGIES AS PART AS NATIONAL RISK MANAGEMENT**

**12 June 2008, Paris**

# List of presentations

**Presentation 1**
**Canada**
**Peter Delorme**

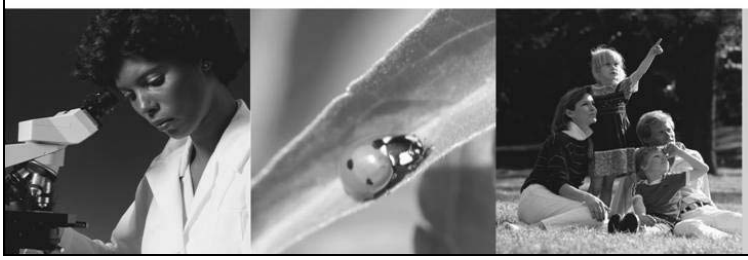
Health Canada Santé Canada

*Your health and safety... our priority.* *Votre santé et votre sécurité... notre priorité.*

## Habitat Protection from Pesticide Spray Drift: The Canadian Approach

**Presentation to the OECD Risk Reduction Steering Group**

**Dr. Peter Delorme**
**Director, Product Assessment**
**Environmental Assessment Directorate, PMRA**



Canada

## Outline

- Legislation
- Canadian Approach
- Issues & Challenges
- Work to address Issues & Challenges

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## Legislation

- The legal mandate of the PMRA includes the protection of the environment.
- To fulfill this obligation, the Environmental Assessment Directorate assesses the potential risks of pesticides to both non-target organisms and non-target habitats.
- When potential risks are identified, attempts are made to identify mitigation measures. Mitigation measures are specified on product labels.
- Can also be legislation/regulation for protection at the provincial level

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## Current Approach

- One common mitigation measure is the use of "no spray" buffer zones to mitigate risks to sensitive habitat resulting from spray drift downwind from the application site.
- This approach mitigates risk by reducing the exposure of non-target organisms and non-target habitats to pesticide thereby reducing the likelihood of adverse effects.

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## Current Approach

- Need for mitigation is identified by risk assessment for both aquatic & terrestrial ecosystems
- Use science based approach which incorporates both exposure and effects
- Spray bufferzones are risk based
  - i.e. magnitude of spray bufferzone is related to the risk posed by product
  - Determine setback required to limit exposure concentrations to point where potential effects are acceptable
  - Based on three models depending on type of application

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## Models Used

- Field sprayer application
  - Wolf and Caldwell (2001)
  - Developed by AAFC Canada
- Air-blast application
  - Ganzelmeier *et al.* (1995)
  - Federal Biological Research Centre for Agriculture and Forestry, Germany (BBA)
- Aerial application
  - AgDISP (v. 8.15)
  - Developed by USDA Forestry Service

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## Major Factors Considered

- Spray Quality/Drop Size Distribution
- Depth of Water – two scenarios >1 & <1m
- Canopy Interception (forestry applications)
- Application Rate/ Frequency
- Toxicity

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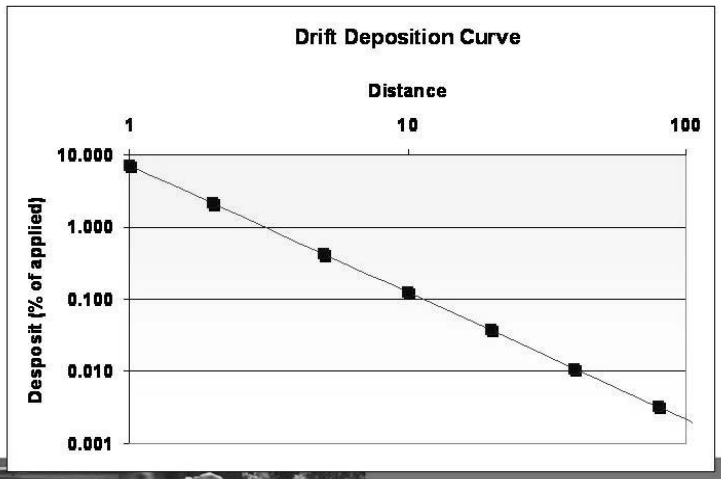
## Principle

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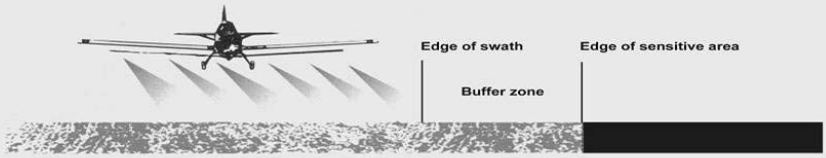
**Spray Buffer Zone -"Distance between the point of direct application and the closest <u>downwind</u> edge of a sensitive terrestrial or aquatic habitat"**

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## Issues & Challenges

- **Defining Habitats requiring protection** - Growers/applicators need to be able to clearly identify which habitats need to be protected and which do not.
- **Large buffer zones** - In some cases, the current approach can lead to BZ that growers or applicators may consider to be impractical.
  - Sometimes growers feel their attempts at good environmental stewardship are punished by the imposition of large buffer zones which inhibit the effective use of their agricultural land.

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## Issues & Challenges

- Diversity of habitats in the Canadian landscape
- Protection Goals – defining what we want to protect
  - Measurement endpoints used for BZ determination
  - Suitability/relevance of available data
  - Balancing Sustainable Ag with Environmental Protection
- Communication of spray bufferzones
- Wide range of application equipment
  - Keeping up with advances in technology
- Diversity of products available
- Balancing Flexibility vs Simplicity

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## Current & On Going Work to Address Issues/Challenges

- Over the past few years PMRA has pursued a number of consultations and initiatives on related topics:
  - Assessment Endpoints workshop (2002).
    - Defined Assessment Endpoints
  - Habitat Protection Goals Workshop (2008)
    - Which types habitats in agricultural and forestry areas are important?
    - What are existing programs/policies aimed at habitat protection? (Fed/Prov/NGO)
  - Multiple Bufferzone Workshops (2002, 2004, 2006)
    - Developing strategy for refining BZs at user level

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## Current & On Going Work to Address Issues/Challenges

- Participation in OECD efforts on non-target plant toxicity testing
- Refinement of assessment methods to better characterize risks
  - e.g.-Use of SSDs, Use of community NOECs
- Developing approach/policy on labelling for BZ
- Developing Best Management Practices (BMP) booklet for applicators

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## Current & On Going Work to Address Issues/Challenges

- Participating in US-EPA Drift Reducing Technology Project
- Interested in exploring UK LERAP approach
  - e.g. classification of low drift nozzles
- Tool Development
  - e.g. Spray Advisor Model (for forestry applicators)
  - e.g. Spray Conditions Advisory (web based tool for farmers)
- On going consultations with stakeholders
  - Aerial Applicators
  - Forestry Sector (SERG International)
  - Provincial Authorities
  - Industry (e.g. Croplife Canada)
- Initiated project to look at issues related to Urban/Rural interface

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## Last Word

- Need to work in cooperation with stakeholders to address issues
- Need to ensure users/applicators are engaged to achieve risk reduction through reduction & management of spray drift

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- PMRA Contact for Spray Drift
  - Dr. Ted Kuchnicki, Environmental Assessment Directorate PMRA

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**Presentation 2**
**Germany**
**Martin Streloke & Heinz Ganzelmeier**

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## Testing, listing of spray-drift reducing application techniques and use as mitigation measure to protect the environment in the authorization procedure

*Dr. Martin Streloke and*
*Dr.-Ing. Heinz Ganzelmeier*



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## Outline

- **Introduction**
- **Regulatory Framework**
- **Regulatory Risk Assessment**
- **Listing of Application Technique**
- **Risk Mitigation Measures**
- **Take-Home Message**

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## Introduction

- Talk deals with plant protection products and risk mitigation to protect the environment
- So far no buffer zones to residential areas in Germany
- Over the last 15 years a lot of experience has been made with setting risk mitigation measures in the authorisation procedure (WORRM, FOCUS-Landscape)
- Buffer zones to protect terrestrial life (insects, plants) and groundwater from spray-drift , and mitigation measures to reduce intake via runoff, drainage, atmospheric deposition have been set
- Fortunately aerial application is less important in Germany
- Clearly, buffer zones to protect aquatic life from spray-drift have received most attention

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## Regulatory Framework

- German plant protection act
- Buffer zones are mentioned in this regulation which shows their importance
- Farmers are obliged to follow these restrictions; penalties might be set
- State authorities are responsible for enforcing these restrictions
- Annual action plans for enforcement are worked out by BVL together with state authorities
- Listing procedures for application technique are also fixed in the plant protection act

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## Regulatory Risk Assessment

- Mainly according to EU-regulations
- Effects assessment:
  - ecotox data package
  - relevant endpoint for most sensitive organism
  - uncertainty factor
- Exposure assessment:
  - EXPOSIT model for surface waters; all relevant exposure routes
  - for spray-drift „basic drift values“ are used
  - 30 cm deep static waterbody
  - 1 m (field crops) and 3 m (tall growing crops) distance to waterbody
  - conventional application technique
- Risk assessment:
  - Toxicity/Exposure Ratio (TER) are calculated
  - requirements of Annex VI of 91/414/EEC must be fulfiled

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## Testing, listing of spray-drift reducing application techniques …

- Three listing procedures:


- Plant Protection Equipment Lists
- Inspection of sprayers in use

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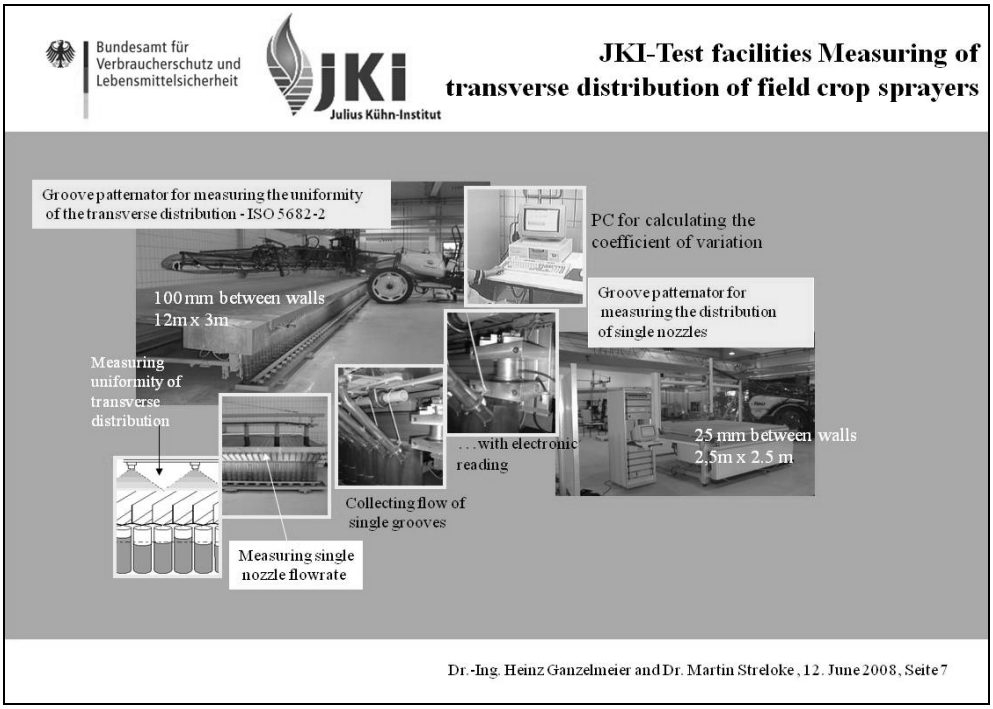
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JKI-Test facilities Measuring of transverse distribution of field crop sprayers
Groove patternator for measuring the uniformity of the transverse distribution - ISO 5682-2
PC for calculating the coefficient of variation
100 mm between walls 12m x 3m
Groove patternator for measuring the distribution of single nozzles
Measuring uniformity of transverse distribution
. . . with electronic reading
25 mm between walls 2,5m x 2,5 m
Collecting flow of single grooves
Measuring single nozzle flowrate
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Inspection of field sprayers
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## Field Trials to determine Basic Drift Values

| | Number of trials | |
|---|---|---|
| | until 2000 [1] | today [2] |
| Field crops | 16 | 50 |
| Grape vine | 21 | 21 |
| Fruit crops | 61 | 71 |
| Hops | 21 | 21 |
| in total | 119 | 163 |

1) Published in „Mitteilungen der Biologischen Bundesanstalt für Land- und Forstwirtschaft, Berlin-Dahlem, Heft 305, 1995
2) Published in Federal Gazette, 26.05.2000

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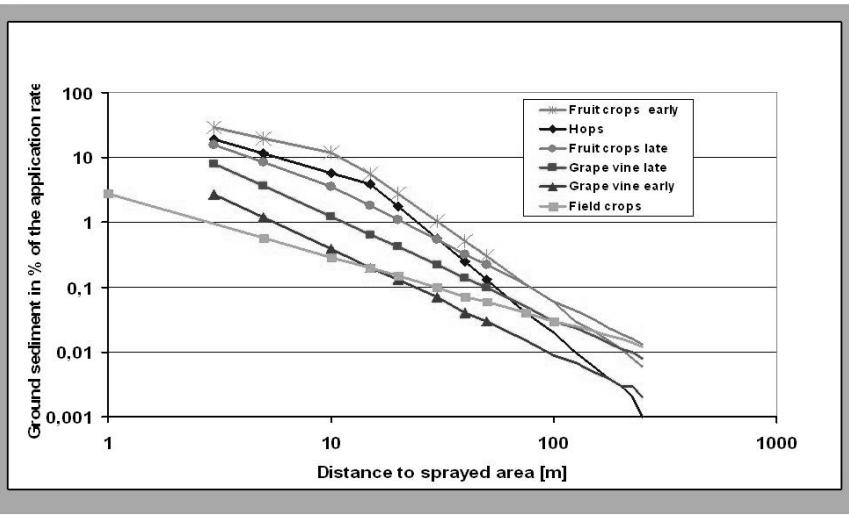
## Basic Drift Values
- 90th Percentiles -

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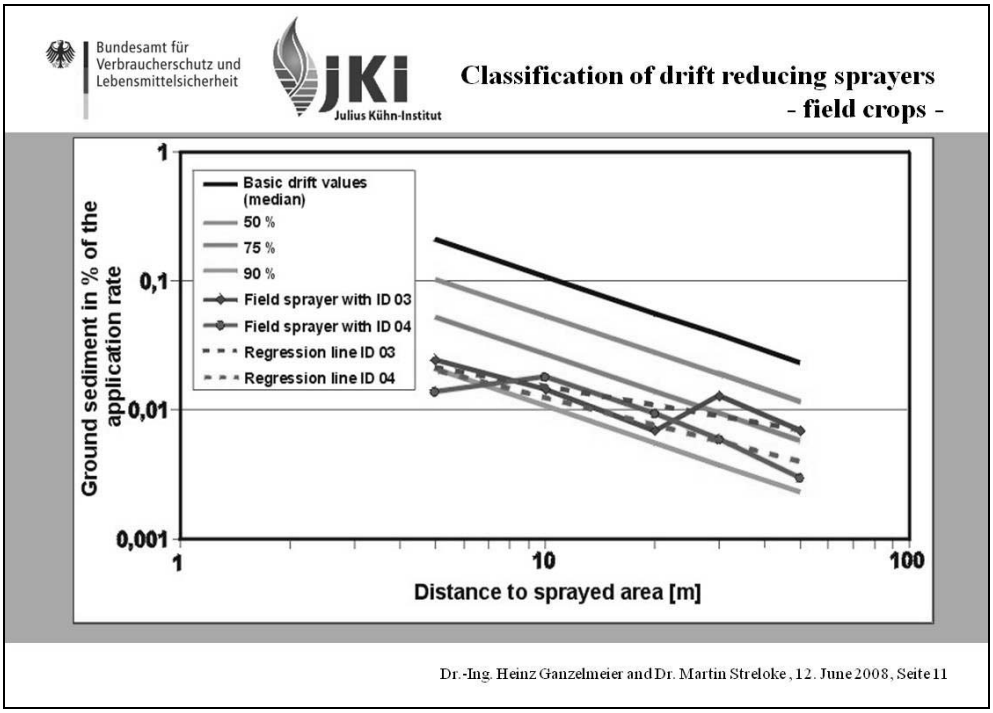
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Classification of drift reducing sprayers
- field crops -
Ground sediment in % of the application rate
1
0,1
0,01
0,001
Basic drift values (median)
50 %
75 %
90 %
Field sprayer with ID 03
Field sprayer with ID 04
Regression line ID 03
Regression line ID 04
1
10
100
Distance to sprayed area [m]
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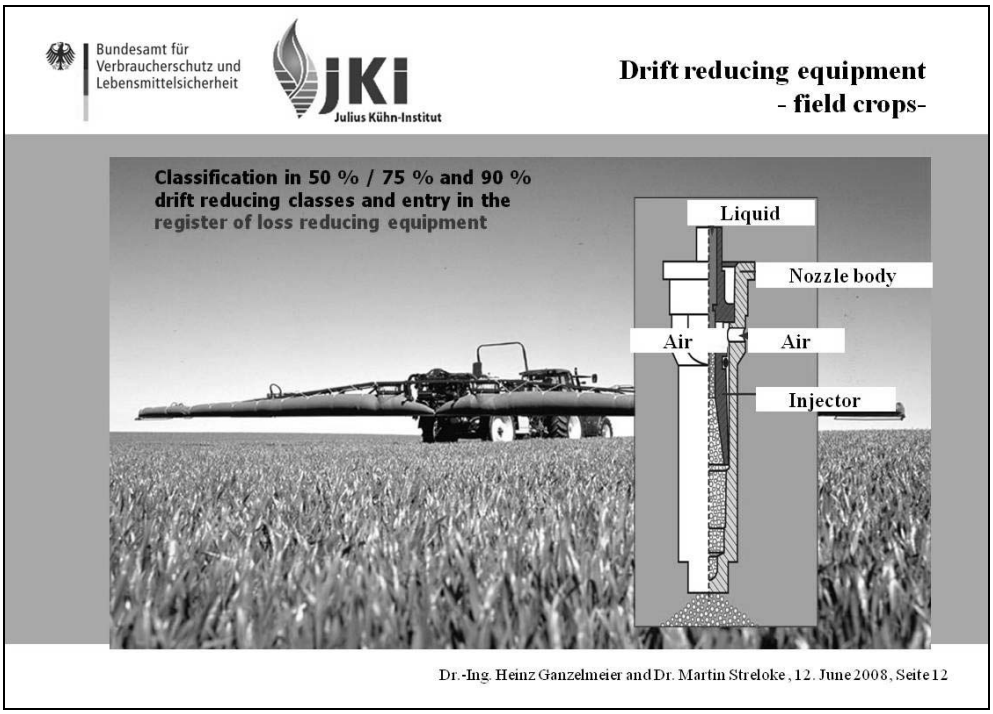
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Drift reducing equipment
- field crops-
Classification in 50 % / 75 % and 90 % drift reducing classes and entry in the register of loss reducing equipment
Liquid
Nozzle body
Air
Air
Injector
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## Drift reducing equipment - fruit crops -

**LIPCO**
**OSG-N**
with nozzle
Agrotop TD 80-02 Keramik
Albuz AVI 80-015; max. 5 bar
Albuz AVI 80-02; max. 5 bar
Albuz AVI 80-03
Lechler ID 90-015 C; max. 5 bar
Lechler ID 90-02 C
Lechler ID 90-025 C
Lechler ID 90-03 C
Lechler AD 90-02 C; max. 3 bar
Lechler AD 90-03 C; max. 3 bar
Lechler AD 90-04 C; max. 4 bar
TeeJet DG 80 02 VS; max. 3 bar
TeeJet DG 80 03 VS; max. 3 bar
TeeJet DG 80 04 VS; max. 4 bar
TeeJet DG 80 05 VS

Drift reduction 90 % class

Drift reduction 99 % class

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## Safety Phrase on the Label

**„When applying the product on areas adjacent to surface waters - except only occasionally but including periodically water bearing surface waters - the product must be applied with equipment which is registered in the index of 'Loss Reducing Equipment', as amended. Depending on the drift reduction classes for the equipment stated below, the following buffer zones must be kept from surface waters."**

| Use | Convention Technique (m) | DRT 50% | DRT 75% | DRT 90% |
|---|---|---|---|---|
| Field crops | 5 | 5 m | * | * |
| Hops | 20 | 20 m | 10 m | 5 m |
| Fruit crops | | | 20 m | 10 m |

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## Risk Mitigation Measures

- Width of buffer zones are calculated by means of „basic drift values“
- Specific buffer zones for different uses
- For approximately 70 % of field uses and 87 % in tall-growing crops buffer zones of 5 - 20 m are set
- Additional buffer zones for Drift Reducing Technique (DRT) of 50, 75 and 90 % reduction have been set since 2000
- Since 2002 a comparable approach has been developed to protect terrestrial organisms (insects, plants etc.)
- Official listing of DRT facilitates its use for regulatory purposes
- For high risk uses application is only allowed with DRT
- The use of DRT by farmers has increased considerably !!!

