



Biodiversity for a better greenhouse crop production

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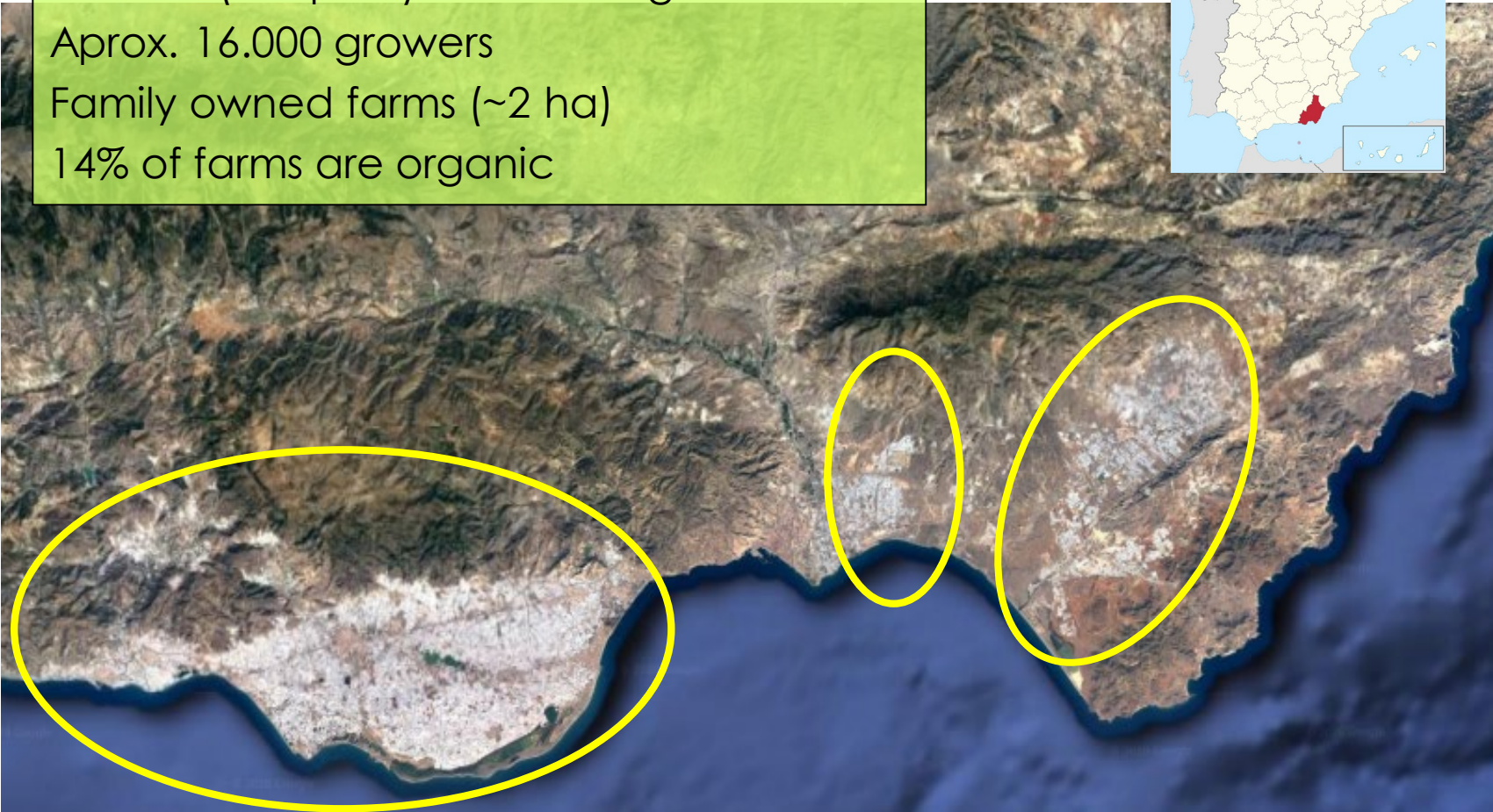
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- COEXPHAL is an **association of cooperatives of fruit and vegetable farmers**, with an innovation center for **applied research, advisory and extension services**
- **104 associated companies** (cooperatives and auctions) (65% of the greenhouse crop production in Almeria)
- **Currently: 9 Horizon Europe/H2020 projects, 7 EIP-AGRI Operational Groups**, targeting crop sustainability and farm digitalization.

