Strategies to reduce point sources of PPP to water

Results and lessons learned from the TOPPS project

AAB Conference Cambridge Jan 2008
Manfred Röttele TOPPS project manager
TOPPS is a 3-year, multi-stakeholder project covering 15 European Countries - it stands for Training the Operators to prevent Pollution from Point Sources which began 1st November 2005, and ends 30th October 2008.

TOPPS is funded under the European Commission's Life program and by ECPA, the European Crop Protection Association.

TOPPS is aimed at identifying Best Management Practices and disseminating them through advice, training and demonstrations at a larger co-ordinated scale in Europe with the intention of reducing losses of plant protection products (PPP) to water.
TOPPS fits with the EU legislation framework

- Useful guidance on programs of measures at catchments
- Training on water protection
- Training of operators
- Best Management Practice to avoid point sources
- Strategic on sustainable use of pesticides

Source: Syngenta
Definition of entry sources of PPP to water
Significance of point sources
Results from stakeholder survey
Elements to built a sustainable strategy to reduce point sources
Key working processes (Examples)
Farmers perception on the impact of various working processes on point sources
Farmers perception on measures for improvements
Needs to be done for a sustainable strategy (Conclusion)
Entry routes of PPP into water – Point and diffuse sources

**Point sources:** mainly related to inappropriate handling of PPP

- Spillage of PPP concentrate or dilute spray (during filling, transport, spraying, cleaning of spray equipment)
- Management of residual spray solutions remaining in the sprayer after the spray operation (in field, on farm – remnant management)
- Poor field practice, (eg over-spraying ditches, wells)

**Diffuse Sources** (not within scope of TOPPS today)
- Surface runoff, or leaching which may occur following approved practices, spray drift.
Point sources a underestimated entry route of PPP into water!?

• Few studies available indicate point sources are the most important entry route of PPP into water, they contribute **MORE THAN 50%** to PPP pollution of water (40 to 95%)

• Point sources can be avoided by adopting the right strategy and focus
Point sources are the most significant entry route of PPP into water as seen by stakeholders (Stakeholder survey)

**Most distinct views on point sources in the Nordic**

Stakeholder profile:
- Farmadvice 29%
- Plantproduction 20%
- Research 8%
- Watermanagement 8%

Majority has direct contact to farmers

**Question:** Which is the most important source of contamination of PPP to water?

<table>
<thead>
<tr>
<th>Results - TOPPS European Stakeholder Survey June to October 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>n</td>
</tr>
</tbody>
</table>
Point sources can be easiest reduced according to stakeholders (Stakeholder survey)

Broad consensus to focus on point sources for quick wins

**Question:** Which source of water contamination could be reduced most easily?

<table>
<thead>
<tr>
<th>Country</th>
<th>France</th>
<th>UK</th>
<th>Italy</th>
<th>DK/S</th>
<th>Belgium</th>
<th>Spain</th>
<th>Poland</th>
<th>Germany</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>199</td>
<td>85</td>
<td>84</td>
<td>73</td>
<td>46</td>
<td>41</td>
<td>40</td>
<td>27</td>
</tr>
</tbody>
</table>

www.topps-life.org
**Perception of stakeholders on key working processes to focus to reduce point sources** - Results: TOPPS Stakeholder survey

<table>
<thead>
<tr>
<th>Process</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>After spraying</td>
<td>4.1</td>
</tr>
<tr>
<td>Before spraying</td>
<td>3.8</td>
</tr>
<tr>
<td>Waste management</td>
<td>3.7</td>
</tr>
<tr>
<td>Process water</td>
<td>3.7</td>
</tr>
<tr>
<td>During spraying</td>
<td>3.5</td>
</tr>
<tr>
<td>Storage</td>
<td>2.6</td>
</tr>
<tr>
<td>Transport</td>
<td>2.1</td>
</tr>
</tbody>
</table>

Question: Rate each of the listed processes according to the potential in reducing ppp point sources (Rate 5= very effective – 1 = not very effective (average across all regions n=570)

After spraying, Before spraying and Remnant management are the most important processes to focus on

* East: Storage No 1
### Perception of stakeholders where changes could have biggest impact

