

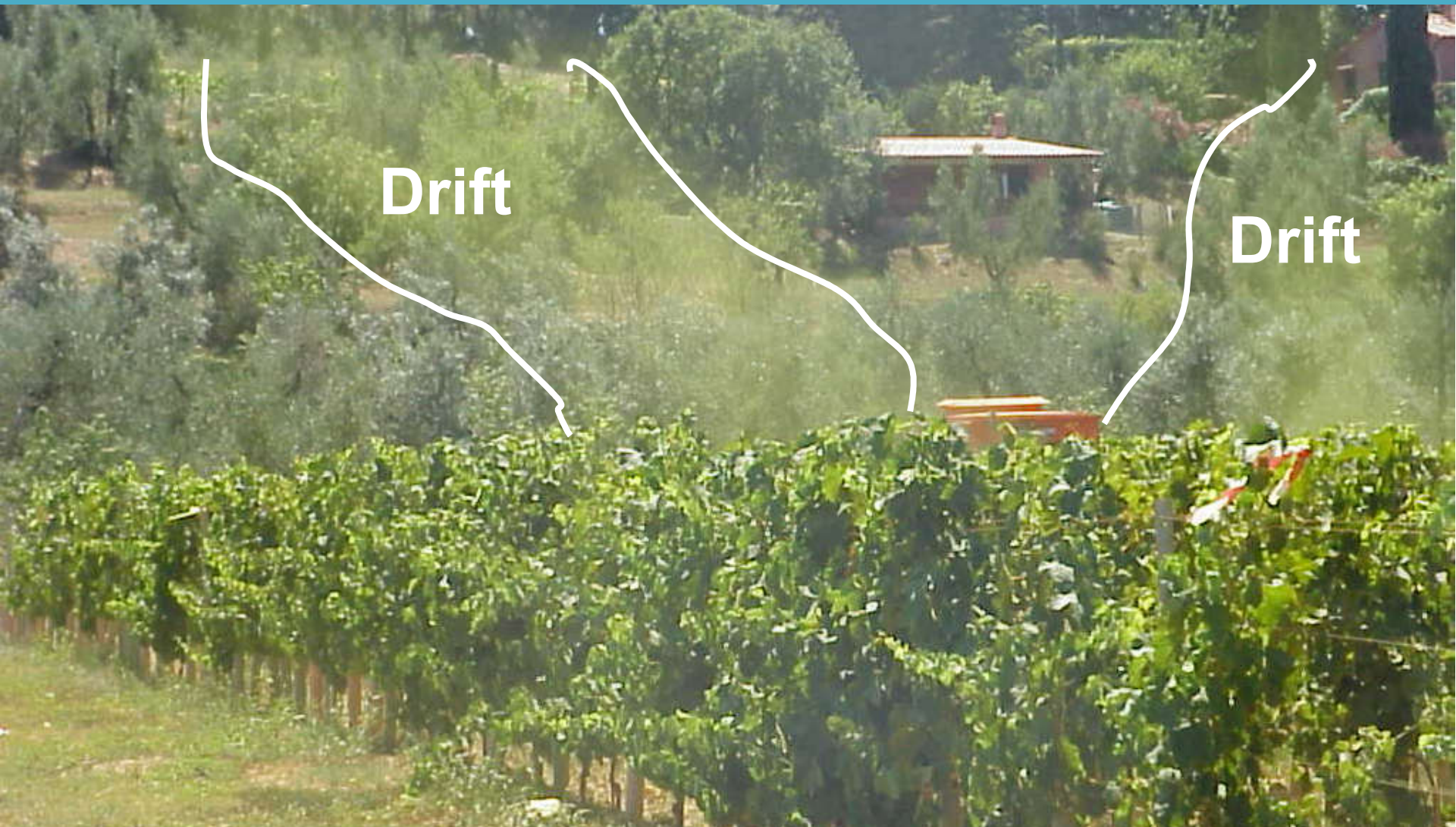
*Water practical solutions for sustainable productive agriculture:
Practical measures for EU policy goals*

Best Practices to manage spray drift issues (How to reduce emissions from spray drift)

