SPRINT Conference

Brussels – 25 June 2025

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SUSTAINABLE PLANT PROTECTION TRANSITION

WP6: Cost-benefit analysis

FiBL: Claudia Meier, Jennifer Mark, Johan Blockeel, Adrian Müller, Kevin DeLuca

DTU: Farshad Soheilifard, Peter Fantke, Marissa Kosnik, Yuyue Zhang, Olivier Jolliet

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WP6 objectives

Evaluate the case studies in terms of environmental and economic sustainability in a cost-benefit (C-B) analysis of different farming scenarios (C-I-O) across spatial scales.

- Analyze health impacts and economic burden of pesticide use at farm level across case studies. (**Task 6.1**, Lead: DTU; other partners involved: FiBL, all CSS leaders. M1-30)
- Quantify health damages and external costs at the farm level, considering farming system life cycles. (**Task 6.2**, Lead: DTU; other partners involved: FIBL. M1-36)
- Compare the performance and rank pesticide reduction strategies at farm level (ex-ante assessment). (**Task 6.3**, Lead FiBL; other partners involved: DTU, all CSS leaders. M1-42)
- Develop upscaling scenarios & sensitivity analysis of pesticide reduction strategies at regional level. (**Task 6.4**, Lead FiBL; other partners involved: DTU)
- Compare the performance and rank pesticide reduction strategies at regional level. (**Task 6.5**, Lead FiBL; other partners involved: DTU)

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Outline

- **STATUS QUO**
  - **Current crop protection practices and opportunities for reduction** (author: Jennifer Mark)
  - **Private costs of current crop protection practices** – a comparative analysis using FADN data (author: Johan Blockeel)
  - **External/ Societal costs of current crop protection practices** (author: Farshad Soheilifard)
- **INTERVENTION STRATEGIES TO REDUCE THE RELIANCE ON SYNTHETIC PESTICIDES**
  - **Perceived economic viability at farm-level** (author: Claudia Meier)
  - **Potential to save costs at societal level –** results from food system modelling (author: Adrian Müller, Kevin DeLuca)
- **POLICY RECOMMENDATIONS**

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STATUS QUO:

Current crop protection practices and opportunities for change

Author: Jennifer Mark, Research Institute of Organic Agriculture (FiBL)

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Current crop protection practices

SPRINT pesticide use database

- Access Database comprising all agronomic data of CSS farms for the year 2021 – around 10 to 15 farms per Sprint case study site.
- Used as input data for all WP6 deliverables.
- Publicly available on SPRINT sharepool:
  - https://doi.org/10.5281/zenodo.12526872 (Mark et al., 2024)
- Related publication is out:
  - Mark et al. (2024). Selected farm-level crop protection practices in Europe and Argentina: Opportunities for moving toward sustainable use of pesticides. *Journal of Cleaner Production* 477, 143577.

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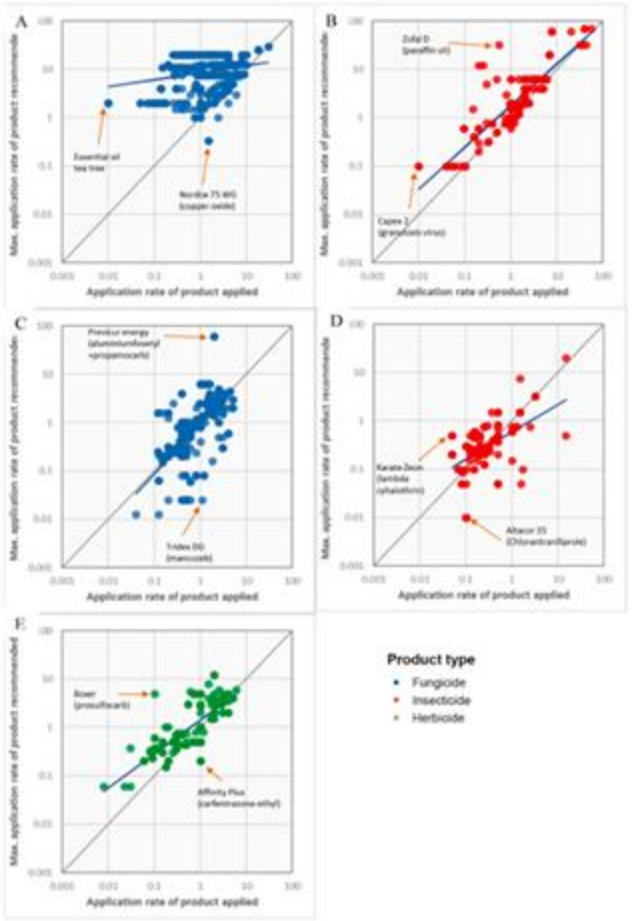
Current crop protection practices
Highlights

- Pesticide dosage applied during cropping season varied up to a factor of 20 around recommended doses.



