Endophytic entomopathogenic fungi and host plant interactions: impact on phytovirus transmission by insect vector

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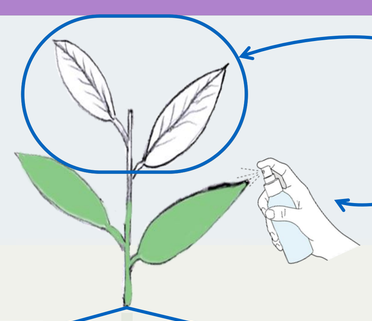
Introduction

Entomopathogenic fungi (EPF) are microbiological agents used to control crop pests. Actually, studies highlighted the successful way of inoculating **endophytic strains in plants**. Endophytic EPF are able to complete their life cycle in host plant, multiply, colonize plant tissues and synthesize secondary metabolites in it without symptom appearance. They **interact then with plants pests and phytopathogenic agents**. Here we investigated the **influence** of these interactions between 2 strains of endophytic Entomopathogenic fungi (EEPF) in ***Nicotiana tabacum*** on Potato leaf roll virus (PLRV) **transmission by** *Myzus persicae* Sulz.

Experiment & Results

Fungus inoculation:

- 25 tobacco plants/treatment with 3 to 4 expanded leaves, sown on autoclaved soil ;
- 2 basal leaves carefully sprayed until flows by the appropriate inoculum, according to the treatment.



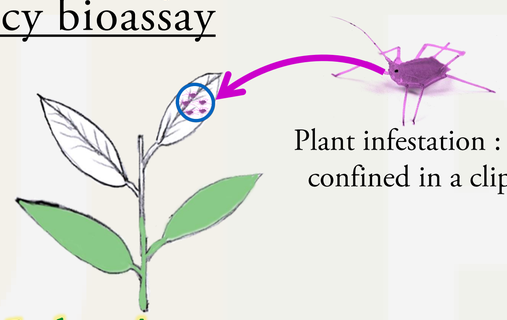
Plastic bag protecting upper leaves

Inoculum: 10^8 conidia/mL of fungus suspension (*Beauveria bassiana* or *Metarhizium acridum*) or sterile distilled water + 0.05% tween 80 for the control.

15 plants/treatment | **10 plants/treatment**

Virus transmission efficiency bioassay

7 days after fungal inoculation, 5 individuals of 5 days old from a PLRV infected plant are released on one of non treated leaves.



Plant infestation : insects confined in a clip-cage

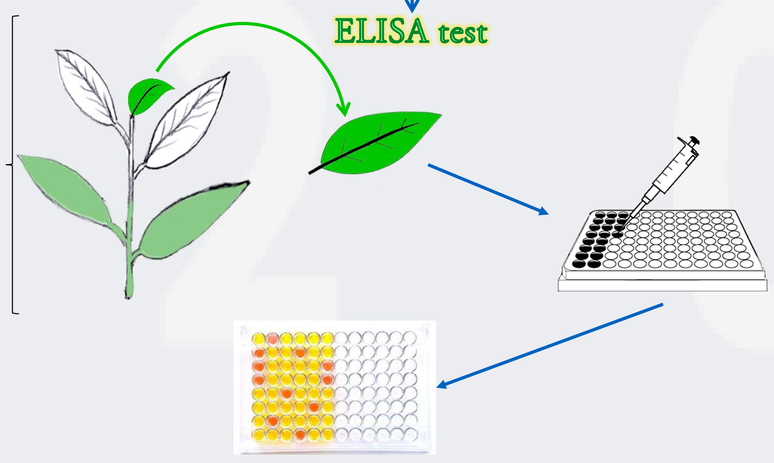
5 plants/group

- Each treatment forms 3 groups of 5 plants;
- Insects are removed from plants according to the appropriate **inoculation access period (IAP).**

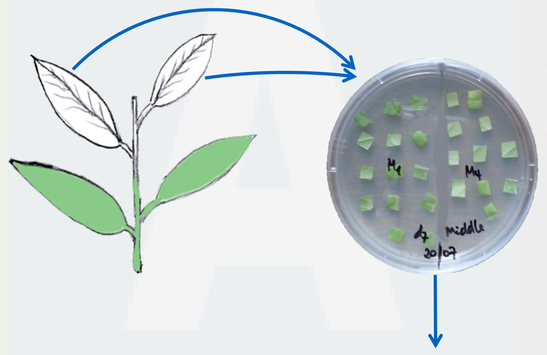
IAP-3 : 3 days | **IAP-5 : 5 days** — Removal of insects, beginning of incubation | **IAP-7 : 7 days**

ELISA test

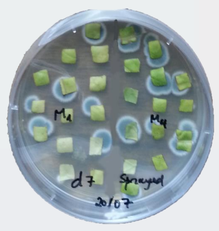
10 days after insects removal, **qualitative ELISA test** was performed with 0.05 g of new emerging leaf sample/plant



