# CHANGES IN PHENOLIC COMPOUNDS IN TOMATO IN RESPONSE TO BIOCONTROL AND PLANT PATHOGENIC *FUSARIUM OXYSPORUM*

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Previous split-root tests demonstrated that the biocontrol fungus *Fusarium oxysporum* strain CS-20 reduces losses to Fusarium wilt of tomato, caused by *F. oxysporum* f. sp. *lycopersici*, through a host-mediated mechanism. Understanding the nature of this resistance could aid in development of alternative disease management tools for Fusarium wilt. One of the mechanisms contributing to host resistance against Fusarium wilt is the accumulation of phenolic compounds. This work was initiated to compare accumulation of phenolic compounds in tomato after exposure to biocontrol and plant pathogenic strains of *F. oxysporum*.

When there were four true leaves, Bonny Best tomato plants were gently removed from sterile sand and roots were washed in sterile distilled water (SDW). Roots of intact plants were placed in water or one of four fungal suspensions for 24 or 72 hours. Two biocontrol *F. oxysporum* strains (CS-20 [host-mediated mechanism] and 8SSK [control mechanism unknown]) and two plant pathogenic strains of *F. oxysporum* f. sp. *lycopersici* Race 1 (32SK-3 and 34SK-3) were used. The fungal suspension was a mixture of mycelia and $10^5$ spores (all spore types) / ml. Tomato leaves and roots were homogenized in acidified SDW. Phenolic compounds were extracted in a series of steps with methanol and a Strata-X column before identification by HPLC.

Relative to the control treatment, phenolic compounds produced in both tomato roots and leaves were quantitatively affected at 24 and 72 hours of exposure to all fungi. The greatest changes observed were in ferulic, vanillic, and caffeic acids, as well as in an unidentified phenolic compound with an HPLC profile of 324-327.6 nm (UN-324). At both 24 and 72 hours, the amount of ferulic acid recovered from roots was greater than from leaves. In roots, CS-20 and the two pathogenic strains of *F. oxysporum* increased ferulic acid at 24 hours, and all fungi increased ferulic acid at 72 hours. In leaves, all treatments reduced ferulic acid relative to the control at 24 hours and ferulic acid from CS-20-treated plants was significantly less than all other treatments. At 72 hours, all treatments increased ferulic acid in leaves. All treatments increased vanillic acid in roots at 72 hours; there were no differences among treatments in vanilic acid recovered from roots at 24 hours. All treatments reduced vanillic acid in leaves at 24 hours, but only CS-20 reduced vanillic acid in leaves at 72 hours. There were no significant differences in caffeic acid in roots at either sampling time. In leaves at 24 hours, all treatments significantly increased caffeic acid. At 72 hours, there were no differences among treatments. UN-324 was detected in roots at both 24 and 72 hours after treatment. At 24 hours in roots, levels of UN-324 were lower in biocontrol treatments than the control or pathogen treatments. At 24 hours in leaves, significantly more UN-324 was detected in the control treatment than any other treatment. Additional research is in progress to elucidate the nature of resistance induced by CS-20 and other beneficial *F. oxysporum*.