Eliciting Plant Defensive Mechanisms via Mycorrhizal Stimulation

Wilson, Amanda (School: Northwestern High School)

The purpose is to better understand the relationships that arise between corn plants and their mycorrhizal symbionts in order to pursue agricultural applications of mycorrhizal fungi. The hypothesis is if corn plants are inoculated with mycorrhizal fungi, then they will exhibit immunity to pests due to elicitation of defensive mechanisms. Experiment 1 indicates that Trichoderma harzianum can combat corn smut infections. After 15 days, infected corn plants inoculated with T.harzianum did not exhibit stunted growth, an indication of corn smut infections. Experiment 2 suggests that T.harzianum, Glomus intraradices, and Ustilago maydis can elicit defense mechanisms in corn plants; Drosophila melanogaster populations decreased when exposed to root tissue and leaf tissue of corn plants inoculated with these fungi. Experiment 3 suggests that mycorrhizal fungi elicit chemical pheromones in corn plants. Leaf tissue of corn plants inoculated with G.intraradices detered D.melanogaster, as did root tissue of T.harzianum corn plants. Experiment 4 indicates that U.maydis elicits a response in corn plants that can be detected by Armadillidae; they were deterred by leaf tissue from infected corn plants but attracted to root tissue from infected corn plants. This result suggests that corn smut infections elicit differing above-ground and below-ground responses in corn plants. In Experiment 5, corn plants defensively responded to corn smut infections. U.maydis cultures produced rings of inhibition when exposed to root tissue from infected corn plants. Ultimately, the hypothesis was supported. The mycorrhizal fungi T.harzianum and G.intraradices and the pathogenic fungus U.maydis elicit defense responses in corn plants.