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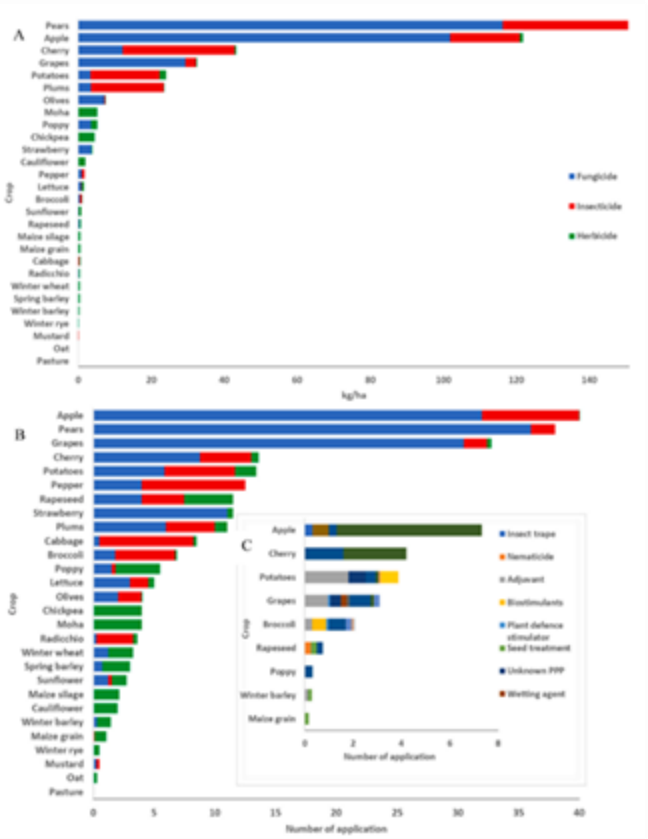
Current crop protection practices
Highlights

- Perennial crops have the highest expenses and interventions for pesticide use.
- Sulfur and copper are by far the most important pesticides in terms of frequency of use and quantities applied.
- Some active substances applied are not renewed and some are candidates for substitution.
- Detailed state of the art of pesticide use help and support pesticide use reduction strategies.



Graphs show results from the application from SPRINT CSS and are therefore not representative for the entire farm population.

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Current crop protection practices
Opportunities for change

Strategies to reduce PPP use and synthetic pesticides collected at farm level in the case study sites.

Type of crops	Preventive measures to reduce PPP use	Replacement of synthetic PPP through organic PPP
Perennial crops (e.g. apple)	Weather station, regional advisor support, damage thresholds, Phytosanitary notices, online information, use of resistant varieties (e.g. Topaz: scab resistance)	Myco-Sin, NeemAzal T/S, Curatio, Madex Top
Grapevine	Warning systems at wine station, monitoring observation, resistant cultivars which are adapted to the region, weather prognostics, advisor support, regional bulletins	Kumulus S, Heliosoufre S, Bouillie bordelaise, Thiovit Jet
Cereals	Notifications, newsletter, farmers associations, resistant varieties, optimal sowing date, 4-year crop rotation	Some farms did no treatments, and strategy was set on preventive measures.
Potatoes	Following non-governmental own paths, non-commercial instructions, crop rotation	Some farms did no treatments and strategy was set on preventive measures
Vegetables (e.g. broccoli)	Warning systems, periodic visual diseases and pest sampling, advisor support, weather station, use of regional bulletins, crop rotation	NeemAzal T/S, Capsanem, Cuprotect, Prev Am

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STATUS QUO:

Private costs of current crop protection practices - a comparative analysis using FADN data

Author: Johan Blockeel, Research Institute of Organic Agriculture (FiBL)

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Private costs of current crop protection practices
Highlights

INPUTS

- **Reductions in crop protection costs across all types**, ranging from **€26.83/ha (Specialist Olive)** to **€431.55/ha (Specialist Horticulture)**.
- **Reductions in fertiliser costs for all types**, with decreases between **€34.38/ha (Specialist Vineyard)**and **€443.93/ha (Specialist Horticulture)**.
- **Decreases in total crop-specific production costs for all types**, ranging from **€5.35/ha (SpecialistVineyard)** to **€1,485.42/ha (Specialist Horticulture)**.

COST SAVINGS

LABOUR

- **Contract work costs showed mixed effects**, ranging from a **€43.22/ha reduction (SpecialistHorticulture)** to a **€37.34/ha increase (Specialist Vineyard)**.
- **Total labour inputs per hectare declined slightly**, with the most significant drop of **0.12 AWU/ha(Specialist Horticulture)**.