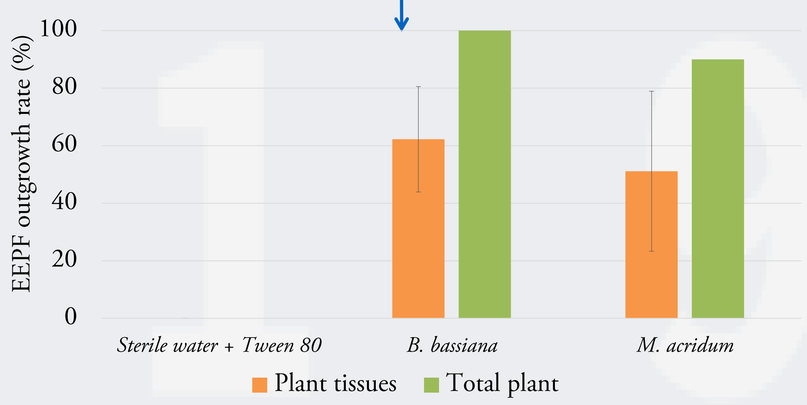
Assessment of EEPF establishment on plant



Non treated leaves were **surface-sterilized** and 9 leaf tissues of 1 cm x 0.5 cm per plant were placed on PDA + chloramphenicol (0.05g/L).

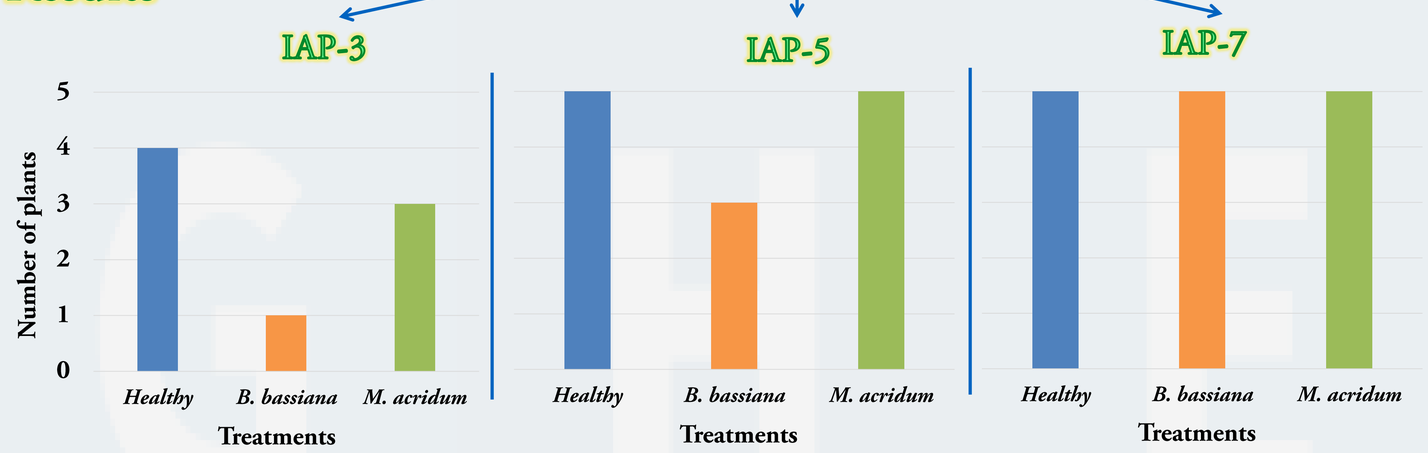


10 days after incubation, EEPF growing from plant tissues were visually identified and counted.



Considering the whole plant, **100% and 90%** of *B. bassiana* and *M. acridum* inoculated plants respectively have at least 1 leaf tissue with EEPF outgrowth, then **considered as endophytically inoculated**.

Results



- *B. bassiana* inoculated plants : number of PLRV-infected plants increase with the extension of IAP until they have all infected plants at IAP-7.
- *M. acridum* inoculated plants and control: the maximum number of infected plants reached at IAP-5.

Conclusion

Our results suggest a tendency to slow PLRV spread in the tissues of tobacco plants inoculated with *Beauveria bassiana*. This is in line with González-Mas et al (2019), which observed a reduction in CMV and CABYV transmission rate to melon plants colonized by *Beauveria bassiana.*

González-Mas N. et al., 2019. **Changes in feeding behaviour are not related to the reduction in the transmission rate of plant viruses by *Aphis gossypii* (Homoptera: Aphididae) to melon plants colonized by *Beauveria bassiana* (Ascomycota: Hypocreales).** *Biol. Control*, 130(November 2018), 95–103.