FiBL TRAPEGO

Jennifer Mark (FiBL)
Lucius Tamm (Agroscope)
Stefano Torriani (FiBL)

Novel tool to assess Swiss crop protection strategies at farm level

INTRODUCTION

Several strategies to reduce pesticide use and residues in CH were implemented as part of the Swiss National Action Plan in 2021, which aims to reduce pesticide risk by 50% until 2027. Plant protection strategies are influenced by farming system, agronomic practices such as variety choice or crop rotation and depend largely on market expectations. Agronomic practices also have an impact on the risk profile of PPP use and there is an obvious need to reduce risks in all current farming systems. Currently, there is a lack of tools to allow farm managers to easily compare their farm-specific risk profile with other farms, crops and regions. There is a need for tools allowing individual, farm-specific strategy optimization in order to improve the risk profile. In this study we therefore aimed to develop a tool based on real-life farm data and risk indicators to compare PPP use strategies that allows comparison of in risk profiles at farm level. This pilot study was performed on apple orchards.

TOOL DEVELOPMENT

Data collection at farm level using surveys. Twenty farms were recruited in 6 different Swiss regions. Data collection covers detailed plant protection strategy and agronomic practices

Selection of suitable pesticide indicators which represent a PPP strategy at farm level and cover a large range of characteristics (ecotoxicology, human health). Indicators fit with pesticide use data collected

Database containing farm level data as well as data. amendment for indi-cator calculation (e.g. physical and chemical properties of active substances)

Data analysis where plant protection strategies were compared among farms, varieties and farming systems.

Feedback to farmers: this step was not implemented in the study and is a follow-up process of the tool development which will be done in a implementation project.

Table 1: selected risk indicators

Indikator	Description	Reference
Danish Pesticide Load (PL)	Calculated based on the chemical properties of the active substance for human toxicity, environmental toxicity and environmental behaviour.	(Kudsk et al., 2018)
Treatment frequency Index (TFI)	Pesticide use in a season based on quantity applied and recommendation	(Fouillet et al., 2022)
Hazard indicator	Number of hazard classifications for active substances (human, environment)	(Mark et al., in prep)
Risk Indikator surface water	Risk scores of active substances (calculated in this study using on-farm operational data)	(Korkaric et al., 2022)
Risk Indikator Groundwater	Risk scores of active substances (calculated in this study using on-farm operational data)	(Korkaric et al., 2022)
Risk Indikator Bees	Risk scores of active substances (calculated in this study using on-farm operational data)	(Korkaric et al., 2022)

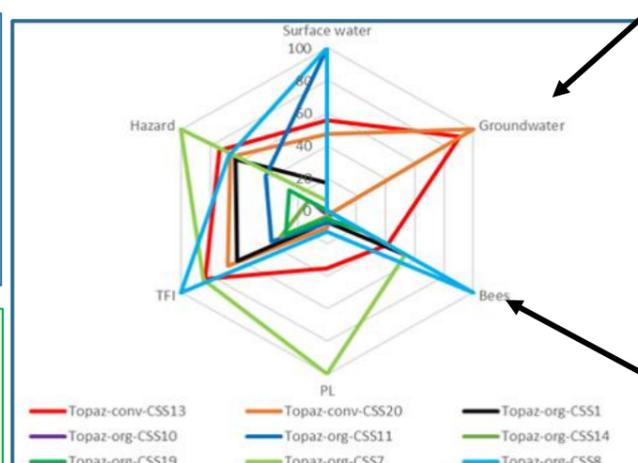Table 2: Type of data collected at farm level

Criteria	Data collected
Swiss Regions and number of farms	6 farms in region Thurgau 2 farms in region Zürich 1 farm in region Waadt 1 farm in region Wallis 4 farms in region Solothurn 6 farms in region Aargau
Number of apple varieties	79 (including apple scab resistant apple varieties)
Farming systems	10 organic 9 conventional 1 IPM (öLN)
Number of reported plant protection interventions	7114
Number of PPP active substances	85 (contained in 114 PPP formulations) Fungicides: n=42 Insecticides: n=26 Herbicides: n=6 Other a.s: n=9 Other than PPP*: n=30
Target Pests and diseases	17 (including fungal pathogens, insects and weeds)

RESULTS
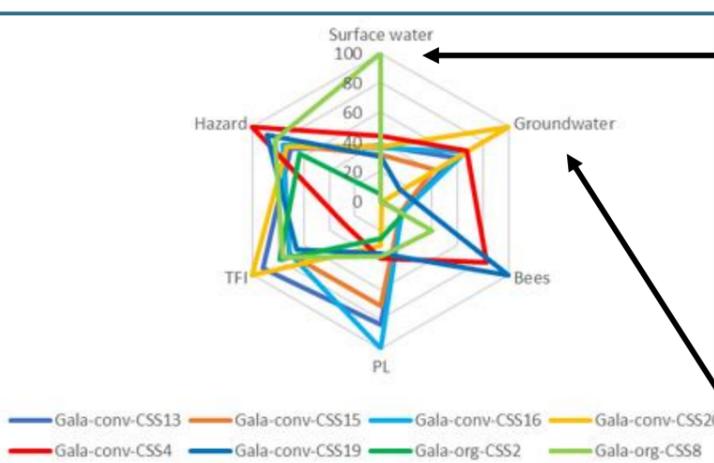
Both farms have different risk profiles on indicator Surface water: CSS8 applied copper: **«Reducing copper use would improve risk my profile»**

"Reducing use of captan and trifloxystrobin would improve my profile"

Figure 1: PPP use strategies on scab-suscptible apple variety. Profiles of 6 conventional farms and 2 organic farms are shown. Risk profile are normalized from 0 (no risk) to 100 (max risk) on 6 indicators.

Both farms applied a.s. which imply high risks on groundwater: captan, trifloxystrobin, thiacloprid, methoxyfenozid **«Reducing thiacloprid use would enhance my profile»**

This farm applied spinosad: **«Reducing spinosad use would enhance my profile»**

Figure 2: PPP use strategies on a scab-resistant apple variety. Profiles of 2 conventional farms and 7 organic farms are shown. Risk profile are normalized from 0 (no risk) to 100 (max risk) on 6 indicators.

CONCLUSION

Pesticide use data combined to risk indicators are an interesting tool for farm managers for their farming optimization. Further tool improvement and feasibility at larger scale has to be tested and discussed.