MINIMAL DIFFERENCES IN LABOUR

INCOME

- **Gross farm income per hectare increased in most types**, with changes ranging from a **€1,456.09/ha reduction (Specialist Horticulture)** to a **€455.13/ha increase (Specialist Vineyard)**.
- **Gross income without subsidies mostly decreased**, with the largest drop seen in **Specialist Olive (€277.42/ha)**.

SUBSIDIES PLAY A FUNDAMENTAL ROLE

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Potential to save costs at societal level
Intervention strategies

More concretely, these different dimensions mean the following:

- Robust varieties: different yields and inputs
- Low residues: different yields and inputs, interaction with rainfall intensity
- Agroecology: wider crop rotations: different crops, in particular more grass
- Agroecology: mechanical weeding: different yields and inputs, interaction with rainfall intensity
- Organic shares: different crops, yields and inputs, interaction with rainfall intensity
- Reduced feed-food competition: different crops, in particular less silage maize
- Rainfall intensity: different yields

- Different yields thus results in changed production quantities
- Different inputs results in changed pesticide use and environmental impacts and related costs
- Different crops (crop rotations) result in different production patterns (e.g. less production of the focus crop for food, more production of other crops for feed)

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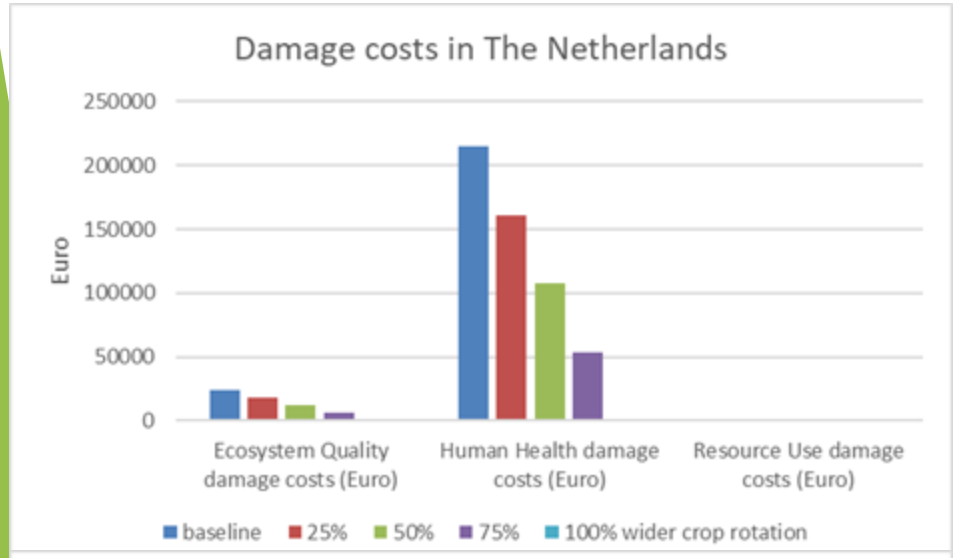
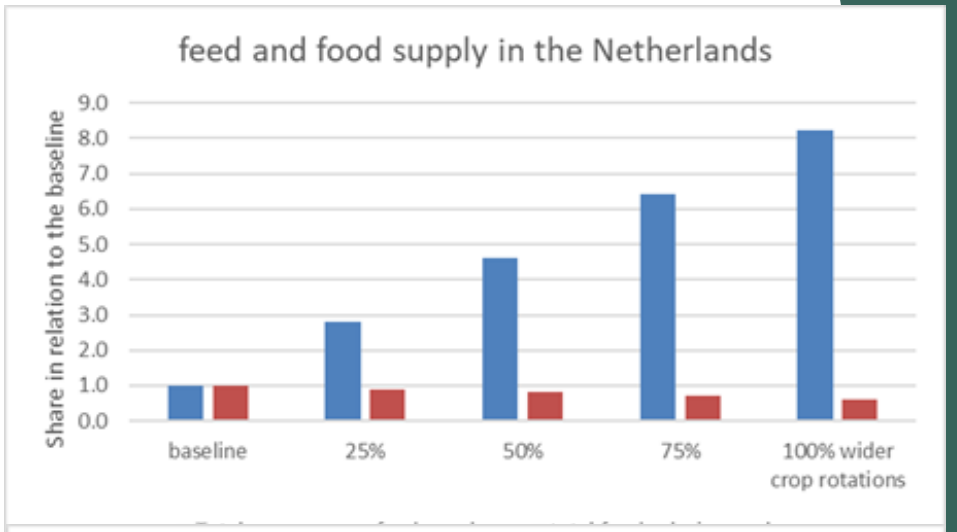
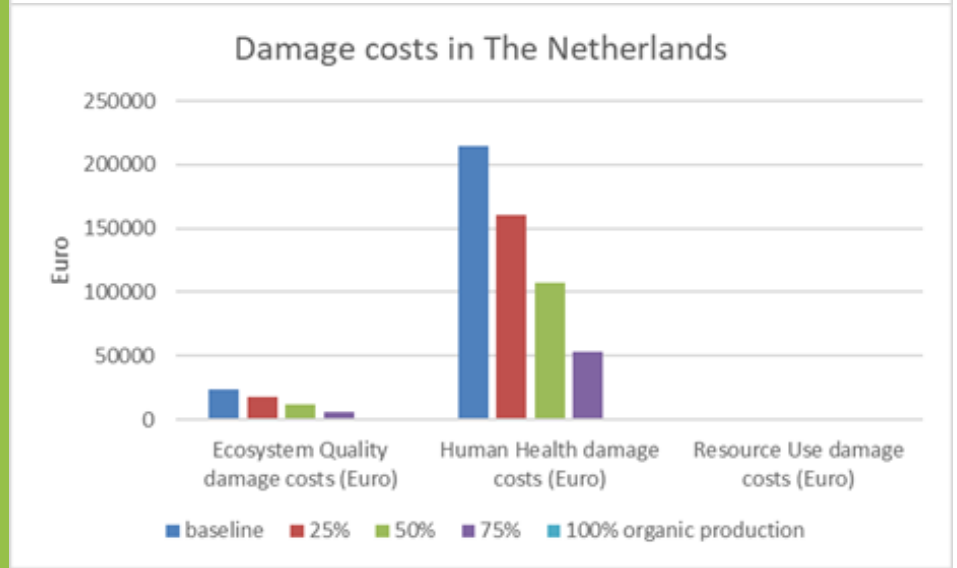
Potential to save costs at societal level Intervention strategies