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SPRAY DRIFT DEFINITION



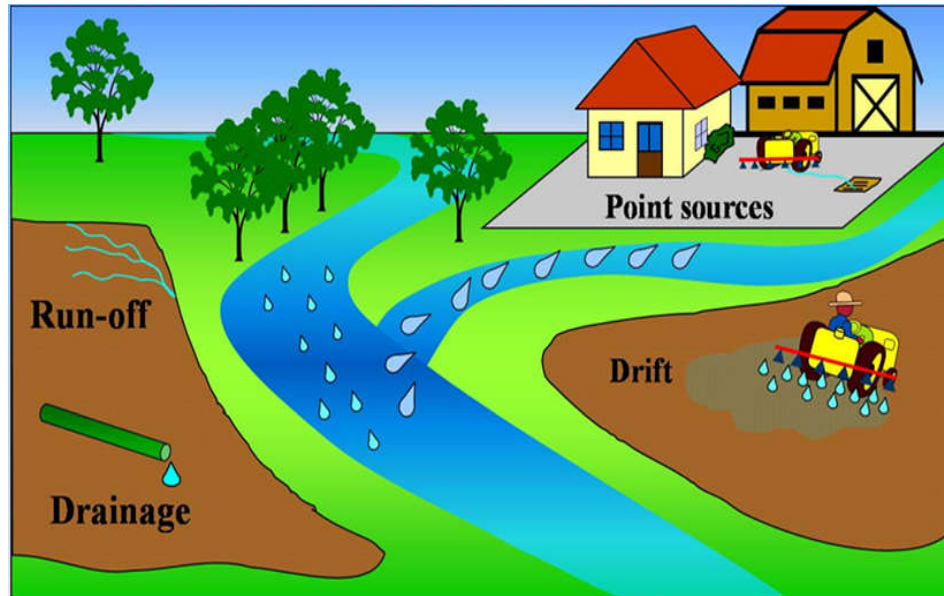
Drift

Drift

SPRAY DRIFT: *"Quantity of plant protection product that is carried out of the sprayed (treated) area by the action of air currents during the application process"* (ISO 22866)

THE «WEIGHT» OF DRIFT

In terms of potential water contamination



5 % Drift
35-40 %
Run-off

> 50%
Point
source

Spray drift is quantitatively among the less important entry routes to water, but the most visible



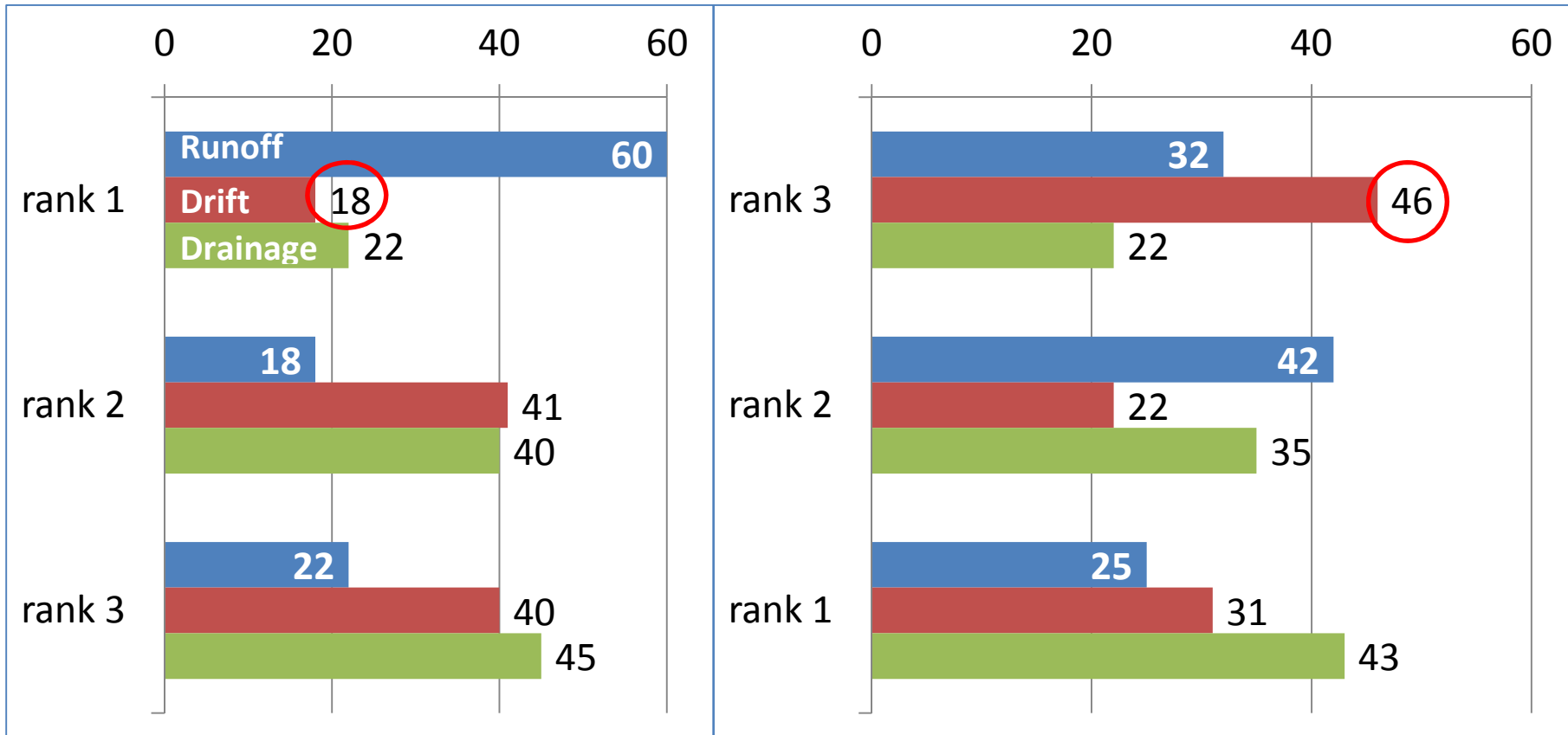
Perceived importance of diffuse sources

(Stakeholder survey 2016)

rank 1 = most important ... Rank 3 least important

DE (n=119)

