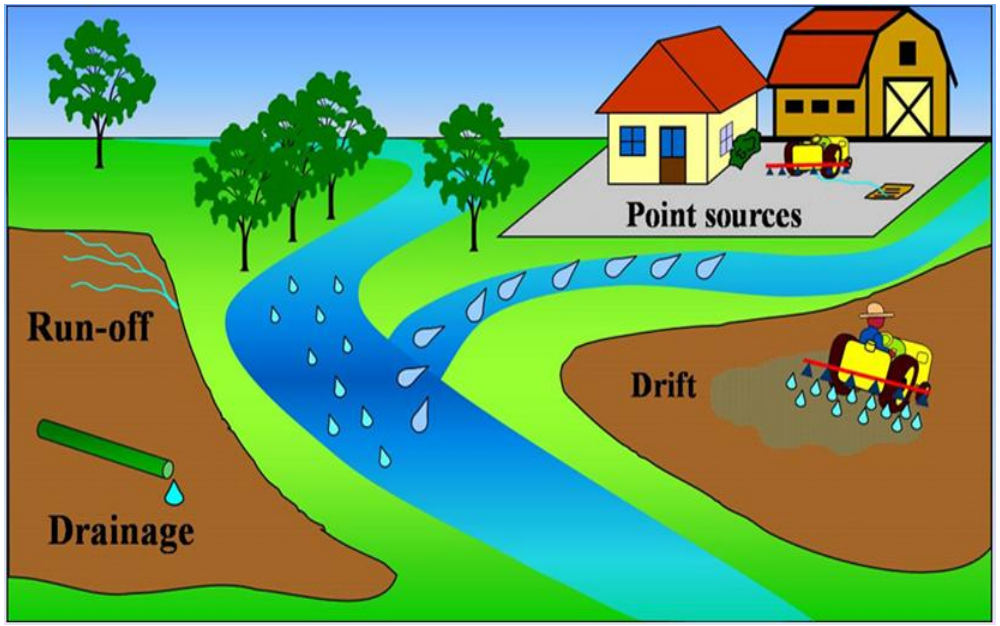



# Implementation of Best Management Practices can strongly reduce losses of Plant Protection Products to water.

Workshop Oct 27th 2014
Kaunas /Lithuenia
Manfred Roettele

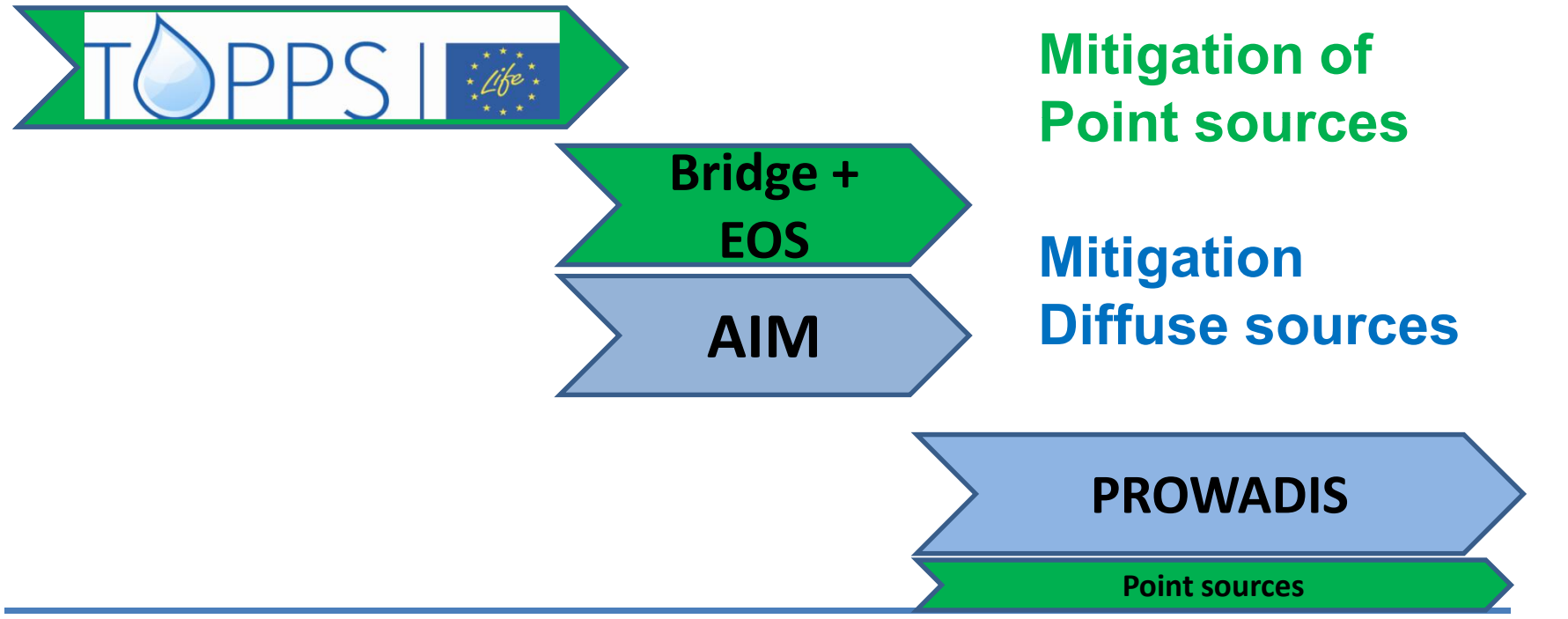
# Outline

- About TOPPS
- Legal frame
- Significance of entry routes
- Point sources
- Runoff / erosion
- Spray drift

# TOPPS projects landscape

## TOPPS projects are running now for 9 years

## Train Operators Promote best Practices & Sustainability



# TOPPS – outreach - EU

| | POINT SOURCES | | | DIFFUSE SOURCES |
|---|---|---|---|---|
| Countries | TOPPS - life | TOPPS - extension | TOPPS-EOS | TOPPS - prowadis |
| Austria | | | | |
| Belgium | | | | |
| Bulgaria | | | | |
| Croatia | | | | |