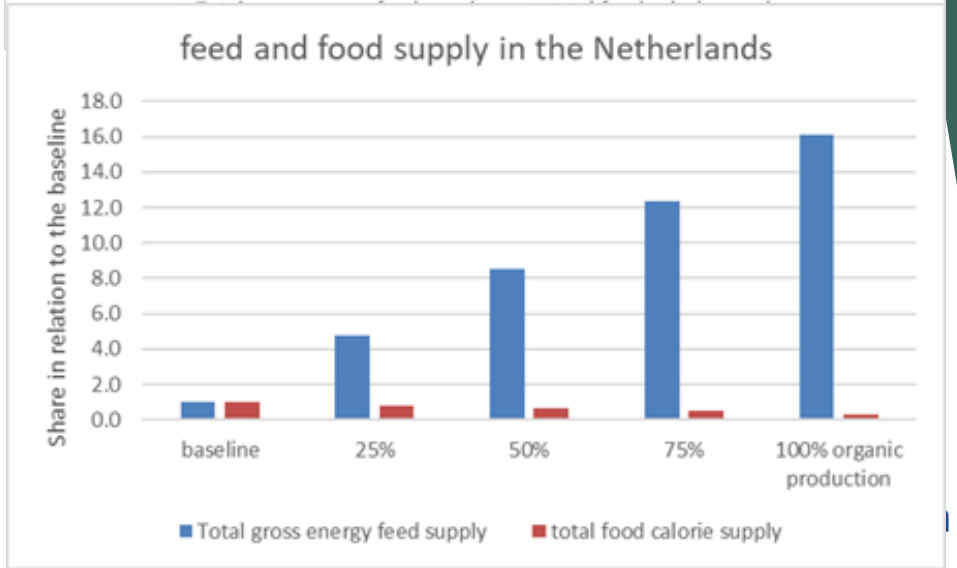


agroecological practices (wider crop rotations)





organic management



Potential to save costs at societal level Discussion

- pesticide reduction strategies contribute to reductions in damage costs for human health, ecosystems and regarding resource use
- they tend to lead to reduced production
  - combined with other strategies, such as reduced feed production from croplands or food waste and loss reduction, these reductions in food supply can be counteracted
- a caveat on the results: damage costs are only reported for the key crops
  - for a comprehensive picture, damage costs of the other crops should be included as well

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Policy recommendations

- Pesticide reduction strategies are economically viable if farmers are compensated for reducing external/ societal costs and if their perceived risk of implementation is addressed through effective advisory support and information/ awareness raising measures.
- Pesticide reduction strategies can change the production basket and thus food and feed supply considerably. For upscaling these strategies, a whole food system perspective thus needs to be adopted. Thus, for consistent implementation, action on other aspects such as dietary patterns and food waste and loss should complement pesticide reduction strategies.

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Policy recommendations

- Strengthen data-sharing protocols between farmers, researchers, and policymakers to enhance real-time tracking of pesticide impacts.
- Establish an EU-wide monitoring system that uses advanced emission and impact models to guide pesticide authorization decisions.
- Support knowledge-sharing platforms to help farmers transition to lower-impact pest control methods, aligning with CAP's emphasis on sustainability.
- Strengthen policies around monitoring and enforcement to ensure compliance with EU-wide regulations and transition targets.

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