IT (n= 63)



Big differences in drift perception between NORTH / SOUTH

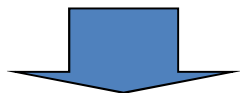
(Drift is visible: *more orchard, vine crops, tourist interactions in South*)

HOW TO REDUCE SPRAY DRIFT LOSSES

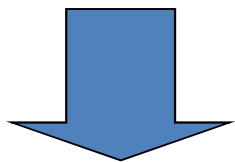
MEASURES TO PROTECT ENVIRONMENT FROM DRIFT

DIRECT

Reducing drift at source



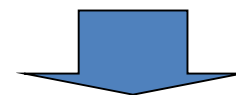
Use of Spray Drift Reduction
Technology (SDRT)



- Application equipment
- Adjustment of sprayers
- Application parameters
- Application scenario

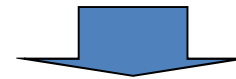
INDIRECT

Reducing exposure to drift



**No spray zones
Buffer zones**

Natural vegetative strips
Windbreaks, hail nets, etc.



- Fixed buffer zones
- Adjustable buffer zones
(depending on spray application
technology)

**Regulatory
activities**



KEY Factors influencing spray drift

indirect
influence

- Wind speed
- Wind direction
- Temperature
- Air humidity
- Proximity to water
- Proximity sensitive area

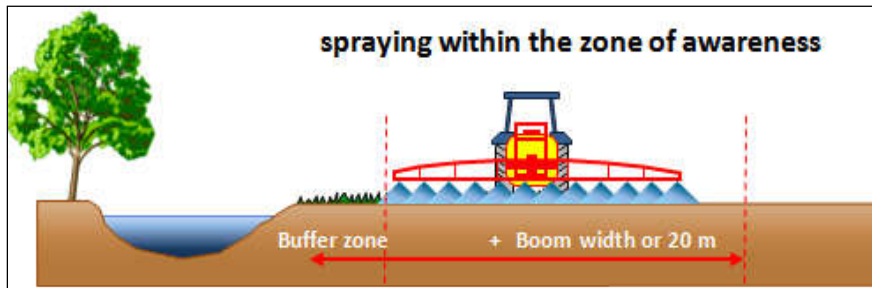
- Crop treated
- Adjacent vegetation
- Droplet size
- Application technique
- Adjustment of sprayers

direct influence



Be aware of the external conditions when spraying close to sensitive areas

Proximity to sensitive areas



Plan thoroughly your application if you need to spray in the zone of awareness

Respect distance regulations
Select optimal time of the day

Wind speed
Wind direction

Temperature
Air humidity

If possible post pone spraying when wind blows towards sensitive area and wind speed is > 3 to 5 m/s

Spray when temperature is < 25 degrees and air humidity is > 40 %

Key parameters to reduce the spray drift

Field applications

- Droplet size
- Distance to target
- Forward speed

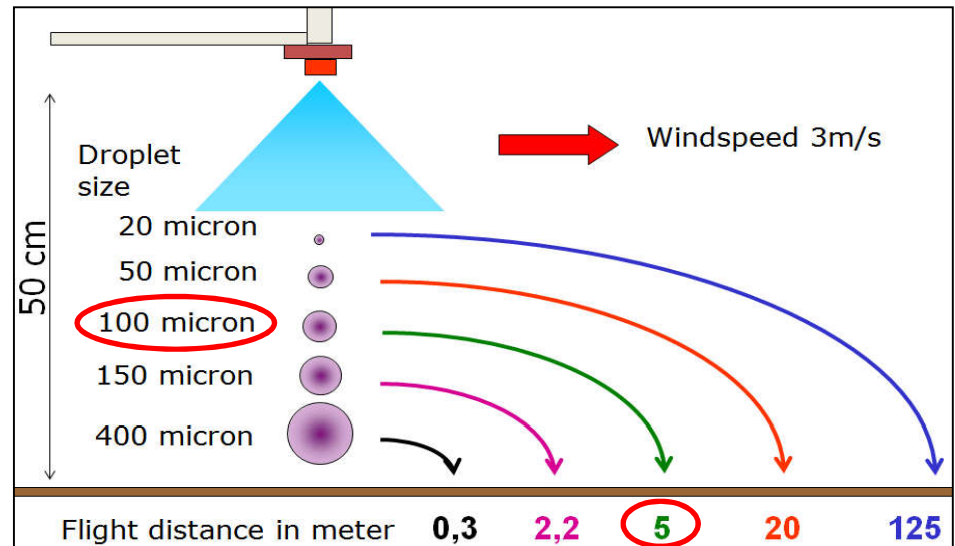
Orchard applications

- Droplet size
- Distance to target
- Air volume
- Air speed
- Air direction

All these parameters are important for the correct adjustment of the sprayer

Spray drift key factor: Droplet Size

- Droplets below 100 micron cause the main drift risk
- Small droplets are lost by wind, thermic turbulence and may evaporate at low air humidity
- Coarse droplet spectra have shown comparable biological activity



Avoid droplets < 100 micron

Modification of droplet spectrum is an efficient mitigation measure to reduce spray drift !