Greenhouse horticultural sector

Almeria (SE Spain): 33.000 ha greenhouses
 Aprox. 16.000 growers
 Family owned farms (~2 ha)
 14% of farms are organic



Greenhouse horticultural sector

Crops: sweet pepper, tomato, zucchini, cucumber, water melon, melon, aubergine
 Total production >3.5 million T
 >75% production is exported



Major pests in greenhouse crops

Tuta absoluta (only in tomato)



Whitefly (*Bemisia tabaci*)



Thrips (*Frankliniella occidentalis*)

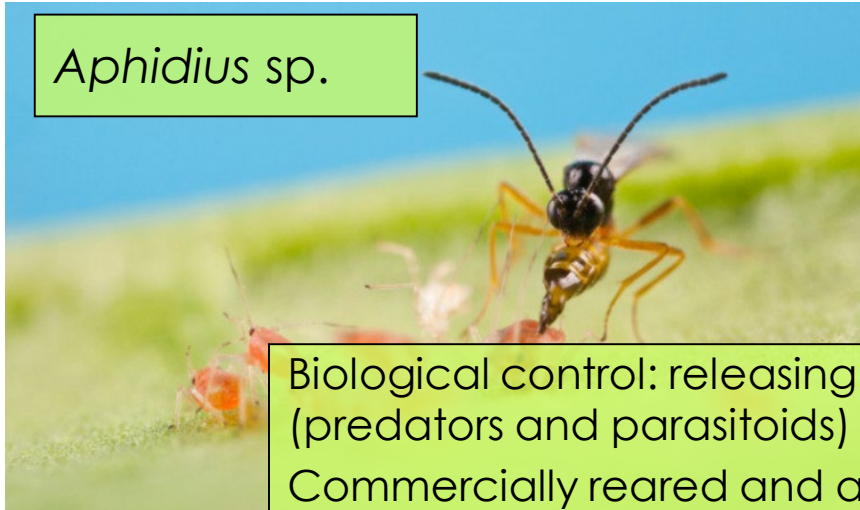


Aphids (different species)

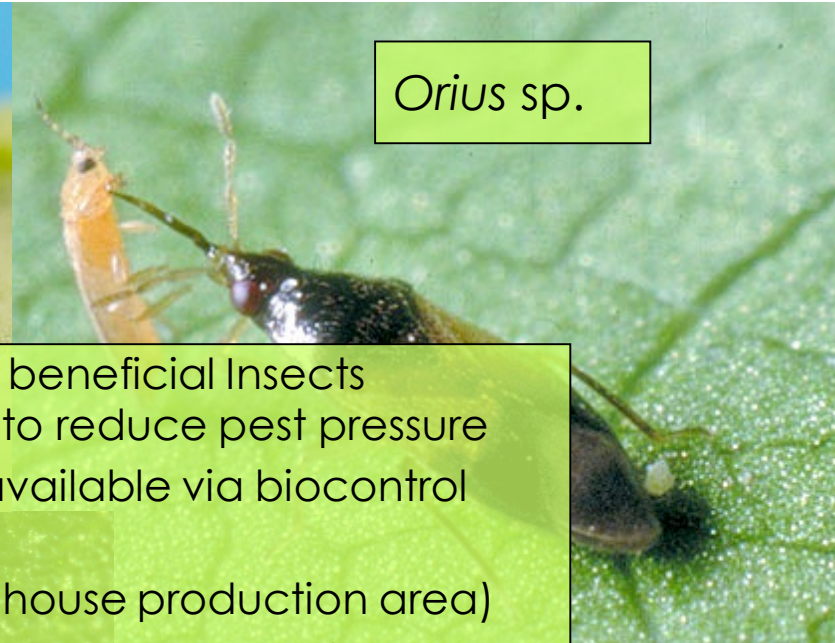


IPM in greenhouses: biological control

Aphidius sp.



