Can Anaerobic Soil Disinfestation Create a Disease-Suppressive Soil to Phytophthora capsici and Fusarium oxysporum f.sp. lycopersici?

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Phytophthora capsici and Fusarium oxysporum f.sp. lycopersici are plant pathogens that causes blight/fruit rot in important economically essential plants, such as eggplant, watermelon, and pepper and tomato. Affecting a wide range of hosts, they are not controllable through crop rotation or by pre-plant soil fumigation and thus these pathogens may even result in up to 100% yield loss in infested fields. In this experiment soil treated using the process of anaerobic soil disinfestation (ASD) was tested to determine if this process creates a disease suppressive soil to the fungal pathogens listed above. ASD would be useful as an alternative to harmful, chemical fumigation processes, and could be used for certified organic vegetable production (Butler et al, 2012). Field soil treatments collected after an ASD period were inoculated with P. capsici (pepper) and F. oxysporum (tomato) then transplanted with pepper and tomato plants. ASD treatment did not have any impact on disease development by P. capsici on pepper, but it significantly suppressed the development of Fusarium wilt on tomato. This result is very promising and clearly shows that the mechanism of disease-suppression by ASD is pathogen-specific. Based on AUDPC, tomatoes in the FOL-inoculated untreated controls experienced a rapid and more severe level of disease then those grown in soil from ASD 1 and ASD 2 treatments. These treatments inhibited disease development in inoculated pots to the same level as the un-inoculated treatments, resulting in complete control. In relation to final tomato disease levels, the ASD 1 treatment resulted in complete control of FOL, comparable to non-inoculated plants.

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