ANTIDRIFT NOZZLES – Droplet size

TurboDrop



ID 90-xx



AVI 80-xx



IDK 90-xx

CVI 80-xx



Advantage of Antidrift nozzles:

low fraction of fine droplets $\varnothing < 100 \mu\text{m}$ →

Reduces spray drift up to 95 % (classification 50%, 75%, 90%)

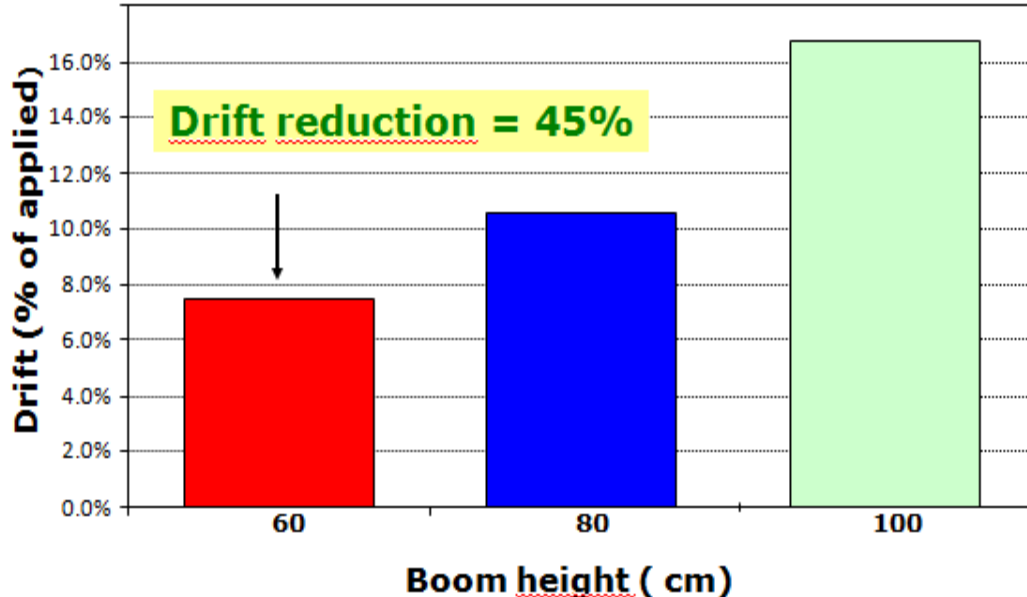
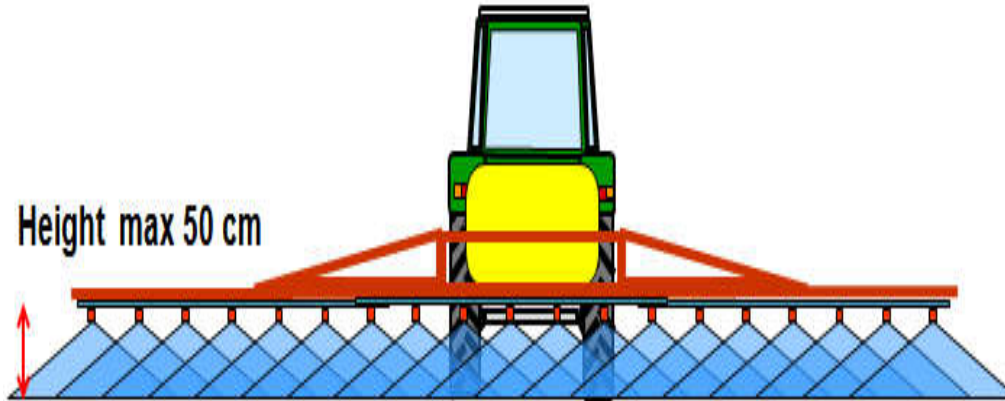
No disadvantages of Antidrift nozzles

- Large number of trials show comparable biological activity for most PPP
- Perceived disadvantage: not visible spray cloud

Adoption of low drift nozzles higher in field applications compared to bush & tree crops

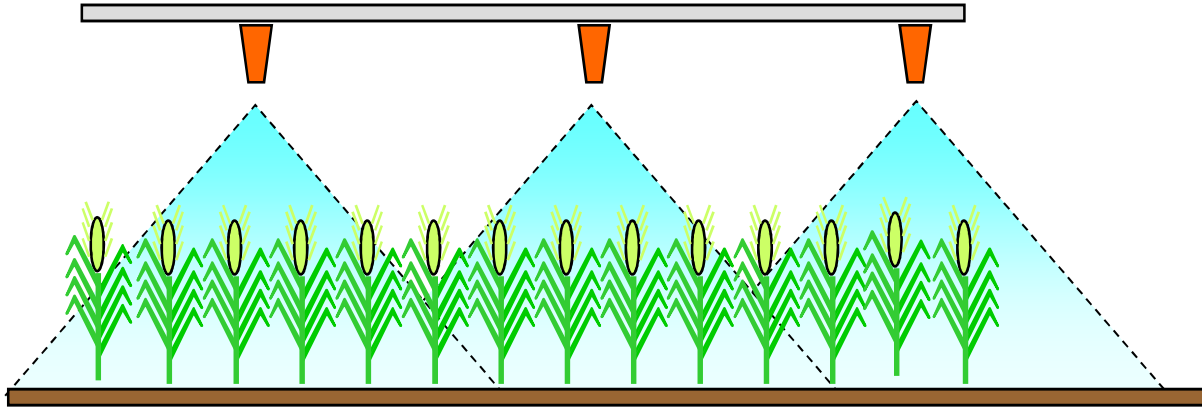
Big variations among regions / countries

