

Institute of Horticulture
Skierniewice - POLAND

Spraying technique as a tool of sustainable use of plant protection products

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**Polish presidency of the European Union
SUSTAINABLE USE OF PESTICIDES AND INTEGRATED PEST
MANAGEMENT IN EAST-CENTRAL EUROPE AND THE BALTICS
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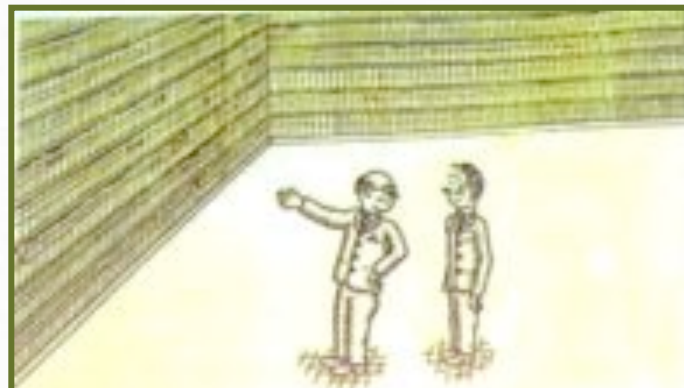
Spraying technique as a tool ...

- **Spraying technique - EU Directives**
- **Trainings**
- **Inspection of sprayers in use**
- **Calibration**
- **Buffer zones**
- **SDRT (Spray Drift Reducing Techniques)**

with reference to the situation in Poland

EU Directives – spray application

- **Waste Framework Directive** (75/442/EEC)
- **Water Framework Directive** (2000/60/WE)
- **Machinery Directive** (2006/42/WE)
- **Sustainable use of PPP** (2009/128/WE)



Didn't know You know how to read dont you !!!!

DIRECTIVES

- **Waste** (75/442/EEC)
- **Water** (2000/60/WE)

Application - contamination

■ Point sources

- On the farm (portioning PPP, cleaning)
- Storing waste



■ Diffuse sources

- Spray drift
- Runoff from fields



Waste Framework Directive

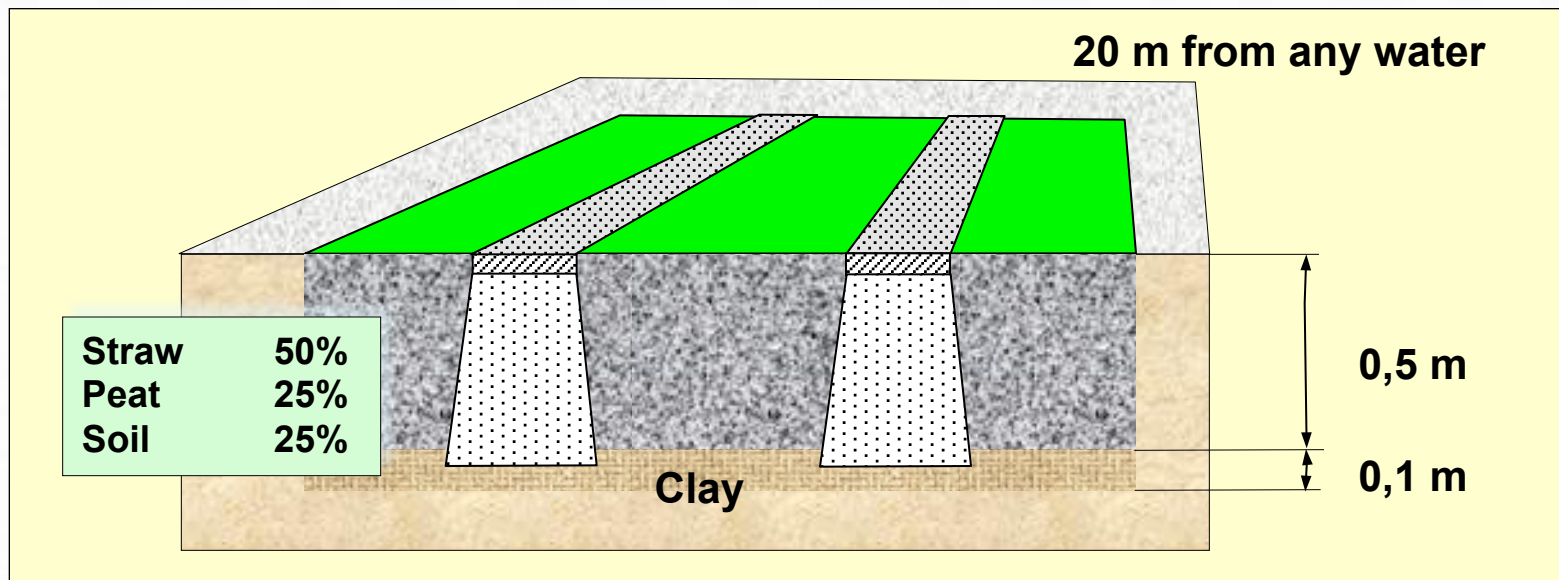
- **Mandatory collection of empty containers**
 - In Germany (82 % of packaging)
 - In Poland (65% of packaging)



