

Native Entomopathogenic Fungi as Biological Control Agents against Insect Pests in Western Massachusetts Apple Orchards

Hayley Kozikowski, Mateo Rull-Garza, Robert Wick, and Jaime Piñero

UMass Extension and Stockbridge School of Agriculture

Introduction

- *Metarhizium* is an insect-eating genus of fungi (IEF) that attacks a plethora of insect orders^[1].
- It is found in soils worldwide, from wild grasslands, to organic and conventionally cultivated agricultural land^[2].
- Native IEF present in the soil may possess the capacity to reduce populations of insect pests, preventing re-establishment in orchards the following season^[3].

Methods

- Soil samples were collected from two commercial apple orchards in Western Massachusetts.
- Wax moth larvae were placed in soil samples as bait for IEF. The larvae were monitored for disease and mortality.
- Fungi growing from cadavers were isolated and grown in agar culture.

Results

- One colony of *Metarhizium spp.* was isolated and identified from a grafted trap tree soil sample.
- Green muscardine (fungal disease) was found to affect larvae in soil samples from both conventionally managed and organic orchards, including conventional and unmanaged trees.
- Unidentified ascomycete fungi killed larvae faster but were only observed in organic soil samples. Other unidentified fungi attached to root debris was also found to cause disease.

Future Directions

- Identify other IEF species that kill pests via DNA analyses.

References

- 1 Hu, X.; Xiao, et al. Trajectory and Genomic Determinants of Fungal-Pathogen Speciation and Host Adaptation. *Proc Natl Acad Sci USA* **2014**, *111*, 16796–16801.
- 2 Moonjely, S.; Bidochka, M. Generalist and Specialist *Metarhizium* Insect Pathogens Retain Ancestral Ability to Colonize Plant Roots. *Fungal Ecology* **2019**, *41*, 209–217.
- 3 Araújo, J.P.M.; Hughes, D.P. Diversity of Entomopathogenic Fungi. Which Groups Conquered the Insect Body? *Genetics and Molecular Biology of Entomopathogenic Fungi* **2016**, *94*, 1–39.

Metarhizium spp., a native insect-eating fungi, lives within the root-zone of plants and acts as a biological control agent against the soil-dwelling stages of insect pests.