BMP: Reduce distance to the target - Reduce boom Height

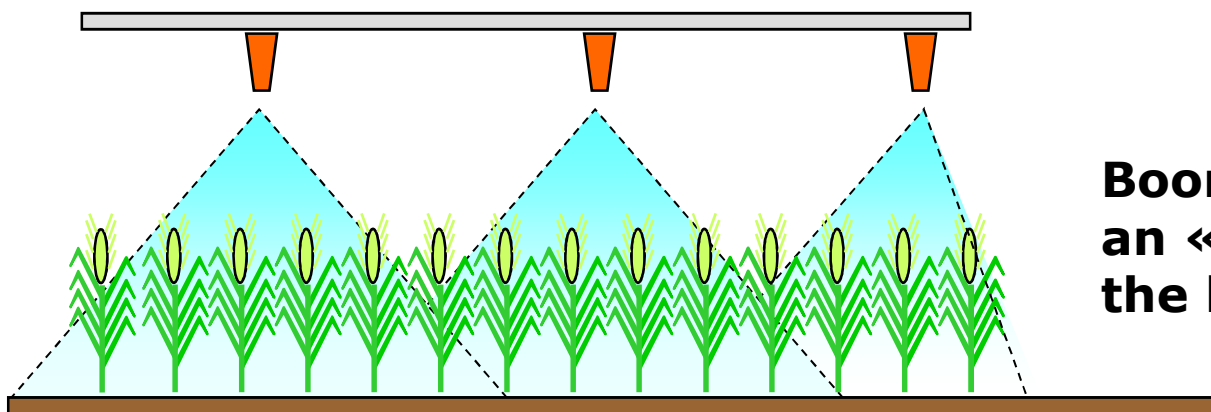


- the higher the boom the more influence of the wind to produce drift
- Boom stability for large booms important to keep boom height at 50 cm.

OTHER TYPES OF SDRT FOR FIELD SPRAYER: END BOOM NOZZLES



Traditional boom



Boom equipped with an «asymmetric jet» at the boom end

Drift reduction = 10-20%

BMP: Reduce forward speed in enviromental critical situation

In field applications spraying speed should be < 8 km / h along sensitive areas and when enviromental wind is present



The longer the spray stays out of the canopy the more wind can cause spray drift

OTHER TYPES OF SDRT FOR FIELD SPRAYER: Spray boom with air support

Drift reduction: 70 - 80%



**Boom sprayer
without air sleeve
activated**

**Boom sprayer with
air sleeve
activated**

SPRAY DRIFT KEY FACTORS IN ARBOREAL CROPS

- *Nozzles type / pressure
(droplet size)*
- *Nozzles open / orientation*
- *Air direction*
- *Air volume / speed*

Sprayer adjustment is a key for drift reduction

BMP: use nozzle technology to reduce small droplets

USE ANTIDRIFT NOZZLES

AVI 80-xx

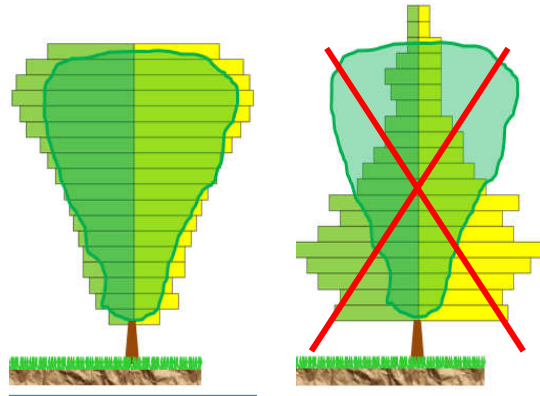
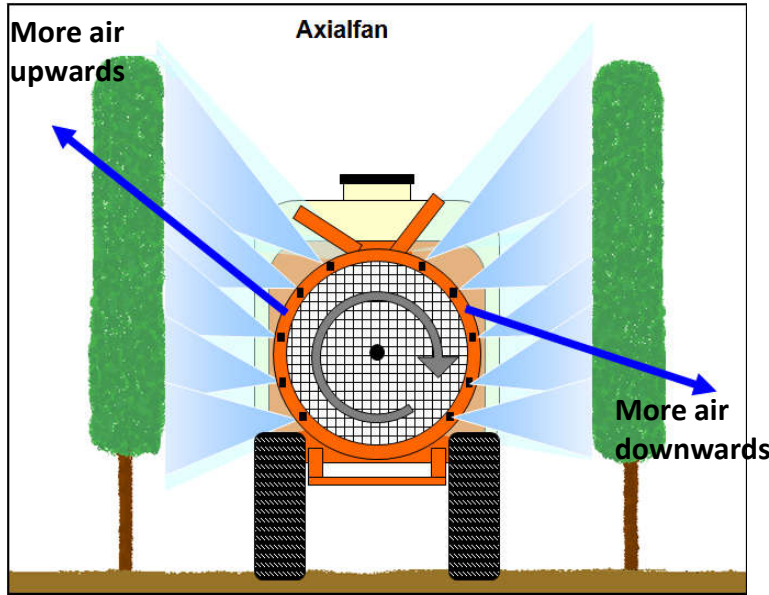


