

Plant surface signal responses for infection-related morphogenesis of phytopathogenic fungus

Agricultural Science and Technology

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Summary

Backgrounds

- Phytopathogenic fungi cause many of the most serious crop diseases. Members of the anthracnose disease-causing *Colletotrichum* can infect a wide range of plant species including many commercially important crops.
- *Colletotrichum* spp. have evolved the capacity to breach the intact cuticles of their plant hosts by elaborating specialized infection structures called appressoria. Appressorium differentiation relies on fungal sensing and transduction of physical and biochemical signals at the plant surface.

Purpose

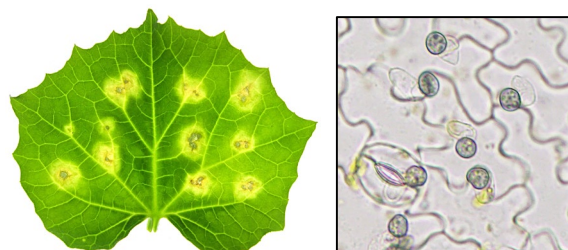
- We aimed to reveal the molecular mechanism for plant surface sensing and fungal morphogenesis during plant infection.

Major achievements

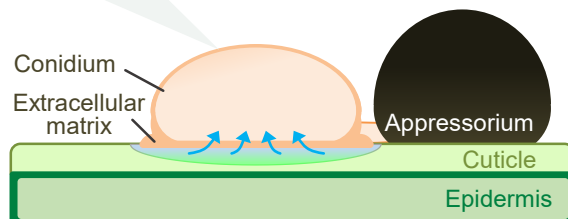
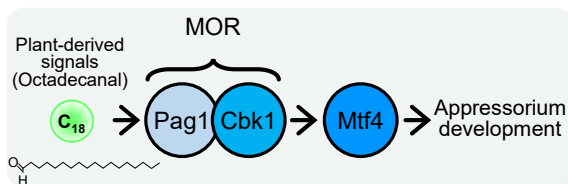
- We reported on the identification of a plant-driven signal molecule and a cognate signal transduction pathway crucial for appressorium development of the cucumber anthracnose fungus *C. orbiculare*.
- *C. orbiculare* utilizes the widely conserved MOR [morphogenesis-related NDR (nuclear Dbf2-related) kinase pathway], and its downstream factor Mtf4 to translate plant surface signals for appressorium development and pathogenesis.
- Conidial surface enzymes hydrolyze the plant surface cuticle to form cutin monomers including octadecanal, and these cutin monomers induce appressorium formation via MOR.

Prospects of collaboration

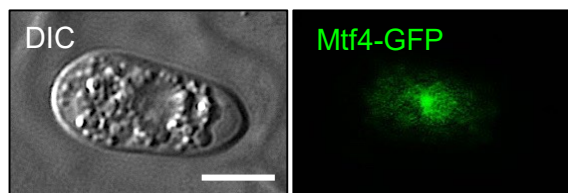
【Collaboration with agriculture】 Fungal plant pathogens including *Colletotrichum* spp. are persistent and global food security threats. To invade their hosts they often form appressoria. Understanding the function of conidial surface enzymes and the MOR cascade provides insight into the plant-pathogen interactions critical for appressorium formation, and could contribute to develop novel approaches for managing plant diseases.



Disease symptoms (left) and appressoria (right) of *Colletotrichum orbiculare*.



Model for plant surface signal-dependent appressorium development in *C. orbiculare*.



Cellular localization of Mtf4 responds to plant-derived signals during appressorium development.



Selling point

We are aiming to reveal the molecular mechanism for fungal responses to plant surface signals critical for plant invasion.