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IMPACT OF BIOCONTROL PLANTS ON BACTERIAL WILT AND NON-TARGETED SOIL MICROBIAL COMMUNITIES ON A NATURALLY INFESTED SOIL

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Bacterial wilt (BW), caused by Ralstonia solanacearum, is a major constraint in production of tomatoes and many other crops in tropical, subtropical regions, as well as in warm temperate regions. Because the efficacy of conventional methods to control BW is limited, there is an urgent need to develop and evaluate biologically based and environmentally safe, alternative control methods. Therefore, the objectives were to: 1) determine the potential of plants possessing biocontrol properties to control BW of tomato and affect non-targeted soil microbial community and activities; and 2) identify microbial properties as indicators of disease suppressive soils. The relative BW suppressiveness was determined for six plant species grown at two densities (Mucuna deeringiana, Crotalaria spectabilis, Crotalaria juncea, Allium fistulosum, Raphanus sativus, Tagetes patula) that were harvested, incorporated into soil and allowed to decompose for ten days. At the end of the plant growth stage, for A. fistulosum, C. juncea or C. spectabilis, tomato BW was dramatically reduced. BW incidence also correlated negatively with Gram-, Gram+ and Actinomycetes indicating an antagonistic effect of the microbial community against R. solanacearum. BW negatively correlated with soil NO3- and plant biomass indicating that high plant biomass incorporation and high NO3- availability may impede R. solanacearum pathogenicity. A. fistulosum, C. juncea and C. spectabilis have potential as BW biocontrol agents in rotation with tomato where this effect could be due to direct alleochemical effects of the roots (e.g. root exudates) and/or stimulation of a microbial component that suppresses tomato BW disease.