

Yuichiro Iida Ph.D.
(Department of Agricultural Science and Technology)

E-mail yuichiro.iida@setsunan.ac.jp

Keywords fungal pathogen, *Cladosporium fulvum*, *Fusarium oxysporum*, biocontrol agent, mycoparasite, entomopathogen, effector



Backgrounds

- In recent years, pathogens and insect pests have developed high tolerance to chemical pesticides around the world.
- Microbial biocontrol agents are an alternative to chemical pesticides for achieving sustainable agriculture.
- Uncovering the molecular basis in the biocontrol mechanisms of beneficial microorganisms will lead to the development of novel microbial pesticides.

Outcomes

- We reported the emergence of 13 races of tomato pathogen *Cladosporium fulvum* that overcome all commercial resistant cultivars in Japan (Fig. 1). As this fungus has also rapidly developed tolerance to some fungicides, the biocontrol strategy will be important.
- We discovered an unique mycoparasitic fungus that parasitizes *C. fulvum*, and now are studying the molecular basis of mycoparasitism for application as a biocontrol agent (Fig. 2. left).
- The soil-born pathogen *Fusarium oxysporum* is known to be suppressed by the non-pathogenic *F. oxysporum*. We have uncovered a part of its molecular mechanism, and generated effective non-pathogenic strains by disruption of pathogenicity gene (Fig. 2. right).
- We found that the entomopathogenic fungus-based microbial insecticide induces plant immune response, and thus can be available not only as a biofungicide but also as a bioinsecticide (Fig. 3).



Fig. 1. Race differentiation of the leaf mold of tomato caused by fungal pathogen *C. fulvum*

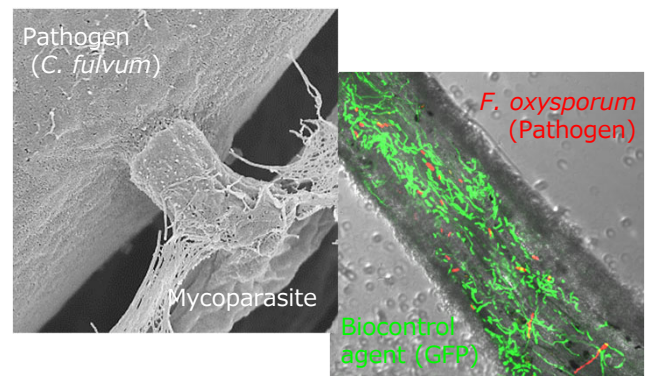


Fig. 2. Insights into the molecular basis of fungal biocontrol agents.



Fig. 3. The entomopathogen-based insecticide induces plant resistance and controls both insect pests and pathogens.



Research features

Our goal is to elucidate the hidden functions of fungal biocontrol agents and develop effective microbial pesticides for the sustainable pest management.