

I-ResPect Project

INSECTICIDE RESISTANCE, POPULATION AND EFFECTS ON BIODIVERSITY

Apple orchards are highly treated crops, in which organophosphorus, neonicotinoid and synthetic pyrethroid compounds are the most heavily sprayed insecticides. These compounds are toxic to non-target arthropods and increase resistance making apple orchards an interesting case to study the deleterious effects of insecticides on non-target species. In the European context of reduced pesticide use, investigating their effects on natural enemies is necessary to promote the introduction of biocontrol agents and to avoid non-target effect of pesticides in IPM programs. To assess the insecticide resistance/tolerance mechanisms in natural enemies, our program develops an integrated approach using the European earwig *Forficula auricularia* L., a generalist and efficient predator of pest insects. The three main scientific questions are:

- 1) Does insecticide resistance affect the energetic reserves on the earwig *F. auricularia*?
- 2) What are the intergenerational effects of resistance on *F. auricularia* fitness traits?
- 3) What are the mechanisms involved in insecticide resistance/tolerance?

The I-ResPect project aims at characterizing the energetic reserves and reproduction success of *F. auricularia* from apple orchards under management strategies with low or high insecticide use. The results will enhance knowledge about essential physiological functions involved in the maintenance of populations and the functioning of ecosystems. Metabolic pathways involved in insecticide resistance, Heat Shock Proteins (HSP) induction and gene expression involved in defense and immunity will be characterized. I-ResPect results will allow clarification of the links from environmental stress to adaptive mechanisms and their ability to sustain throughout generations. Those results will give full insight for potential use of insecticide resistant earwigs in Integrated Pest Management programs.

PARTNERS



UMR 7263 – Mediterranean Institute of Biodiversity & Ecology, Leader: **Magali Rault**, is Associate Professor at the University of Avignon, and leader of the IMBE team « Environmental biomarkers and bioindicators ». Her research deals with physiological mechanisms and metabolites of invertebrates in environmental stress conditions. She focus more specifically on pesticide impacts on terrestrial ecosystems and develops biochemical and behavioral biomarkers for non target organisms and beneficial organism. She conducts her studies from the molecular scale to populations, combining laboratory and field approaches.

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