| Cyprus | | | | |
| Czech Republic | | | | |
| Denmark | | | | |
| Estonia | | | | |
| Finland | | | | |
| France | | | | |
| Germany | | | | |
| Greece | | | | |
| Hungary | | | | |
| Ireland | | | | |
| Italy | | | | |
| Latvia | | | | |
| Lithuenia | | | | |
| Luxembourg | | | | |
| Malta | | | | |
| Netherlands | | | | |
| Poland | | | | |
| Portugal | | | | |
| Romania | | | | |
| Slovakia | | | | |
| Slovenia | | | | |
| Spain | | | | |
| Sweden | | | | |
| United Kingdom | | | | |

**TOPPS – point sources**
BMPs / Materials developed europe wide (23 countries)

**TOPPS – EOS**
Environmantally optimized sprayers
Expert information tool.

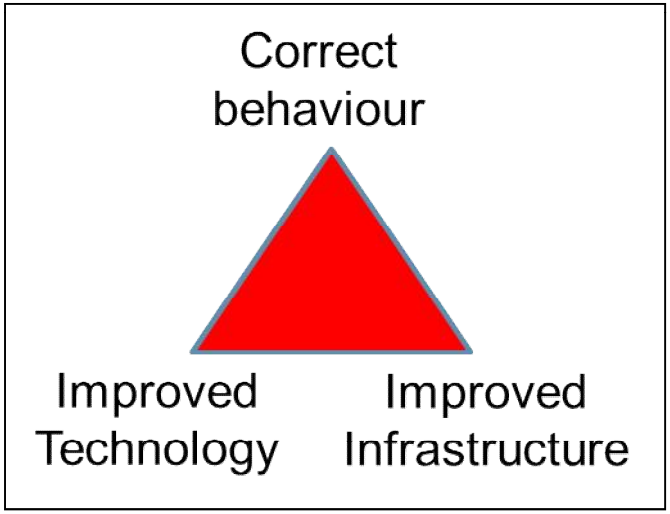
**TOPPS-prowadis**
**7 countries**
**Common EU BMPs + materials developed**

