

In 2021, the EU Parliament validated the “Farm to Fork” strategy to reduce pesticide use by 50% by 2030: urge need to find alternatives to synthetic products



Amblyseius andersoni



Phytoseiulus persimilis
eating spider mite

Various levers available

(Dardouri 2018)

- Resistant plant varieties
- Natural products
- Biodiversity in agroecosystem
- Promotion of biological control & application of effective Integrated Pest Management (IPM) strategies

Major issue

(Laws, 2017)

Climate change affects species interactions between pest & natural enemies

↪ The positive outcome of the application of sustainable IPM strategies is at risk

The model of study

(Guzman et al. 2016)

- Predatory mites are effective biological control agents (BCA)
- Important predators of pests
- Strongly affected by abiotic conditions

Purpose and research questions:

- Study the multi-trophic interactions involving predatory mites and their prey under different abiotic stress to promote next generation biocontrol
- Is there already an established resistance to pesticide and/or temperatures in predatory mites used on agricultural crops?
- If so, is there a genetic determinism of these resistance/tolerance mechanisms ?

Methodology:

In order to answer these questions, we will perform several experiments to test our hypotheses:

- Characterization of the resistance to insecticides (pyrethroids) applying different doses and looking for the survival and performances of the predatory mites
- Characterization of the tolerance to temperature (high/low) exposing the mites to a range of temperatures and assessing their survival and performances
- Evaluation of the genetic determinism of the resistance/tolerance mechanisms using genomic and transcriptomic tools

Expected results and impact:

- Identify the effect of insecticide on the predatory mites collected from the field showing different resistance levels
- Identify the effects of major climatic drivers on predatory mites population dynamics
- To develop Next Generation Biocontrol Agents resistant to pesticides and adapted to different climate change scenarios for future IPM programs

References:

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- Guzman, Celeste, et al. "Temperature-specific competition in predatory mites: Implications for biological pest control in a changing climate." *Agriculture, Ecosystems & Environment* 216 (2016): 89-97