Interactions Between Myxobacteria, Plant Pathogenic Fungi and Biocontrol Agents

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Myxobacteria are soil dwelling gram-negative gliding bacteria, which form fruiting bodies containing resistant myxospores. Although they produce a wide range of antibiotics and lytic enzymes, their role in plant pathogen control has received little attention. We have conducted preliminary studies to determine if myxobacteria have potential as biological control agents for soilborne diseases of strawberry. Preliminary studies showed the presence of myxobacteria in the strawberry rhizosphere. Populations of myxobacteria were below detectable levels in soils fumigated with methyl bromide while they were detected in soils fumigated with methyl iodide or vapam. Six myxobacterial species belonging to the genus Myxococcus were tested in vitro against 9 soilborne plant pathogenic fungi (Cylindrocarpon spp., Fusarium oxysporum f. sp. apii, Phytopthora capsici, Pythium ultimum, Rhizoctonia spp., Sclerotinia minor, S. sclerotiorum, Verticillium albo-atrum, and V. dahliae) and against selected fungal (Gliocladium virens, Trichoderma viride, Talaromyces flavus, and Coniothyrium minitans) and bacterial biological control (BC) agents (Bacillus subtilis, Pseudomonas aureofaciens, and P. fluorescens). Myxobacteria exhibited a strong inhibitory effect on both pathogenic and beneficial fungal growth in vitro, and the degree of inhibition varied with the species tested. The ability to produce certain antibiotics by the bacterial BC agents had an effect on their interaction with myxobacteria. Antibiotic production by BC agents may protect them from lysis by myxobacteria. We are beginning to test the biological control efficacy of myxobacteria against soilborne diseases of strawberry greenhouse studies.