IPM ADOPTION FACTSHEETS

Organic sector

The aim of IPMWORKS is to encourage the implementation of IPM strategies across the European Union by utilizing a network of farmers. Through peer-to-peer learning and collaborative efforts, these farmers will advance in their use of IPM strategies and showcase the effectiveness of holistic IPM in achieving reduced pesticide reliance, improved pest control, cost savings, and increased profitability.

This factsheet outlines the IPM practices employed by the organic sector, uniting organic farmers across various countries and crops.

COUNTRIES

BELGIUM FINLAND

ITALY POLAND SPAIN

CROPS/CULTIVARS

Cereals, soy, lentils, flax, gold of pleasure (arable), horticultural crops (greenhouse), brassicas, berries, courgette, leek and carrot (outdoor veg).

FARMERS

A collective of **26** organic farmers actively participates in the project, organized by crop types. Specifically, there are **4** organic farmers in Belgium and Finland affiliated with the Outdoor Vegetable HUB, **9** in Italy contributing to the Orchard HUB, **6** in Spain associated with the Greenhouse HUB and **7** distributed between Italy and Poland belonging to the Arable HUB.

MAJOR PESTS AND DISEASES

Greenhouse: Tuta absoluta (tomato), whiteflies, thrips, aphids (most crops)

Orchards: Olive fly, margaronia, bedbug (Rincota pentatomidi)

Outdoor Veg: Club root, Flea beetles, cabbage root fly, diamond moth and cabbage aphid (brassicas), snails (celery)

All: weeds. *Lolium spp* (arable)

ARABLE

INTERCROPPING WITH LEGUME FORAGE CROPS ON COMMON WHEAT

→ Weed control

→ Biomass production with a contemporary sowing, with differences highlighted in the two species tested (Egyptian clover and sulla)

→ N-fixation

Egyptian clover gives a better soil cover but is too competitive against wheat, so seed rate should be limited. Sulla (usually biennial) has a lower emergency rate but it resprouts in September if no tillage is performed. Moreover, Sulla can be oversown to get a better soil cover and used as a forage crop in the following spring.

Intercrop sulla soft wheat

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INTERCROPPING WITH PULSES

Lentil intercropped with durum wheat was tested. The technique has few agronomic limitations and can be successfully implemented in organic. Tested for two years in a row in hilly environment in an organic farm with a relay sowing and a contemporary sowing.

Sulla intercropped with durum wheat

RESISTANT LOLIUM SPP. POPULATION AND GRASS WEEDS CONTROL

In organic farm hills, Lolium spp. and grassweeds are well controlled in crop rotations involving winter cereals – forage crops thanks to mowing and ploughing at the end of the annual or perennial grassland (every 2-5 years) e.g. after sulla or alfalfa and before winter cereal sowing. Seed cleaning before sowing the cereal helps too.

GREENHOUSE

INTEGRATED CONTROL OF TUTA ABSOLUTA

Augmentative and conservative biological control, mating disruption technique, light traps, bioinsecticides and crop management. Tuta absoluta is the top pest of tomato crops worldwide. For greenhouses in the Mediterranean area, we recommend using a combination of strategies:

→ **Releasing mirid predators** (Nesidiocoris tenuis or Macrolophus sp.) and egg parasitoids (Trichogramma sp.);

→ **Using flower strips to attract spontaneous, parasitoid species such as Necremnus tutae**. Provided that this parasitoid establishes well in the greenhouse, the efficacy of this integrated strategy deems the application of chemical pesticides unnecessary, as shown in the organic and conventional farms that have tested it.

