A Cost Efficient Solution to Citrus Root Destruction: Developing a Defensive Barrier against Citrus Weevils and Other Pests Using a Methylxanthine Agent

Reddy, Shreya

Developing a defensive barrier against invasive species that destroy native citrus populations is major problem for agricultural developers throughout the state of Florida and United States. With the ever-growing concerns against the use of potentially harmful pesticides, it is necessary to explore alternative approaches that provide protection from invasive species but are also cost efficient, and therefore implementable. The purpose of this project is to determine a new, inexpensive, and efficient way to lower the population of invasive insects that destroy citrus. Based on a previously groundbreaking study (Nathanson 1998), this project will explore the effects of caffeine, a methylxanthine, on the mortality/reproductive rates of 3 nonnative, invasive, insect species: Citrus root weevils (Diaprepes abbreviatus), Leafhoopers (Homalodisca vitripennis) and Asian Citrus Pysllids (Diaphoria citri). Caffeine and other methylxanthines have been shown to work to interfere with cellular signaling by inhibiting cyclic adenosine monophosphate (AMP) production. Therefore, the experimenter hypothesized that using the highest concentration of a pure caffeine concentration (1.0%) would have the greatest effect on the insects. It was found that mortality was greater in the 1% caffeine concentrations in several cages of the weevil, leafhopper, and psyllids. Along with mortality, all weevil cages showed a declining number of eggs laid, as the caffeine concentration increased. Weevils were also observed to avoid plant cuttings sprayed with caffeine rather than water. A cost efficiency analysis also showed that at $8.50/acre, caffeine may in fact have a promising future in the pest management industry.

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