FRUIT PRODUCTION IN SWITZERLAND: FARM-LEVEL IMPACTS OF PESTICIDE REDUCTION STRATEGIES

Country: Switzerland

Crop: Apples

Focus: Fungal disease control

Agronomic interventions:
Robust varieties
Organic fungicides
Foil coverage

Some of the SPRINT case study sites were selected for a deep analysis into farm-level economic impacts of agronomic interventions for reducing synthetic pesticide reliance. This factsheet provides country-specific results for Switzerland.

Apples in Switzerland

Table apples were the main type of fruit focused on here. These apples are grown to eat rather than to juice, with growers tending to use low trunk systems. The main apple varieties grown and consumed in Switzerland include Gala, Golden Delicious, and Braeburn.

3 orchards analysed
1 = IPM
2 = organic

Pesticide use in orchards

- There are a 3700ha of apple orchards in Switzerland, around 600ha of which is organic
- The surveyed IPM farm applied 22 chemical treatments while the organic orchards used 25 treatments in the same period
- Fungicides applied on the IPM farm: 8 fungicides, of which 3 organic and 5 synthetic.
- Fungicides applied on the organic farms: 3 to 4 organic fungicides
- Many apple growers appear to use several different active substances to avoid resistance.

A detailed economic assessment of conventional and organic apple orchards is available in Bravin et al (2023).

Key fungal pressures in orchards

Apple scab
Apple brown rot
Apple leaf spot

Organic
Sooty blotch
Bitter rot
Apple blotch

Current agronomic practices

Interviewed experts explained that apple growers in Switzerland are using several measures to minimise reliance on synthetic fungicides. These measures include:

- Pruning, trimming and thinning out to ensure trees dry rapidly after rainfall
- Removal of fallen fruit, fruit 'mummies', and fallen leaves, which are recycled as mulch
- Low tree densities can help to improve aeration and minimise leaf wetness (3000 tree/ha maximum)
- Hot water treatment is used in organic orchards and is promising for preventing storage diseases
- Applying Armicarb, an organic product which treats against scab and powdery mildew
- Robust apple varieties can help control fungal diseases, with 10-15% of Swiss orchards already using varieties resistant to scab, fire blight, and/or powdery mildew
- Copper can control fungal diseases but the high application rates can leave substantial residues in soil - compost tea offers a potential alternative

Advice surrounding weed control

Extensionists use several communication channels to engage with farmers about disease control in orchards, with engagement highest during Spring, when crop protection becomes more of a challenge.

Methods include:

- 1:1 interactions
- Experience-sharing events
- Workshops
- Emails
- Newsletters
- Training courses
- Information evenings
- Contributions to fruit associations

Impacts of agronomic interventions

Experts had differing views on the ideal density of apple trees per hectare, with recommended levels ranging from 2000-3000 trees/ha.

Interventions for reducing synthetic pesticide reliance

The following sections explore the potential of the following approaches:

1. Robust varieties
2. Low residue strategies
3. Foil coverage

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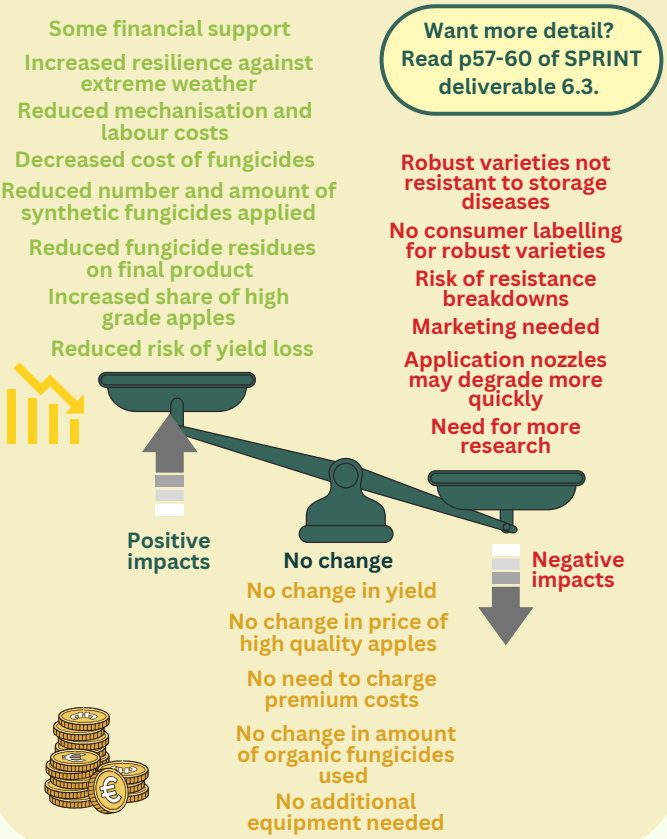
Proposed intervention 1: Robust apple varieties

Experts were asked to assess various indicators for this intervention, and evaluation was undertaken based on current fungicide prices.

Pros and cons of growing robust apple varieties

Want more detail? Read p57-60 of SPRINT deliverable 6.3.



