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# Prospective evaluation of parasitoids to control *Tuta absoluta*

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## Introduction

The tomato leafminer *Tuta absoluta* is an important pest species that has been introduced into Europe and has just started its expansion into China, the largest tomato producer in the world. Recently, several species of hymenopteran wasps have shown great potential as biological control agents against the pest, especially egg parasitoids of the genus *Trichogramma*. Unfortunately, several factors are limiting the success of their augmentative use including the low suitability of the tomato – host system for supporting the parasitoids. Therefore, it is important to identify suitable and safe candidate agents and understand the factors limiting their establishment in the field.



## Tritrophic interaction

Tomato produces secondary metabolites as constitutive and inducible defense against herbivores. In some case these metabolites increase the plant's attractiveness to parasitoids, enhancing their foraging success. However, some metabolites can be transferred to parasitoids via their host with potential detrimental effects.

- We will collect *T. absoluta* eggs and larvae to analyze and quantify the presence of tomato secondary metabolites by HPLC .
- The effect of these compounds on the parasitoids will be assessed by rearing them on hosts that were fed the metabolites in different concentrations.
- In olfactometer assays we will test the foraging efficiency of parasitoids and evaluate how it can be improved through odor learning.

## Aim of the project

Since *T. absoluta* is a quarantine pest in China, the research in the country is restricted. In a collaboration with the Institute of Plant Protection of the Chinese Academy of Agricultural Sciences, we aim to improve the efficiency of parasitoids present in China and Switzerland by analyzing the tritrophic system. We will evaluate the parasitoids present in the Chinese tomato fields and analyze the tritrophic interactions between the plant, the host and the parasitoids. We will then assess the compatibility with other control methods.

## Screening in China

Knowledge about the distribution and the biology of natural enemies present in Chinese tomato fields is essential to understand the risk pose by the release of parasitoids.

- Eggs and larvae of a similar moth species will be placed in a tomato field to collect parasitoids
- evaluation of preferred (micro-) habitats will follow.

## Evaluation in IPM system

The compatible use of chemical and biological control is essential in integrated pest management (IPM) and organic pest control programs. Virus and bacteria based pesticides have been developed to regulate the tomato leafminer but little is known about the residual effect on the parasitoids.

- The toxic effect on parasitoids of two bio-insecticides commonly used to control *T. absoluta* will be assessed.
- We will evaluate at a larger scale the compatibility of the most promising agents with predator and bio-insecticide