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## Risk Mitigation Measures

- Difficulties encountered so far:
  - too much different label restrictions were introduced; leads to confusion amongst farmers
  - too complicated label phrases reduce acceptance and complicate enforcement
  - often legal requirements make phrases difficult to understand
  - what is a „waterbody“ ?
- Revision of system is currently underway
  - more realistic risk predictions (probabilistic approaches)
  - reduction of buffer zone width without violating the protection goal
  - „easier to understand“ phrases and lower number

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## Take Home Message

- Listing of application technique is mandatory in Germany
- Classification of DRT is based on spray-drift measurements
- Over the last 15 years a considerable number of risk mitigation measures to protect the environment have been set when authorising products
- Buffer zones to protect aquatic life from spray drift have been most important
- Specific buffer zones for DRT have been set since 2000
- Listing of maschines and authorisation are closely connected
- Use of DRT by farmers has increased considerably
- Revision of current system is underway

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## Many thanks for your attention

Dr.-Ing. Heinz Ganzelmeier and Dr. Martin Streloke, 12. June 2008, Seite 18

**Presentation 3**
**Czech Republic**
**Petr Harasta**


# Drift Reduction Possibilities in the Czech Republic

Petr Harašta
State Phytosanotary Administration,
Application Technique Department,
Brno, Czech Republic

## Available possibilities

- Application equipment

-Field crop sprayers with air-assistance

-Bush and tree crops sprayers

-Low-drift nozzles

- Plant Protection Products
- Training of application equipment users
- Provide an information about drift

## Application equipment

- Field crop sprayers with air-assistance: more than 400 sprayers operational
- Anti-drift nozzle: every new sprayer has at least one set of these nozzles
- List of equipment classified as drift reduced is provided

# Droplet spectrum regulation

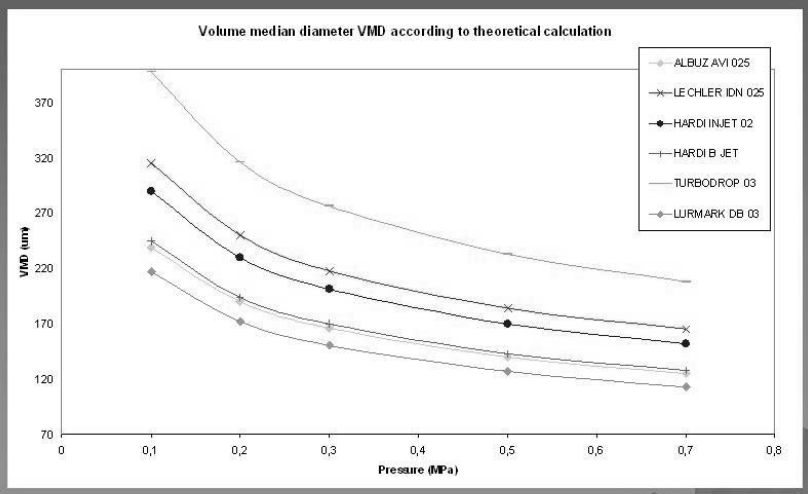
**Droplet spectrum measurement realized in CZ**

- The Effect of the Change of Pressure of Liquid on a Droplet Spectrum
- The Effect of the Change of the Type of a Nozzle on a Droplet Spectrum
- The Effect of the Changes of the Size of the Discharge Orifice on a Droplet Spectrum

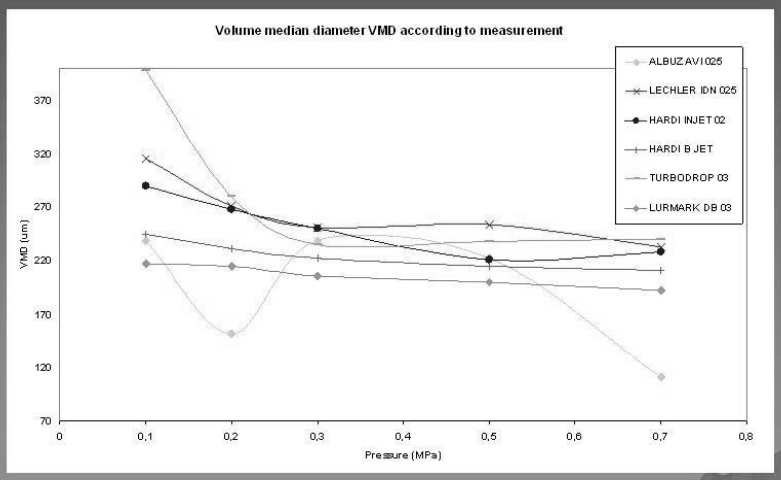
Three general findings

- Nozzles with a wider angle of dispersion form smaller droplets
- Nozzles with a greater flowage form larger droplets
- The higher the pressure is, the smaller the droplets are

# Droplet spectrum regulation



# Droplet spectrum regulation




# Application technique/technology

- Meteo conditions: most important – not controllable (great influence to avoid drift)
- Working conditions of appl.technique: calibration, regular inspection, appropriate use of technique – controllable
- EU Framework Directive – possibility of improvement

## Buffer zones

- No buffer zones in the CZ obligatory at this time, only recommendation for farmers (statement and specification in leaflets)
- Safeguard drinking water zones given by the „water" law
- Restrictions on the labels of Plant Protection Products

## TOPPS project

**T**rain **O**perators to prevent **P**olution from **P**oint **S**ources

- It is not drif reduction activity but possibility to improve availability of information about appropriate and safe use of Plant Protection Products and PPPs application equipment
- Future – continuous activity (project is planned for diffusion sources – e.g. for drift reduction)

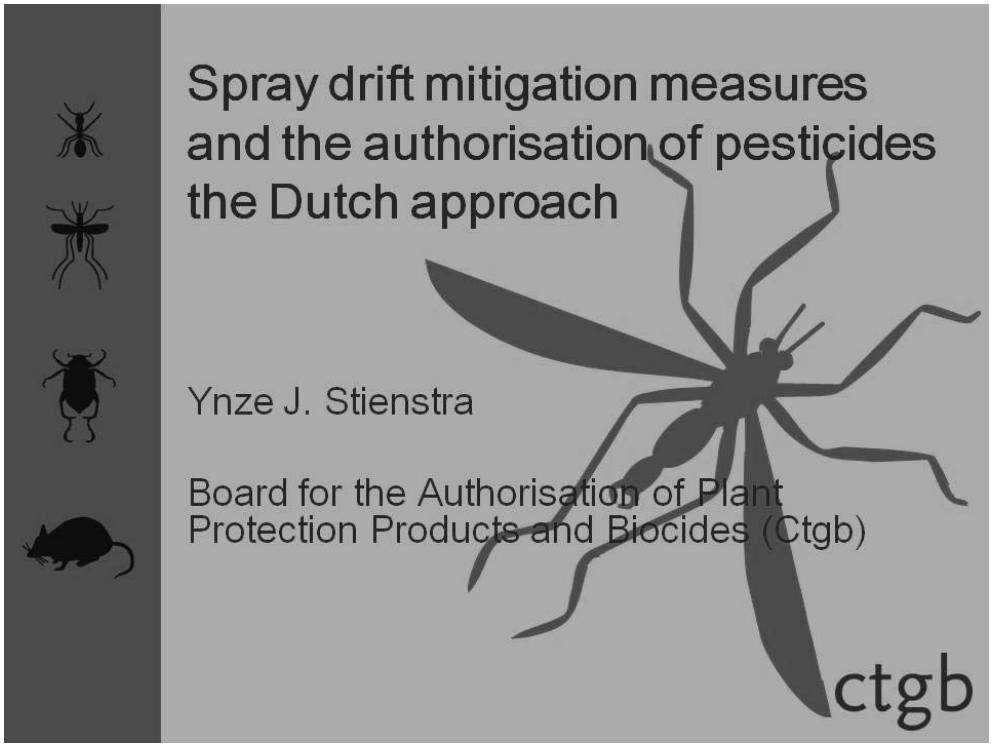
## Conclusions

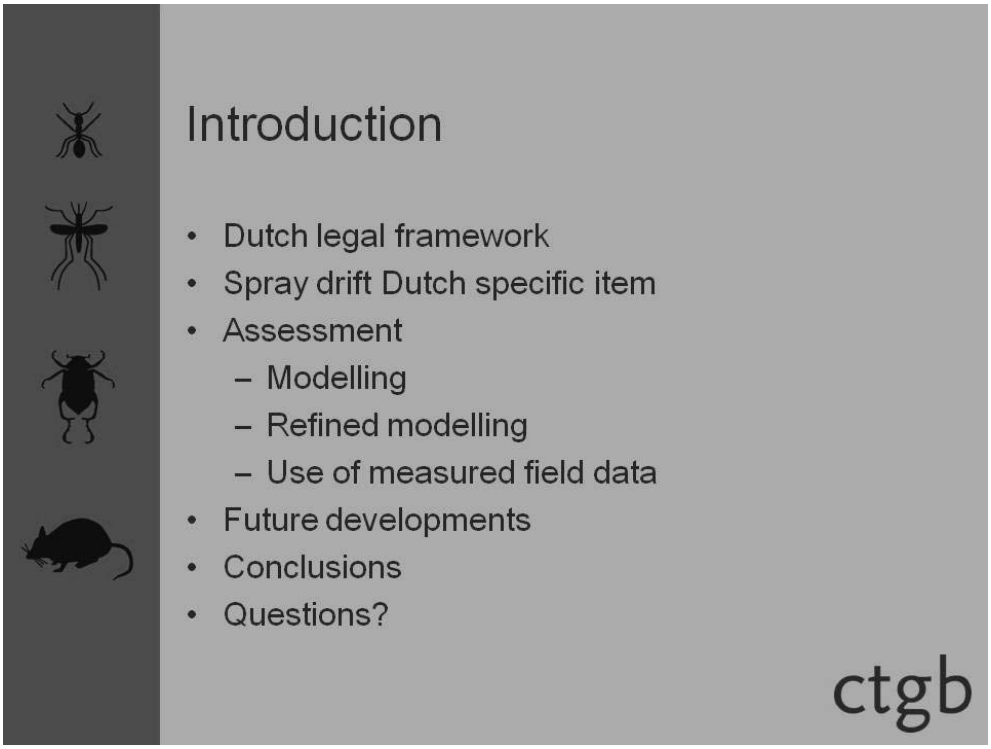
For proper and safe application of Plant Protection Products to reduce drift is needed:

- *Better cooperation/support of industry and institutions*
- *Better extension service and advisory system*
- *Better education and training of users/ farmers*

Thank you for your attention !

**Presentation 4**
**Netherlands**
**Ynze Steinstra**


Introduction
• Dutch legal framework
• Spray drift Dutch specific item
• Assessment
– Modelling
– Refined modelling
– Use of measured field data
• Future developments
• Conclusions
• Questions?
ctgb


Dutch legal framework (1)
Assessment is based on:
• Pesticide Act 1962, now Plant Protection Products and Biocides Act,
• Water Pollution Act 1969,
• Decree Surface water pollution Act arable farming and animal husbandry 2000, updated May 2007,
– Sets standard non-cropped buffer zones per crop.
largely in line with Guideline 91/414/EC, but…
ctgb

# Dutch legal framework (2)

… spray drift is Dutch national specific item, due to:

- Small strips of arable land
- Abundant surface water edge of field
- On average more wind than in rest of EU
- Dutch spray drift table

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# Dutch spray drift table

| Application | Subdivision | Drift [%] | Remarks |
|---|---|---|---|
| **Fruit crops (large fruit)** | without leaves | 17 | |
| | with leaves | 7 | In the revised Lotv 2007 the maximum allowed absolute spray drift value is set at 1.5%. |
| **Nursery trees** | spindle form trees (closely spaced) | 0.8 | |
| | transplanted trees (widely spaced) | 2.8 | |
| **Field crops (incl. soft fruit)** | | 1 | Differentiation of the drift figures to cover crop-free zone is under development |
| **Bush and hedge shrubbery** | | 1 | |
| **Bulb growing** | | 1 | |
| **Greenhouse applications** | | 0.1 | |
| **Special applications** | -airplane | 5 | including spray-free zone of 14 metres |
| | -mud-bank | 100 | |
| | -dry ditch | 100 | |
| **Applications without drift**[1] | see explanatory notes | | |

[1] Applications without drift
A drift percentage of 0% applies for:
1) Enclosed spaces (not greenhouses):storage cells and shower rooms and comparable enclosed spaces;
2) Specific greenhouse applications: raining, drenching, soil treatment, application of granules, dripping treatment,
3) witloof chicory (forcing)
4) Specific field applications: application of granules using a specially mounted granule sprinkler, drenching, dipping, foaming, placing of bait, injection of soil/plant, treatment of plant base, smearing, jointing, treatment of furrow, dosing pistol or comparable apparatus, and seed treatment.

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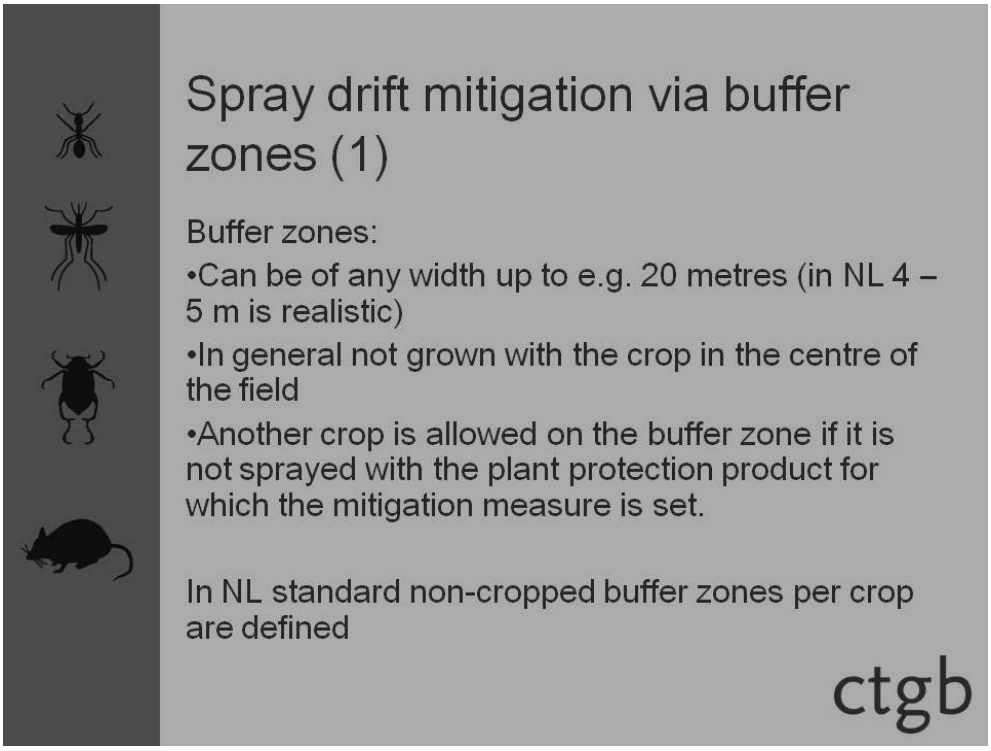
Spray drift mitigation via buffer zones (1)
Buffer zones:
•Can be of any width up to e.g. 20 metres (in NL 4 – 5 m is realistic)
•In general not grown with the crop in the centre of the field
•Another crop is allowed on the buffer zone if it is not sprayed with the plant protection product for which the mitigation measure is set.
In NL standard non-cropped buffer zones per crop are defined
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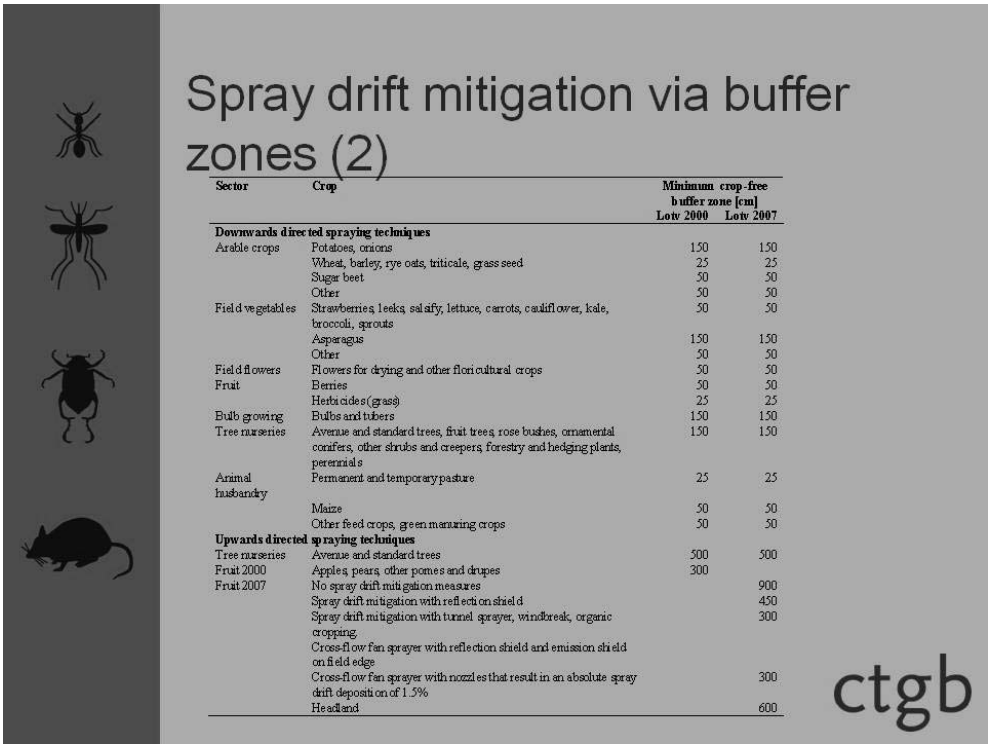
Spray drift mitigation via buffer zones (2)
Sector
Crop
Minimum crop-free buffer zone [cm]
Lotv 2000
Lotv 2007
Downwards directed spraying techniques
Arable crops
Potatoes, onions 150 150
Wheat, barley, rye oats, triticale, grass seed 25 25
Sugar beet 50 50
Other 50 50
Field vegetables
Strawberries, leeks, salsify, lettuce, carrots, cauliflower, kale, broccoli, sprouts 50 50
Asparagus 150 150
Other 50 50
Field flowers
Flowers for drying and other floricultural crops 50 50
Fruit
Berries 50 50
Herbicides (grass) 25 25
Bulb growing
Bulbs and tubers 150 150
Tree nurseries
Avenue and standard trees, fruit trees, rose bushes, ornamental conifers, other shrubs and creepers, forestry and hedging plants, perennials 150 150
Animal husbandry
Permanent and temporary pasture 25 25
Maize 50 50
Other feed crops, green manuring crops 50 50
Upwards directed spraying techniques
Tree nurseries
Avenue and standard trees 500 500
Fruit 2000
Apples, pears, other pomes and drupes 300
Fruit 2007
No spray drift mitigation measures 900
Spray drift mitigation with reflection shield 450
Spray drift mitigation with tunnel sprayer, windbreak, organic cropping 300
Cross-flow fan sprayer with reflection shield and emission shield on field edge
Cross-flow fan sprayer with nozzles that result in an absolute spray drift deposition of 1.5% 300
Headland 600
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## Assessment: modelling (1)

