Background and objectives

- EU pesticide regulations and IPM-principles were adopted in Norwegian legislation in 2015.
- IPM-practices potentially conflict farming practices recommended based on priorities of the Water Framework Directive.
  - A case-study in Norwegian cereal production was performed to demonstrate:
    - the environmental impacts of current practice
    - conflicting environmental and economic concerns in agricultural production systems
    - the potential for improvements with selected IPM-tools and policy instruments

Methods

Case-study catchment

A small agriculture and cereal dominated catchment in South East Norway was selected as case study for the project. The catchment is part of the JOVA monitoring program.

Test of tools to improve IPM practice

- VIPS** (forecasting and DSS) and expert recommendations compared to farmer’s choice showed:
  - Reduced use of fungicides (leaf blotch disease)
  - Reduced use of herbicides in spring
  - Reduced use of glyphosate for stubble treatment

- No apparent effect on environmental risk from pesticide use (as modeled by SYNOPS GIS).

- DAT-sensor**** for precision spraying of herbicides compared to broadcast treatment showed:
  - Up to 95% reduced area sprayed depending on weed infestation level

- Reduced environmental risk from pesticide use, due to reduced area sprayed.

Survey of farmer awareness of IPM

- The top three priorities of Norwegian cereal farmers’ (internet survey) were:
  - high crop quality
  - high crop quantity
  - low pesticide residue level

- Survey showed low knowledge of IPM, and reducing pesticide use was stated to not be a concern.

- Current practice shows adoption of IPM, as the farmers reported to often rely on:
  - Crop rotation (mainly cereal species)
  - Disease resistant varieties
  - Visual pest assessment in the field before choice of pesticide and spraying
  - Pesticide choice to avoid pesticide resistance
  - (Professional) advice – incl. some use of decision support/forecasting system (VIPS**)

Nevertheless, almost half the farmers surveyed based their choices on previous years spraying practice.

- The main suggestions to improve farming practices were:
  - better advisory service
  - educational tools for farmers
  - economic instruments targeting improved tools and technologies

- Challenges for application of IPM defined in focus group meetings included:
  - Norwegian cold and moist climate conditions
  - Need for good timing of plant protection measures
  - Fewer full-time farmers and increasing acreage to farm
  - Lack of information regarding economic benefits of IPM

Conclusions

- Current cereal cropping is sound, but precision treatment will reduce environmental impact

- Under current practice risks for P-loss is larger than risks from use of pesticides, and this must be considered for non-chemical IPM-tools

- Measures are needed to improve farmer knowledge and awareness of IPM in Norway

- Economic instruments should target new precision farming technologies

Plant diseases and weeds

Tools and practices for management of weeds and plant diseases were studied in the field, including field observations with or without aid of a forecasting/decision support system (DSS) and image processing for precision spraying (VIPS**).

Environmental impact and farm economics

Long term monitoring data (1995-2011/2015) for the Skuterud catchment (JOVA-program*) were used for model simulations of:

- Pesticide environmental effects (SYNOPS model)
- Soil and phosphorus loss (SWAT model)
- Economics of current cropping and pest management practices (regression models)

Farmer awareness studies

Current state of farmer awareness of IPM-principles (Directive 2009/128/EC), their actual IPM-practices and attitudes toward measures and instruments for increased adoption of IPM were assessed through:

- An online survey sent to 1000 cereal farmers (approx. 40% answers received)
- Focus group discussions with:
  - Farmers and advisors
  - Agricultural administration at local and regional level, the Norwegian Agriculture Agency, the Norwegian Food Safety Authority, the farmer union and the agricultural extension service

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PROJECT PARTNERS

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Further research

The RCN-funded SMARTTOP project (www.smarttop.no, fl/smarttop) assures continued focus on topics studied in the STRAPP project, including:

- New tools for improved IPM practices to control weeds/plant disease/insect pests in cereals, strawberry and apple production
- Web application for site specific pesticide risk assessment (SYNOPS WEB)
- Farmer awareness and instruments for increased adoption of IPM

* NIBIO, Ås, Norway
** Website of the project: www.nibio.no
*** Contact: marianne.stenrod@nibio.no
**** VIPS is an automatic forecasting and decision support system for agricultural pests, diseases and weeds, developed by NIBIO and The Norwegian agricultural extension service (www.selskapetforlandbruksfylte.no)
***** DAT-sensor Technology under development by DAT AS (Dimension Agri Technology) for use in precision spraying.

Contact: marianne.stenrod@nibio.no

nibio.no