Air inclusion nozzle

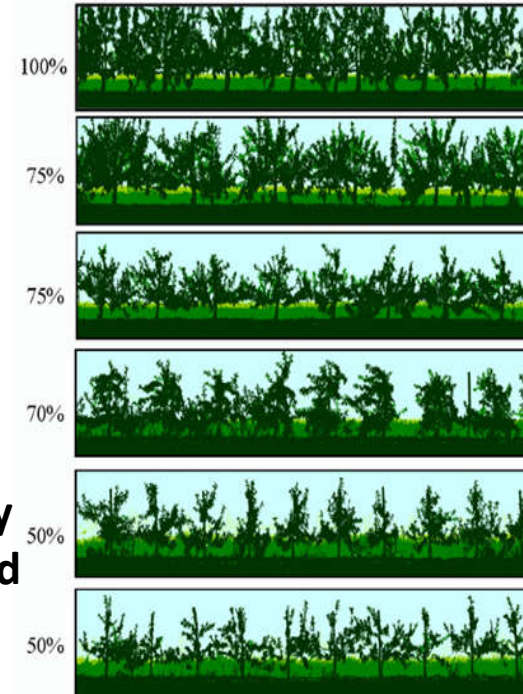
Standard hollow
cone nozzle

Key aspects in orchard/vine crops

Adjust air direction /speed and volume to the crop canopy characteristics



Nozzles with different spray output need to be arranged to fit the canopy



Adjustment through correct setting of deflectors Adjustment of axial fan sprayers is difficult