Orius sp.

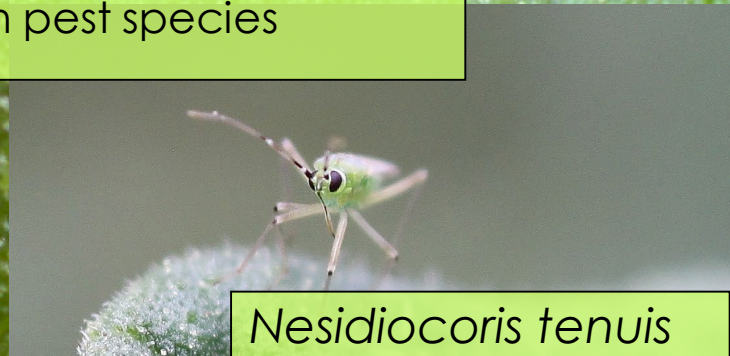


Biological control: releasing beneficial Insects (predators and parasitoids) to reduce pest pressure
 Commercially reared and available via biocontrol companies
 Fairly common (~50% greenhouse production area)
 Successful against most common pest species

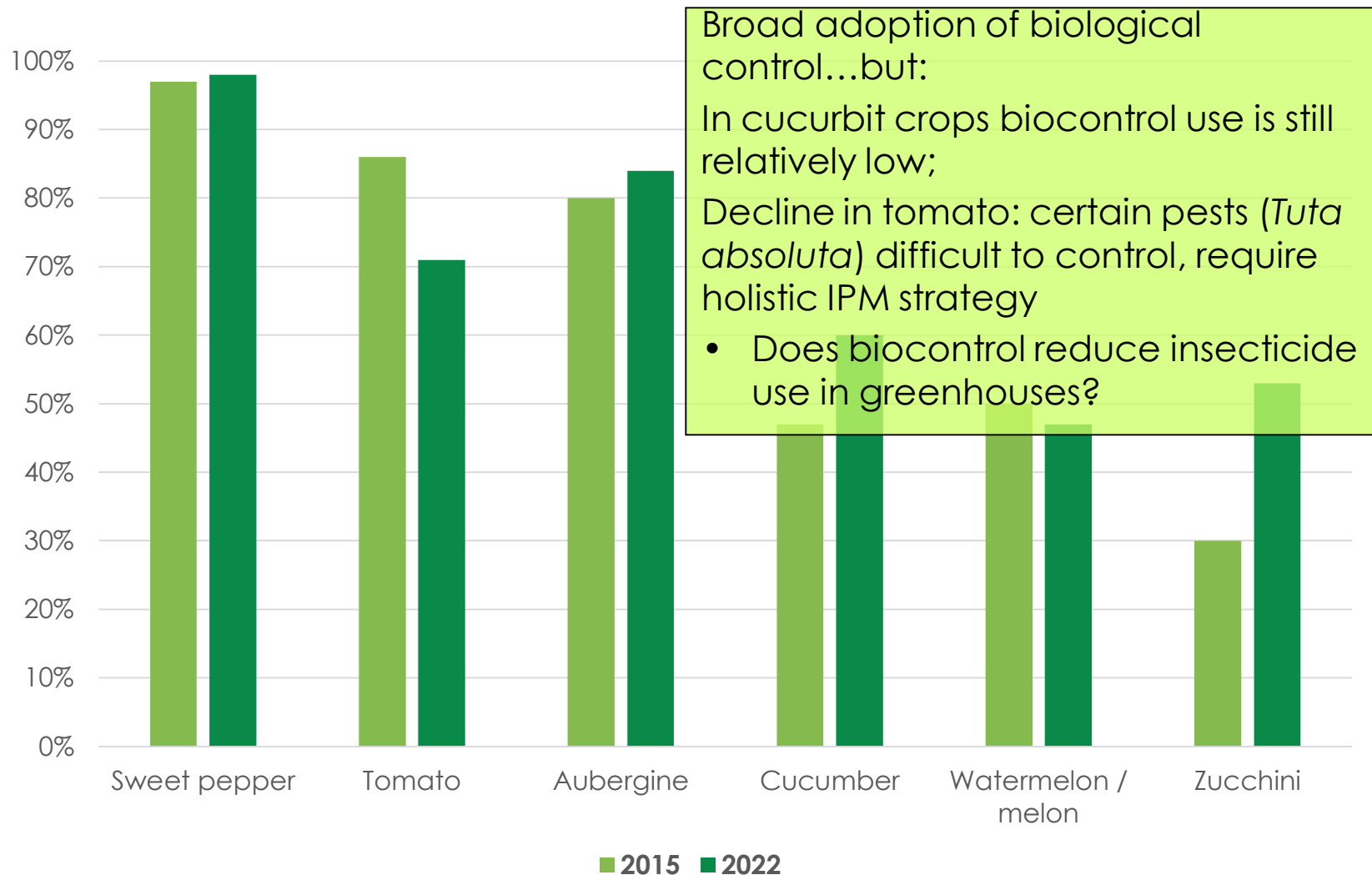
Phytoseiid mites



Nesidiocoris tenuis



Greenhouse growers (%) using biocontrol in Almeria



Broad adoption of biological control...but:

In cucurbit crops biocontrol use is still relatively low;

Decline in tomato: certain pests (*Tuta absoluta*) difficult to control, require holistic IPM strategy

- Does biocontrol reduce insecticide use in greenhouses?