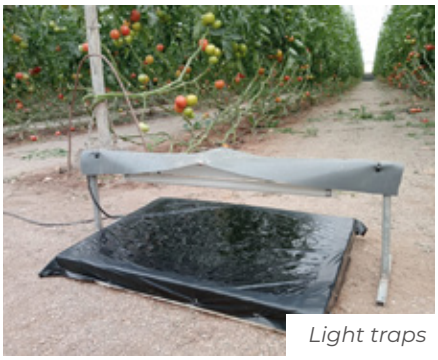
→ **Using sex pheromones** to promote mating disruption, which slows down the population build-up of *T. absoluta*;

→ **Using light traps to reduce the abundance of adults** (moths); and

→ **Using bioinsecticides such as Bacillus thuringiensis.**

→ Also, it is important to use crop management techniques such as **manual defoliation** to reduce the number of galleries in the crop, and **solarization** at the end of the crop cycle to eliminate all T. absoluta pupae in the soil. Each of these elements have proven to successfully reduce T. absoluta abundance in tomato greenhouses. Since each element targets different stages of the pest (egg, larva, pupa, adult), it is recommended to combine all, to maximize their effect.

Nesidiocoris



Light traps

Solarization

FLOWER STRIPS AND/OR HEDGEROWS TO BOOST BIOLOGICAL CONTROL OF PESTS

Favouring the abundance and diversity of autochthonous plant species inside and outside the greenhouses boosts the activity of beneficial insects such as predators and parasitoids of pests. These plants offer nutrients (nectar, polen, insects) and shelter for beneficial insects, and can also act as a barrier against pest species.

Flower strips on a watermelon crop

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This strategy reinforces biological control, including natural enemies that are released over the crop, and those spontaneously appearing from the surroundings. Particularly, hedgerows have been shown to increase the diversity of natural enemies in greenhouses, indirectly promoting a reduction of major pests such as aphids and whiteflies.

Whitefly (Bemisia tabaci)

ORCHARDS

CONTROL OF OLIVE FLY WITH

→ **Rock powder (kaolin and zeolite):** Applied max 3 times a year to produce a film to prevent olive fly from recognising the tree and the fruit. It also reduces moisture in the leaves' surface, prevents fungal diseases and reduces soil temperature, which in turn reduces heat stress. This was tested in 3 organic farms in Italy.

→ This method has been used in combination with **protein-bait**, but only when infestations exceed recommended thresholds. Protein-bait's limited application has to do with rising product costs. The bait is spread in large droplets on the upper, sun-exposed parts of the tree. It can also be activated with a natural insecticide approved for organic farming, such as Spinosad. This method attracts and eliminates insects using a food-based attractant.

→ **Mass trapping**: using traps activated with pheromones, food attractant or both. it is recommended to deploy a range of 50 to 75 traps per hectare, depending on the severity of the infestation. The primary constraint lies in the necessity to cover a minimum area of 3 hectares to achieve optimal effectiveness. However, numerous farms have smaller or fragmented land holdings, presenting an opportunity for collaborative efforts with neighboring farmers. This was tested in 2 organic farms in Italy.

Rock powder applied

OUTDOOR VEGETABLES

CONTROL OF GREY MOULD (BOTRYTIS)

It is the biggest strawberry and raspberry plant disease in open field cultivation. The alternative to chemical pesticides is the **biological control agent Prestop Mix (*Clonostachys rosea J1446*)**. It is applied through pollinated-assisted distribution: bees help transport it during strawberry and raspberry flowering time. The bees carry the Prestop Mix in their leg hairs as they walk out of the hive through the Vekotin, where the Prestop Mix is located. They deliver it to the strawberry and raspberry inflorescences in the flowering phase. The losses caused by grey mould are minimal.

PEST CONTROL IS FOCUSED ON BRASSICAS & BERRIES

→ Insect nets or cover cloths.

→ In the fight against birds and moles, a wind hawk is used to help in the strawberry & raspberry farm, for which a nest is built.

Insect net

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→ A rich and healthy biodiversity helps keeping pests and diseases from the fields.

CROP ROTATION

The target is to implement a 4 to 5-year crop rotation plan:

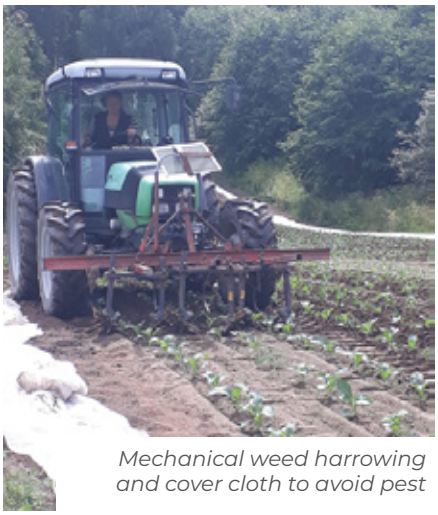
→ **Year 1:** Brassicas

→ **Year 2:** Other vegetables

→ **Year 3:** 1 grass year; weed control is managed in the spring. The lawn is sown with a multi-species grass seed mixture by the end of June.

