TOPPS Water Protection Methodology and Decision Support Tools

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Multi-partner development of toolboxes of EU-wide recognized BMPs* for water protection in agriculture

Achieve a holistic water protection concept at catchment level, covering all key pollution sources & pathways

Promote a multi-stakeholder approach to come to solutions, which are acceptable and economically viable for farmers

* Best Management Practices
Basic Methodology II
Water Contamination Pathway Analysis

Point sources
- Handling on farm (filling, cleaning, remnant management)
- Before/after spraying in the field

Diffuse sources
- Surface runoff
- Spray drift
- Drainage
- Leaching

Easy to avoid

Identification of relevant pathways
Specific risk diagnosis and mitigation
Methodology: Point Sources
Structured diagnosis and DST*

* Decision Support Tool

Farmyard Emission Scan
MEASURES TO PROTECT ENVIRONMENT FROM DRIFT

DIRECT
- Reducing drift at source
- Use of Spray Drift Reduction Technology (SDRT)
  - Application equipment
  - 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)

Spraying within the zone of awareness

Methodology: Diffuse Sources
Spray drift risk analysis and DST

www.topps-drift.org
Methodology: Diffuse sources Water flow analysis and DSTs

Field diagnosis

Rain Irrigation

Surface Runoff

Sub-surface Runoff

Drainage existing?

Poorly permeable layer

Runoff risk decision dashboards

Drainage & Leaching risk decision dashboards
Methodology: Diffuse sources
Catchment diagnosis and risk maps

Catchment diagnosis: Water flow pathway analysis

- Water output from field?
- Does runoff reach surface water?
- Do vulnerable areas for groundwater exist?

→ Field visit necessary

Catchment risk maps: e.g.
- Infiltration restriction runoff
- Saturation excess runoff
- Concentrated runoff
- Drainage
- Leaching
General Structure of BMPs and Measures
Harmonized Approach

BMP = Risk diagnosis + adapted mitigation measure(s)

“Statement”
What to do?
A clear communication in form of a general recommendation statement, which will form the core of the harmonized EU BMP measure.

“Specifications”
How to do it?
A detailed description of requirements, materials, conditions, and parameters to consider in order to realize the recommendation goal (Country-specific modifications in national BMP toolboxes)
Example: Runoff BMP Measure

Soil Management

**Objective: Stop runoff at source**

**Prepare rough seedbed**
- Establish a rough seedbed with soil clods (do not roll over after seeding)
- Slows down water flow
- Increases infiltration

**Establish mini-dams in the field** (e.g. potato)
- Small bunds are created in between rows at seeding
- Height and spacing of bunds needs to be adapted to local conditions
- Minimization of runoff and erosion
### Example: Runoff Mitigation Measures
#### Toolbox for Flexible Mitigation

<table>
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<tr>
<th>Soil management</th>
<th>Cropping practices</th>
<th>Vegetative buffers</th>
<th>Retention structures</th>
<th>Adapted use of pesticides</th>
<th>Optimized irrigation</th>
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</thead>
<tbody>
<tr>
<td>• Reduce tillage intensity</td>
<td>• Use crop rotation</td>
<td>• Use in-field buffers</td>
<td>• Use edge-of-field bunds</td>
<td>• Adapt application timing</td>
<td>• Adapt irrigation technique</td>
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<tr>
<td>• Manage tramlines</td>
<td>• Do strip cropping</td>
<td>• Establish talweg buffers</td>
<td>• Establish vegetated ditches</td>
<td>• Optimize seasonal timing</td>
<td>• Optimize irrigation timing and rate</td>
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<tr>
<td>• Prepare rough seedbed</td>
<td>• Enlarged headlands</td>
<td>• Use riparian buffers</td>
<td>• Establish retention ponds/wetlands</td>
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<tr>
<td>• Establish in-field bunds</td>
<td>• Use annual cover crops</td>
<td>• Use edge-of-field buffers</td>
<td>• Build fascines</td>
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<tr>
<td></td>
<td>• Manage surface soil compaction</td>
<td>• Manage field access areas</td>
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</tr>
<tr>
<td></td>
<td>• Manage subsoil compaction</td>
<td>• Establish hedges</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Do contour tilling/disking</td>
<td>• Establish/maintain woodlands</td>
<td></td>
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</tr>
</tbody>
</table>

- Enlarged headlands
- Double sowing
- Use annual cover crops
- Use perennial cover crops
- Double sowing
- Use in-field buffers
- Establish talweg buffers
- Use riparian buffers
- Establish field access areas
- Establish hedges
- Establish/maintain woodlands
- Establish vegetated ditches
- Establish retention ponds/wetlands
- Build fascines
- Adapt application timing
- Optimize seasonal timing
- Adapt product and rate selection
- Adapt irrigation technique
- Optimize irrigation timing and rate
Best Practice at Catchment Level

Analysis ⇒ Diagnosis ⇒ Mgmt Plan

Definition of catchment and data collection

Example: Run-off risk diagnosis (BE)

Meeting with farmers

Analysis and diagnosis in the field

Management Plan

Risk Map

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Risk Map
Further Decision Support Tools
Enabling Farmers

Web-based sprayer configuration tools

**EOS**
- Environmentally Optimised Sprayer
  - Evaluates technologies of Crop Protection sprayers on their risk mitigation capabilities to protect water and the environment.
  
  **Steps**:
  1. Click on " goodies" menu to select the desired evaluation scenario.
  2. Select the sprayer type and the spray parameter to simulate.
  3. Perform the simulation to obtain the evaluation result.

**Step-Water**
- Good Spray Application for Healthy Crops & Clean Water
- ON-LINE WATER PROTECTION EVALUATION FOR CROP SPRAYERS
Conclusions

- TOPPS methodology is science-based and developed in a broad EU-wide multi-stakeholder approach:
  - Pollution pathway analysis
  - Specific risk diagnosis
  - Selection of BMP measures

- Web-based decision support tools aim to empower many farmers to take decisions standalone

- Further web-based TOPPS DSTs to come to:
  - Increase the outreach to farmers
  - Reduce complexity for decision making
Thank you for your attention!

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