Identification of dsRNA Mycoviruses in Plant-Pathogenic Fungus Fusarium oxysporum

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Fusarium oxysporum is a plant pathogenic fungus posing threat to many crops worldwide. Persistence in soil, inefficient chemical control and lack of treatment make this fungus a major cause for concern in agriculture. In this study, I focused on viruses infecting Fusarium oxysporum, exploring the possibility of using these so called mycoviruses to debilitate the fungus, thus protecting plants from disease. As a marker of fungal virus presence, I used dsRNA, which does not occur in cellular organisms, but is a constituent of most fungal viruses. Using dsRNA isolation as a marker of virus presence, I tested several F. oxysporum strains for viruses. Fungal strains positive and negative for dsRNA were then compared in terms of growth, microscopic morphology and pathogenicity toward Arabidopsis thaliana, a model plant. Viral dsRNA fragments were reverse transcribed, amplified, ligated into vector and cloned into Escherichia coli as preparation for further sequencing. From four fungal samples tested, one was conclusively dsRNA-positive, and thus marked as mycovirus-positive. No significant differences were observed in terms of growth or microscopic appearance. However, when inoculated in soil, only the fungus lacking dsRNA caused disease and subsequent wilt in plants. Arabidopsis thaliana inoculated with fungus containing dsRNA showed no signs of wilt or disease. In my work, I have demonstrated that mycoviruses may decrease virulence in plant pathogenic fungi. These results have shown great potential in employing a yet uncharacterized fungal virus to curb the spread of aggressive Fusarium oxysporum, currently threatening many vital crops such as banana plants worldwide.

Awards Won:

Second Award of $2,000