Several adjustments needed during the season as canopy develops

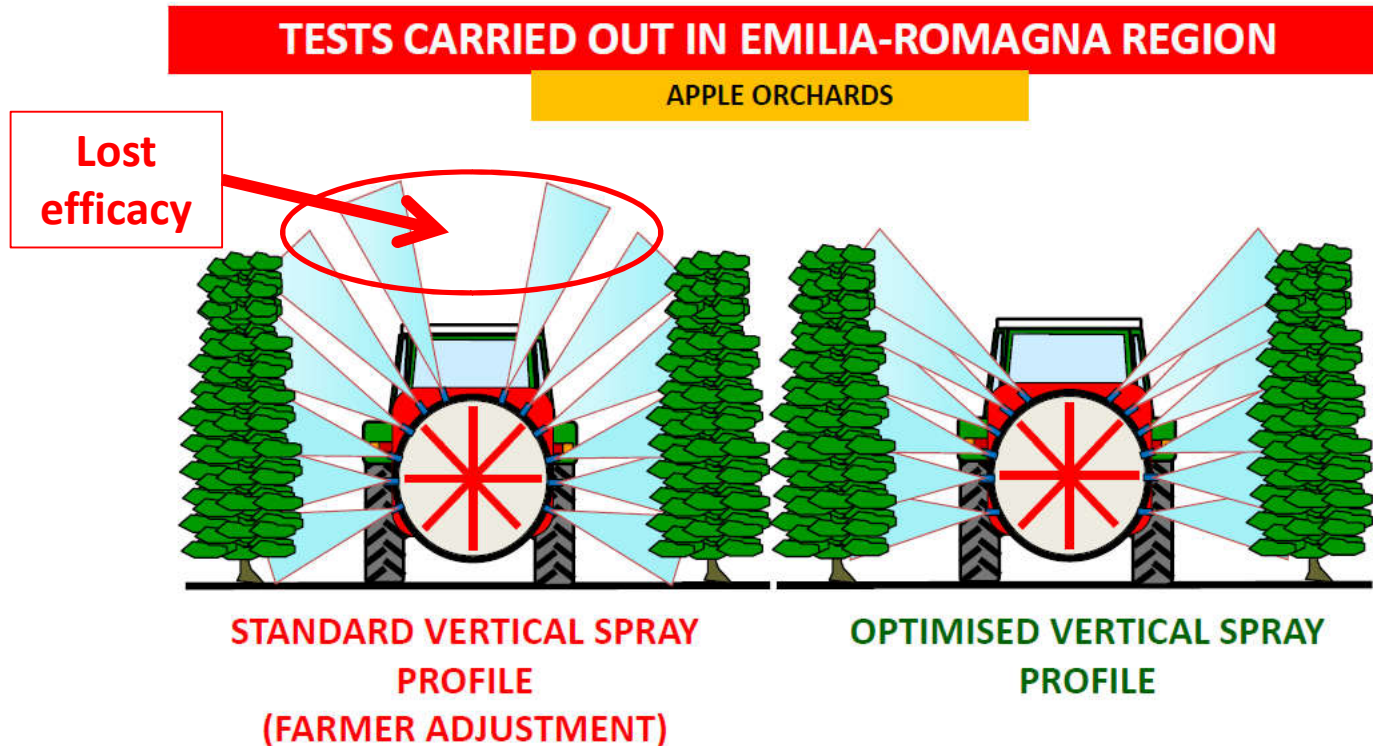
How to adjust air direction in practice



BMP: Adjust deflector position in order to address the air into the canopy

BMP : Adjust spray to the crop target

Adjustment to tree height - Correct number and direction of nozzles



2 Drift trials Italy: measured drift reduction 65 to 70 %

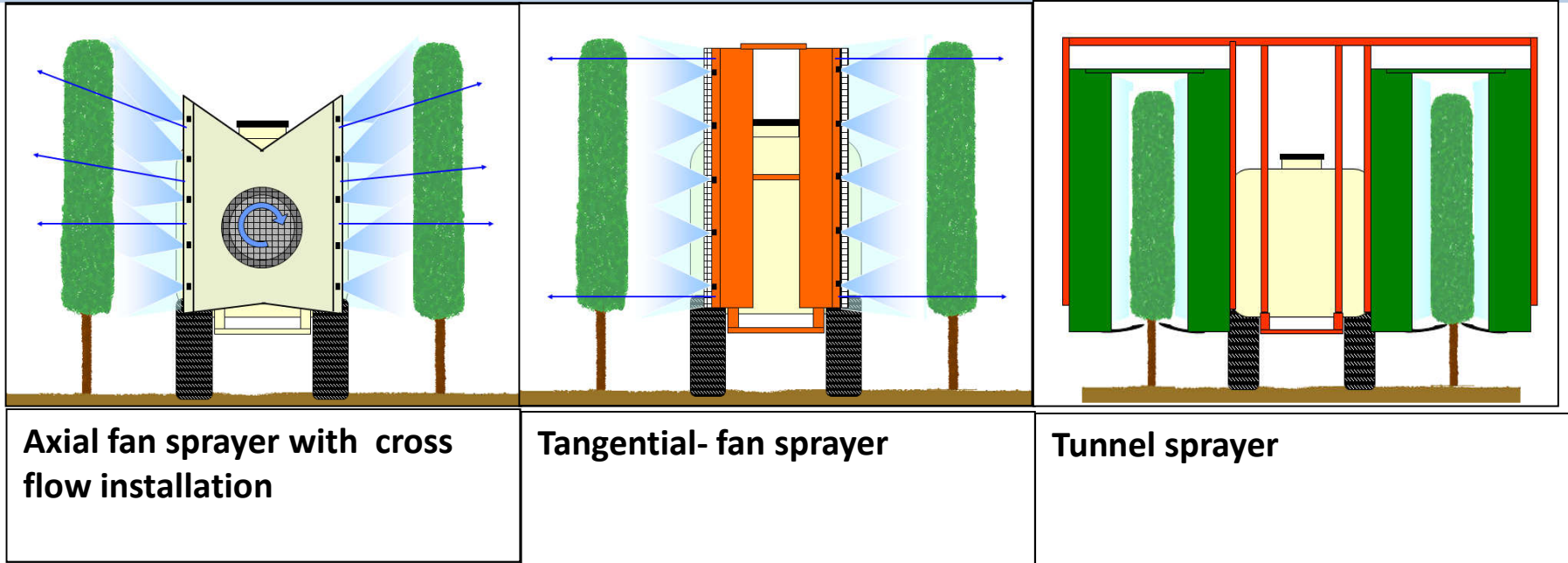
Windspeed: 1,4 to 2,1 m/s

Source: Paolo Balsari, Paolo Marucco, Marco Grella, Simone Savoia

DiSAFA – Department of Agricultural, Forestry and Food Science, Turin ; Suprofruit conf 2015 Lindau

