Oophagous parasitoids are able to kill Paysandisia archon eggs (Burmeister, 1880) on Palm trees

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Introduction

Paysandisia archon (Lepidoptera, Castniidae) is an invasive insect from Argentina that attacks palm trees and is responsible for economic losses of millions of euros around the Mediterranean region. Palm Protect aims to find new treatments to control this pest that are less toxic to human health and the environment.

The Unity Entomology and Mediterranean Forest of the French Institute of Agronomy (INRA) has been evaluating whether egg parasitoids are able to parasitize *P. archon* eggs. The egg is the most accessible stage of development, attacking the egg would reduce damage caused by the endophytophagous larvae.

Methods

Eggs of *P. archon* were exposed to different strains of Trichogramma in either tubes or in mesocosms (palms). Experiments were conducted under controlled conditions (temperature, humidity, day length).

In tubes eggs were incubated for 24 or 48 hours at a ratio of 1 egg to 5 10, or 15 female parasitoids to determine the attractiveness of eggs to parasitoids and the impact of egg:female ratio.

In the mesocosm, 10 or 20 eggs were placed around the stipe of potted palms and exposed for 7 days to 1000 or 5000 Trichogramma to determine the attractiveness and ability of parasitoids to locate *P. archon* eggs.

At the end of the incubation periods eggs were assessed for parasitism and viability (abortion) and results are expressed as the global efficiency (parasitism + abortion) of Trichogramma.

Results and discussion

Screening in tubes

P. archon eggs

Dissection

Aborted (non-viable eggs)
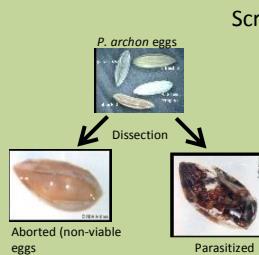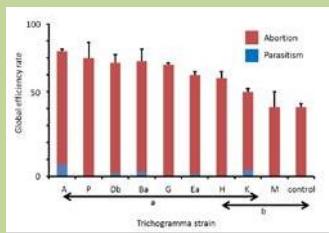
Parasitized

Figure 1. The global efficiency of Trichogramma in tubes

Egg:Female parasitoid ratio does not affect parasitism rates.

In 100% of repetitions, a single Trichogramma female (strain P) is able to kill an egg of *P. archon*.

Five strains of Trichogramma parasitized *P. archon* eggs.

Abortion rate (63%) is significantly higher than natural abortion rate (41%).

Trichogramma female laying in *P. archon* egg.

Combined global efficiency rate (parasitism + abortion) = 74%.

Screening in mesocosms
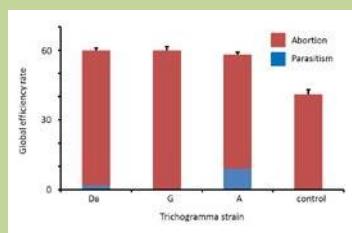
Figure 2. The global efficiency of Trichogramma released in mesocosms

Efficient strains in tubes gave good results in mesocosms.

Abortion rate after releases of Trichogramma (56%) is significantly higher than natural abortion rate (41%) (Figure 2).

The maximum global efficiency rate was 87% (Strain G)

The position of *P. archon* eggs in palm trees had no effect parasitism.

The larger number of Trichogramma released resulted in 10x more parasitism.

Conclusions

Trichogramma are able to kill *P. archon* eggs.

Methods for Trichogramma strain selection is validated.

Position of eggs on palms did not affect parasitism : Trichogramma are able to explore the entire stipe.

Trichogramma could potentially be used for the biological control of *P. archon*, but the results have to be confirmed by releases *in-situ*.