Key barriers to adoption

- Growers who sell to traders, wholesalers or large retailers may struggle to sell robust apple varieties as they are **unknown to many consumers**, unlike current popular varieties such as Gala, which is one of the most susceptible apples to fungal disease
- A **lack of production experience** with robust varieties can limit the capacity of growers to experiment
- Robust varieties are **only resistant to certain fungal diseases**, including scab and mildew, so spraying is still needed to some extent
- **Storage diseases are not prevented** by robust varieties. These diseases must be avoided when selling to retailers
- **Resistance breakdown** is another key concern

Enabling adoption

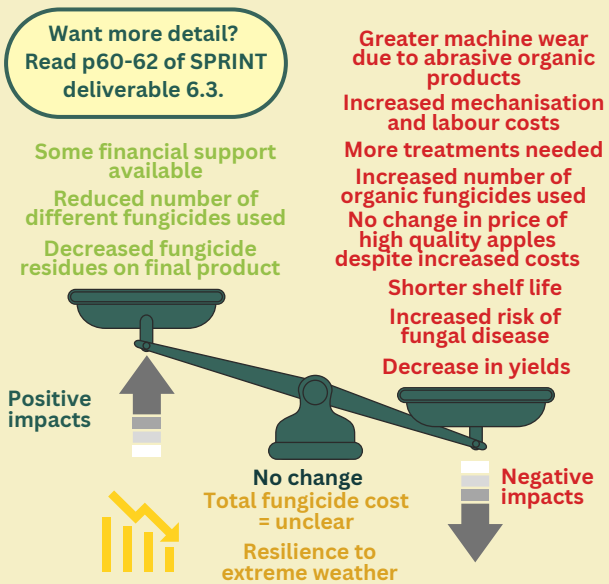
- Experts explained that **growing robust apple varieties can be easier for organic producers and where apples are sold directly** to consumers or small retailers
- **Consumer demand and financial incentives** from traders and retailers may help to promote the use of resistant apple varieties
- Since 2024, the Swiss government has introduced **some financial support** for those growing robust apple varieties
- There are also ongoing efforts to **increase consumer awareness**, including by an organic agriculture research institute (FiBL)
- IP Suisse is developing a **label for robust varieties**

Experts explained that **current uptake of robust apple varieties is around 10-15%** among conventional growers and 30% in organic orchards. They agreed that conventional orchards will **increase uptake to around 30% within the next 5-10 years**.

Proposed intervention 2: Low residue strategy

Pros and cons of low residue strategy

Want more detail? Read p60-62 of SPRINT deliverable 6.3.



Key barriers to adoption

Adopting a low residue strategy was seen as difficult by most experts due to:

- **Wet weather conditions in Spring**, as this makes using organic fungicides more difficult
- **Difficulties avoiding chemical use before harvest** as these make apples more storable
- **More knowledge intensive,** with increased research and monitoring needed
- **Copper**, an organic alternative, has a poor reputation
- **Lack of subsidies** to support low residue approaches

Enabling adoption

Low residue strategies may be **more realistic for those transitioning to fully organic systems**. Hot water treatment may also mitigate storage disease, though this is costly and energy intensive.

Current uptake in conventional orchards: <10%
Experts did not expect any significant increase in uptake in the next 5-10 years.

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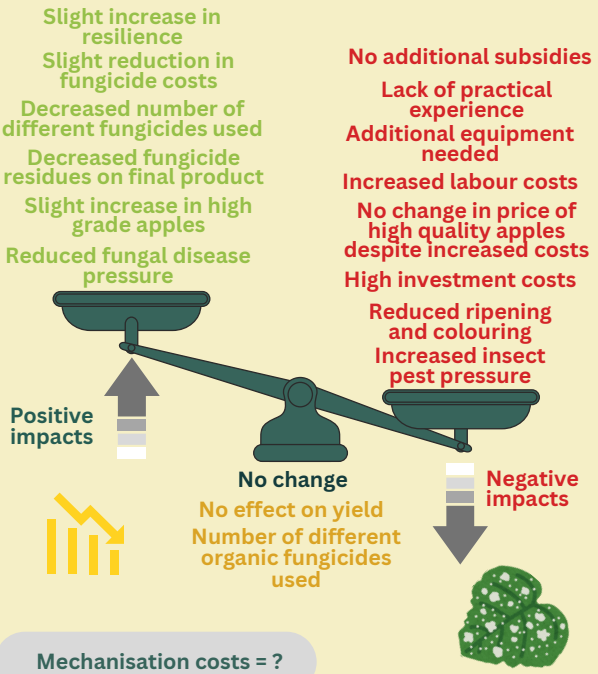
Proposed intervention 3: Foil coverage

Pros and cons of foil coverage in apple orchards



Mechanisation costs = ?

Current uptake in conventional orchards: <0-5%
Experts expected a maximum uptake of 10% in the next 5-10 years due to the identified barriers.

Want more detail? Read p62-65 of SPRINT deliverable 6.3.

Key barriers to adoption

Foil coverage in Swiss apple orchards was seen as very difficult by most experts. This is due to:

- **High investment costs**, including foil and irrigation equipment
- **A lack of government support**
- **Additional labour costs**
- **Additional space** requirement, making the approach impractical for smaller orchards
- **Increased insect pest pressure,** e.g., aphids/mites
- More risk of **dry rot fungi** due to increased temperature under foils
- **Inhibited fruit ripening and colouring** due to reduced light
- Increased irrigation requirement

Enabling adoption

Foil coverage may be beneficial for preventing apple scab and apple blotch. It may also reduce the incidence of storage diseases. However, the costs of installation and management of foil is seen as prohibitive.

The benefits for organic orchards may be higher as they are unable to use synthetic fungicides. Equally, orchards with their own water supply for irrigation may also be more able to use foils.

Conclusions

The potential of three agronomic interventions for moving away from synthetic fungicides in apple orchards were assessed. These interventions were assessed through expert interviews and evaluation of current pesticide costs. All three approaches involve several drivers and barriers to adoption. Each of these appear to be more suitable for orchards undergoing organic conversion. Organic growers are prohibited from using synthetic fungicides, giving them more impetus to experiment with alternative interventions for controlling fungal diseases.

Full report: SPRINT Deliverable 6.3.
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