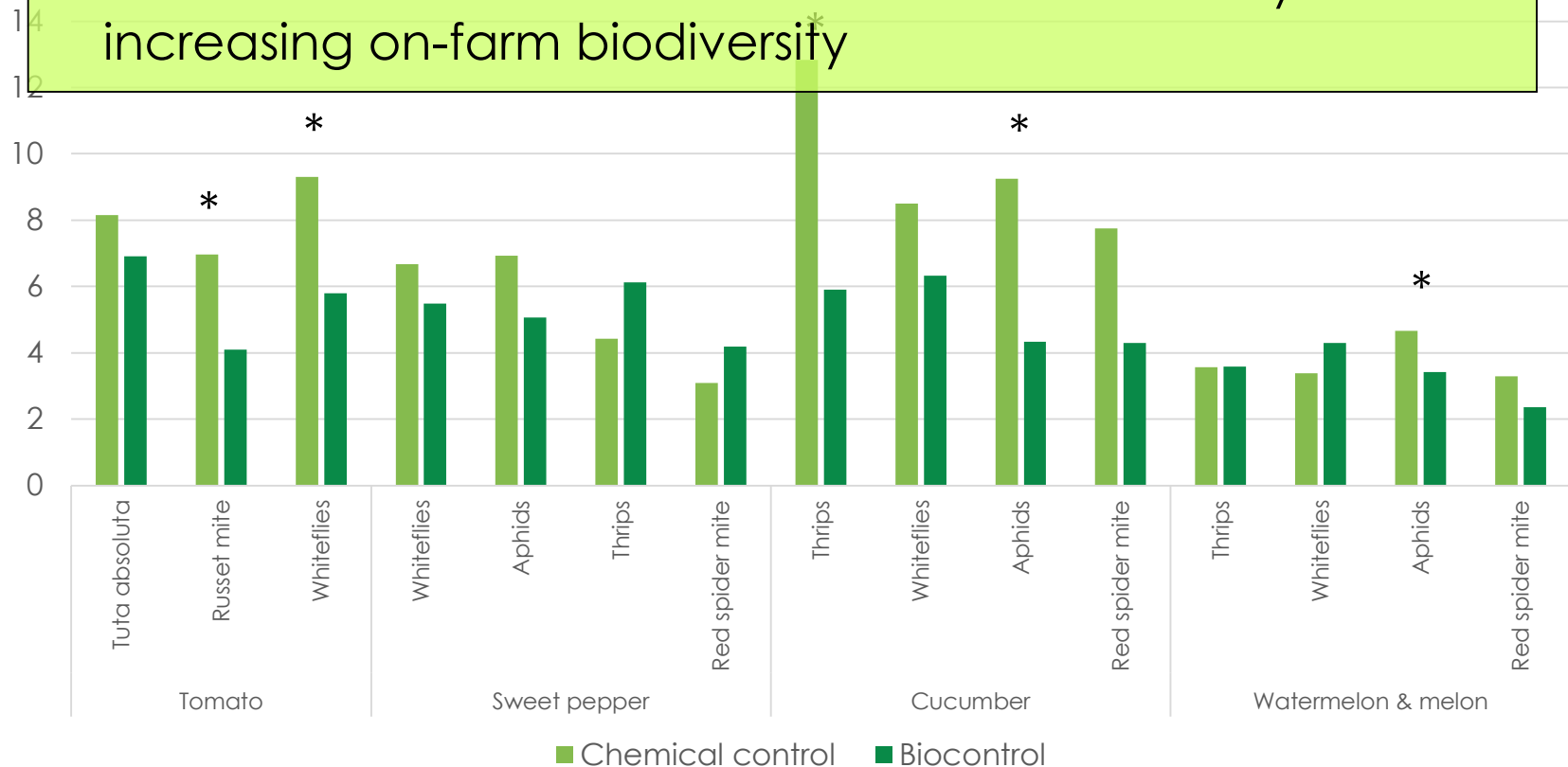
Data from questionnaires (n ~ 550 farmers)

Insecticide treatments (chemical vs. biocontrol) in

greenhouses (2022)

Farmers using biocontrol reported lower number of insecticide treatments for 11 (out of 15) pest species.

- Biocontrol works... and... it can be enhanced by increasing on-farm biodiversity



Data from questionnaires (n ~ 550 farmers)

Biodiversity boosts biocontrol

Habitat



Food



Parasitoid wasp



Common yarrow (*Achillea millefolium*) in a sweet pepper crop



Syrphid fly



Lacewing

Farmers are learning that the more diverse their farm is, the lower the risk of pest and disease damage

Biodiversity boosts biocontrol



Cucumber crop with a combination of multiple auxiliary plant species

Biodiversity boosts biocontrol



Hedgerow with several plant species surrounding a greenhouse

My duty as a hub coach in IPMWORKS

Guide and support a network of farmers (and advisors) to help them to upgrade their IPM strategies – very much focused on improving biological control



1st demo event (2021) – the farmer



Esther Molina (Coprohñíjar):
watermelon, sweet pepper and
 tomato crops

1st demo event – IPM strategy



Efficient, **holistic pest control strategy** in **watermelon** (particularly vs. **aphids**):

- Releasing beneficial insects
- Anticipating (2 months) the plantation of banker plants
- Flower strips

1st demo event – IPM strategy



Esther's hedgerow, outside her greenhouse
>20 autochthonous plant species

1st demo event – crop monitoring

Every two weeks, we monitored crop health, beneficial insects' and pests' abundance (together with the farmer, her field advisor, researchers, biocontrol company staff, regional government staff)



1st demo event – the right timing

A few weeks before harvest, there was a full control of all crop pests (including aphids)...without using chemical pesticides



1st demo event – organization of the demo



Junta de Andalucía

Demonstration announcement: Esther Molina López

Biological pest control in Watermelon

In cucurbits, the great challenge in pest management is in the biological control of aphids and red spider mites. In this crop, a fantastic performance of the auxiliary fauna has been achieved, through the use of reservoir and food plants.