**TOPPS water protection (plans)**
Intensify dissemination and expand TOPPS prowadis to more countries

# Water is a key resource to keep clean by reducing entry from contamination sources

- Fertilzers and pesticides
- Human and animal waste
- Plastics and heavy metals
- Other manmade and natural chemicals

Most losses of PPPs to water can be prevented by using a framework of Best Management Practice (BMP)



# Legal framework to protect water in EU

Water is not a commercial product like any other but, rather, a heritage which must be protected, defended and treated as such …

(Excerpt from the recitals to the European Water Framework Directive).

**Water Framework Directive**

- Ground water
- Surface water
- Marine water

**Regulation of Plant Protection Products**

- Access to Market
- Hazard reduction
- Risk assessment

**Directive on Sustainable Use of Pesticides**

- Focus on use phase
- Sales & training
- Risk reduction

## Threshold values for PPPs in drinking water and the protection of aquatic organisms are extremly low

For example, spilling just 1 g of active incredient into water exceeds the drinking water threshold of 0,1 µg/L, *unless* mixed in a ditch:

- 1 m wide
- 30 cm deep
- 33 km long

**Stakeholder Perception study winter 2011 / 2012**

PROBLEM: POLLUTANTS

If you consider surface water pollution originating from agriculture, what would you consider the main problem ? (rank in order of importance 1= most important….5 = least important (only respondents with correct ranking)

| Average ranks on the main problems for surface water pollution – top three | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Country | BE | DE | DK | ES | FR | IT | PL | all |
| PPP | **2,2** | **3,0** | **2,2** | **2,6** | **1,6** | **2,3** | **2,2** | **2,4** |
| Org- Fertilizer | **3,0** | **1,9** | **2,2** | **2,2** | **3,3** | **2,4** | **2,6** | **2,5** |
| Min. - Fertilizer | **2,8** | **3,1** | | **2,4** | **3,0** | **2,7** | **2,3** | **2,8** |
| Vetproducts | | | **3,3** | | | **2,7** | | **3,8** |
| Other Chem | | | | | **3,3** | | | **3,6** |
| n | **62** | **80** | **49** | **59** | **43** | **52** | **46** | **391** |

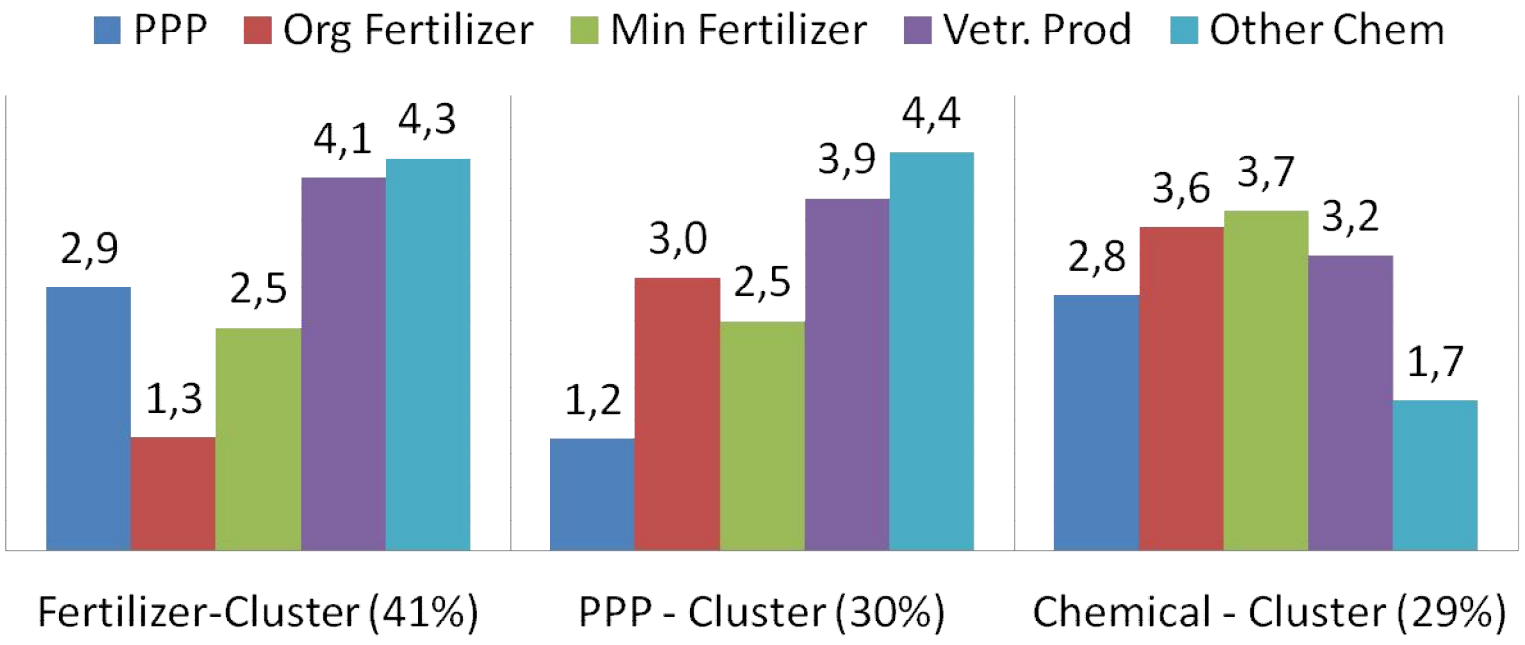
- PPP and organic fertilizer considered main water pollution problem
- Most divers perception on PPP between FR and DE