- Dutch specific spray drift values
- No drainage , no run off considered
- One water course modelled

- No FOCUS SW, but:
- Specific TOXSWA model developed by Alterra
- Standardized ditch

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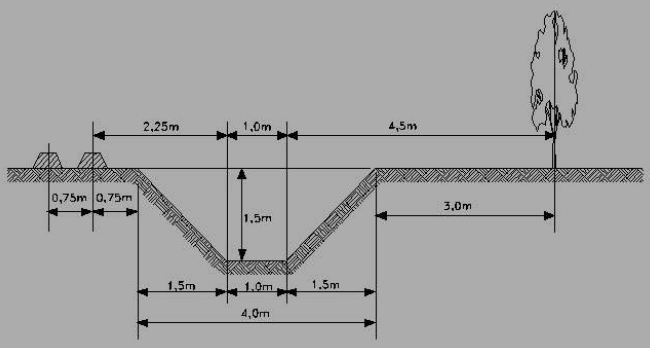
## Assessment: modelling (2) Standardized ditch

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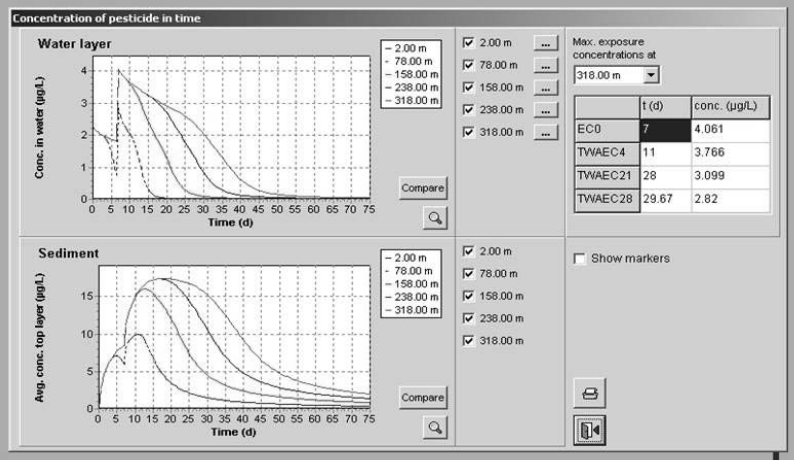
## Assessment: modelling (3) Output

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## Assessment (4)

Several options (only fate and behaviour considered in this presentation):

TER acceptable -> safe use -> Assessment aquatox finished

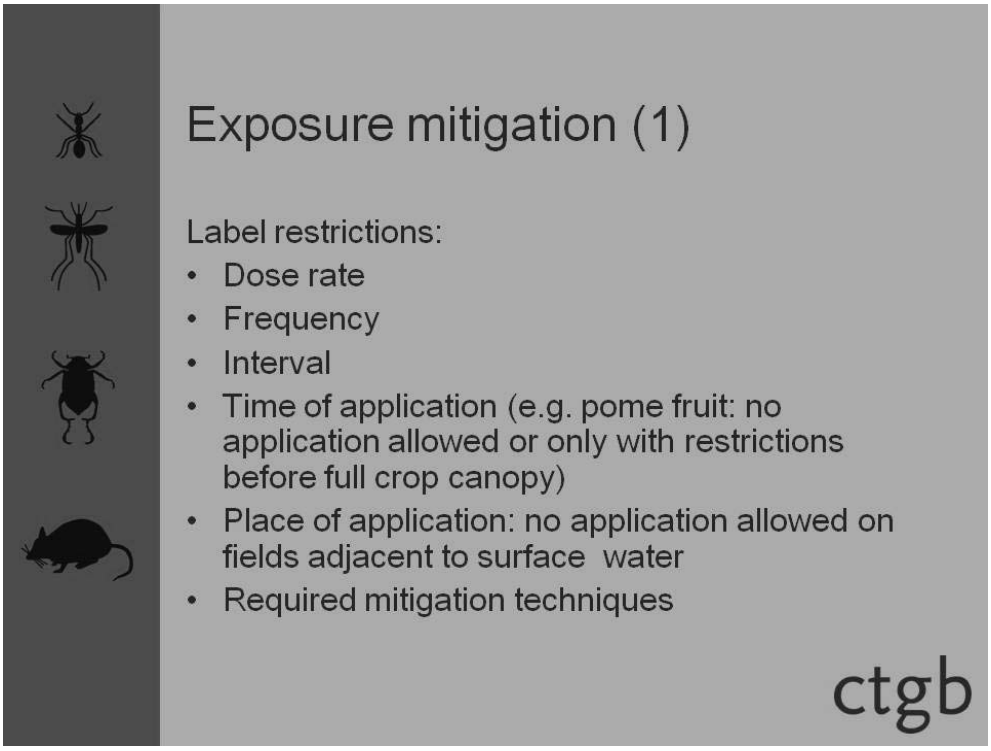
TER unacceptable -> higher tier

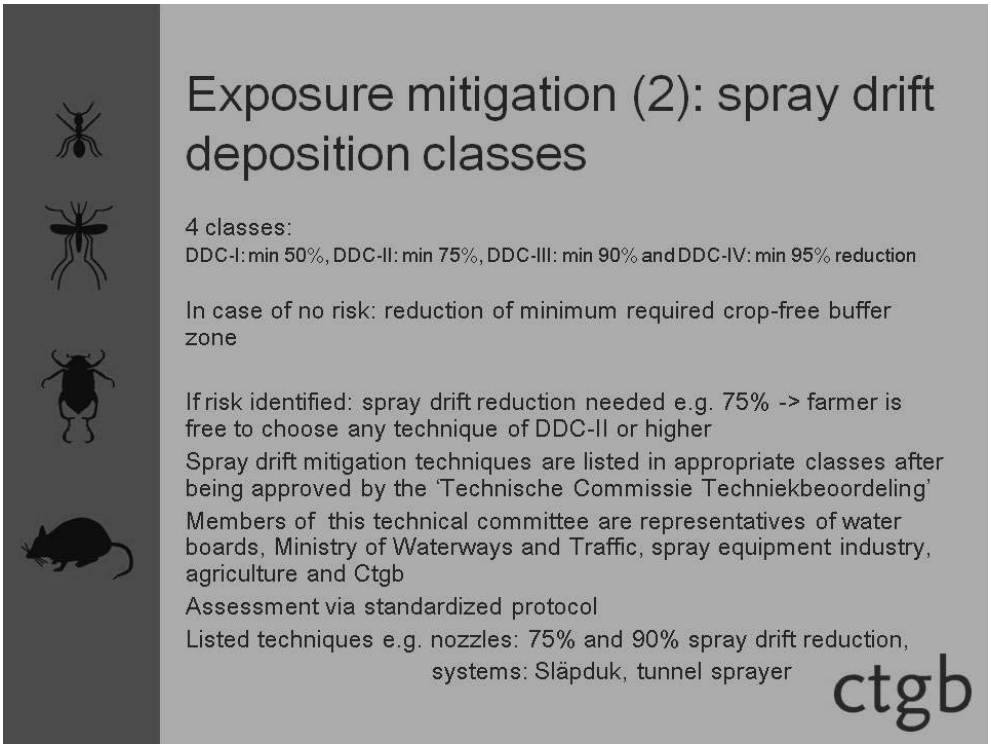
Exposure mitigation by means of:

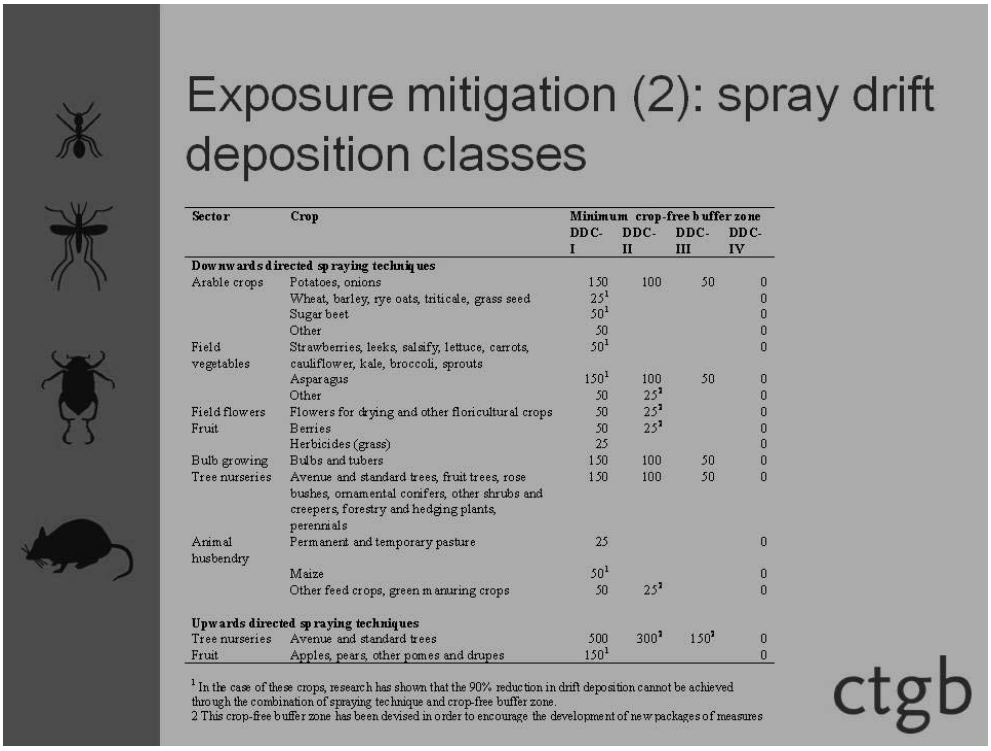
1. Label restrictions
2. Spray drift deposition classes
3. Tailor made measures

Measured data (if representative) are taken into account -> final tier

ctgb


Exposure mitigation (1)
Label restrictions:
• Dose rate
• Frequency
• Interval
• Time of application (e.g. pome fruit: no application allowed or only with restrictions before full crop canopy)
• Place of application: no application allowed on fields adjacent to surface water
• Required mitigation techniques
ctgb


Exposure mitigation (2): spray drift deposition classes
4 classes:
DDC-I: min 50%, DDC-II: min 75%, DDC-III: min 90% and DDC-IV: min 95% reduction
In case of no risk: reduction of minimum required crop-free buffer zone
If risk identified: spray drift reduction needed e.g. 75% -> farmer is free to choose any technique of DDC-II or higher
Spray drift mitigation techniques are listed in appropriate classes after being approved by the 'Technische Commissie Techniekbeoordeling'
Members of this technical committee are representatives of water boards, Ministry of Waterways and Traffic, spray equipment industry, agriculture and Ctgb
Assessment via standardized protocol
Listed techniques e.g. nozzles: 75% and 90% spray drift reduction,
systems: Släpduk, tunnel sprayer
ctgb



# Exposure mitigation (2): spray drift deposition classes

| Sector | Crop | Minimum crop-free buffer zone DDC-I | DDC-II | DDC-III | DDC-IV |
|---|---|---|---|---|---|
| **Downwards directed spraying techniques** | | | | | |
| Arable crops | Potatoes, onions | 150 | 100 | 50 | 0 |
| | Wheat, barley, rye oats, triticale, grass seed | 25[1] | | | 0 |
| | Sugar beet | 50[1] | | | 0 |
| | Other | 50 | | | 0 |
| Field vegetables | Strawberries, leeks, salsify, lettuce, carrots, cauliflower, kale, broccoli, sprouts | 50[1] | | | 0 |
| | Asparagus | 150[1] | 100 | 50 | 0 |
| | Other | 50 | 25[2] | | 0 |
| Field flowers | Flowers for drying and other floricultural crops | 50 | 25[2] | | 0 |
| Fruit | Berries | 50 | 25[2] | | 0 |
| | Herbicides (grass) | 25 | | | 0 |
| Bulb growing | Bulbs and tubers | 150 | 100 | 50 | 0 |
| Tree nurseries | Avenue and standard trees, fruit trees, rose bushes, ornamental conifers, other shrubs and creepers, forestry and hedging plants, perennials | 150 | 100 | 50 | 0 |
| Animal husbendry | Permanent and temporary pasture | 25 | | | 0 |
| | Maize | 50[1] | | | 0 |
| | Other feed crops, green manuring crops | 50 | 25[2] | | 0 |
| **Upwards directed spraying techniques** | | | | | |
| Tree nurseries | Avenue and standard trees | 500 | 300[2] | 150[2] | 0 |
| Fruit | Apples, pears, other pomes and drupes | 150[1] | | | 0 |

[1] In the case of these crops, research has shown that the 90% reduction in drift deposition cannot be achieved through the combination of spraying technique and crop-free buffer zone.
2 This crop-free buffer zone has been devised in order to encourage the development of new packages of measures

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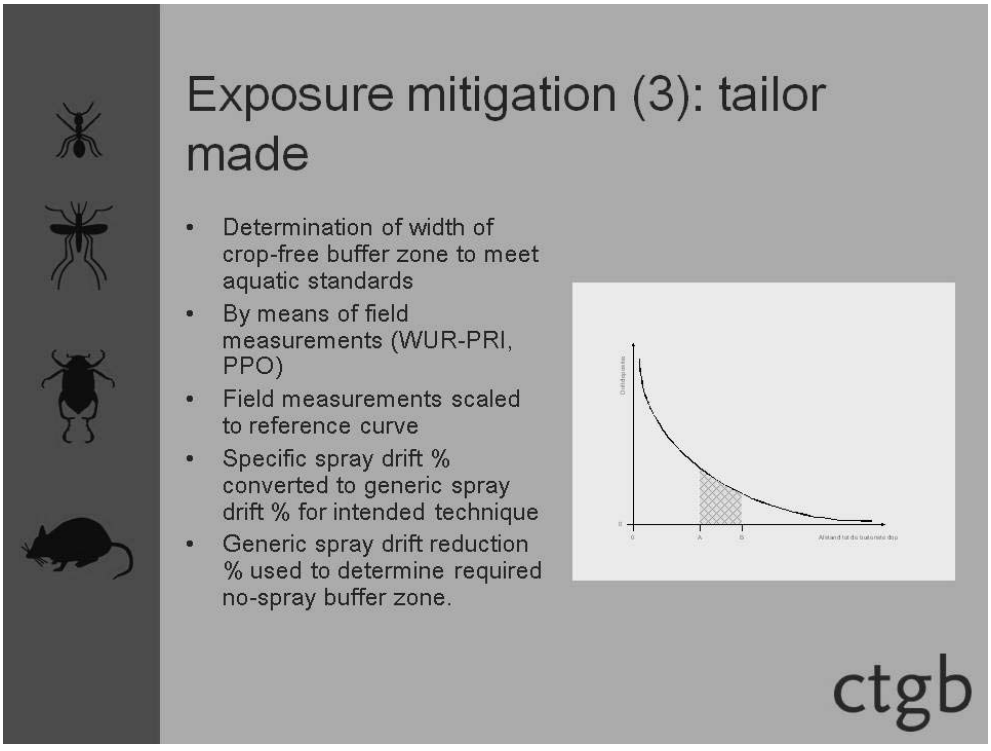
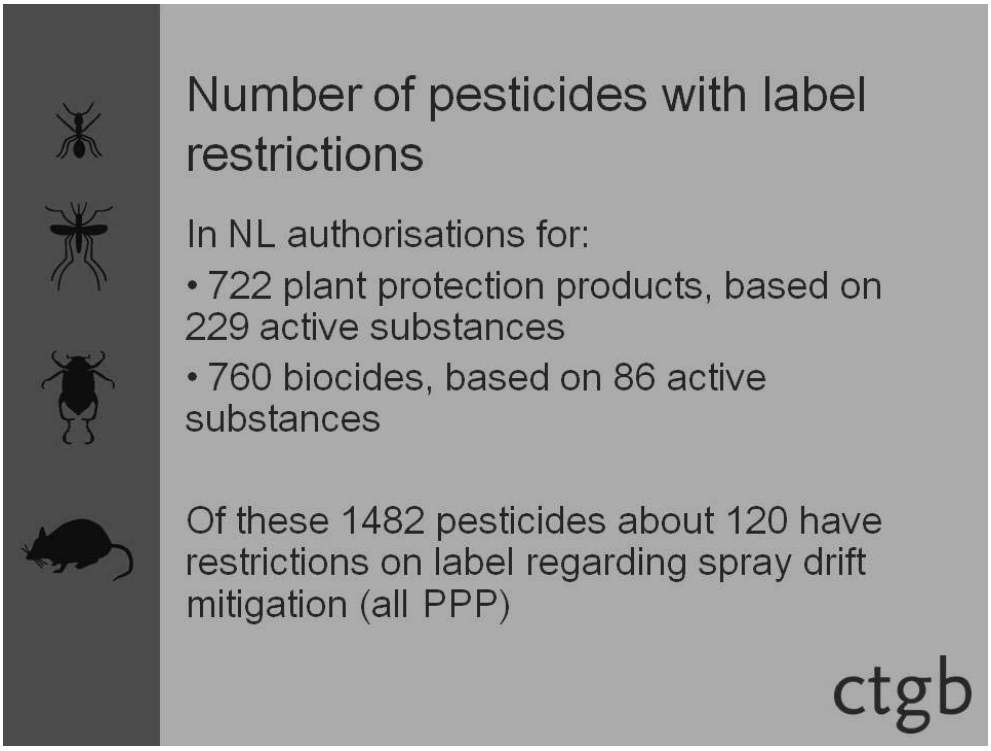