BMP: Reduce Distance to target

– Sprayer designs are available to reduce spray drift

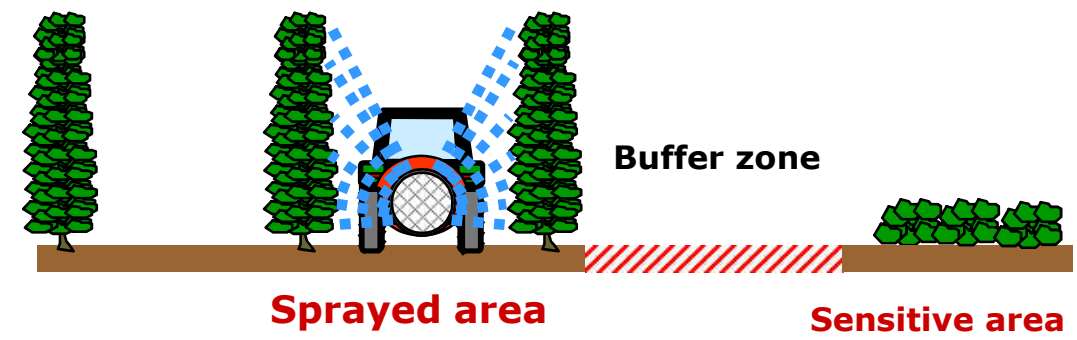
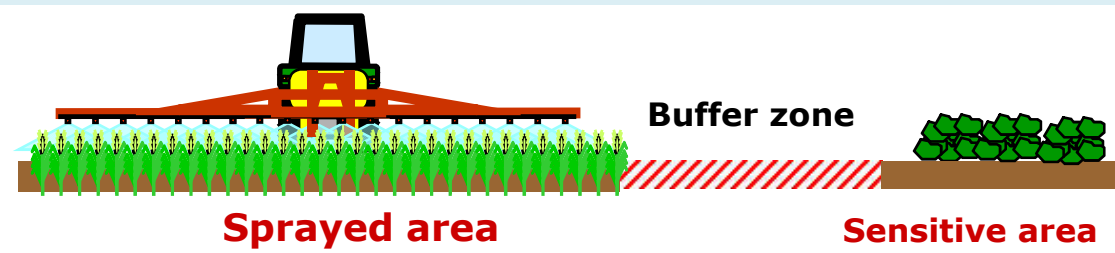


Measurement of drift reduction on complete sprayer and its configuration – a challenge

INDIRECT SPRAY DRIFT REDUCTION MEASURES



- **Buffer zones**



- **Wind breaks**



Drift reduction up to 80%

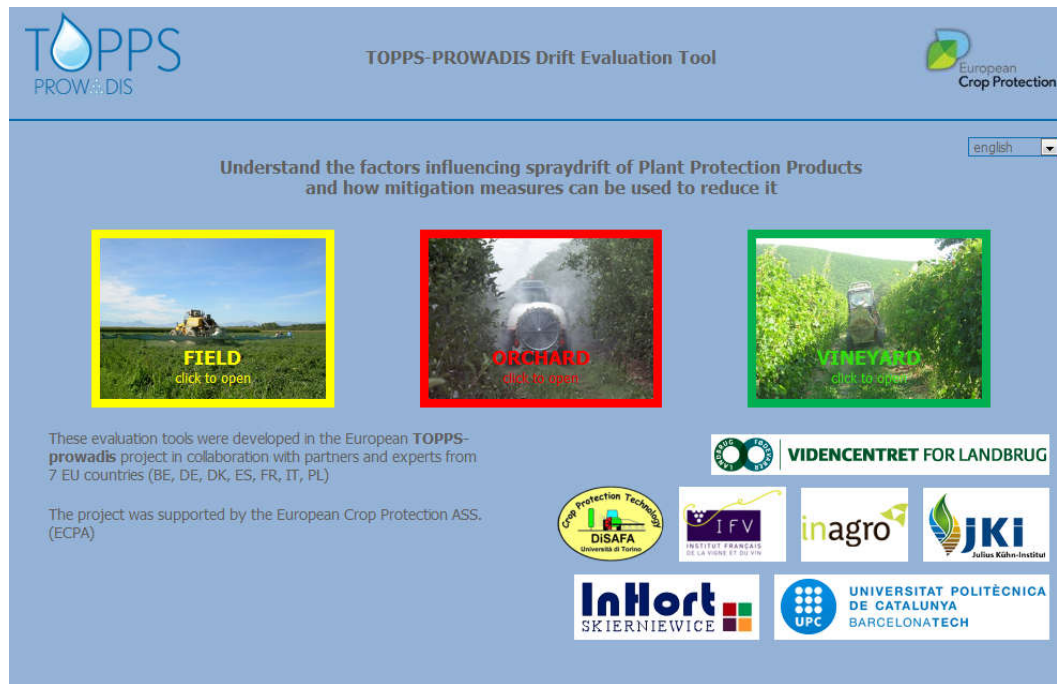
- **Hail nets**



Drift reduction up to 50%

Understand more about spray drift and drift reduction

www.TOPPS-drift.org



TOPPS
PROWADIS

TOPPS-PROWADIS Drift Evaluation Tool

European Crop Protection

english

Understand the factors influencing spraydrift of Plant Protection Products and how mitigation measures can be used to reduce it

FIELD
click to open

ORCHARD
click to open

VINEYARD
click to open

These evaluation tools were developed in the European TOPPS-prowadis project in collaboration with partners and experts from 7 EU countries (BE, DE, DK, ES, FR, IT, PL)

The project was supported by the European Crop Protection ASS. (ECPA)

VIDENCENTRET FOR LANDBRUG

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inagro

JKI
Julius Kühn-Institut

InHort
SKIERNIEWICE

UPC
UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

Field crops / Orchards / Vine – 8 languages

Education and awareness

CONCLUSION

Key parameters to reduce the spray drift risk

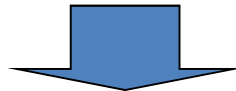
Field applications

- *Droplet size*
- *Distance to target*
- *Forward speed*

Orchard applications

- Droplet size
- Distance to target
- Air volume
- Air speed
- Air direction

Most important is the correct sprayer adjustment



Improve users training : a challenge

Thanks for your attention

QUESTIONS??



... We have means for the cloud to disappear