**Stakeholder Perception study winter 2011 / 2012**

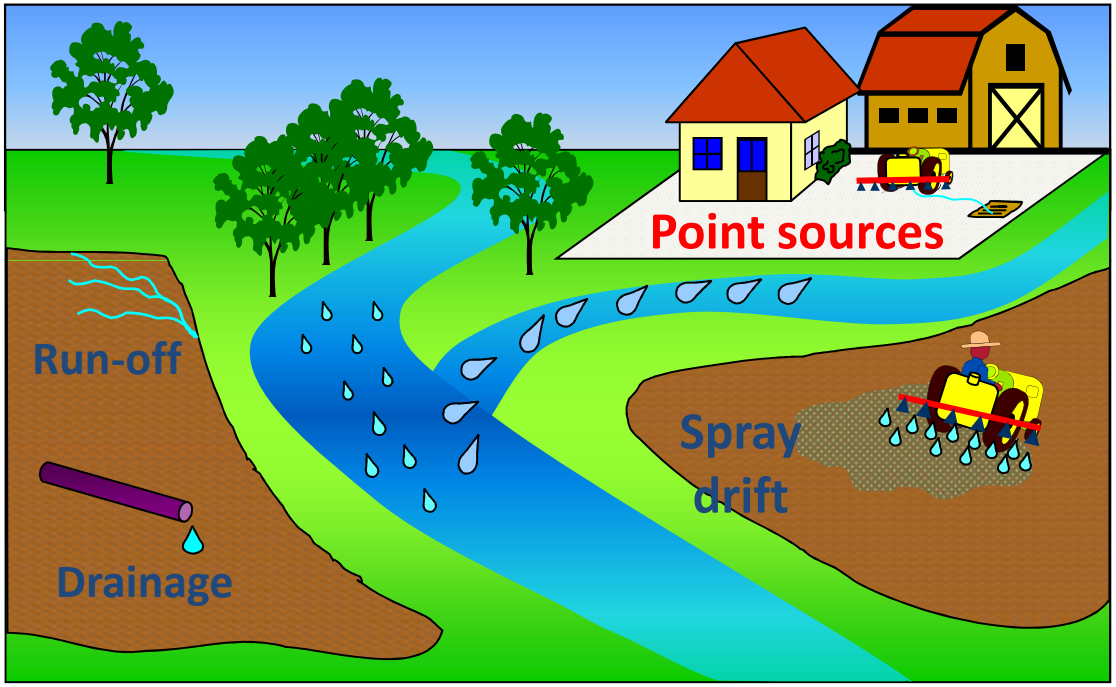
PROBLEM PERCEPTION DIFFERS STRONGLY

# Cluster analysis separates tree different groups of respondents in their evaluation of main water pollutants

Average ranks in clusters (1 most important …. 5 least important)



