Application of molecular methods in trophic ecology of useful predators within Mediterranean agriculture – a review

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Outlines

• Introduction
• Molecular methods in ecology
• Trophic interactions in Mediterranean ecosystem—What has been done so far?
• Pesticides
• Perspectives
• Our project
Molecular methods in ecological research

Different applications

1. Revealing trophic interactions
   - DNA → PCR (diagnostic PCR), qPCR, sequencing
   - protein → protein electrophoresis, ELISA

2. Pest control using sterilization by RNA silencing

3. Revealing insect vectors of fitopatogens
Reaveling trophic interactions

DNA based methods vs. protein based methods

diagnostic PCR vs. NGS

depending on what you are looking for
What has been done so far regarding Mediterranean ecosystem?

- Olive groves
- Bactrocera oleae

Silencing experiments

**trophic interactions** → feeding experiments data

Field data (who is feeding on B. oleae)

Control

Bactrocera oleae pupae

Ocypus olens

Pterostichus melas
new generation sequencing

screening for potential predators
What has been done so far regarding Mediterranean ecosystem?

• *L. botrana*
• Same of the predators identified
• More informations needed
• Carabid beetles potential predators on pupae
• *Byctiscus betulae*
• *Drepanothrips reuteri*
• *Empoasca vitis* (some informations from other agroecosystems)
• ...
• New informations about trophic interactions are needed
Open questions?

• What are the main predators of pest species in olive orchards and vineyards?
• How can we apply knowledge of trophic interactions to biocontrol?
Pesticides used in Mediterranean agroecosystems:

1. **neonicotinoids**

- Neonicotinoids
- Nicotinic acetylcholine receptors
- Negative effect on numerous pest but also beneficial insects
2. Copper

- Copper based pesticides
- Used in Mediterranean agriculture
- Accumulation in the soil
Pesticides

Open questions

• What effect do they have on non-target invertebrates present in Mediterranean agroecosystem?

• Do they change trophic interactions?

• Are they transferred through soil by fungies?

• ...

...
Perspectives

• Reveal trophic interactions in vineyards and olive groves
• Reveal predators for pest species present in vineyards and olive groves
• Propose biological control methods for pest species
• Reveal effect of used pesticides on non-target organisms
Shortly about our project

**MEDITERATRI project**
understanding the effect of pesticides on non-target invertebrates through trophic interactions in Mediterranean agriculture

Project team:
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[http://www.pmf.unizg.hr/mediteratri](http://www.pmf.unizg.hr/mediteratri)