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DEFENSE RESPONSES OF *FUSARIUM OXYSPORUM* TO 2,4-DIACETYL-PHLOROGUCINOL, A BROAD-SPECTRUM ANTIBIOTIC PRODUCED BY *PSEUDOMONAS FLUORESCENS*

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In soil and plant-associated environments, interactions within and among microbial communities are numerous and range from synergistic and mutualistic to antagonistic and parasitic. Antagonistic interactions have been exploited in the area of biological control of plant pathogenic fungi. To date, biological control is typically viewed from the perspective of how antagonists affect pathogens. This study examines the other face of this interaction, i.e. how plant pathogenic and saprophytic fungi respond to antagonistic bacteria. Various mechanisms that enable fungi and other microorganisms to resist toxic compounds have been described in the areas of medical microbiology, bioremediation and plant-pathogen interactions. These mechanisms include enzymatic degradation or inactivation of antibiotic compounds, alteration of the target sites, and active efflux. Relatively little is known about the role of these mechanisms in fungal defense against microbial antagonism. Some studies have shown that within specific fungal populations there is variation in sensitivity to antifungal metabolites produced by antagonistic bacteria. In this study, we examined the variation in sensitivity of plant pathogenic and saprophytic Fusarium oxysporum to 2,4-diacetylphloroglucinol (2,4-DAPG), a broad-spectrum, phenolic antibiotic produced by antagonistic Pseudomonas fluorescens. In vitro assays showed that approximately 18% of the strains, representing both pathogenic and saprophytic F. oxysporum, were relatively insensitive to 2,4-DAPG. Insensitivity was not linked to specific formae speciales, geographic origin, IGS-groups, or fusaric acid production levels. Insensitive strains were further analyzed at the biochemical level with respect to the nature of their defense mechanism against 2,4-DAPG. Most insensitive isolates degraded 2,4-DAPG. Degradation products consisted of the less toxic derivatives monoacetylphloroglucinol and phloroglucinol, suggesting that deacetylation is one of the initial steps in degradation of 2,4-DAPG by insensitive F. oxysporum isolates. The results also showed that 2,4-DAPG negatively affects fusaric acid production in several F. oxysporum strains. In conclusion, this study shows that also plant pathogenic and saprophytic fungi have surprisingly diverse responses to cope with microbial antagonism.