# Which sources of pesticide get into surface water & by how much?




5 % Drift
30 % Run-off

> 50 % Point Sources

**The transfer of diffuse sources (uses on crops) to water can be reduced**

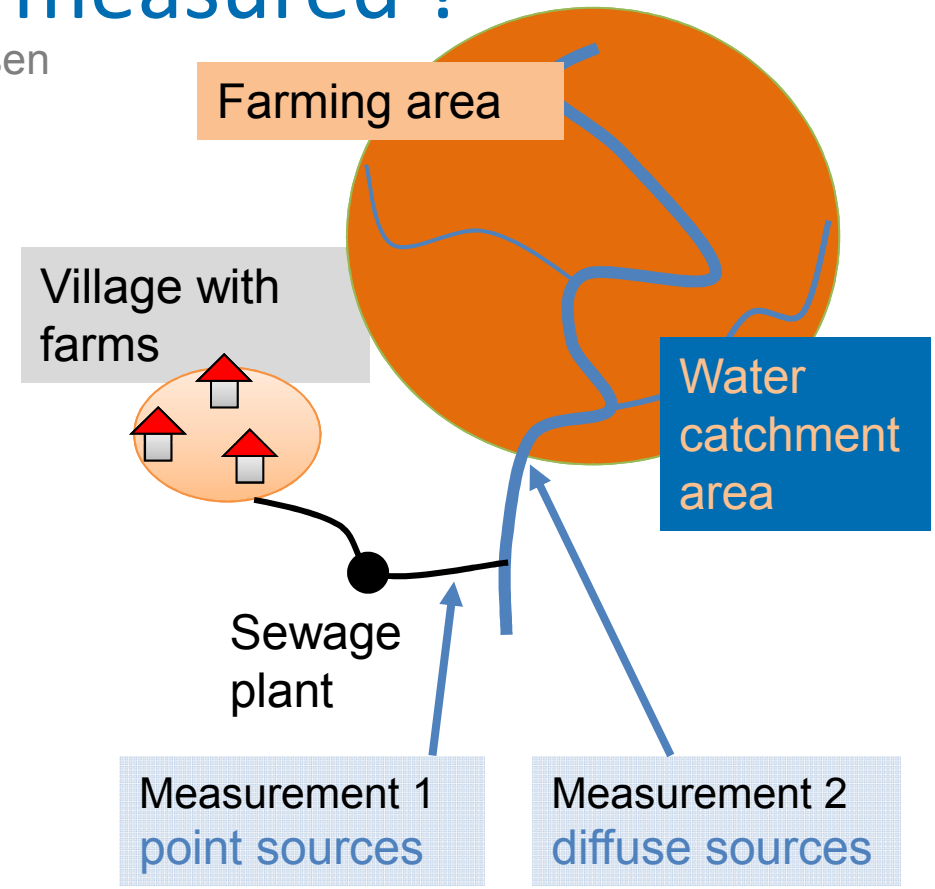
**Point source releases mostly occur around farmyards from poor handling**

**Most point source releases of PPPs can be prevented!**

# How are point sources measured ?

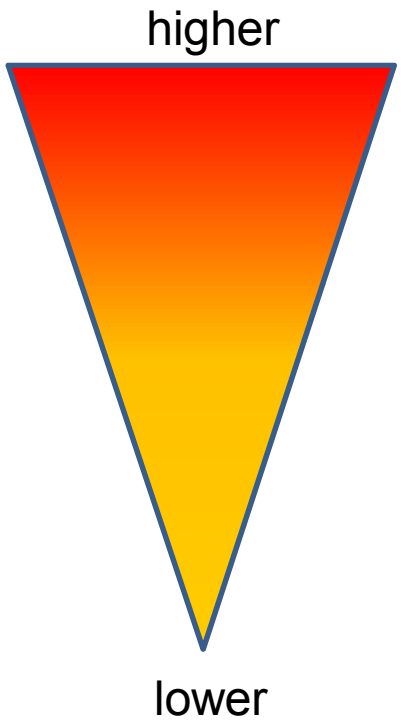
Frede *et al.* 2006, TOPPS-Forum; Univ Giessen