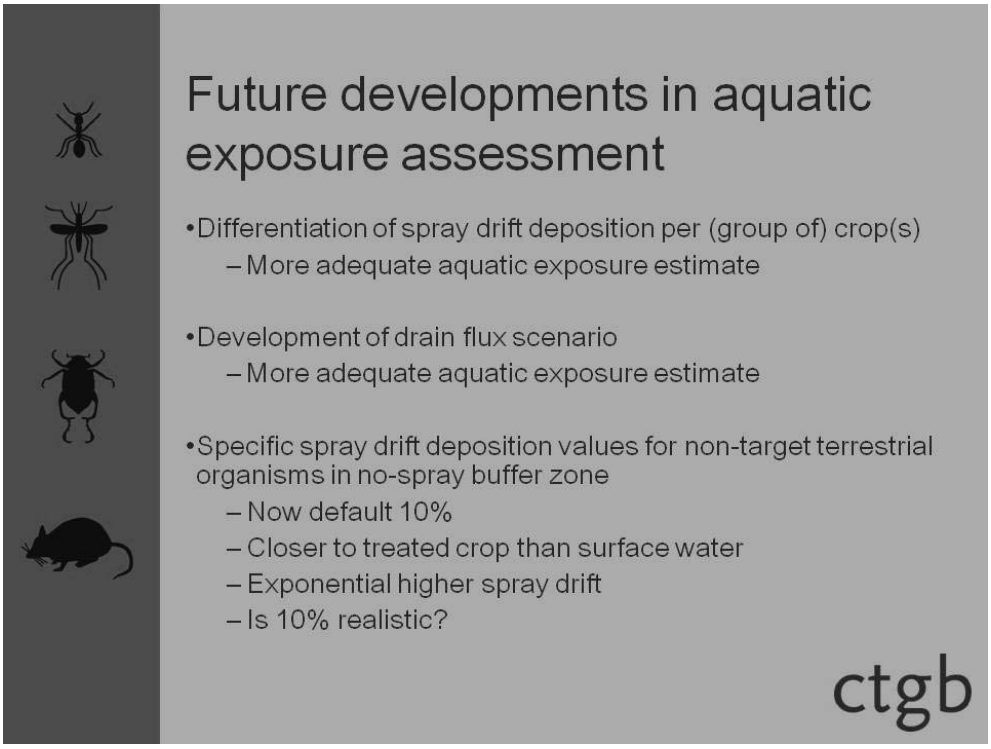
# Exposure mitigation (3): tailor made

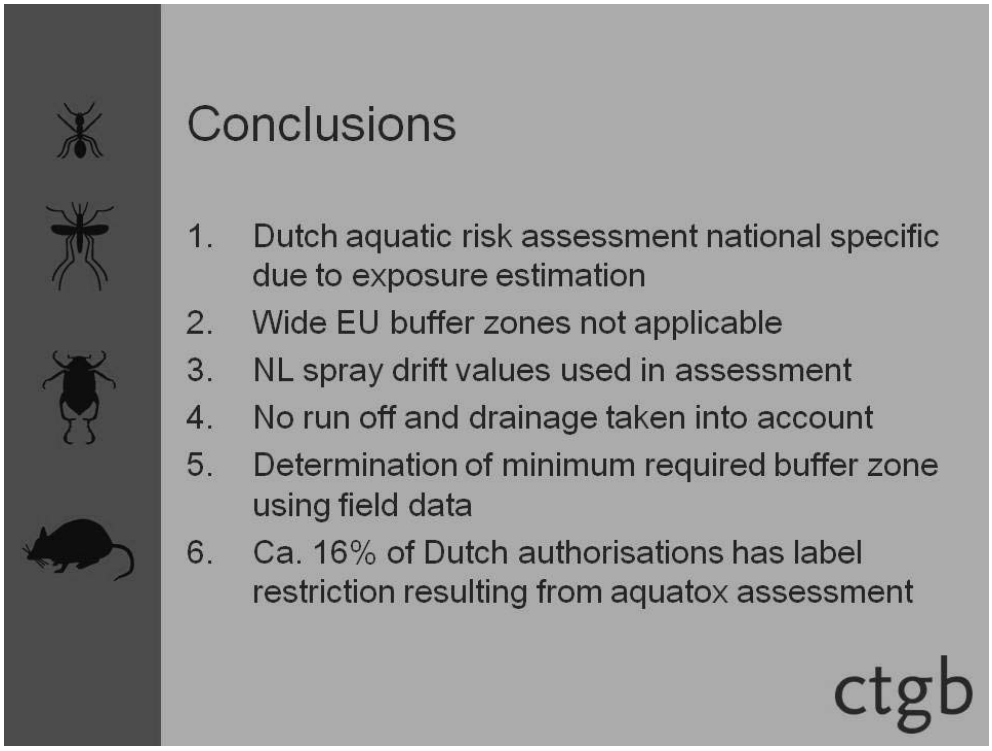
- Determination of width of crop-free buffer zone to meet aquatic standards
- By means of field measurements (WUR-PRI, PPO)
- Field measurements scaled to reference curve
- Specific spray drift % converted to generic spray drift % for intended technique
- Generic spray drift reduction % used to determine required no-spray buffer zone.



ctgb


Number of pesticides with label restrictions
In NL authorisations for:
• 722 plant protection products, based on 229 active substances
• 760 biocides, based on 86 active substances
Of these 1482 pesticides about 120 have restrictions on label regarding spray drift mitigation (all PPP)
ctgb


Future developments in aquatic exposure assessment
•Differentiation of spray drift deposition per (group of) crop(s)
– More adequate aquatic exposure estimate
•Development of drain flux scenario
– More adequate aquatic exposure estimate
•Specific spray drift deposition values for non-target terrestrial organisms in no-spray buffer zone
– Now default 10%
– Closer to treated crop than surface water
– Exponential higher spray drift
– Is 10% realistic?
ctgb


Conclusions
1. Dutch aquatic risk assessment national specific due to exposure estimation
2. Wide EU buffer zones not applicable
3. NL spray drift values used in assessment
4. No run off and drainage taken into account
5. Determination of minimum required buffer zone using field data
6. Ca. 16% of Dutch authorisations has label restriction resulting from aquatox assessment
ctgb


Any questions?
Thank you for your attention.
ctgb

**Presentation 5**
**Australia**
**Alan Norden**

# Spray Drift Risk Assessment at the APVMA

Prepared by: David Loschke

Presenter: Alan Norden

Australian Government
Australian Pesticides and Veterinary Medicines Authority

## The Australian Pesticides and Veterinary Medicines Authority is Australia's national regulator of pesticides

The APVMA is responsible for 3 main risk areas of pesticide use. It must

- Protect human health
- Protect the health of the environment
- Protect Australia's international trade

Australian Pesticides and Veterinary Medicines Authority

## Australia has a vigorous application industry

Australian Pesticides and Veterinary Medicines Authority

## APVMA and Spray Drift

The APVMA began re-evaluating and refining its spray drift risk assessment methodology in 2002

- Published 4 successive drafts of a discussion paper for public consultation between 2003 -2008
- Hosted national workshops and conferences
- Made presentations at many State and Industry conferences and workshops

Australian Pesticides and Veterinary Medicines Authority

Australia's recently refined spray drift risk assessment methods are already used for applications for new products and new product uses

The new refinements will soon be applied to a systematic review of all older products that have not been assessed for spray drift risk with modern methods

Australian Pesticides and Veterinary Medicines Authority

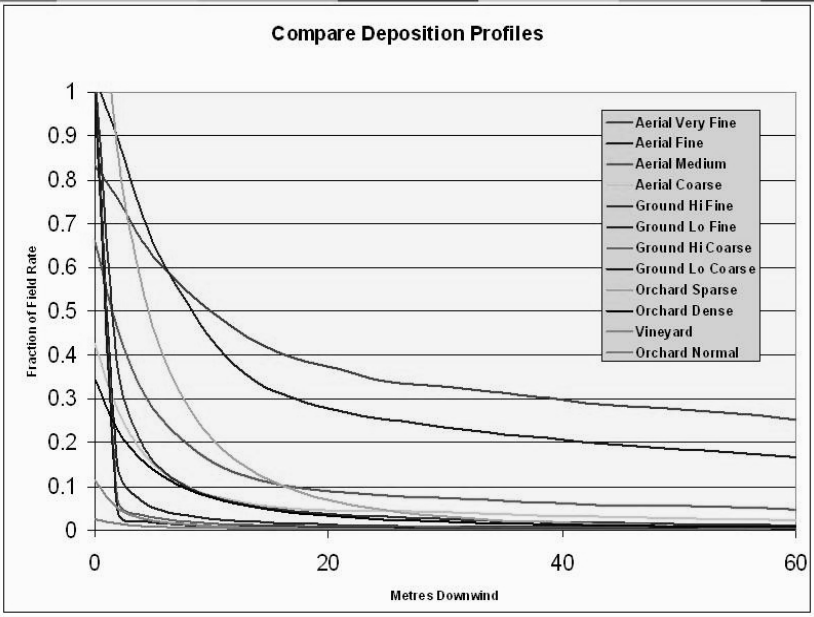
## APVMA Spray Drift Risk Assessment

Spray drift risk assessment methods have evolved with the availability of new field data sets and the development of validated spray drift computer modelling

- The APVMA uses both computer modelling and field data sets to estimate drift deposition
- Standard drift scenarios are being finalised for use in routine risk assessments

Australian Pesticides and Veterinary Medicines Authority

## Examples of typical drift deposition profiles




## Risk Assessment Approach

Spray drift risk is assessed near the upper bound of risk for equipment and methods typical of Australian industry

- Risk is managed by means of instructions and restrictions placed on product labels
- States and Territories enforce mandatory label instructions as law

Australian Pesticides and Veterinary Medicines Authority

## Risk Assessment Approach

Specification on the label of particular equipment or the way equipment is set up would only rarely, if ever, be done. Such specifications are too limiting and quickly become out of date.

If a method of application (for example aerial) has not been assessed for risk, that method is forbidden on the label.

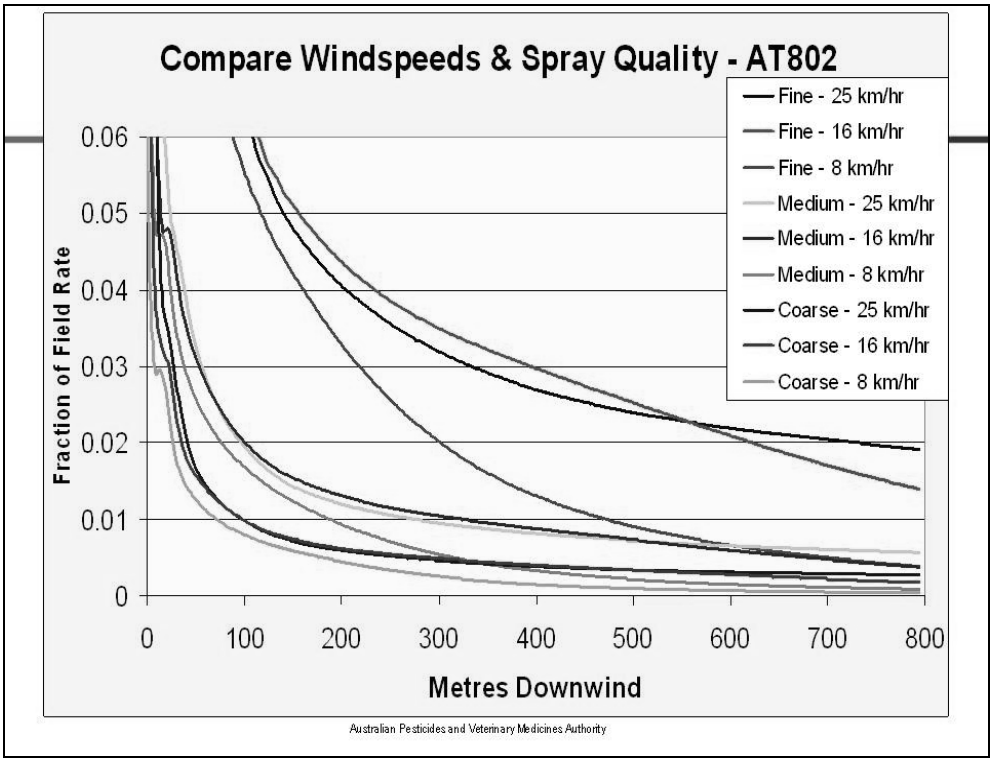
Australian Pesticides and Veterinary Medicines Authority

## Principal Label Restrictions

Mandatory label statements include:

- Use of largest spray droplet size compatible with efficacy – specified as a standard spectrum – currently within ASAE S572
- Limits on wind speed during spraying
- Imposition of downwind no-spray zones (buffer zones) when necessary

Australian Pesticides and Veterinary Medicines Authority

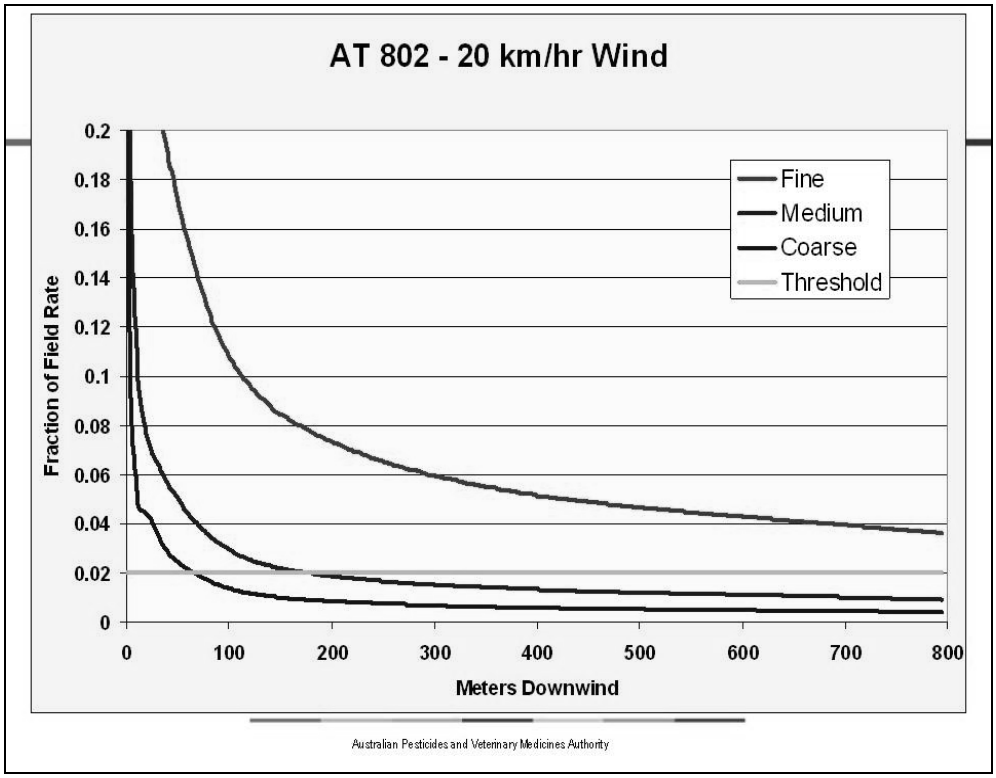



## Mandatory No-Spray Zones

Mandatory no-spray zones (buffer zones) exist only in the downwind direction at the time of spray application

- Labels might have a no-spray zone for each of the three major risk categories
- The size of a no-spray zones is based on estimated spray drift deposition linked to an acceptable risk-threshold

Australian Pesticides and Veterinary Medicines Authority




## Beyond Label Restrictions

Label restrictions based on current typical practice will form a relatively stable reference point over time.

- As industry practices improve with new drift reducing technologies (DRT), those who take up aspects of DRT can be rewarded through a special mechanism
- The mechanism will be based on methods used in Europe and Canada

Australian Pesticides and Veterinary Medicines Authority

## Beyond Label Restrictions

Label mandatory no-spray zones can be reduced by factors tied to the measured benefit of particular DRTs

- An easily updated reference document referred to on each label will explain the reduction factor for each type of DRT
- Australia will use overseas data for these factors as much as possible

Australian Pesticides and Veterinary Medicines Authority

## Systematic Label Reviews

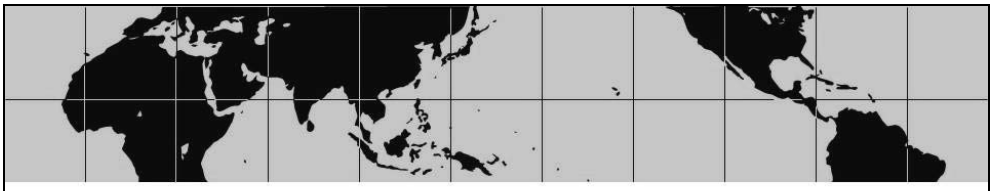
The targeted label reviews of older products for spray drift risk will begin soon

- A large number of old products need to be reviewed – perhaps more than 2,000
- This massive task is expected to require four to five years

Australian Pesticides and Veterinary Medicines Authority


thank you
Australian Pesticides and Veterinary Medicines Authority

**Presentation 6**
**US EPA**
**Susan Lewis**



# EPA's Plan to Address Spray Drift

**Susan Lewis**

**U.S. Environmental Protection Agency**

**OECD Spray Drift Seminar**

*June 12, 2008*

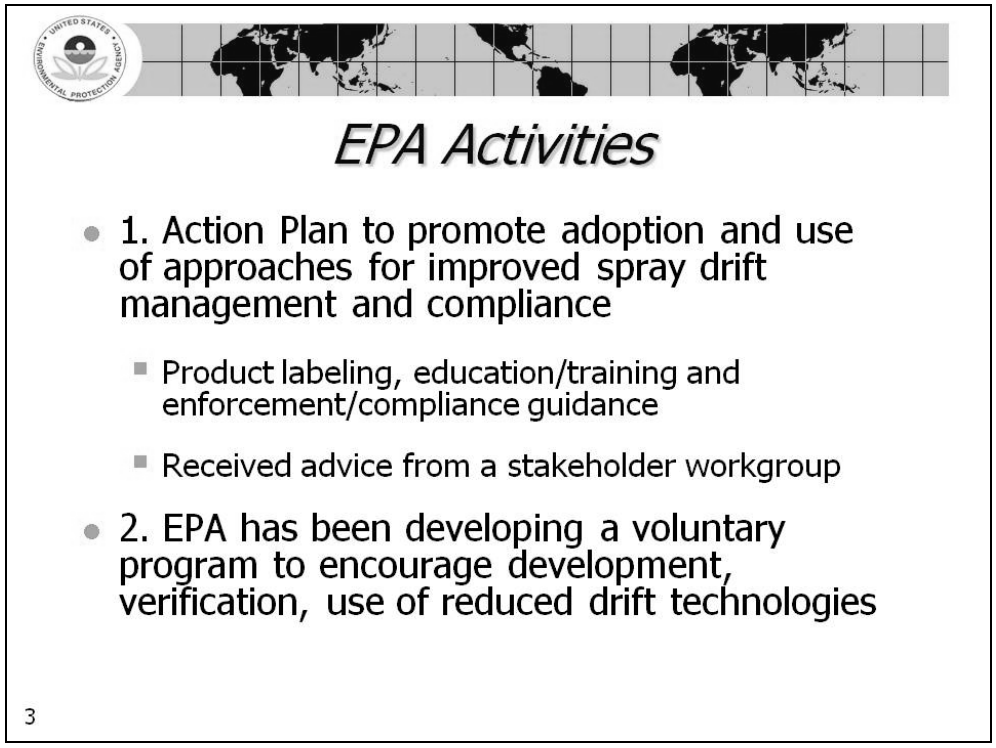
22-Jan-2009 12:16 PM

1

## Background

- Addressing human health and environmental risks posed by pesticide spray drift is a significant priority for EPA
- EPA routinely considers potential exposures and risks from spray drift in each pesticide risk assessment and management decision

