Presentation: Oral
Scientific Field: 5. Biodiversity, Resources, Environment & Conservation

Discovering Myxomycetes: towards applications for bio-control

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Myxomycetes are a class of Amoebozoa of which only few practical applications are published in literature. Here we report the first results towards the use of selected slime mould species as antagonist in agricultural applications. Antagonists in this context are organisms used to control plant pathogens, protecting the plant host against invasion by *e.g.* bacteria and fungi. Mycotoxigenic fungi from the Genera *Fusarium*, *Aspergillus*, *Penicillium* and *Alternaria* as well as selected plant pathogenic bacteria were used in the tests. Myxomycetes were collected from maize plants in 2015 and 2016 at the end of the growth season. Five different species including soil-borne *Physarum* and *Didymium* spp. were identified. It was demonstrated that slime moulds can have at least 3 different known types of antagonism: 1) direct antagonism due to feeding (phagocytosis) on fungal spores and plant pathogenic bacteria, 2) indirect antagonism due to antibiotic and antimycotic activity in the glycocalyx and solubilisation of fungal mycelium using extracellular lytic enzymes, and 3) competition for feed such as plant pollen and anthers which are required nutrient sources for specific plant pathogens (*e.g. Fusarium* species) during plant infection.

A further step required towards practical applications is the production of sufficient biological mass for field tests. Theoretically 3 long-lived stages including spores, microcysts and sclerotium (macrocysts) would be suitable for practical use since they could have a shelf-life of at least 2 years.

Two possible applications will be investigated. First we will check the use of slime moulds for biological seed dressing. The seed will be coated with *e.g.* macrocysts. After sowing the slime mould should protect the seed and the young seedling against invasion by soil-born plant pathogens (fungi and bacteria). In a second approach the antagonistic activity of soil-born myxomycetes will be tested on crop debris colonized with *Fusarium* spp. These mycotoxigenic fungi produces spores on the plant residues which infect small grain cereals. The ultimate goal is to cut the life cycle of the plant pathogen inhibiting infection of the host plant.