- **Waiste water of village farms in community sewage plant.**
- **Measurement point 1 measures PPP pollution from farmyards (point sources).**
- **Measurement point 2 measures PPP pollution from the field (diffuse sources).**



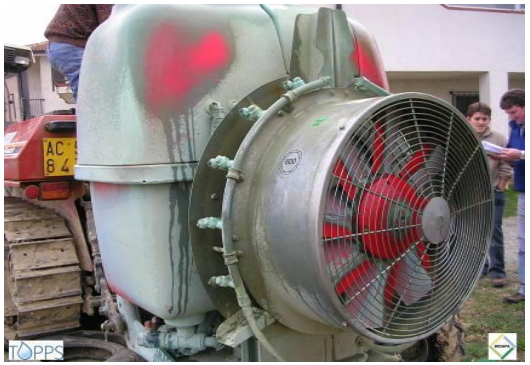

Not many countries have generated results on point source significance

# Avoid PPP losses from point sources
# Awareness of key risks helps focus on prevention




## Key Risks

- **Sprayer cleaning**
- **Mixing and loading**
- **Remnant management**
- **Empty container disposal**
- Transport to the field
- Farm pesticide storage
- Transport to the farm



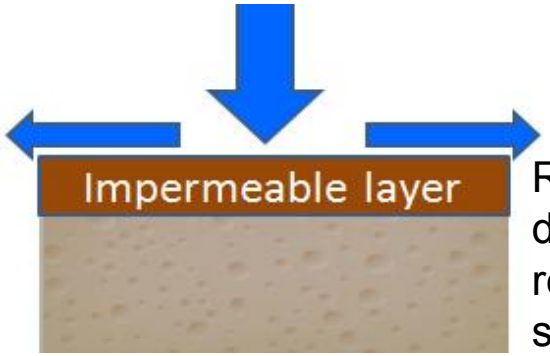
# Reduce PPP losses from diffuse sources Runoff / Erosion

**Key factors influencing runoff**

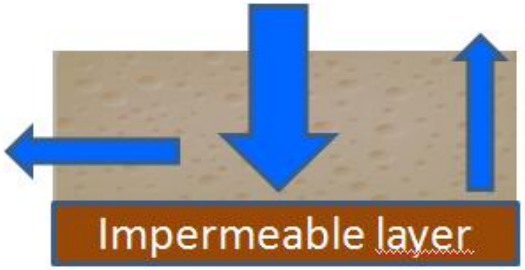
**What we cannot directly influence**
Weather
Soil characteristics
Form of the landscape

**What we can influence**
Field sizes
Crops grown
Cultivation practices
Land management
PPP - application

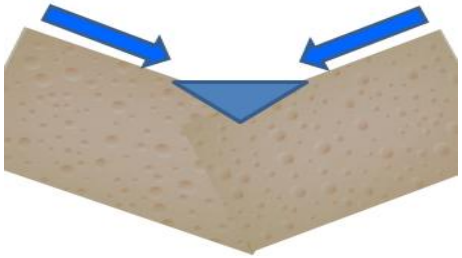
# Diagnosis of runoff risk determins mitigation measures
# 3 Situations to be distinguished




Runoff
due to infiltration
restriction (intensity:
spring/summer)




Runoff
due to soil saturation
(volume: winter)



Concentrated
Runoff /
Erosion

# 1. Prevent runoff at source

## In the field mitigation measures

**Increase water infiltration**
- *reduce tillage*
- *break soil compaction*
- *more organic matter*
- *stabilize soil aggregates*

