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Seed-borne bacterium interacts with air-borne fungus in rice fields

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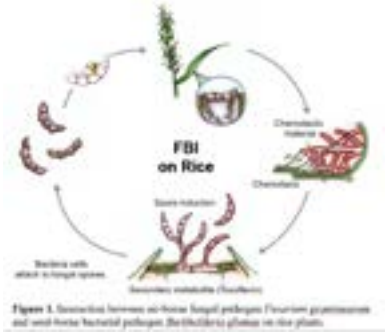
The air-borne ascomycete fungus *Fusarium graminearum* causes head blight in many cereals and produces mycotoxins such as trichothecenes and zearalenone. The seed-borne bacterium *Burkholderia glumae* causes bacterial panicle blight in rice and produces toxolavin that has antimicrobial activity and phytotoxicity. Disease symptoms caused by two pathogens are very similar and could often cause false diagnosis. In this study, we showed that two pathogens frequently co-isolated in rice heads and *F. graminearum* is resistant to toxoflavin produced by *B. glumae* while other fungal genera are sensitive to the toxin. We have tried to clarify the resistant mechanism of *F. graminearum* against toxoflavin and the ecological reason of co-existence of the two pathogens in rice. We found that *F. graminearum* resistance to toxoflavin is related to production of triacylglycerides containing linolenic acid. Co-cultivation of two pathogens resulted in increased conidia and trichothecene by F. graminearum. Bacteria physically attached to fungal conidia, which protected bacterium cells from UV light and allowed disease dispersal. Chemotaxis analysis showed that bacterial cells moved toward the fungal exudation. Disease severity on rice heads was significantly increased by co-inoculation rather than single inoculation. This study provides evidence of the two pathogens cooperatively interacting, with F. gramienarum gaining the opportunity to induce disease progression efficiently and *B. glumae* achieving aerial dispersal.



Recent Publications:

1. Jung B. et al. (2018) Cooperative interactions between seed-borne bacterial and air-borne fungal pathognes on rice. Nature Communications 9:31.
2. Jung B. et al. (2014) A putative transcription factors pcs1 positively regulates both conidiation and sexual reproduction in the cereal pathogen *Fusarium graminearum.* The Plant Pathology Journal 30:236-244.
3. Jung B. et al. (2013) Development of a selective medium for the fungal pathogen *Fusarium graminearum* using toxoflavin produced by the bacterial pathogen *Burkholderia glumae*. The Plant Pathology Journal 29:446-450.
4. Son H. ea al. (2012) Mannitol induces the conversion of conidia to chlamydospore-like structures that confer enhanced tolerance to heat, drought, and UV in *Gibberella zeae*. Microbiological Research 167:608-615.
5. Son H. et al. (2011) A phenome-based functional analysis of transcription factors in the cereal head blight fungus, *Fusarium graminearum*. PLoS Pathogens 7:e1002310.

Biography

Jungkwan Lee has completed his Ph.D. from Kansas State University, USA and postdoctoral studies from Seoul National University, Korea. He is an associate professor in Dong-A University, Korea. He has been working in the interaction between plant pathogenic fungi and bacteria in rice plants. He published more than 40 papers in reputed journals and has been serving as an associate editor for The Plant Pathology Journal.

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