Shortly before harvest, Esther opens her greenhouse to explain her way of working to fellow farmers and COPROHNIJAR technicians. The technicians Juan José Guzmán (COPROHNIJAR), Isabel M^ª Caparros (BIOLINE); Carmen Méndez (RAIF, Junta de Andalucía); Eduardo Crisol & Jan van der Blom (COEXPHAL) will also be present for further explanations.



Date: April 22. Location: Los Grillos, San Isidro, Níjar. Time: Consult your technician. Due to security measures, visits will be organised in small groups.

Demonstration farm in Integrated Pest Management of COEXPHAL, within the framework of the European project IPMWORKS, and of the Alerts and Phytosanitary Information Network (RAIF) of the Andalusian Government.



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1st demo event – execution

The day of the event we had **70 participants**, including **45 farmers**, and a few field advisors and policy makers



1st demo event – Information leaflet

Information handed out to visitors of the demonstration event

General information

Organic watermelon, surface 1 Ha.

Planting date: 03/02/2021

Variety: Precious Petite (mini) + Premium (3x1)

Treatments:

- THIOVIT (Sulfur) 2x
- AMYLO-X (*B. amyloliquefaciens*) 1x
- COSTAR (*Bacillus thuringiensis*) 1x



Releases of Boil. Contr. Agents (Average of 4 separate greenhouses, with a total area of 3 Ha):
A. swirskii (loose, 100 / m²); *Aphidius colemani* (6,000 / Ha); *Chrysoperla carnea* (6,000 / Ha);
P. persimilis (6,000 / Ha); *Aphidoletes aphidimyza* (1,000 / Ha); *Orius laevigatus* (1,500 / Ha);
 Barley pots with aphids (12 / Ha); Syrphids (*S. rueppellii*, 1,400 / Ha). Cost approx./Ha: 1.800 €.

A. swirskii has been the base in all four greenhouses. Most of the other releases have been carried out in the greenhouses planted three weeks before the demonstration plot. From there, many 'bugs' have been collected to inoculate or reinforce populations in the last crop.

Aphids: Anticipating the arrival of pests has been key. The reservoir plants were planted two months before the watermelon transplant, in the previous crop. So, there was already a lot of aphids on these plants, and many parasitoids and predators, when the watermelon started.

1st demo event – Information leaflet

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Organic watermelon, surface 1 Ha.

Pest management info



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1st demo event – general discussion



The farmer, along with her field advisor, during the general discussion with farmers in the greenhouse

1st demo event – evaluation

29 farmers filled out the **post-event evaluation form**

They particularly liked:

- The **anticipation** when planting **banker plants** to control aphids
- The **high diversity of beneficial insects** that they found in the crop
- Some farmers were interested and willing to **plant a hedgerow** in their greenhouses

Challenges to achieve pesticide reduction in greenhouses

- There are some pest species difficult to control or against which there are no natural enemies commercially available
- It takes time!
- Climate change -> Pest-related exacerbated problems, extended throughout the entire crop cycle
- New pests, viruses and diseases
- Commercial pressure of chemical pesticide companies

Opportunities to achieve pesticide reduction in greenhouses

- Peer-to-peer exchange of knowledge is a solid strategy to boost IPM adoption
- Bottom-up approaches where farmers are the core of knowledge generation (networks, on-farm demos, Living Labs, etc.) are essential to reach the objectives of the Green Deal.
- But...it must be a fair deal: not all farmers are willing to freely share know-how, so it is vital to “give something back”: technical/economical support



Thank you for your attention



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IPMWORKS is a FarmDemo aligned project and is partnered with the IPM Decisions Project