**Slow down water flow**
- *rough seedbed / bunds*
- *cover soil with materials*
- *manage tramlines*
- *work across the slope*
- *use infield buffers*

**Utilize the water**
- *grow intermediary crops*






# 2. Prevent runoff reaching surface water

## Out of the field mitigation measures

**Increase water infiltration and capture soil particles**

- *implement vegetative buffers*
  *grass buffers*
  *grass + hedges*
- *optimize crop rotation and use variety of crops as buffer (row crops + broadcast crops)*
- *built fascines to disperse the water*
- *optimize field size*
- *organise crop rotation also in the landscape*
- *Build bunds*
- *build terraces*






# 3. Keep runoff water in the catchment

## In catchment mitigation measures

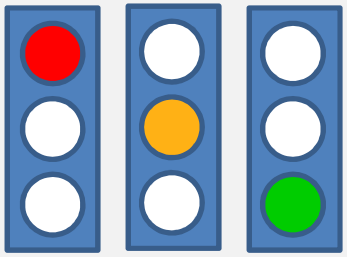
**Build retention structures**

- *Develop natural wetlands (Water infiltration, water evaporation, PPP - degradation)*
- *Use vegetated ditch to collect runoff water (outlet control)*
- *Develop artificial wetlands*

# Best Management Practice reduce the risk of PPP transfer to water through runoff / erosion

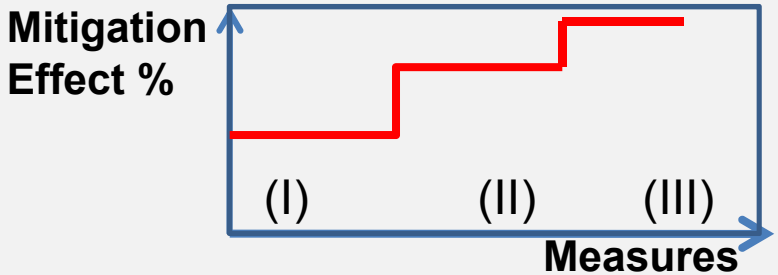
**Step 1**
**Risk diagnosis**

**TOPPS - dashboards**



**Step 2**
**Select effective measures**

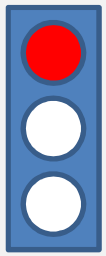
**TOPPS**
**Mitigation measures toolbox**