2


EPA Activities
1. Action Plan to promote adoption and use of approaches for improved spray drift management and compliance
Product labeling, education/training and enforcement/compliance guidance
Received advice from a stakeholder workgroup
2. EPA has been developing a voluntary program to encourage development, verification, use of reduced drift technologies
3


Labeling Recommendation
Standardize labeling statements for spray drift mitigation
Draft guidance to registrants on drift labeling in summer 2008 for public comment
Goal is to ensure that drift labeling is consistent, clear and enforceable
Anticipate issuance final label guidance end 08/early09
4

## Motivation for DRT Work

- Overall risk reduction, increased sensitivity to spray drift issues from suburban development and endangered species concerns
- Development of improved methods, tools, and data for EPA's scientific review of pesticides and spray drift reduction for product labels
- Verifying and quantifying a DRT's potential to reduce drift can benefit growers/applicators and manufacturers
- The acceptance of a larger variety of DRTs would allow greater flexibility in drift management

5

## Collaborations & Partnerships

- U.S. Environmental Protection Agency
- U.S. Department of Agriculture (USDA)
- Pesticide Manufactures
- Stakeholder Group includes: pesticide registrants, adjuvant producers, applicator groups, sprayer manufacturers, academic and government researchers
- Interest in collaborating with other governments

6

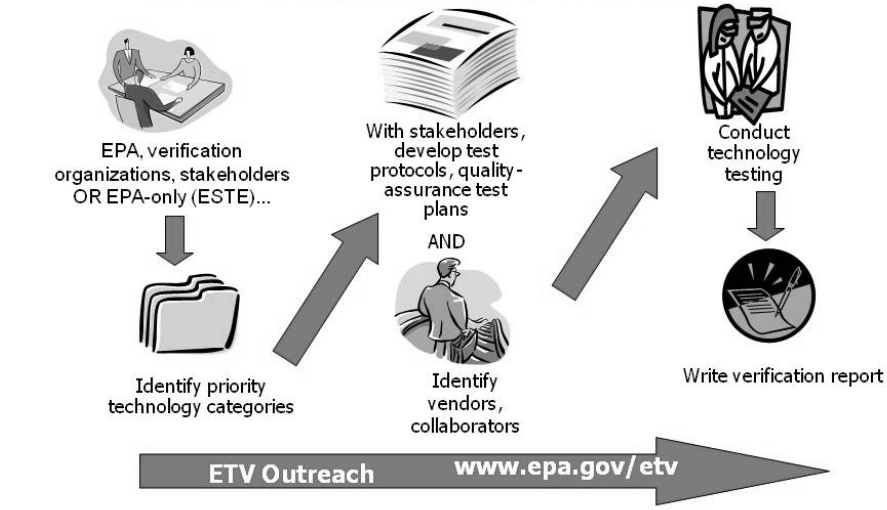
## EPA Environmental Technology Verification (ETV) program

ETV

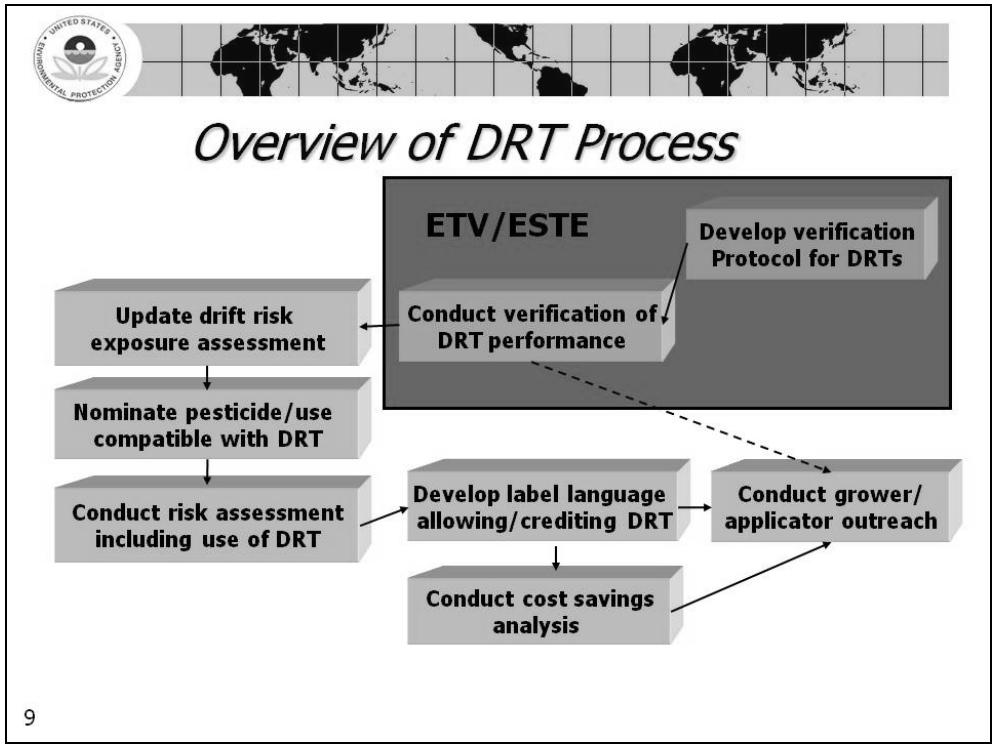
- ETV develops testing protocols and verifies the performance of technologies that have the potential to improve protection of human health and the environment

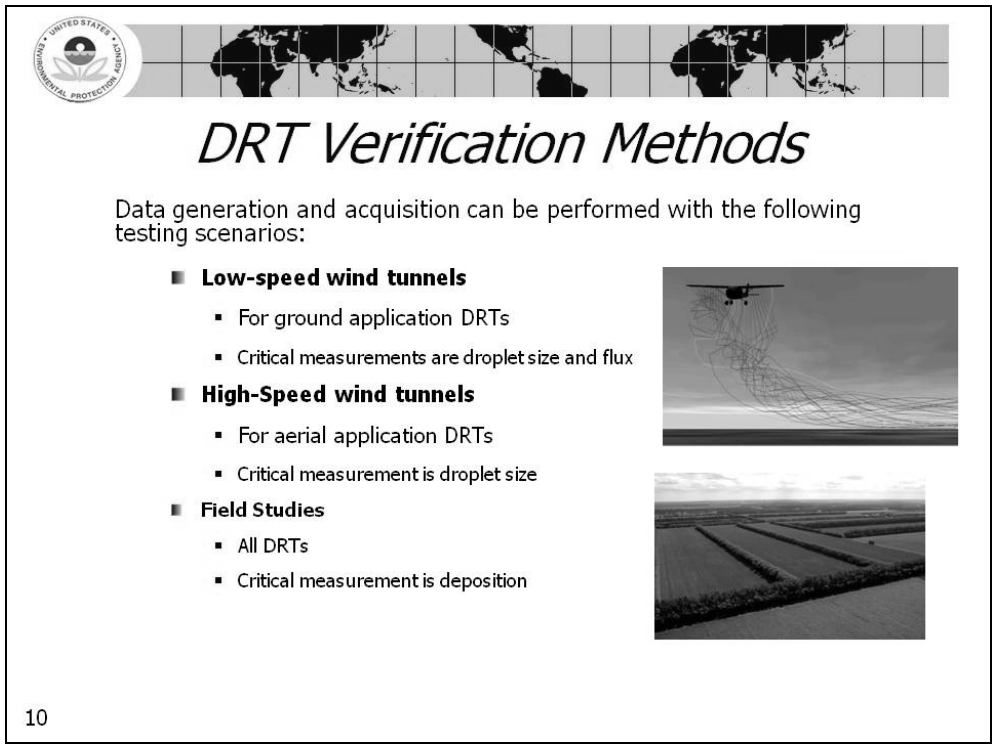
7

## ETV Verification Process




8


Overview of DRT Process
ETV/ESTE
Develop verification Protocol for DRTs
Conduct verification of DRT performance
Update drift risk exposure assessment
Nominate pesticide/use compatible with DRT
Conduct risk assessment including use of DRT
Develop label language allowing/crediting DRT
Conduct grower/ applicator outreach
Conduct cost savings analysis
9


DRT Verification Methods
Data generation and acquisition can be performed with the following testing scenarios:
Low-speed wind tunnels
For ground application DRTs
Critical measurements are droplet size and flux
High-Speed wind tunnels
For aerial application DRTs
Critical measurement is droplet size
Field Studies
All DRTs
Critical measurement is deposition
10

## Desired Features

- Use results in realistic, high-end deposition values
- Easily available
- Consistent over time
- Consistent across different tests
  - Wind tunnel and field studies
- Internationally recognized
  - Harmonize test protocol with others?

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## Use of Results

- The drift reduction associated with a DRTs use could be utilized by EPA to develop spray drift reduction factors (50, 75, 90, 99%)
- Spray drift reduction factors could be incorporated into EPA pesticide risk assessments:
  - Drinking water assessments
  - Aquatic organism assessments
  - Terrestrial plant assessments
  - Special assessments

- Allow more labeling options for pesticide products to manage spray drift

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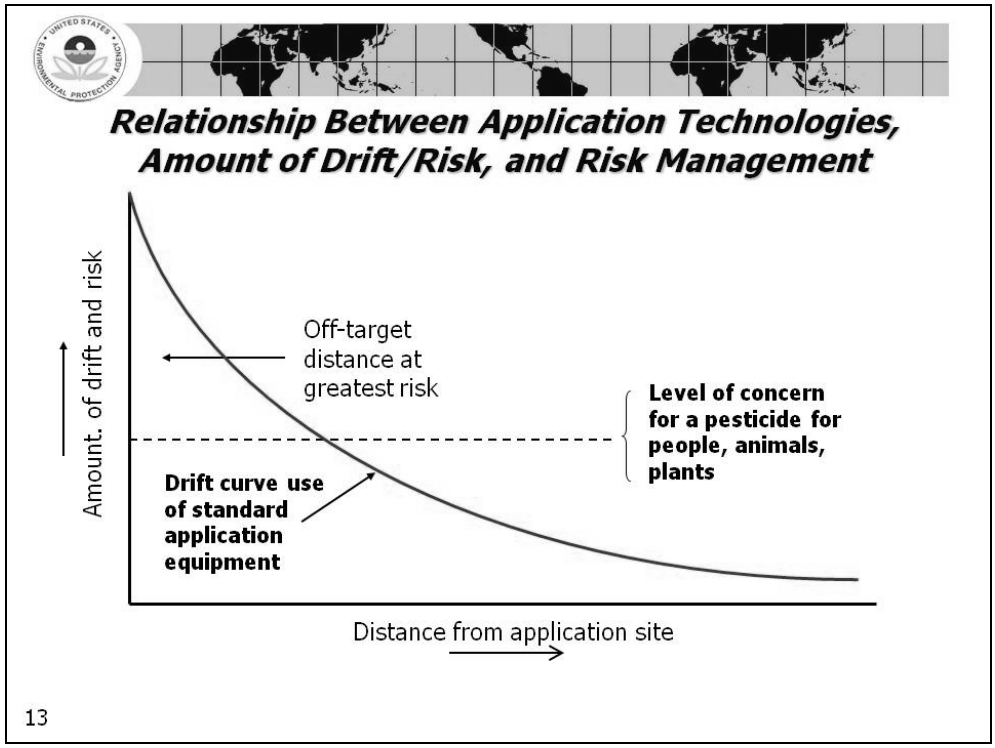
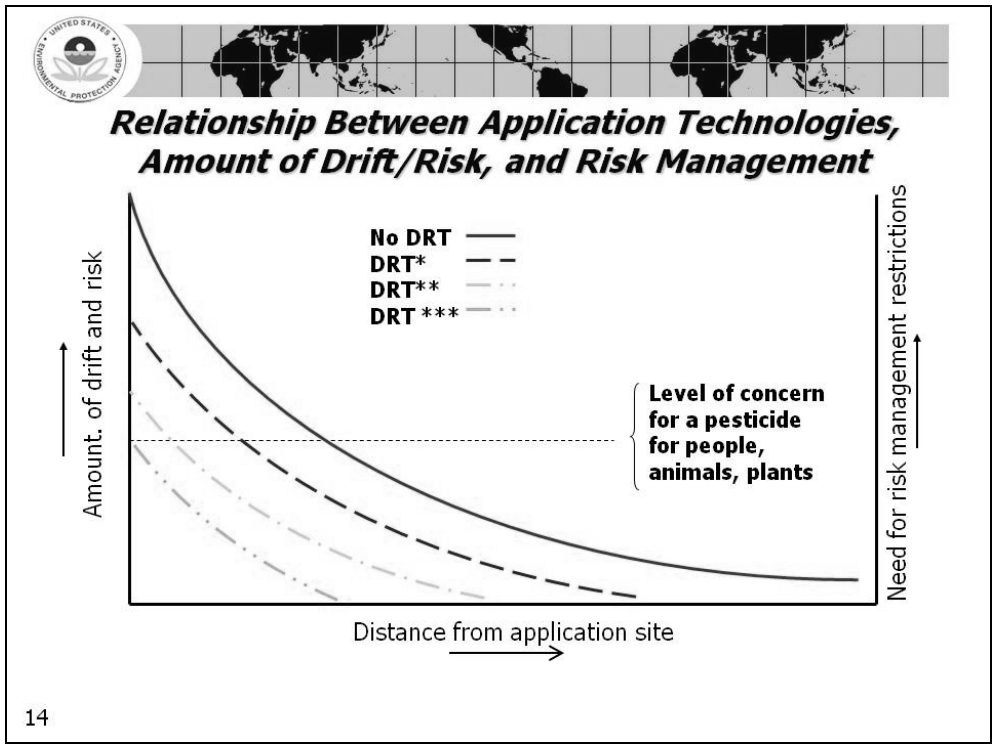

Relationship Between Application Technologies, Amount of Drift/Risk, and Risk Management
Amount. of drift and risk
Off-target distance at greatest risk
Level of concern for a pesticide for people, animals, plants
Drift curve use of standard application equipment
Distance from application site
13


Relationship Between Application Technologies, Amount of Drift/Risk, and Risk Management
No DRT
DRT*
DRT**
DRT ***
Amount. of drift and risk
Level of concern for a pesticide for people, animals, plants
Need for risk management restrictions
Distance from application site
14

## Example of Possible DRT Incentives on Label

| Application Equipment | Release Height | Droplet Size | Buffer Size (m) |
|---|---|---|---|
| Standard application equipment | High boom | Fine | 24 |
| | | Coarse | 12 |
| | Low boom | Fine | 12 |
| | | Coarse | 6 |
| DRT | -- | -- | 6 |

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## Summary

- **EPA and pesticide manufacturers can include use of DRTs in risk assessments and on product labels**
- **A winner for multiple stakeholders:**
  - **Gives greater flexibility and knowledge to growers and applicators to meet or improve on drift requirements**
  - **Gives incentives to equipment manufacturers to manufacture/sell DRTs**
  - **May lower overall costs of spraying**
- **Opportunity to extend similar efforts for future DRT verification program compatible with other countries**

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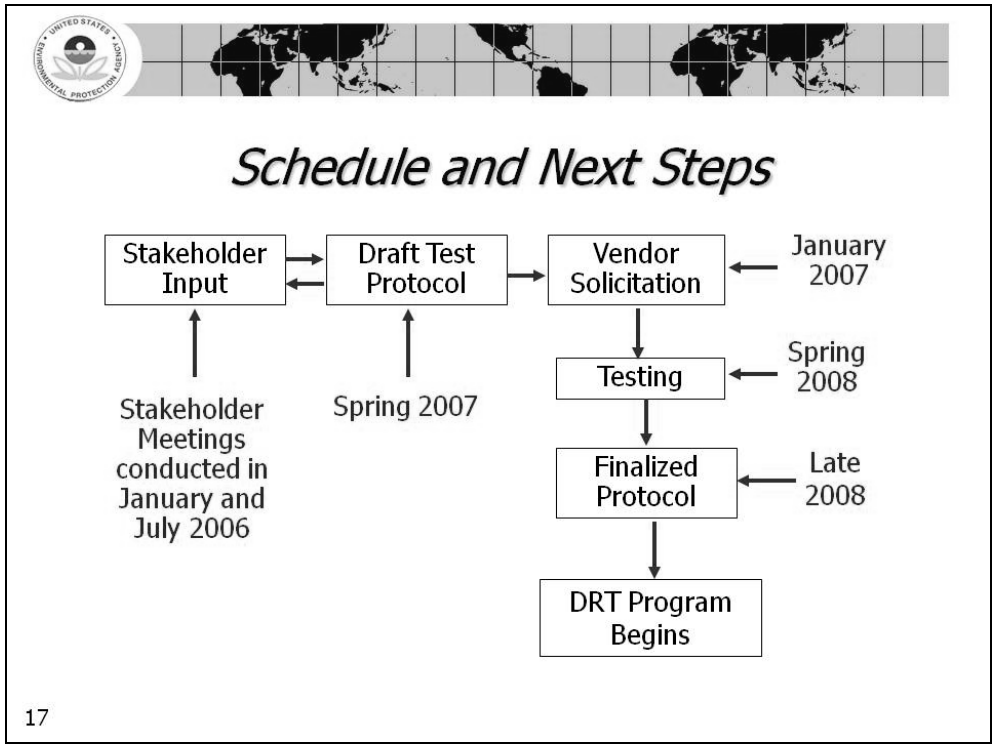
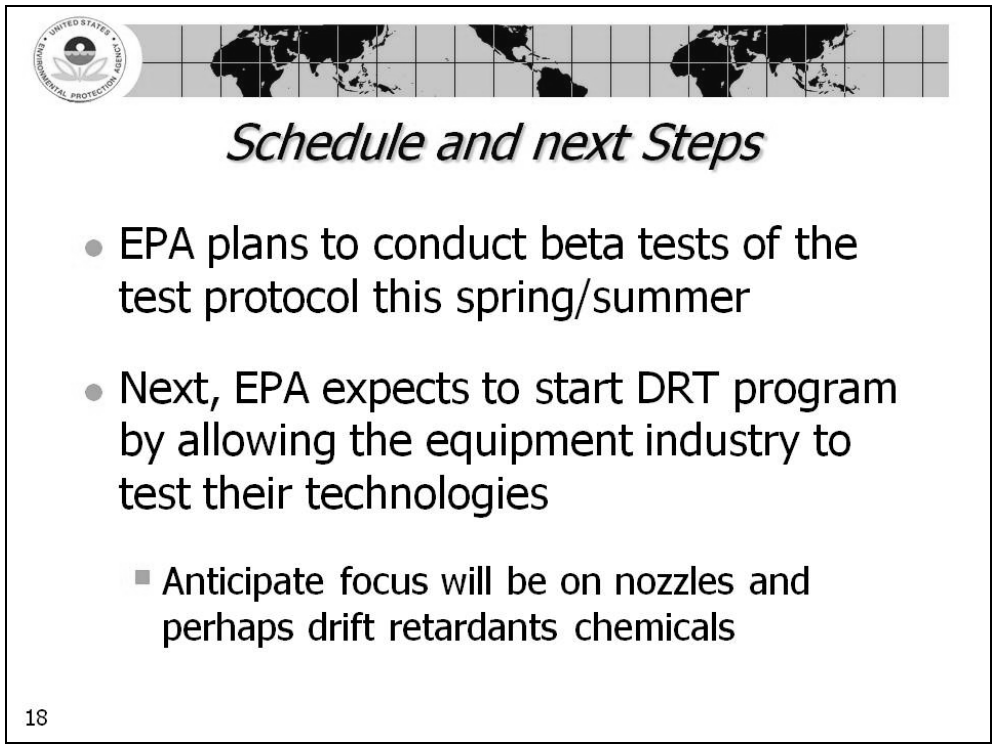
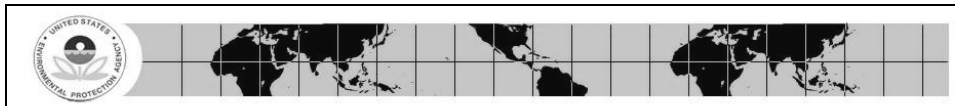