- **Portioning and filling of sprayers**
 - Avoid point sources (no leakage, induction hopper)
- **Remnants of spray liquid**
 - Dilute and spray on a previously treated field
 - **Sprayers** (internal cleaning installation, minimizing dead volume)

Bioremediation

- **Biobed** (Bioremediation system)
 - Filling
 - External cleaning
 - Storing



DIRECTIVE

- Machinery (2006/42/WE)

Machinery Directive (2006/42/WE)

■ New Plant Protection Equipment

- EC declaration of conformity
- CE marking



■ Safety

- Operator
- Environment

■ Sprayer design

- Easy and safe filling and cleaning
- Accurate adjustment of the volume rate
- Even distribution
- **Instructions handbook** (working parameters, changing parts, etc.)
- **Others** (e.g. identification of spare parts)



DIRECTIVE

- Sustainable use of PPP

(2009/128/WE)

Directive on sustainable use ...

- **CHAPTER II**

Trainings, sales of pesticides, information, ...

- **CHAPTER III**

Pesticide application equipment

- **CHAPTER IV**

Specific practices and uses



Chapter II

TRAININGS

Trainings, ... (Chapter III)

■ For whom ?

- Access to training: professional users, advisers, distributors
- Trainings for non-professional users

Professional users shall conduct regular calibrations and technical checks of the pesticide application equipment in accordance with the appropriate training (Article 5)

■ Organization

- Initial
- Additional training (refreshing courses)

■ Program (Annex 1)

- Preparing equipment to work + calibration,
- Use of equipment
- Drift reducing techniques
- Technical check of sprayers
- Emergency action (eg. accidental spillage)

Training in Poland

- **Organizing the new type of courses**

- Advisers
- Non-professional users (informing of operators)

- **Updating the program of courses**

- **Not sufficient number of the trainers**

- 2 000 000 farms, 330 000 sprayers
- 300 courses/year

- **Training materials are ready to use**

- **TOPPS Project – EU LIFE Environment (2006 ÷ 2010)**


(Training the Operators to prevent Pollution from Point Sources),
Best Management Practice for the safe use of Plant Protection Products

- **TOPPS - PROWADIS 2011 ÷ 2014** (financed by ECPA)



**We are able to organize the courses for the trainers
from other New Members countries**





Chapter III
PESTICIDE
APPLICATION
EQUIPMENT

Application equipment

ARTICLE 8 - Inspection of equipment in use

- **Equipment in professional use**
 - **Interval** (5 years until 2020; 3 years thereafter)
 - **New equipment - once within five years**
- **Mandatory inspection**
 - **Widening** (under cover, seed treatment, railway sprayers)
 - **Requirements** (listed in Annex II)
 - **EU harmonization of certificates**
- **Possible derogation, other inspection intervals**
- **Obligatory calibrations & technical check**
(made by operators)

Inspection of sprayers



■ Mandatory inspection

- Spray boom > 3m (field crop)
- Spray boom mounted on sowing equipment
- Railway sprayers, aerial application

■ Derogation, other inspection intervals

- Very low scale of use
- Risk analysis for human health and environment
- Shall be listed in the National Action Plan



Pesticides application equipment in professional use can not be derogated from inspection at regular intervals

■ Handheld equipment (informing of operators)

- Replacing of worn elements
- Risk linked to that equipment
- Proper use of application equipment