**Stakeholder Survey**

<table>
<thead>
<tr>
<th>Change Type</th>
<th>Av. rating</th>
<th>Ratings in % of respondents (very strong (5) to very weak (1))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator behaviour</td>
<td>4.3</td>
<td>23, 25, 15, 11, 1</td>
</tr>
<tr>
<td>Improved Technology</td>
<td>3.6</td>
<td>23, 25, 15, 6, 3</td>
</tr>
<tr>
<td>Improved Infrastructure</td>
<td>3.3</td>
<td>23, 28, 21, 19, 6</td>
</tr>
<tr>
<td>New regulations</td>
<td>3.2</td>
<td>23, 26, 21, 19, 11</td>
</tr>
</tbody>
</table>

**Majority expects strongest impact from changing operators behaviour**

**Second most important impact expected from improved technology**

*East: Improved technology No. 1*

**Question:** Where do you expect the most impact on reducing water contamination from point sources? Ratings in % of respondents (very strong (5) to very weak (1))
Strategy to reduce point sources must be built on

Correct Behaviour

Improved Technique

Improved Infrastructure

......along working processes

Transport

Storage

Before spraying

During spraying

After spraying

Remnant management
Strategy to reduce point sources must be built on (1)

Top ten mentioned criteria able to influence operator behaviour
(stakeholder survey (rating: 5 strong..1 weak effect))

- Quality training
- Reg. Operator training
- Mandatory training
- More advisor support
- Behaviour linked to incentives
- Regular demonstrations
- Clearer legal regulations
- Reg farm audits
- Stronger fine
- Pilot river bassin experiments

www.topps-life.org
Strategy to reduce point sources must be built on (2)

Top ten mentioned technical improvements to avoid point sources (stakeholder survey (rating: 5 strong..1 weak effect))

- Tech solution to avoid spills
- Reduce residual vol
- Rinsing water tank
- Sprayer inspection
- Specific component on sprayer
- Internal cleaning equipment
- Enforced tech standard
- Spray tank full alarm
- External cleaning device
- Handwash tank
Top ten mentioned infrastructure improvements to avoid point sources
(stakeholder survey (rating: 5 strong..1 weak effect))

1. PPP handling area with water collection
2. Container collection scheme
3. Drain washings to field or tank
4. Avoid sprayer cleaning on farmyard
5. Avoid tank overflow
6. Safe storage for full and empty packs
7. Avoid direct contact of water supply
8. Bioremediation system
9. Collect contaminated water
10. Keep absorbent materials at hand
Avoid spills – handling of concentrated PPP (Filling process)

...how often do you spill your coffee?

...how often must a farmer deal with measuring and filling of PPP?

Variables

<table>
<thead>
<tr>
<th>Number of sprayer fills</th>
<th>Number of applications</th>
<th>Number of products used</th>
</tr>
</thead>
<tbody>
<tr>
<td>tank capacity</td>
<td>by crop</td>
<td>per application</td>
</tr>
<tr>
<td>water volume</td>
<td></td>
<td></td>
</tr>
<tr>
<td>spray area</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Precautionary measures are absolutely necessary if filling on farm

• Handling area to collect spills
• Flow meter avoid backflow and tank overflow
Working Process: After spraying

Reduction of residual volumes of sprayers necessary and also technically possible (Cleaning process)

Current technical standards for sprayers are not demanding enough and not yet enforced in EU

Fieldsprayers - Standard

<table>
<thead>
<tr>
<th>Total residual volume in l (EN 12761-2)</th>
<th>Tank</th>
<th>Boom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tank volume</td>
<td>0, 5 %</td>
<td>length m</td>
</tr>
<tr>
<td>800</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>3000</td>
<td>15</td>
<td>21</td>
</tr>
<tr>
<td>4200</td>
<td>21</td>
<td>36</td>
</tr>
</tbody>
</table>

If the cleaning is not done properly these residual volumes may end up in the water

- Sprayers should be designed to optimized the residual volumes to the lowest possible level.
- It should be made a criteria to certify sprayers (level of regulation low today)
Upgrading of sprayers necessary to enable Best Management Practices (Cleaning process)

Farmer Surveys / audits: 6 pilot areas FR;BE;DE;DK;PL;IT (Aquasite*, questionnaires)

- Rinse water tank
  Key requirement to clean sprayer in the field

- Best Management Practice

After spray operation bring no or only lowest possible amount of contaminated liquid back to the farm in the sprayer!!!