→ **Years 4-5:** Grass.

This rotation strategy aims to optimize agricultural practices while ensuring effective weed control and promoting biodiversity in the grassed areas.



Mechanical weed harrowing and cover cloth to avoid pest

WEED MANAGEMENT

Effective weed management practices have been implemented across different crops within the agricultural system. For Brassicas and leek, a combination of harrowing and hand weeding is employed to ensure thorough weed control. On the other hand, for Celery and Zucchini, the soil is covered using biodegradable film, acting as a protective barrier against unwanted weeds.

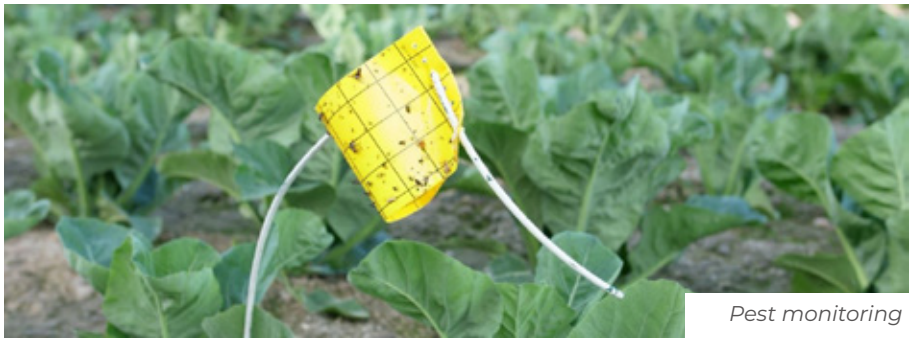
Plastic covering in Zucchini to avoid the use of herbicides

PEST MONITORING

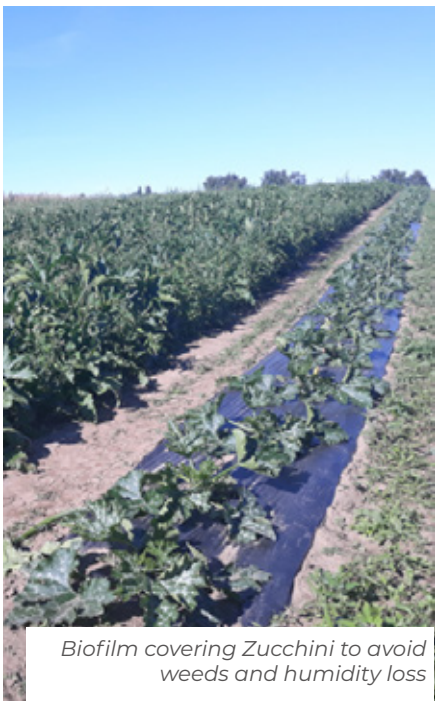
Pest monitoring is conducted through the strategic use of yellow sticky traps or pheromone traps. These monitoring techniques serve as effective tools to track and assess pest populations, enabling timely and targeted responses to maintain crop health and minimize potential damage.

PEST MONITORING IS FOCUSED ON BRASSICAS & BERRIES

In the ongoing battle against birds and moles, insect nets or cover cloths are employed as protective barriers. Specifically, in the strawberry and raspberry farm, a wind hawk is utilized, aided by a purpose-built nest. This integrated approach not only addresses the challenges posed by birds and moles but also contributes to the establishment of a rich and healthy biodiversity. This diverse ecosystem plays a crucial role in naturally preventing pests and diseases from infiltrating the fields, promoting sustainable and eco-friendly farming practices.



Pest monitoring



Biofilm covering Zucchini to avoid weeds and humidity loss

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