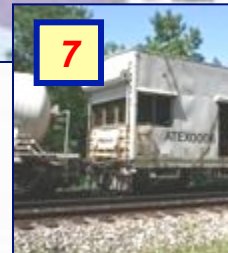
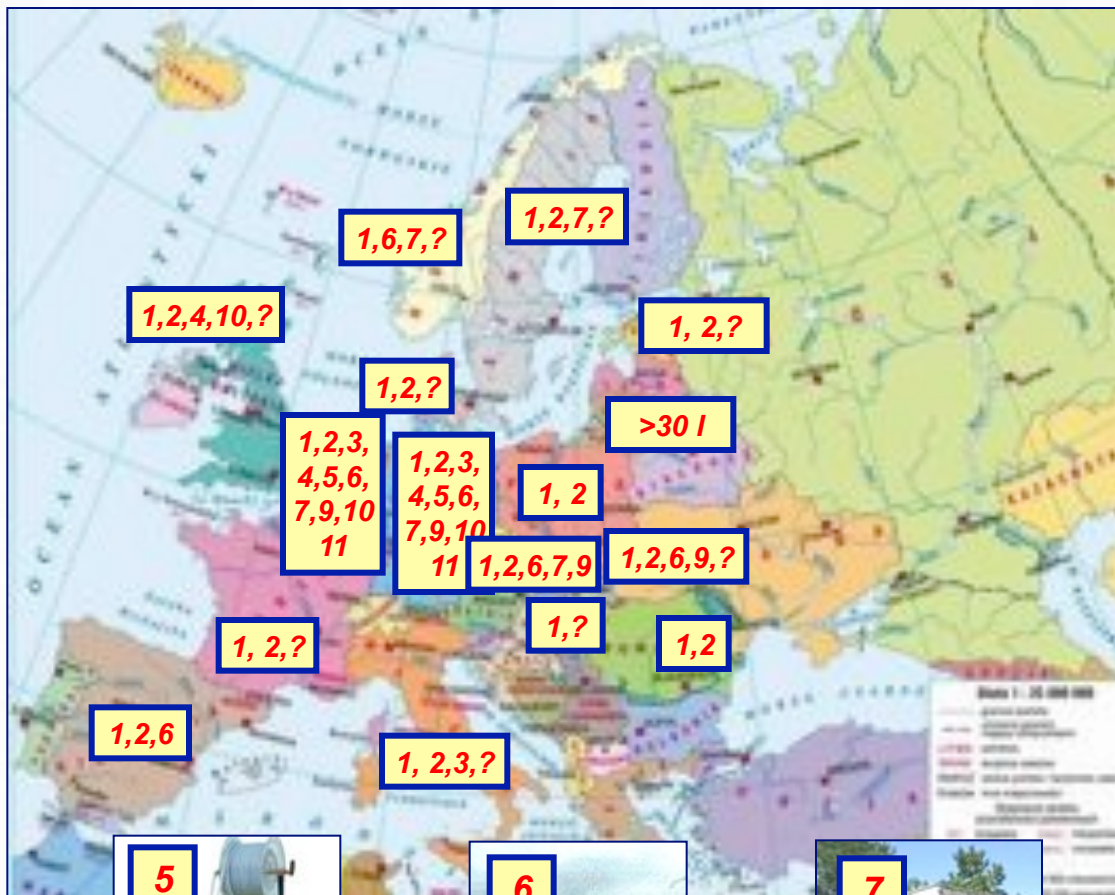
- Training

- Training

- Training

Inspection of sprayers

- Type of machine for PPP application



Inspection of sprayers

Can not be consider as „low scale”

Different inspection intervals

Field crop > 3m



Railway



Aerial



Used in „small scale”

Other than sprayers



Can be derogated

Handheld



Knapsack



Requirements (Annex II)

- **Power transmission**
- **Pump, agitation, spray liquid tank**
- **Pipes and hoses**
- **Filtering**
- **Measuring system**
- **Spray boom** (orchard sprayers)
- **Blower** (field crop sprayers)
- **Nozzles**
- **Distribution**

In general it will be easy to control in testing unit and to reach required the technical status by the farmer