*Aquasite is a registered trade mark of Arvalis
On average farmers evaluate the risks for water contamination by working process similar to the stakeholders

<table>
<thead>
<tr>
<th>Country</th>
<th>FR</th>
<th>DK</th>
<th>DE</th>
<th>BE</th>
<th>PL</th>
<th>IT</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remnant management</td>
<td>2.17</td>
<td>3.73</td>
<td>2.72</td>
<td>3.06</td>
<td>3.75</td>
<td>3.07</td>
<td>3.07</td>
</tr>
<tr>
<td>Cleaning</td>
<td>2.19</td>
<td>3.49</td>
<td>2.96</td>
<td>3.14</td>
<td>3.44</td>
<td>2.65</td>
<td>2.98</td>
</tr>
<tr>
<td>Filling</td>
<td>2.31</td>
<td>3.9</td>
<td>2.84</td>
<td>2.61</td>
<td>3.29</td>
<td>2.54</td>
<td>2.92</td>
</tr>
<tr>
<td>Storage</td>
<td>1.51</td>
<td>3.03</td>
<td>1.93</td>
<td>1.25</td>
<td>2.31</td>
<td>2.16</td>
<td>2.03</td>
</tr>
<tr>
<td>Transport</td>
<td>1.63</td>
<td>2.76</td>
<td>2.05</td>
<td>1.25</td>
<td>2.28</td>
<td>2.09</td>
<td>2.01</td>
</tr>
</tbody>
</table>

Remnant management, cleaning and filling are the processes which have the biggest impact on water pollution from PPP.
Awareness on potential risks is not homogeneous

(Example: French study similar pattern in other catchments – cluster analysis)

Challenge!

How can we get awareness and information to those farmers, which are not reached by information and advice today?
Any strategy to reduce point sources only works with the operators (Farmer surveys catchments)

Agreement to top 4 statements by farmers

<table>
<thead>
<tr>
<th>What should be done to prevent contamination of water with PPP?</th>
<th>Farmer agreement to listed propositions % (Farmer survey six catchments 2007)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
<td>FR</td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Farmers should be financially supported to invest in technique and infrastructure</td>
<td>91</td>
</tr>
<tr>
<td>Give more advice to farmers</td>
<td>79</td>
</tr>
<tr>
<td>Farmers should attend regular trainings</td>
<td>66</td>
</tr>
<tr>
<td>Only farmers with special licence allowed to spray *</td>
<td>18</td>
</tr>
</tbody>
</table>

* Ideas on what a licence means may be very variable
Needs to be done for a sustainable strategy (1)

Technique and Infrastructure are enablers to comply with the BMPs and to mitigate the risks of PPP water pollution

- Upgrade **technique** (key requirements)
  - Devices to support avoidance of spills (Induction bowl, container cleaning)
  - Devices to support best cleaning (Rinse water tank, internal/outside cleaning
  - Design sprayers with lowest possible residual spray volume
  - **Key performance criteria should be regulated and need enforcement**

- Upgrade **infrastructure** (precautionary measures)
  - Filling and cleaning on farm must have precautionary measures to collect any spills
  - Storage and transport managed with precautions (BMPs)
  - If remnants management necessary f.e biobed / biofilter could be an option

**IMPORTANT: CONSISTENT ACROSS WORKING PROCESSES**
Needs to be done for a sustainable strategy (2)

Key is **correct behaviour** to comply with Best Management Practices

- Create awareness
  Occupy mind space for water protection from advisers and operators

- Provide information, training and advice regularly to advisers and operators
  BMPs offer a consistent frame across the working processes

- Provide incentives for operators

- **Challenge!** access to operators
  All operators need to be informed and advised regularly
  (It seems that current advice concepts are not reaching all)

- Sustainable strategy only will work with the operators
Thanks for your attention

Follow the TOPPS project on our website

www. TOPPS-life.org

See the
BMPs
Presentations / Documents / Leaflets
Training materials
Picture gallery