Schedule and Next Steps
Stakeholder Input
Draft Test Protocol
Vendor Solicitation
January 2007
Testing
Spring 2008
Finalized Protocol
Late 2008
DRT Program Begins
Stakeholder Meetings conducted in January and July 2006
Spring 2007
17


Schedule and next Steps
EPA plans to conduct beta tests of the test protocol this spring/summer
Next, EPA expects to start DRT program by allowing the equipment industry to test their technologies
Anticipate focus will be on nozzles and perhaps drift retardants chemicals
18



## URL Links to EPA's Spray Drift and DRT Project

http://www.epa.gov/pesticides/factsheets/spraydrift.htm

http://www.epa.gov/etv/este.html#pdrt

Includes draft protocol

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# Thanks for your interest

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**Presentation 7**
**Eureau**
**Durk Krol**

# Eureau

European federation of national associations of drinking water suppliers and waste water services

## The drinking water sector's perspective on pesticides

Durk Krol
Deputy Secretary-General

Rue Colonel Bourg 127
1140 Brussels
+32 2 7064080
www.eureau.org
d.krol@eureau.org

1

## Content

1. EUREAU
2. Water and its European regulatory context
3. Resource quality & drinking water quality
4. Doing things better

EUREAU

# 1. EUREAU

31 full and 1 observer member association

29 countries

± 405 million of customers

- Full members
- Full members (EFTA countries)
- Observer members
- Non members (EU countries)


EUREAU

# 2. Regulatory framework

EUREAU

# Water Framework Directive

- River basin management
- Planning
- Environmental objectives
- Protection of resources
- Prescribes methods:
  - ⇒ cost recovery
  - ⇒ Polluter pays principle
  - ⇒ public participation

EUREAU

# Drinking Water Directive

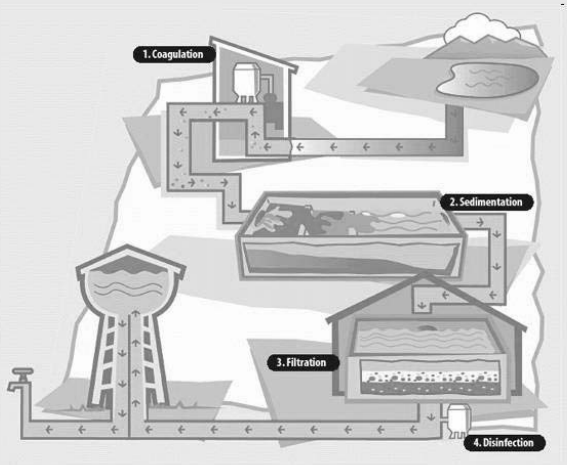
- Pesticides:
  - ⇒0,10 µg/L
  - Pesticides: insecticides, herbicides, fungicides, etc. metabolites, degradation products and reaction products
- Total pesticides
  - ⇒0,50 µg/L
  - Total pesticides: sum of all individual pesticides discovered and quantified through control procedure

# Metabolites

- Tolyfluanid
  ⇒ dimethylsulfamid (DMS)
  ⇒Nitrosodimethylamine (NDMA)
  - NDMA is carcinogenic

- DMS non-toxic => non relevant according to current legislation

# 3. Resource quality & drinking water quality



# Follow-up

- Compliance check
  - ⇒ Relevant national authority
  - ⇒Versus standard
  - ⇒Certified laboratories
- Control by water operator
  - ⇒Frequency and place depending on risk

# Pesticides - findings in ground- and surface water

| | ground water | surface water |
|---|---|---|
| number of substances | 60 | 89 |
| concentration > 0,1 µg/L | 41 | 73 |
| not authorized | 47 % | 45 % |
| authorized | 43 % | 47 % |
| *metabolites* | *10 %* | *8 %* |

Source: "pesticides found in groundwater and surface waters in Germany", TZW study by J. Kiefer

High number of findings
→ extensive pollution / entry although pesticides are used properly

EUREAU

# Most found pesticides

| rang | Active substance | garden plots | application | sales 2005 [t] | Application rate (examples) [g/ha] |
|---|---|---|---|---|---|
| 1 | Diuron | no | pipfruit, ways and places, ornamental trees | 25-100 | 5600 |
| 2 | Isoproturon | no | cereal, ornamental trees | >1000 | 1500 |
| 3 | Bentazon | no | cereal, corn, peas, herbs | 250-1000 | 1000 |
| 4 | Mecoprop (MCPP) [1)] | yes | cereal, pipfruit, gramineous plants | 100-250 | 780 |
| 5 | Terbuthylazin | no | corn, lupine | 250-1000 | 750 |
| 6 | MCPA | yes | cereal, meadows, pastures, pipfruit, gramineous plants | 250-1000 | 2720 |
| 7 | Metazachlor | no | rape, beet, cabbage, radish, herbs, ornamental plants | 250-1000 | 750 |
| 8 | Metolachlor [2)] | no | corn, lupine | 250-1000 | 1200 |
| 9 | Dichlorprop (2,4-DP) [3)] | no | cereal, gramineous plants | 250-1000 | 1500 |
| 9 | Glyphosat | yes | cereal, corn, meadows, grass, fruits, ornamental plants, tree nursery, ways and places, railway line | >1000 | 3600 |

1) zugelassen als Mecoprop-P 2) zugelassen als S-Metolachlor 3) zugelassen als Dichlorprop-P

Source: "pesticides foundin groundwater and surface waters in Germany", TZW study by J. Kiefer

EUREAU

# Water Supply & pollution


- Blending
- Well closing
- treatment: Activated Carbon, membranes
- Energy & Environmental footprint

## 4. Doing things better ?


## Doing things better

- Better apply the WFD & daughter directives
  - ⇒ Article 7 & Ground Water Directive
  - ⇒ Quality standards based on simple treatment
- Pesticides package
  - ⇒ Reference to the WFD in the future regulation on Plant Protection Products
  - ⇒ Manufacturers should provides analytical methods & quantities used
  - ⇒ Should tackle all pollution routes (Drainage, Groundwater, leaching…)

EUREAU

# Draft Regulation on plant protection products

- Main issues water operators:
  - ⇒ Coherence with WFD
  - ⇒ Zonal approach
  - ⇒ Combined effect co-formulants, adjuvants, synergists and safeners
  - ⇒ Substitution of high risk substances
  - ⇒ Access to information

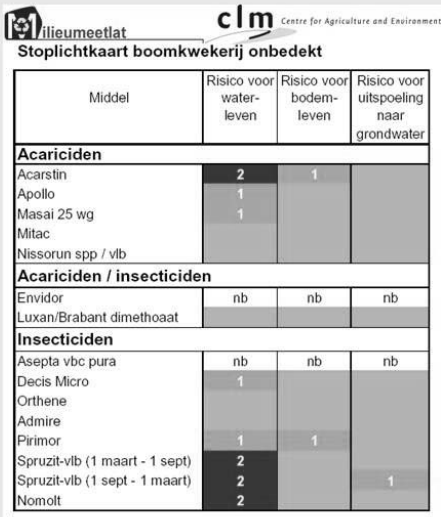
EUREAU

# What can the water suppliers do?

- Create awareness about WQ problems
- Provide WQ results
- Provide knowledge of the GW Systems
- Help in identifying necessary measures for GW protection & remediation

# Cooperative agreements

- Stimulation Policy:
  - ⇒Use of Best Management Practices
  - ⇒Additional to Regulation
  - ⇒Temporary financial support & Payment-by-result
  - ⇒Importance of yardstick or indicators
- Multiple Parties Involved
  - ⇒Farmers, Water Companies, local Government



ilieumeetlat clm Centre for Agriculture and Environment

**Stoplichtkaart boomkwekerij onbedekt**

| Middel | Risico voor water-leven | Risico voor bodem-leven | Risico voor uitspoeling naar grondwater |
|---|---|---|---|
| **Acariciden** | | | |
| Acarstin | 2 | 1 | |
| Apollo | 1 | | |
| Masai 25 wg | 1 | | |
| Mitac | | | |
| Nissorun spp / vlb | | | |
| **Acariciden / insecticiden** | | | |
| Envidor | nb | nb | nb |
| Luxan/Brabant dimethoaat | | | |
| **Insecticiden** | | | |
| Asepta vbc pura | nb | nb | nb |
| Decis Micro | 1 | | |
| Orthene | | | |
| Admire | | | |
| Pirimor | 1 | 1 | |
| Spruzit-vlb (1 maart - 1 sept) | 2 | | |
| Spruzit-vlb (1 sept - 1 maart) | 2 | | 1 |
| Nomolt | 2 | | |

# Water suppliers responsibility

- Environmental surveillance is a full-time job
  - ⇒Monitoring of catchment area?
  - ⇒Who's got the responsibility if anything goes wrong?
  - ⇒Direct or indirect subsidy?
- Enforcement power for environmental laws
  - ⇒Variety of stakeholders in catchment
  - ⇒WFD has organized this debate
  - ⇒Water suppliers are only one of the legitimate users


EUREAU
Thank you for your attention !

**Presentation 8**
**CropLife International**
**Bernhard Johnen**

CropLife INTERNATIONAL

## Influence of Additives on Drift Reduction
## RRSG (12 June)

Bernhard Johnen

1

## Tank Mix - Additives

- *Adjuvants*: Many valid uses – spreaders, wetters, stickers, uptake/penetration, anti-evaporants, conditioners
  - *wetters* (both nonionic & ionic) can increase fines (droplets < 150micrometer)
  - any *alcohols* always increase fines! – read label ingredients & ***avoid*** alcohols, if possible

2

## Tank Mix – Additives (2)

- *Crop Oils* – generally very little effect on drop size
- *Fertilizer* – does increase density/settling; does not increase fines (SDTF tests); but may increase activity = off target effect
- *Nearly all additives* do reduce water evaporation (by increasing %-age of non-volatile portion in spray mixture)

## Adjuvants - Drift Control Additives (1)

- CAUTION !!
  Additives interact with tank mixture and formulations uniquely
  - NEED TEST DATA or ACTUAL Experience
  - Data with water tank mixes should be treated with caution;
    EC blank recommended for test tank mix.

## Adjuvants – Drift Control Additives (2)

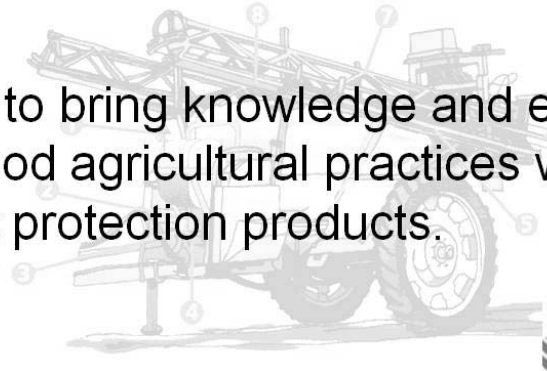
- "Drift Retardants" – polymers, thickeners
  - ***big*** problem with polymer breakdown by pump shear
    - so consider spray swath timing choices
      - may negatively affect spray pattern and uniformity
  - Polymers can increase VMD without reducing fines

## Evaporation Mitigation

- Problem at low humidity, > at high temperature
- High temperature with low humidity = evaporation of water and shrinking droplet sizes
- Replace some water with crop oil to increase droplet size
- Increase nozzle size/spray quality
- Some anti-evaporants work, (e.g. terpenes)
  InPlace/Placement data show ~20% reduction in evaporation rate, (Wilbur-Ellis, at New Brunswick Research Council)
- Keep spray mixture temperature below ambient

**Presentation 9**
**IFAP**
**Philippe Van Kempen**

# APPLICATION OF PESTICIDES



How to bring knowledge and expertise to good agricultural practices with plant protection products.

Philippe van Kempen - BCMA

Bcma

# Introduction

- The farmers want to progress on the environment protection (food and water quality are the most important factors they are sensible but also responsible)
- They know that Pesticides are dangerous for health,
- They know that a certain amount of pesticides will never reach the intended site of application

because of particle drift, volatility, or misapplication.

## The first way to limit the danger

- **By reducing the applied quantity**
  - less active ingredient on the market, but that means also less choice for a good efficiency and a risk for resistance
  - less quantity of a. i. per ha with good application practices (application just on time, good treatment conditions, low volume per ha)
  - integrated system with alternatives when possible
  - farm evolution to biological farm and production without any pesticides

## reaction of farmers on these topics

- less choice for a good efficiency and a risk for resistance
- Less security to produce more in quantity and quality,
- extra cost by using alternatives
- harmonization of the maximal contents in residues in food

## The second way to limit the danger

- regulation with buffer zone restrictions
- The reference is the field map with indication of rivers and “water points”, so that farmers can determine where they can treat their fields and respect the regulations to protect water

## Regulation of Buffer zone « ZNT » in France since september 2006

- The use of products must be realized by respecting the ZNT mentioned on the label.
- 4 widths of ZNT are defined (5 m, 20 m, 50 m or 100 m and more).

(for the same product, the value can vary according to the use of it).

- In the absence of this mention, a minimal width of 5 m must be respected.

## The width of the ZNT can be reduced

From 20 m or from 50 m ► **to 5 m if 3 conditions** are simultaneously respected:

- Presence of a permanent vegetation of at least 5 m of wide in border of water sources.
- use of specific means allowing to divide at least by 3 the risk for the aquatic environment.
- Recording of all the applications of products in the fields (name of the product, date, dose).

## Question on the use of low drift nozzles

- A new official list of drift-reducing techniques has been published in april 2007 in France
- droplet size modification is an answer to drift
- but the optimum droplet size for delivery to a target is not always the same as that for achieving the best results on the target.

## quality of the spray and biological performance.

- The influence of the properties of the spray liquid
  - the density of the spray liquid and the surface tension
  - Surfactants and other *additives* to pesticide sprays
- Good weather conditions
- boom heights of forward speed effect

## Conditions of application

- it is forbidden to pulverize with a wind of more than strength 3 on the Beaufort scale ( 19 km /h wind speed)
- temperature and relative humidity are limiting factors for efficiency but not limited as mandatory
- Application of the right volume /ha with indication on new sprayers

## Quality of spraying material

- An harmonization of the procedures in Europe
- A mandatory inspection in France will start in 2009
- The tools of diagnosis have to satisfy the European standard EN 13790,
- The agents, at the local level, will be approved on the basis of their initial skill completed by a training program.

## To limit unwanted exposure of humans and to respect the environment

Specific measures have been taken in France:

- Security of the water source supply
- Better handling of pesticides, including diluting and mixing the chemicals before incorporation in the tank
- cleaning of application equipment after use,
- spraying the surplus of the tank after dilution by 5 times the initial concentration
- discharge of tank surplus in the field after several dilutions to a factor 100

## Conclusion

- a margin of progress exist to insure an homogeneous application in all the fields with the reduction of pesticides and drift

The objective today is to master

- better production costs,
- while keeping the production of quality products
- and answering the request of a durable environmental management.

## But how to succeed

to reach an effective application and an real impact on all the farms, the technological progress and the agronomic knowledge must be accompanied by comprehensive education and clear information to the users.

**It must be simple to be accepted !**

**Thank you.**

**Presentation 10**
**PANNA**
**Brian Hill**

# Monitoring, Modeling and Urgent Mitigations for Airborne Pesticide Drift

*Presentation to OECD Working Group on Pesticides*
*Risk Reduction Steering Group*
*June 12th, 2008, Paris, France*

Brian R. Hill, PhD
Director, Science Department
Pesticide Action Network North America
bhill@panna.org

## Airborne Pesticide Drift

*For the Purpose of this Talk, Concentrations and Exposures Include Both:*

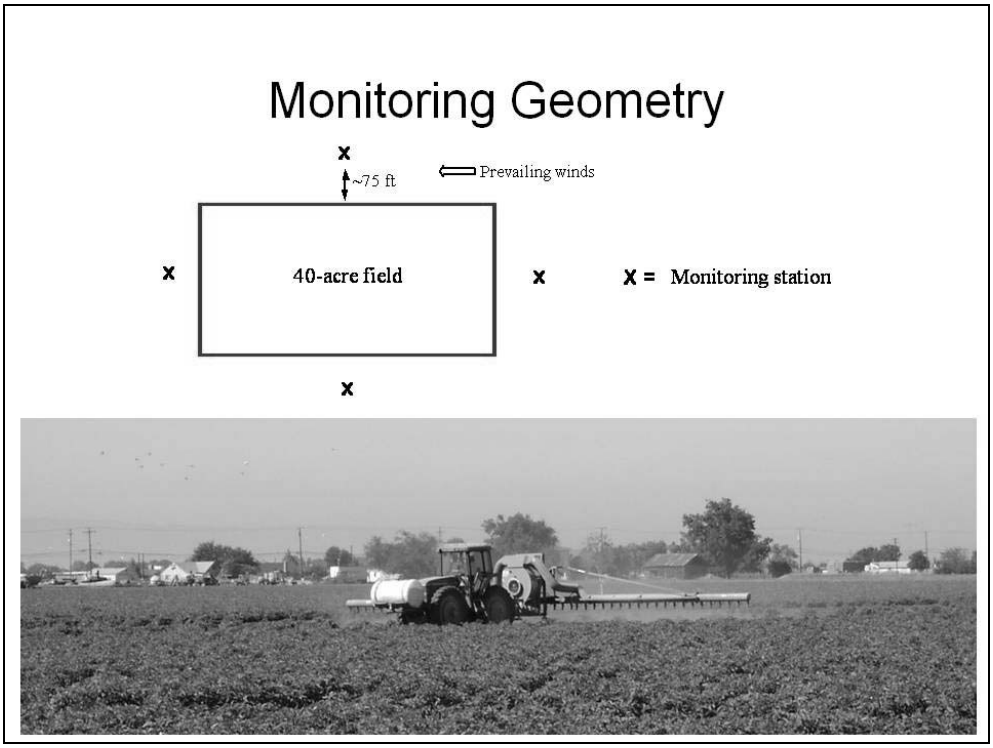
- Spray drift
  - Drift off-site during or immediately after an application
  - Governed principally by application parameters, wind
  - Strong wind can exacerbate
- Post-application drift
  - Volatilization drift during and days after an application
  - Governed by physicochemical properties, wind, temperature
  - Calms and inversions can exacerbate