Inspection in Poland

■ Sprayers in use – interval 3 years

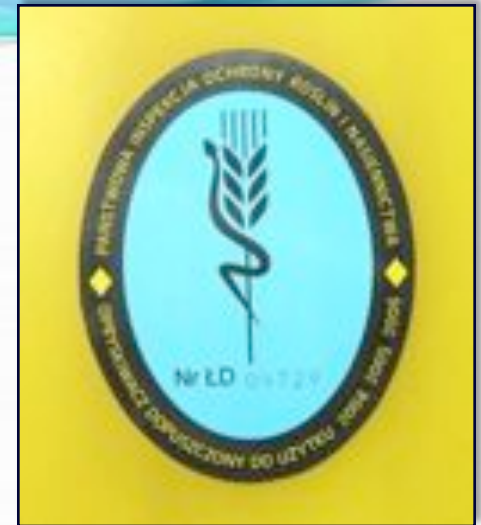
- Field crop sprayers - 300 000
- Orchard sprayers - 28 000

■ Organization

- Beginning of inspection - 1999
- Organized by State Plant Health and Seed Inspection Service
- Minor repairs during inspection are permitted

■ Results

- 359 officially approved testing units
- 65.000 sprayers/year



Inspection in Poland - plans

- **Increasing the scope of inspections**
 - Greenhouse equipment
 - Railway sprayers
 - Seed dressing machines
- **Harmonisation**
 - Uniform inspection based on EN 13790
- **Refreshing courses for personnel**
 - Every 5 years
- **Derogation of knapsack sprayers**
 - Risk assessment was performed



Calibration is mandatory

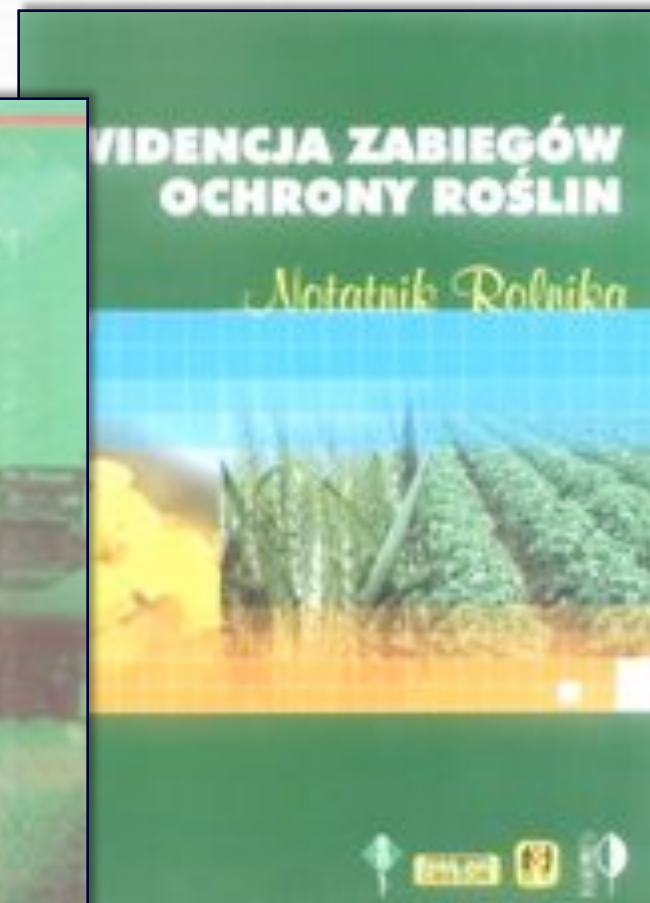
- **When ?** (4÷5 times/year)
 - Beginning of the season
 - At each specific treatment (conditions, spray dose)
- **Who ?**
 - Testing units (every 2÷3 year ???)
 - Mechanical workshop
 - Advisory service
 - Farmer himself
- **Why farmer ?**
 - Label
 - Growth/leaf stage
 - Dimension of plants
 - Wind velocity




Calibration should be the crucial part of training courses for operators of sprayers

Calibration is mandatory

- **Training materials** (are already made)
 - Farmers, fruit growers, advisors





Chapter IV

SPECIFIC PRACTICES AND USES

Specific practices



■ Aerial spraying

- Prohibition of aerial spraying
- With derogation possibility

■ Reduction use of PPP in specific areas

- Parks, gardens, recreation grounds, school grounds
- Vicinity of healthcare facilities
- Non-target areas

