

Beneficial insects in organic agriculture: citrus little helpers

Problem

Pests, such as the mealybug *Planococcus citri*, are of major economic concern in the citrus growing chain. Organic and safe alternatives to pesticides are crucial to control *P. citri*.

Solution

Beneficial insects (BIs) may offer a sustainable alternative to pesticides since they can be propagated in the laboratory and released within the crop when pest infestation rates are high enough.

Benefits

The BIs against *P. citri* are well-perceived by consumers and do not represent a threat to the agroecosystem.

Practical recommendations

- BIs are reared inside climatic chambers (Picture 1) and shipped to farmers pre-fed and pre-mated.
- For citrus, two BIs are commonly used: *Leptomastix dactylopii* and *Cryptolaemus montrouzieri* (Picture 2).
- The parasitoid *L. dactylopii* is very efficient against *P. citri*. Repeated releases over a short period should be done under warm, sunny, humid conditions when the first mealybug females move towards the top of the plant.
- The ladybug *C. montrouzieri* can wipe out large *P. citri* populations. 10-20 adults per plant is necessary in cases of high infestations (around 5,000 ladybugs/hectare in orchards). High prey density stimulates egg laying and prevents dispersion; hence ladybugs' release is recommended in hot spots.
- Limiting factors (for both species) include temperatures below 17 °C or above 34 °C and the presence of ants.
- To ensure maximum BIs at the site, it is suggested to (i) mist plants with water before releasing and in the evening, (ii) reduce the use of sticky traps, and (iii) avoid white cloths.

Applicability box

Theme

Crop production, environment and society

Context

Global, Mediterranean basin

Application time

During the cropping season and at high-density infestation sites ("hot spots"). Repeated releases are suggested

Required time

From two months to one year

Period of impact

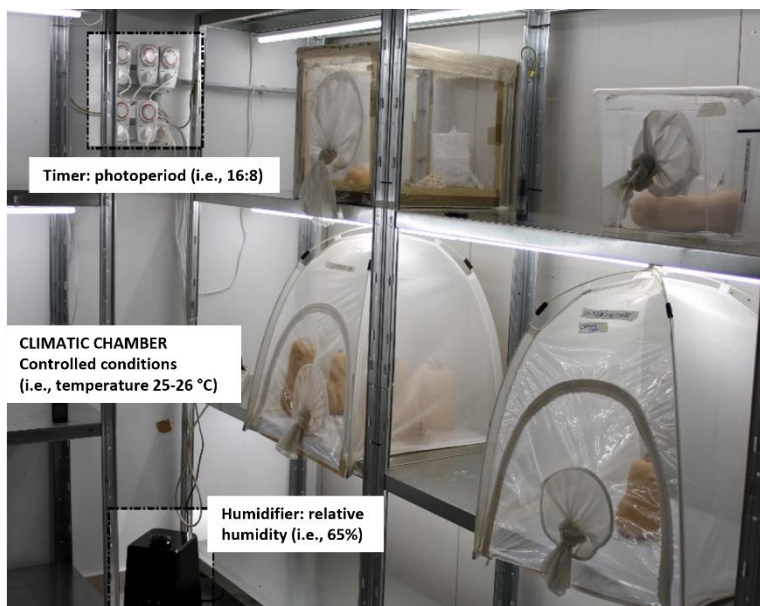
Less than one year

Equipment

Release boxes provided by the biofactory

Best in

Low-input management cropping systems, systems where the ground cover is managed as "ecological infrastructure", as pollen helps retain the BIs at the site.



Picture 1: Typically, BIs are reared inside a climatic chamber where climatic conditions (i.e., temperature, humidity and photoperiod) are controlled. The BIs are reared inside cages (made of mesh and plastic, as shown in the picture) and provided with their main food source, water and honey. Photo: Sabina Avosani, CIHEAM-Bari.



Picture 2: The main BIs against the pest *Planococcus citri* (Pseudococcidae). A) Nymphs of the predator *Cryptolaemus montrouzieri* (Coleoptera) feeding on *P. citri* adults and juveniles. A white and spiny wax covers the predatory nymphs. B) Adult of the parasitoid *Leptomastix dactylopii* (Hymenoptera) using the antennae to find a host for ovipositing. Photo: Sabina Avosani, CIHEAM-Bari.

Further information

Further reading

- *Cryptolaemus montrouzieri*. Biological Control. A Guide to Natural Enemies in North America. Cornell University. New York.
- Afifi AI, El Arnauty SA, Attia AR, Abd Alla Ael-M. Biological control of citrus mealybug, *Planococcus citri* (Risso) using coccinellid predator, *Cryptolaemus montrouzieri* Muls. Pak J Biol Sci. 2010 Mar 1;13(5):216-22. doi: 10.3923/pjbs.2010.216.222. PMID: 20464943.
- Flint, Mary Louise, and Steve H. Dreistadt. Natural enemies handbook: the illustrated guide to biological pest control. Vol. 3386. Univ of California Press, 1998.

Weblinks

- Check the [Organic Farm Knowledge](https://www.organicfarmknowledge.org/) platform for more practical recommendations.

About this practice abstract and CIHEAM Bari

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