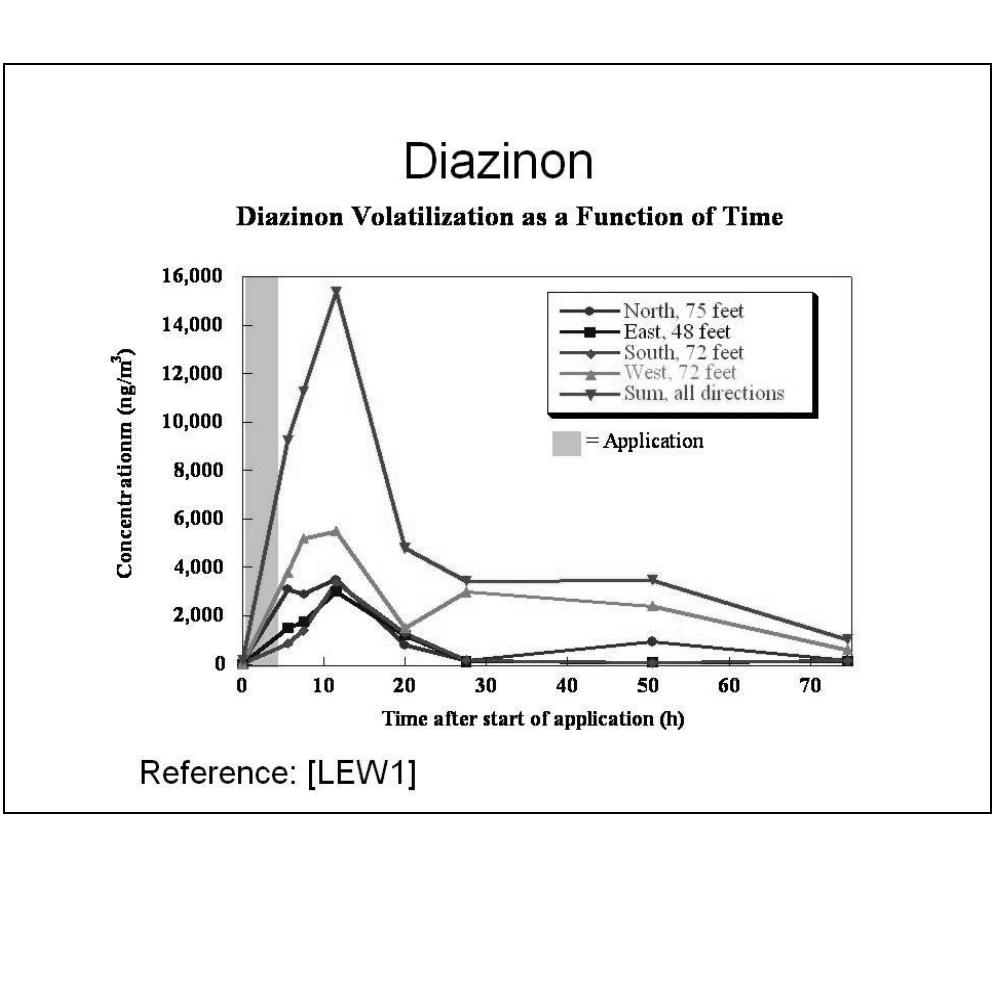
## Monitoring

- California Department of Pesticide Regulation (DPR) and Air Resources Board (ARB)
  - Toxic Air Contaminant (TAC) Program
- Pesticide Action Network North America (PANNA) Drift Catcher Projects
  - Community Exposure Monitoring

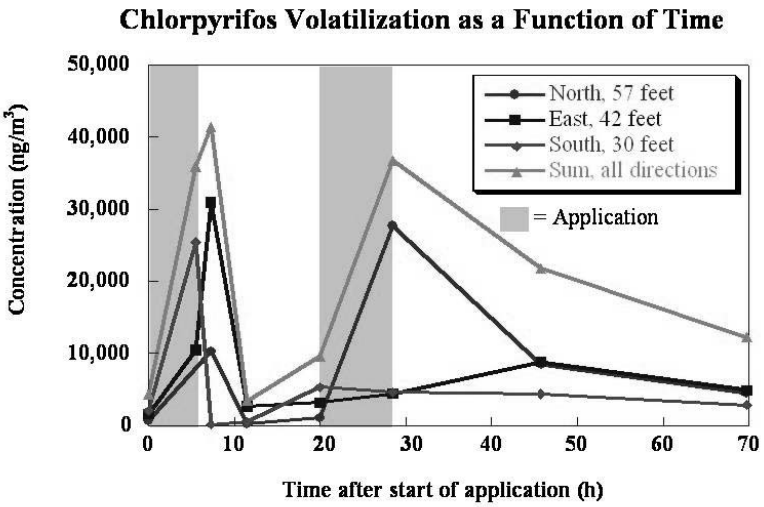
## Air Monitoring by ARB and DPR

- ~900 Registered Active Ingredients in CA
- Air Monitoring Data for ~50 Pesticides
- Application Site and Ambient Monitoring
- See References [DPRTAC], [LEW1], [LEW2]


Monitoring Geometry
~75 ft
Prevailing winds
40-acre field
X = Monitoring station

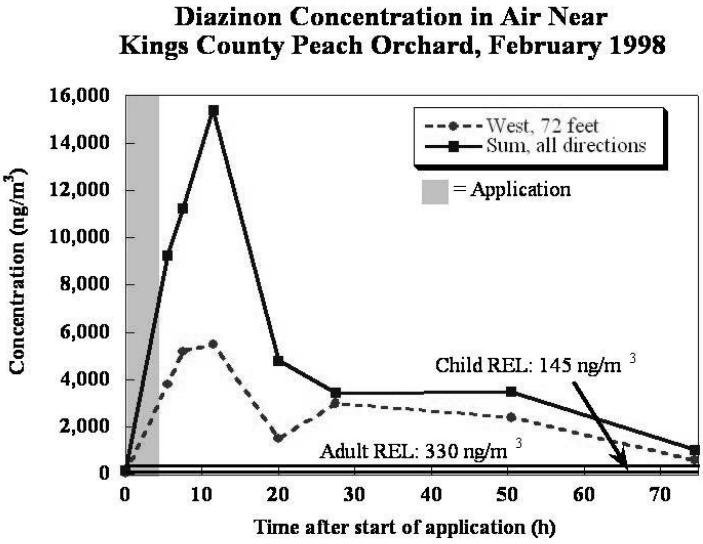

Diazinon
Diazinon Volatilization as a Function of Time
Concentrationm (ng/m3)
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
0
10
20
30
40
50
60
70
Time after start of application (h)
North, 75 feet
East, 48 feet
South, 72 feet
West, 72 feet
Sum, all directions
= Application
Reference: [LEW1]

# Chlorpyrifos

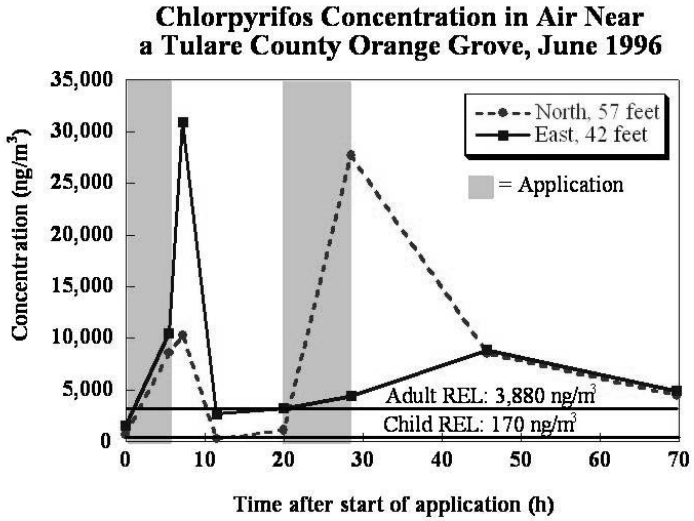



Reference: [LEW2]

# Diazinon Acute RELs Exceeded

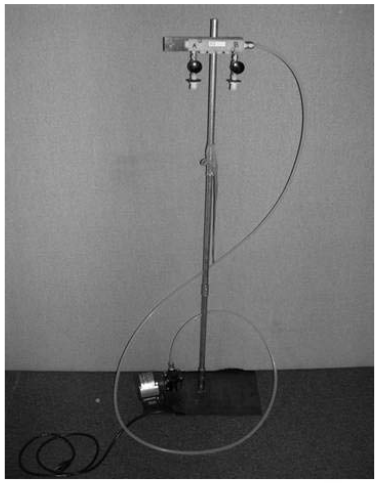


## Chlorpyrifos Acute RELs Exceeded

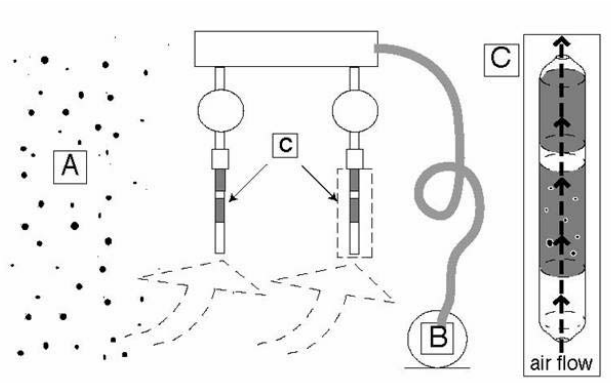



## Community Air Monitoring by PANNA and Partners

- Sampling in Six U.S. States
  - California
  - Florida
  - Minnesota
  - Oregon
  - Maine
  - Colorado
- Many Active Ingredients and Breakdown Products, including
  - Chlorpyrifos
  - Chlorothalonil
  - DDVP
- Monitoring At Homes, Schools, and other Occupied Places
- See Reference [PANNADC]



## Drift Catcher Schematic




**A. pesticide molecules** suspended in or part of the air

**B. electric air pump** draws pesticide-laden air through glass sampling tubes

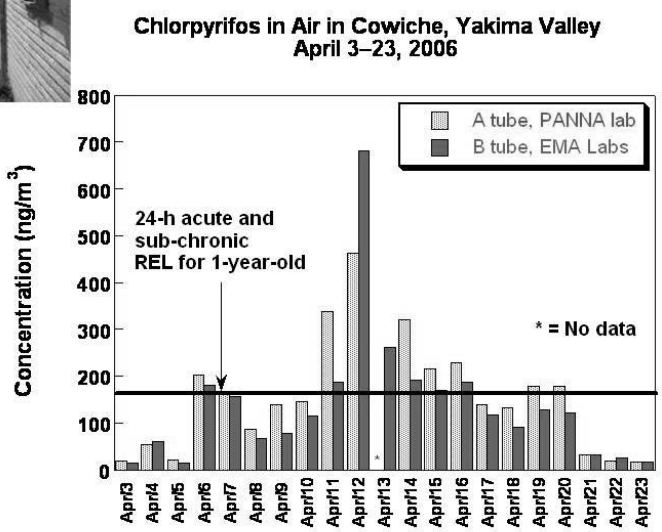
**C. glass sampling tubes** contain special resin that trap pesticides as air passes through them

## Protocols

- Training and Certification
- Log Sheet
- Chain of Custody
- Sorbent, Flow Rate, Sampling Period
- Trip Blank
- Spiked Samples

# Washington State - Yakima Valley

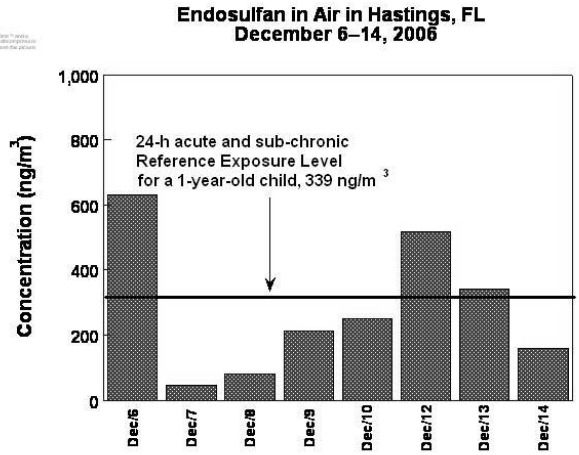
- **Application site:** Insecticide applications to apples and pears
- **Sampling time:** Spring, Summer 2006
- **Results:** Chlorpyrifos (spring), azinphos-methyl, endosulfan (summer)
- **Reference:** [KEGLEY]



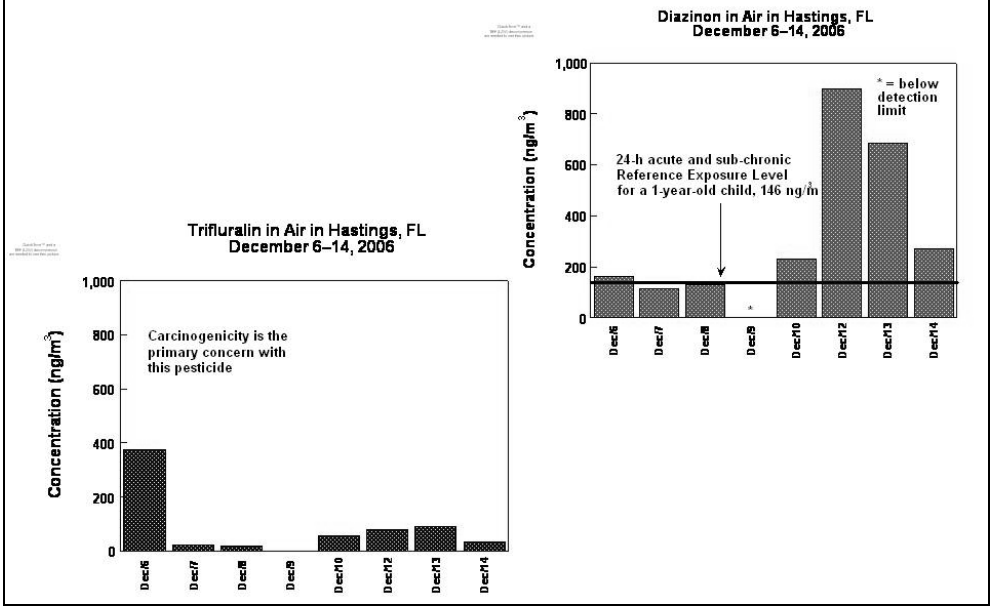
# Florida State - Hastings


# Florida State - Hastings

- **Application site:** Chinese cabbage field across from elementary school.
- **Pesticides:** Thought OPs based on CA PUR data, actually endosulfan and Diazinon (asked grower).
- **Sampling time:** 8 days in December.
- **Results:** Endosulfan, diazinon, and trifluralin found, usually on the same day.



# Florida State - Hastings




# Fumigant Modeling

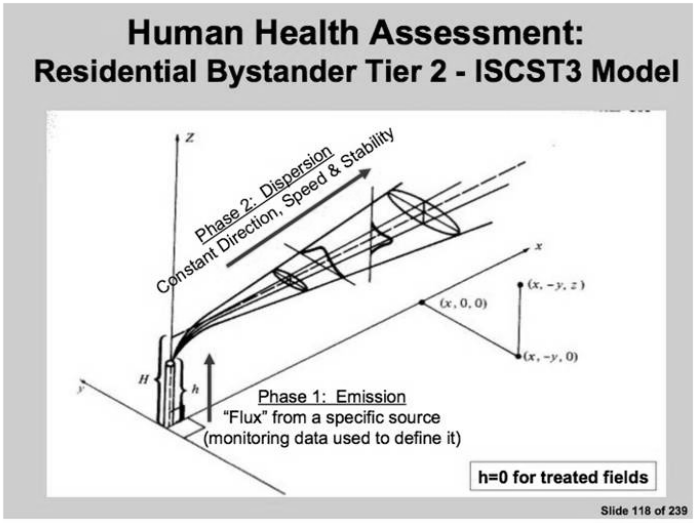
- "Fumigant Cluster Assessment"
  - High Application Rate
  - High Toxicity
  - High Volatility
  - Numerous Drift Incidents

  ==> Urgent Need for Mitigation

  ==> Transition to Safer Alternatives
- Modeling
  - Workhorse Plume Model, "Industrial Complex Source," ISCST3, http://www.epa.gov/scram001/dispersion_alt.htm
  - Monte Carlo Extension "Probabilistic Exposure and Risk Model for Fumigants," (PERFUM) http://www.epa.gov/scipoly/sap/tools/atozindex/perfum.htm

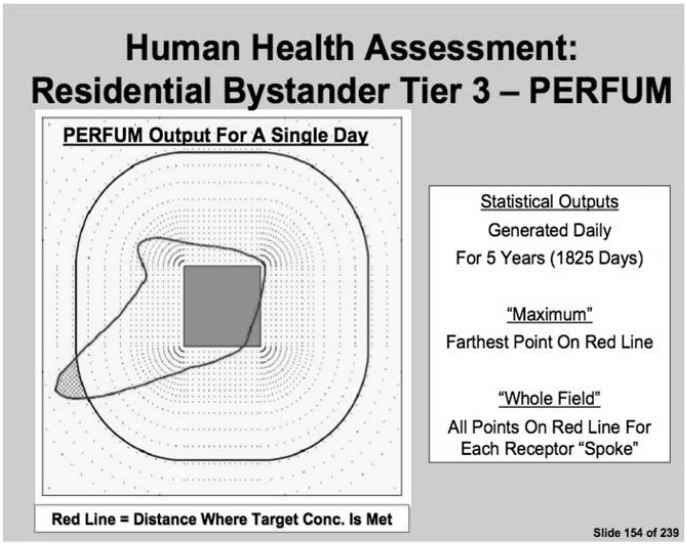
Reference: [EPAFCA]

## Fumigant Modeling, "Tier 2"




Reference: [EPASOILFUM]

## Fumigant Modeling, "Tier 3"




Reference: [EPASOILFUM]

## Modeling Results

- Buffer Zones are Necessary to Protect Bystanders from Fumigant Drift
- Buffer Zones Depend (Principally) on
  - Toxicity of Product Applied
  - Application Rate
  - Area Treated
  - Method of Application
- Buffer Zone Tables
- "Percentiles of Exposure"
- Qualitatively Relevant for Non-Fumigants

Reference: [EPAFCA]

## Fumigant Mitigation Options

- Buffer Zones
- Timing of Applications To Avoid Stable Atmospheric Conditions
- Application Area Size Limits
- Reporting
- Notification
- Posting

Reference: [EPAFCA]

## Selected Mitigation Benefits

- Reporting
  - Critical to Understanding, Analysis
  - Examples: Integrated Pest Management (IPM), Clean Air Act Implementation and Control of Volatile Organic Compounds (VOCs), Retrospective Health Impact Analysis, Proximity to Sensitive Sites
  - Implementation, see California's System, Reference: [DPRPUR]
- Notification
  - Enforcement
  - Right-to-Know
  - Preparation, especially at Sensitive Sites
  - Emergency Response
  - Implementation Issues: "Publish and Subscribe"
- Posting
  - Demarcation and Avoidance of Buffer Zone
  - Right-to-Know
  - Emergency Response

## VOC Mitigations

- Clean Air Act and Ozone Standards
- Volatile Organic Compounds (VOCs)
- Mitigations
  - Long Term: Product Reformulation
  - Short Term: Focus on Fumigants
    - Application Methods
    - Application Rate
    - Limits on Treated Area
    - Shifting Away from Ozone "Season"

Reference: [DPRVOC]

# Conclusions

- Measurements and Modeling Demonstrate inadequacy of Current Mitigations
- People Living or Working Near Sprayed Fields are Substantially and Unknowingly Exposed
- Immediate Need for Much More Effective Controls and Warnings
- Long-Term Need for Reduction and Elimination of Intrinsically Hazardous Uses
- Consistent with Long-Standing Reports and Recommendations of Other Pesticide Action Network Members: [BUTLER-ELLIS], [CRAIG], [NEUMEISTER], [PEREZ], [PN77A], [PN77B], [SIMON], [WATTS].