■ Handling of pesticides, remnants

- Reduction risks

■ Protecting aquatic environment and water

Aerial spraying



- **Aerial spraying is prohibited**
- **Derogation is possible**
- No alternatives
- Clear advantages in comparison with ground application
- **A lot of special requirements**
- Pesticides must be approved for aerial spraying
- Operator must hold a certificate
- The enterprise shall be certified
- The area shall not be in close proximity to residential areas
- The best available technology to reduce spray drift
- Approval of an application plan to the competent authority
- And others

Handling, storage, remnants

Professional users

- Storage, handling, dilution and mixing
- Handling of packaging and remnants
- Disposal remnants after application
- Cleaning of the equipment after application
- Disposal of pesticide packaging
- Preventing unwanted use of PPP (storage area)



Non-professional users (avoid dangerous handling operations)

- Pesticides of low toxicity
- Ready to use formulations
- Limits on sizes of containers or packaging

Aquatic environment, water

■ Preferences

- Pesticides not dangerous for the aquatic environment
- The most efficient application techniques
(SDRT equipment in vertical crops: hops, orchards, vineyards)

■ Minimize the risk of off-target pollution

- Spray drift
- Drain-flow
- Run-off

■ Establishing appropriately-sized buffer zones

■ Reducing or eliminating applications of PPP

- Along roads, railway lines
- Infrastructure close to surface water or groundwater

Spray drift

- **Examples**
 - Field crops
 - Vertical crops



APPROPRIATE BUFFER ZONES



APPROPRIATE BUFFER ZONES

Creating reduced or PPP-free zones can have a huge impact on the local farming sector. Additional requirements, should be adequately compensated. This compensation needs to be extended to cover extra labour, investment in equipment and possible income and crop loss. (Copa-Cogeca position)

Buffer zones

- **Specific areas**

- **Surface, ground water**
- **Drinking water** (water intake, wells)
- **Natura 2000**
- **Areas used by the general public** (parks, recreation areas, hospitals)



Buffer zones in Poland

■ Current situation - fixed width

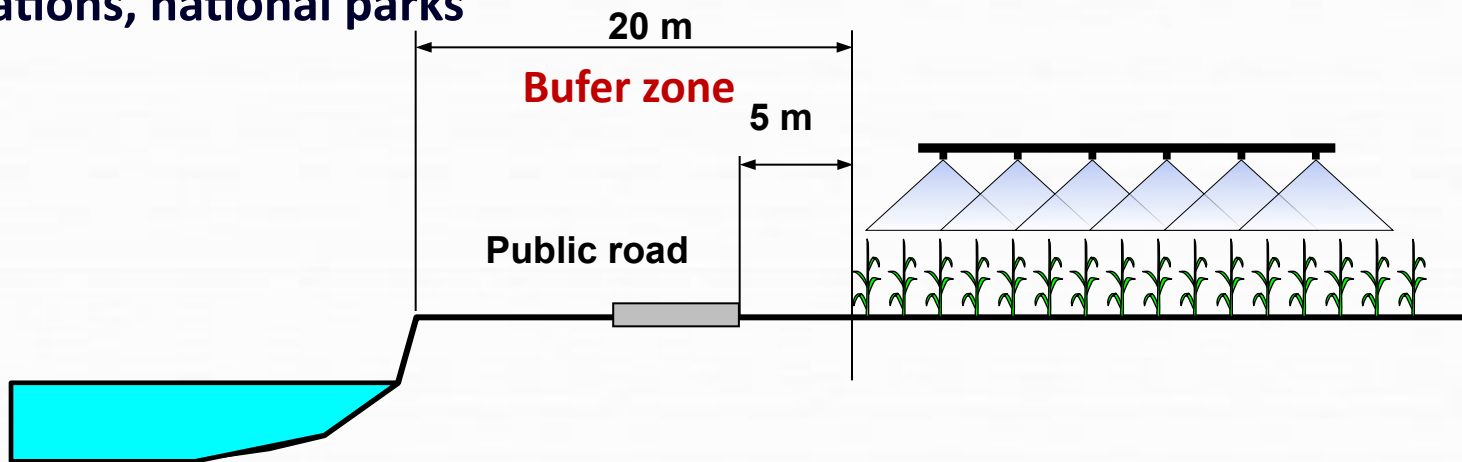
20 m

- Surface water
- Wells, water intake
- Plantations of herbal plants
- Apiaries
- Nature reservations, national parks

5 m

- Public roads

wind
max 3,0 m/s



Is the drift be the same for all spraying techniques?

