

# PhD Thesis Defenses

On Friday January 24<sup>th</sup> 2025 at 3.00 pm in the classroom G, Via Santa Sofia 100

**Roberto Catania** (XXXVII cycle)

Will discuss her PhD theses titled

International  
Doctor  
Candidate

Double Degree  
UNICT- UFV

***Toxicity assessment of pesticides and biopesticides on wild and managed bees (Hymenoptera, Apoidea), and richness evaluation in Mediterranean and tropical agroecosystems***

## ***Thesis Abstract***

Bees (Hymenoptera, Apoidea) are the main pollinator insects for wild and cultivated plants, being of crucial environmental and economic importance. Their global decline, driven by anthropogenic factors, including the use of synthetic pesticides, is an alarming concern. Biopesticides can be a viable alternative for the protection of cultivated plants due to their high selectivity and short environmental persistence. Despite their natural origin, biopesticides can cause lethal and sublethal effects on non-target organisms. During this PhD project, we studied the toxicity of synthetic pesticides and biopesticides on wild and managed bees, using different products marketed in Mediterranean and tropical areas, and some nanoformulations of essential oils (EOs) tested on pests but not yet commercialized. Lethal and sublethal effects caused by pesticides commonly used in Italian and Brazilian agroecosystems, including greenhouses, were evaluated, with particular attention to some biopesticides of botanical origin, such as EOs. Synthetic and botanical pesticides caused lethal and sublethal effects on social (honeybees, bumblebees, Neotropical stingless bees), and solitary bees. Specifically, EOs caused lethal effects after topical and oral exposure to *Apis mellifera*, *Bombus terrestris*, *Osmia bicornis*, and *Melipona mondury*. Changes in feeding behavior and locomotor alterations caused by exposure to EOs were observed on the stingless bee *M. mondury*. Commonly used pesticides and biopesticides caused reduced survival of ground-nesting wild bees of *Andrena* and *Eucera* species, and altered the locomotor behavior of managed bees. Synthetic insecticides used to protect greenhouse tomato plants reduced the survival and caused changes in feeding behavior, and midgut alterations in *B. terrestris*. These results may be important for the appropriate use of pesticides and biopesticides in integrated pest and pollinator management, providing crucial data for the conservation of pollinating insects. In addition, populations of wild bees were studied in two tree crops in Southern Italy, one Mediterranean (almond) and one tropical (mango), comparing species richness and abundance between integrated and organic management.

Advisor:

Prof. Gaetana Mazzeo for the University of Catania

Prof. Maria Augusta Pereira Lima for the Federal University of Viçosa



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On **Friday January 24<sup>th</sup> 2025 at 5.00 pm** in the classroom **G**, Via Santa Sofia 100

**Fabrizio Lisi** (XXXVII cycle)

Will discuss her PhD theses titled

International  
Doctor  
Candidate

## **New insights for the *Drosophila suzukii* sustainable control: integrating parasitoids into current pest management strategies**

### ***Thesis Abstract***

Invasive arthropod pests are a major agricultural and ecological threat in the era of globalization. The spotted wing drosophila, *Drosophila suzukii* (Matsumura), is a key example of invasive pest causing significant economic losses worldwide, particularly for the soft-skinned fruit production. Within the community of *D. suzukii* natural enemies, the pupal parasitoid *Trichopria drosophilae* (Perkins) is commercially available for augmentative releases, while the Asian larval parasitoid *Ganaspis kimorum* Buffington is being employed as classical biological control agent in Europe and the US. However, insecticides remain a mainstay for controlling the invasive fly, despite their use comes with several drawbacks related to the impact on non-target organisms. With the aim to integrate parasitoids within the existing pest management practices against *D. suzukii*, the present thesis focused on: (i) the review of the classical biological control program efforts against *D. suzukii* in Italy; (ii) the promotion of *G. kimorum* mass production through cold storage optimization, and (iii) the understanding of its interspecific interactions with *D. suzukii* pupal parasitoids; (iv) the assessment of the baseline toxicity of synthetic and bio-insecticides on *D. suzukii* juveniles and adults and the evaluation of their lethal and sublethal effects on *T. drosophilae* and *G. kimorum*; (v) the review of the pesticide immunotoxicity on target and non-target insects. Overall, these results offer practical applications to promote the sustainable management of *D. suzukii* by supporting the use of biological control agents and minimizing the environmental harm caused by pesticides.

Advisor:

Prof. Antonio Biondi