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- [LEW2] Lew, G, "Final Report for the 1996 Chlorpyrifos in Tulare County," http://www.cdpr.ca.gov/docs/emon/pubs/tac/tacpdfs/chlrpfs.pdf.[PANNADC] PANNA Drift Catcher http://www.panna.org/drift/catcher and Drift Catcher Results http://www.panna.org/drift/catcher/results.
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# Acknowledgements (1/2)


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- European Environmental Bureau, http://www.eeb.org/
- Pesticide Action Network Europe, http://www.pan-europe.info
- Pesticide Action Network UK, http://www.pan-uk.org/

# Acknowledgements (2/2)

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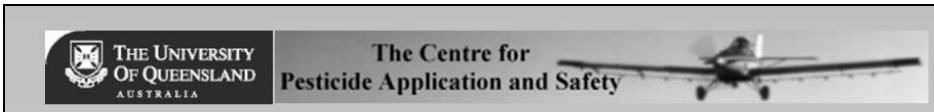
- Florida: Bill Hamilton, Jordan Whitmire & the Environmental Youth Council; Karen Ford, ReAnna Greene, Alex Lowe at Pedro Menendez HS
- Minnesota White Earth Reservation: Connie Minowa, Robert Shimek, John Shimek, Ron Chilton, Winona LaDuke & the White Earth Pesticide Action Network
- North Central Minnesota: Julie Jansen & Clean Water Action, and Minnesota Pesticide Awareness.

**Presentation 11**
**University of Queensland**
**Andrew Hewitt**




# Spray Drift Management

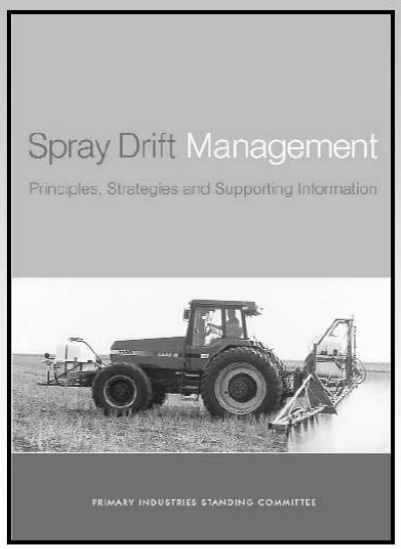
Dr Andrew Hewitt (Universities of Queensland and Lincoln)

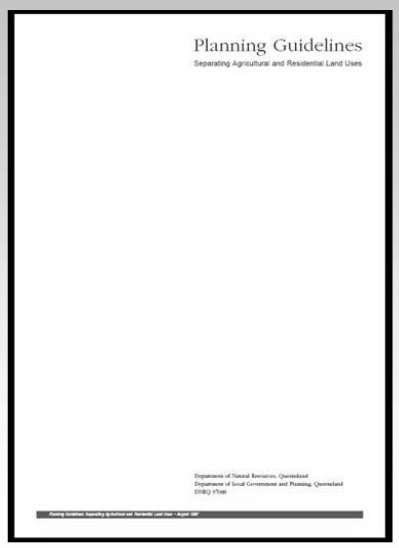
THE UNIVERSITY OF QUEENSLAND
C-PAS

## Summary

- Many countries have developed drift databases for specific aerial, ground and orchard application scenarios
- Most existing data cover "conventional" applications. Existing and emerging drift reduction technologies are being evaluated for effectiveness
- Models for various application scenarios and crops

# Australian Background Documents



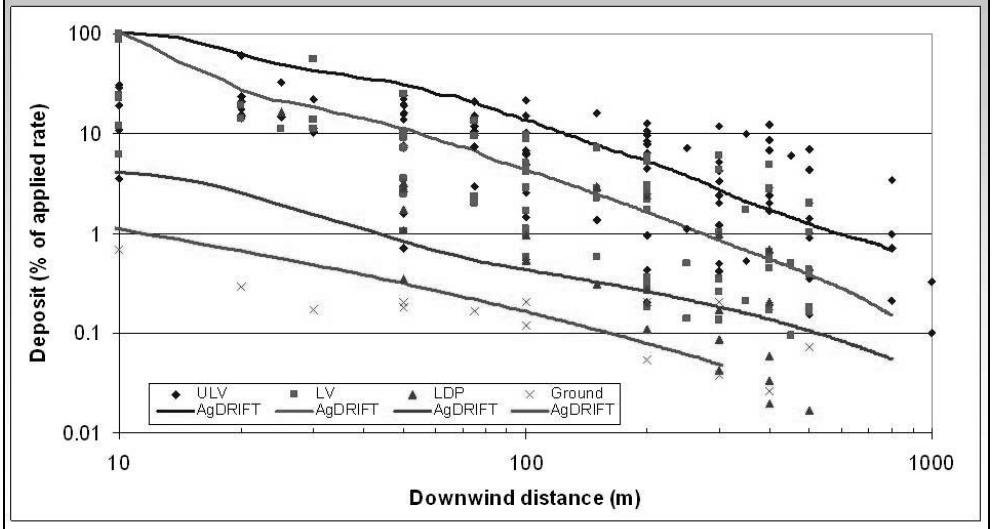




http://downloads.publish.csiro.au/books/download.cfm?ID=3452

# Major Available Databases on Drift

- U.S. Spray Drift Task Force – aerial, ground, tree crop, chemigation
- German BBA – ground and tree crops
- Canada AAFC/ PMRA – mostly ground
- Netherlands IMAG – ground and tree crop
- Others
- Summarised in "AgDBAIS" database developed by Hewitt and Wolf for CropLife America

## Summary of CPAS Australian Drift Studies Showing Reasonable fit to AgDRIFT Model




# Drift Reduction Technologies (DRTs)

- ISO standards cover testing procedures in wind tunnels (e.g. nozzles) and field (e.g. sprayers)
- Several nozzles evaluated in Europe and now encouraged as DRTs – e.g. many air induction nozzle designs
- Some data on ground and tree crop sprayer DRTs – e.g. air-assisted, shielded and shrouded systems

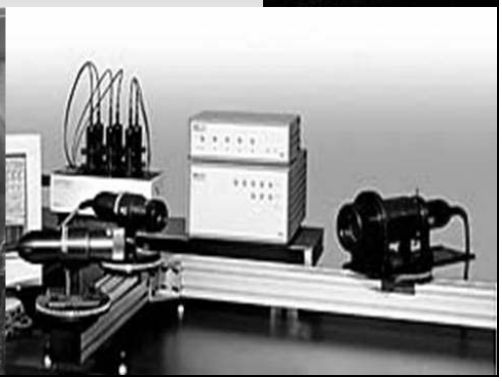
## Australian Testing of DRTs

- Air induction nozzles evaluated in wind tunnel at CPAS, e.g. for GRDC studies
- Drift exposure risk assessed through measurements of droplet size (smallest droplets usually have highest drift potential) and drift potential using international standards for measurements

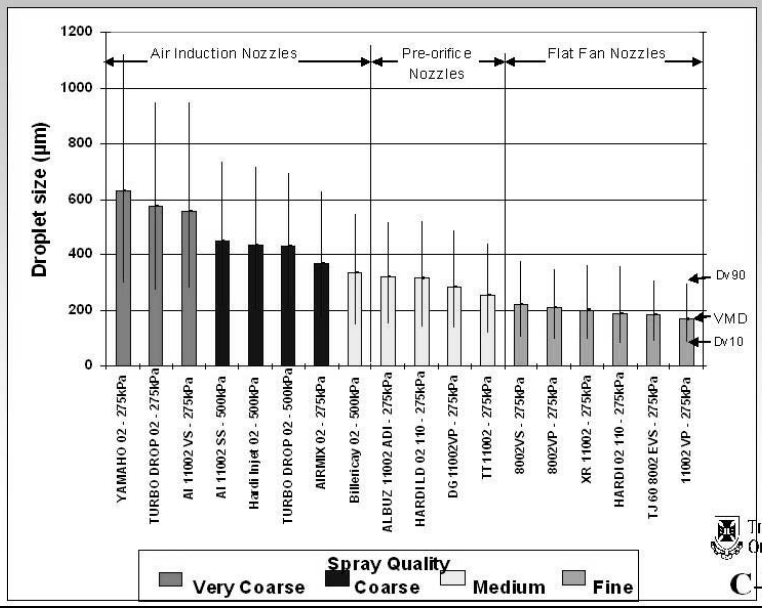
## Wind Tunnel at CPAS, Australia

# Droplet Size Measurement

- Three laser systems used at CPAS: Phase-Doppler, Laser Diffraction and Laser Imaging



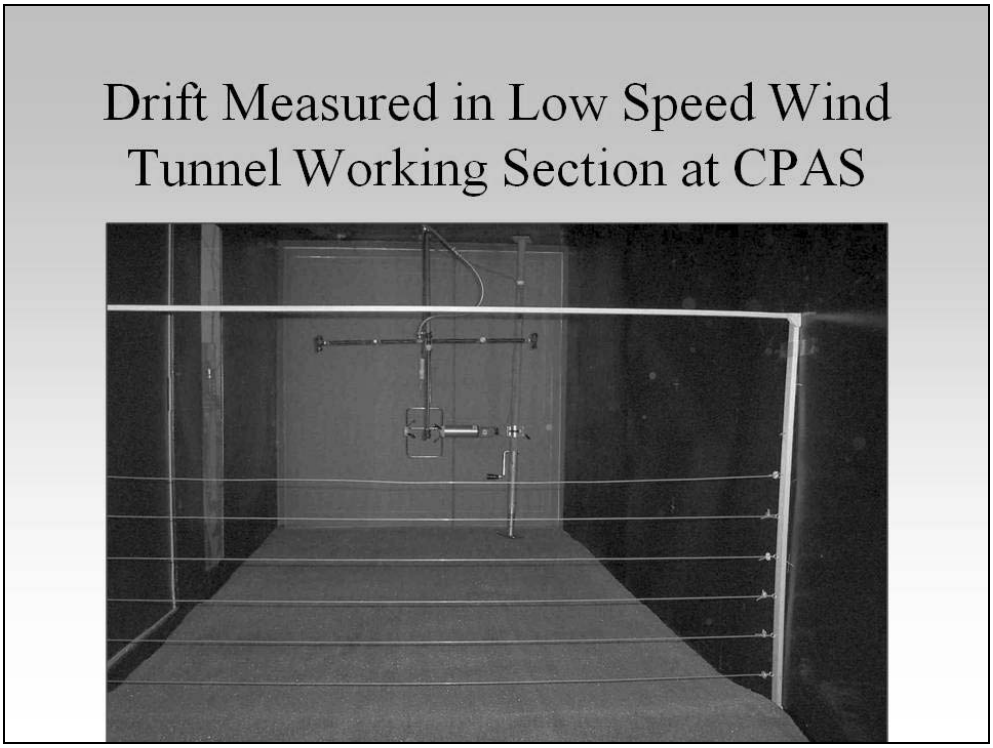
# Droplet Size for Nozzles Measured in Wind Tunnel at CPAS

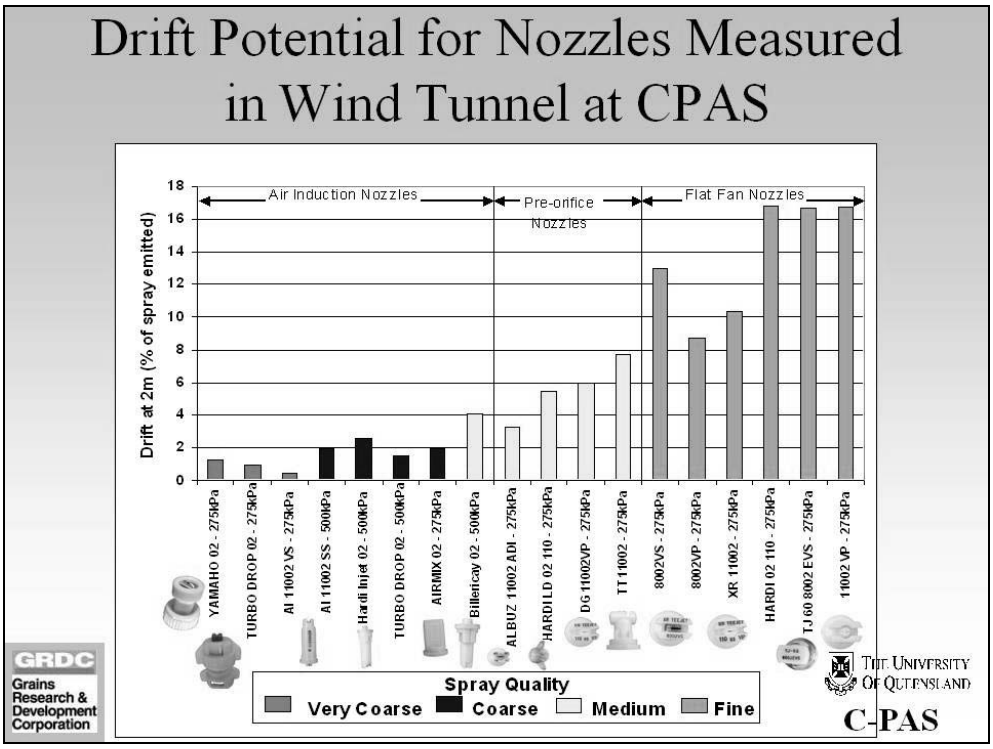



GRDC Grains Research & Development Corporation

The University Of Queensland

C-PAS

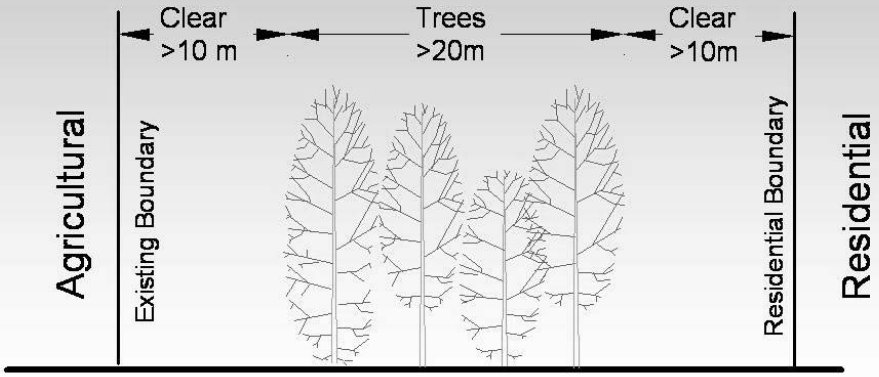

Drift Measured in Low Speed Wind Tunnel Working Section at CPAS


Drift Potential for Nozzles Measured in Wind Tunnel at CPAS
Drift at 2m (% of spray emitted)
0
2
4
6
8
10
12
14
16
18
Air Induction Nozzles
Pre-orifice Nozzles
Flat Fan Nozzles
YAMAHO 02 - 275kPa
TURBO DROP 02 - 275kPa
AI 11002 VS - 275kPa
AI 11002 SS - 500kPa
Hardi Inject 02 - 500kPa
TURBO DROP 02 - 500kPa
AIRMIX 02 - 275kPa
Billericay 02 - 500kPa
ALBUZ 11002 ADI - 275kPa
HARDI LD 02 110 - 275kPa
DG 11002VP - 275kPa
TT 11002 - 275kPa
8002VS - 275kPa
8002VP - 275kPa
XR 11002 - 275kPa
HARDI 02 110 - 275kPa
TJ 60 8002 EVS - 275kPa
11002 VP - 275kPa
Spray Quality
Very Coarse
Coarse
Medium
Fine
GRDC
Grains Research & Development Corporation
The University Of Queensland
C-PAS

## Droplet capture with vegetative barriers –

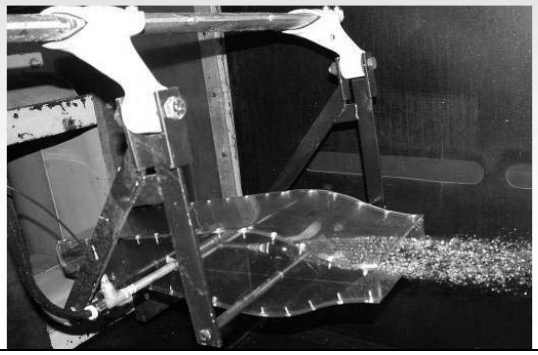
CPAS studies show 60-90% drift reduction. Included in state guidelines for developing barrier vegetation between urban and rural areas

## Queensland Guidelines separating agricultural and residential land uses



## Aerial DRTs: For Example Reverse Venturi Chamber

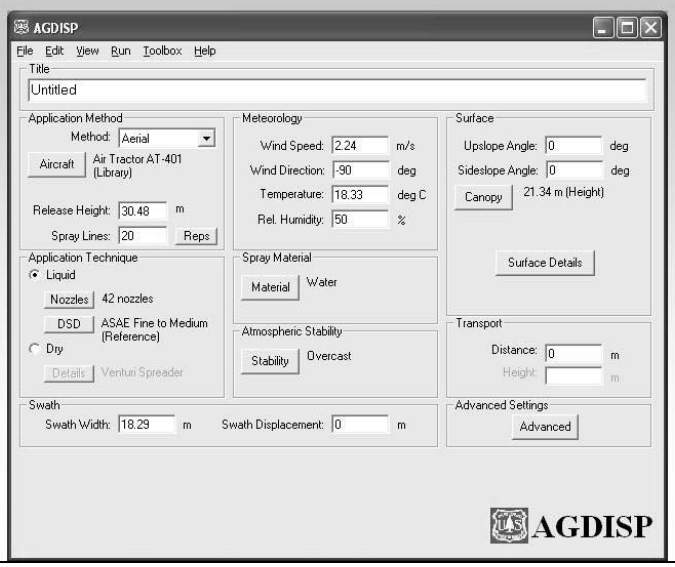
- Reduces effective air velocity to about half the actual aircraft speed, allowing coarser sprays at higher flight speeds ~ 50-75% drift reduction



## Modelling

- Modelling of spray drift exposure risk allows the effects of mitigation measures to be assessed – e.g. what effect does droplet size, release height or wind speed have on drift risk at a given distance
- Aerial modelling is fully predictive but most ground models are curve-fits to field data so only allow limited range of conditions to be evaluated
- We need more ground and (especially) tree crop models

# AgDRIFT and AGDISP Models Include Some Australian Data and Uses




# Adjuvants

- Adjuvants may also help increase the proportion of the spray tank mix that is contained in non-volatiles which can reduce overall evaporation and thereby reduce far-field drift risk
- AGDISP model predictions of such effects validated in field studies conducted by CPAS and USDA

# Conclusions

- Australia and New Zealand have developed extensive data on spray drift from aerial and ground application systems for agriculture and forestry, including nozzle, sprayer and adjuvant effects on drift
- Drift reduction technology schemes are being developed in many countries including Australia
- Spray drift modelling research continues in Australia and New Zealand