Buffer zones – new approach

■ Main factors

- **Toxicity** (basic buffer zone width in the label)
- **Chemical dose** (e.g. 25, 50, 75% reduction)
- **SDRT** (Spray Drift Reducing Techniques)

■ Other factors

- **Whether conditions** (wind speed)
- **Temperature/air humidity**
- **Windbreaks** (trees, scrubs)
- **Tree density** (growth stage)

Sweden

Sweden

Holland, UK

Holland, Sweden

■ Watercourse

- **Width**
- **Dry ditch**

United Kingdom

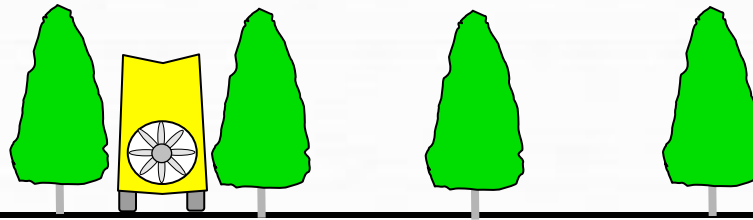
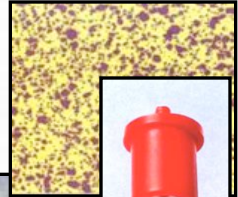
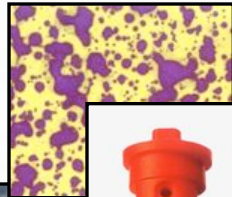
United Kingdom

How to harmonize the procedure of determining the buffer zones in EU ???

SDRT (Spray Drift Reduction Technology)

■ Vertical crops - nozzles

- Conventional
- Air-inclusion

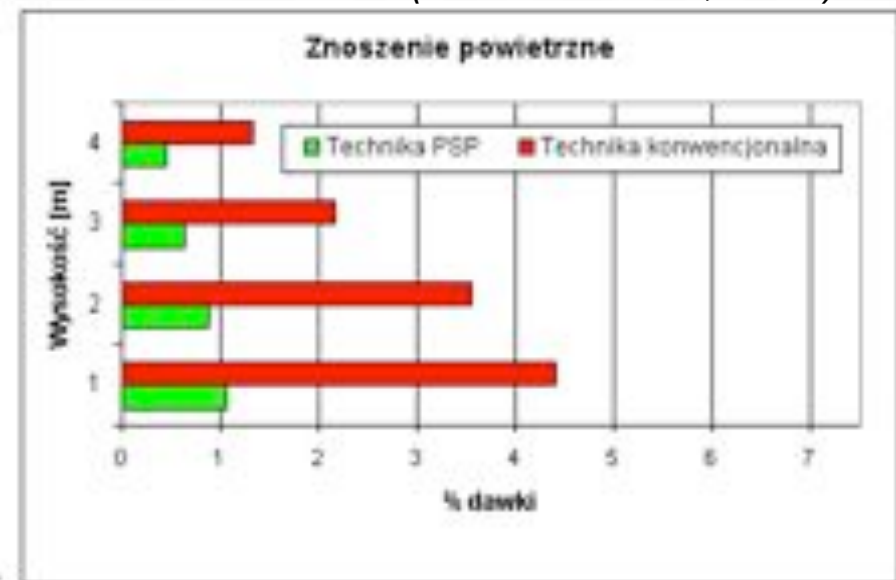
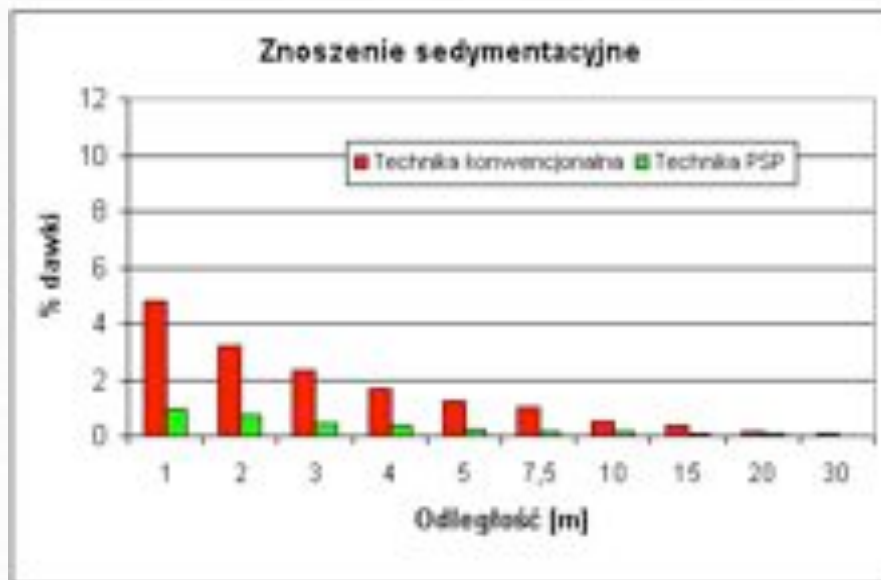