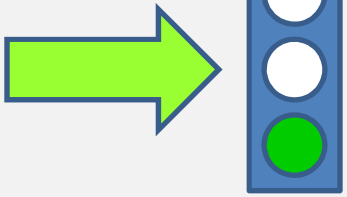

**Step 3**
**Implement BMPs**

**Diagnosis +**
**Measures**

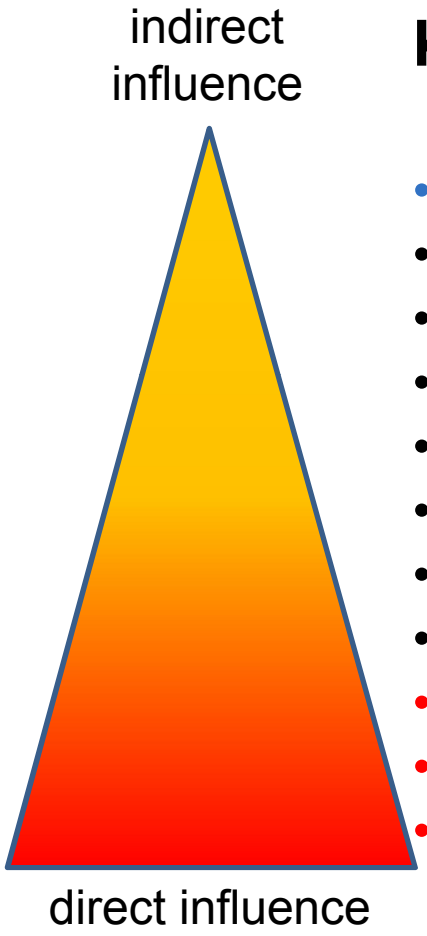
**from**



**to**



# Reduce PPP losses from diffuse sources
# Spray drift




## Key factors

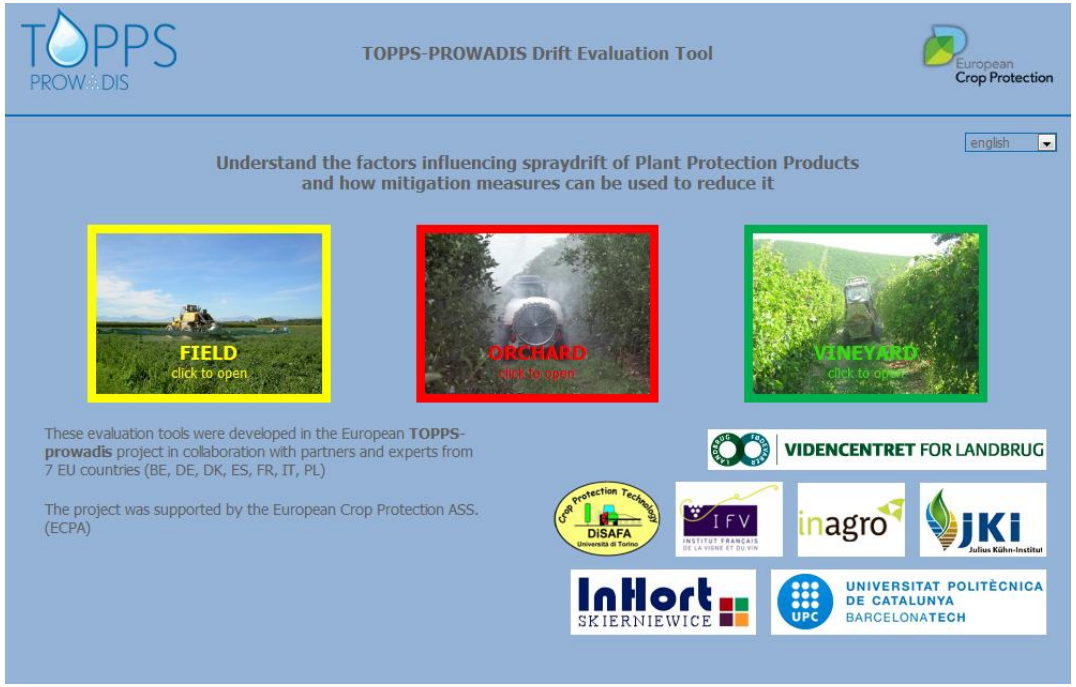
- **Wind speed**
- **Wind direction**
- **Temparature**
- **Air humidity**
- Proximity to water
- Proximity sensitive area
- **Crop treated**
- **Adjacent vegetation**
- **Droplet size**
- **Application technique**
- **Adjustment of sprayers**

# Key recommendations to manage spray drift in field applications

- Droplet size
  reduce amount of fine droplets
- Boom height
  the lower the better < = 50cm
- Driving speed
  keep speed along sensitive areas < 8 km/h
- Sprayer with air support
  (bare soil !)


# Understand more about drift risks and drift reduction

## www.TOPPS-drift.org




Field crops / Orchards / Vine – 8 languages
Education and awareness


... We have means for the cloud to disappear

# Water protection starts in the minds of people

# Thank you for the attention

I would like to acknowlege all contribution from the TOPPS- prowadis partners

Univ. Cordoba, ES
Univ. Polytech Catalunia, Barcelona, ES
Univ Turin (Deiafa), IT
Univ. Turin Agroselviter IT
Irstea , Lyon FR
Arvalis Inst du Vegetal, Boigneville FR
Inst. francaise du vigne et du vin, Grau du Roi , FR
Julius Kühn Inst. Braunschweig, DE
Bavarian State Res Inst. Freising, DE
InAgro, Rumbeke , BE
Danish Agric.Advisory Service,Aarhus, DK
InHort, Skierniewice ,PL
Nat.Env. Inst ,Warsaw, PL
Experts from ECPA