SDRT (Spray Drift Reduction Technology)

- Field crops – spray boom
 - Conventional
 - Air-assisted spray boom



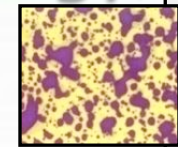
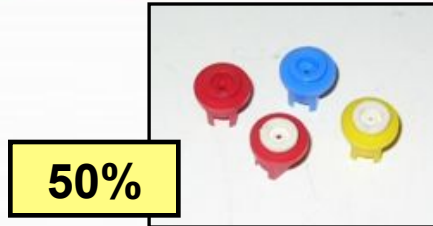
(Hołownicki i in., 2006)



SDRT (Spray Drift Reduction Technology)

■ Nozzles

- Low drift
- Air-inclusion



75%



■ Sprayers

- Field crop
 - Air-assisted spray boom
- Vertical crops
 - With deflectors
 - Sensor
 - Tunnel (spray recycling)



■ Parameters (e.g.)

- Conventional spray boom
- Low drift nozzles (drift reducing 50% class)
- Boom height 30 cm



90%

National SDRT list is necessary for local specific conditions and manufactures of sprayers



Procedure – field crops

- A. Dose reduction 50%, conventional spray boom, conventional nozzles
- B. Dose reduction 0%, air-assisted spray boom, low drift nozzles

Basic width
(label)

A
24 m

B
24 m



Pesticide dose
(farmer decision)

50%

100%

Dose reduction by:
25%, 50%, 75%



SDRT
(Spray Drift Reducing Techn.)

0%

90%

Drift reducing class
50%, 75%, 90%



Reading – table
(Spray records)



9 m



1 m

CONCLUSIONS

Conclusions

- **Growing interest to environmental aspects**
 - Important input to improve spray application technique
 - This will require the development of new parts for sprayers
- **Growing interest to application techniques**

(The main component of chemical plant protection)

 - **Sprayers** (intelligent sprayers, more efficient cleaning)
 - **Infrastructure** (storing of PPP, bioremediation system)
- **Chance for mitigation of environmental risks**
 - Trainings
 - Mandatory inspection
- **The biggest challenge**
 - Organizing the new type of courses
 - Implementing buffer zones scheme
 - Introducing obligatory inspection

**THANK YOU VERY MUCH
FOR YOUR ATTENTION**



Definitions

■ Spray drift

- ISO standard 22866:2005

The part of the applied product that leaves the treated field through the air because of air currents during the application of plant protection products

- **Data Base SDRT** (Spray Drift Reduction Technology), <http://www.sdrt.info>

Movement of airborne drops of spray solution, or vapours, from the intended area of application to non-target species

■ Buffer zone

- **Data Base SDRT** (Spray Drift Reduction Technology), <http://www.sdrt.info>

The area designed to provide some form of protection between the point of application and a non-target environment

Buffer zones – Poland, UE

- Current situation - fixed width

	UE	Poland*
Protected areas		
Surface water	YES	YES
The border of water intake zone	OK	20 m
Public roads	none	5 m
Apiaries	none	20 m
Plantations of herbal plants	none	20 m
Nature reservations, national parks	none	20 m
Buffer zone width		
Depending on the real risks	OK	None
Fixed, without taking into account the risks	none	???