DEVELOPING A NOVEL DETECTION AND MONITORING SYSTEM FOR THE GLASSY-WINGED SHARPSHOOTER

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INTRODUCTION

Pheromones and other semiochemicals are invaluable tools for quarantine and monitoring insect populations. Attractants are critically needed to detect early invasions of the glassy-winged sharpshooter (GWSS). Once detected using current technologies, their population densities may be too high to achieve eradication or effective control. Although it is unlikely that chemical communication is the major means of sex recruitment in the GWSS, plant-derived chemical signals are utilized for host location. The primary objective of this project is to develop attractants for detection and monitoring of the glassy-winged sharpshooter, *Homalodisca coagulata.* The goal is going to be pursued by the extraction, isolation, identification and synthesis of leaf compounds from plants that attract sharpshooters and other leafhoppers. Synthetic compounds, originally identified in plants, as well as other candidate compounds, will be tested in the field in order to evaluate their potential for monitoring population levels of the GWSS.

OBJECTIVES

1. The primary objective of this project is to develop attractants for detection and monitoring of the glassy-winged sharpshooter, *Homalodisca coagulata*.
2. One approach (strategy I) is based on the extraction, isolation, identification and synthesis of leaf compounds from plants that attract sharpshooters and other leafhoppers.
3. The other potential attractants will be screened by a binding assay with an olfactory protein, odourant-binding protein (OBP), involved in the filtering of chemical signals in the insect antennae. Initially, OBP(s) from the GWSS will be isolated, cloned and expressed in bacteria.

RESULTS AND CONCLUSIONS

Plants that attract sharpshooters and other leafhoppers were extracted and fractionated (chromatographic separations). Identification of the active constituents was carried out by gas chromatography-mass spectrometry, vapor-phase infrared spectroscopy and by chemical derivatizations. Based on these data, chemical structures of the compounds were proposed and confirmed by synthesis of the authentic compounds.

Candidate compounds were incorporated in release-controlling plastic pellets (Leal et al., 1996) and evaluated as baits with yellow sticky traps in randomized blocks (Leal, 1999). Field bioassays are being conducted in Ventura County. This is an excellent location to test attractants because the area has well established populations (among the first identified in California) which are not heavily treated as they must be in locations such as Riverside and Kern counties where transmission of *Xylella fastidiosa* to grapes is of primary concern.

Field observations indicated that sharpshooters lay eggs in non-host plants and that location of these oviposition sites is chemically mediated. This prompted us to characterize potential attractants from plants preferred for oviposition. Plants were extracted either in Ventura County or other locations where field ecology of sharpshooters have been studied. Chemical analysis of the plant extracts led us to the characterization of semiochemicals of potential application in monitoring the GWSS (Figure 1).

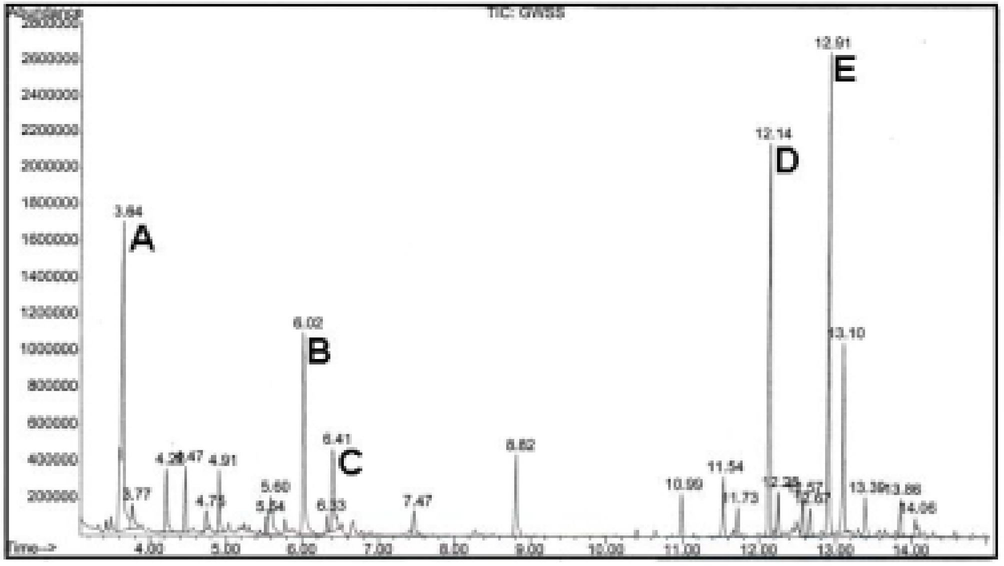

Figure 1. Gas chromatography-mass spectrometry (GC-MS) analysis of an extract from a plant preferred by GWSS for oviposition. The major constituents of the extract were identified and synthetic compounds are being tested as potential attractants for GWSS. To date, combinations of compounds A, B, C, D, and E have been tested.

Field evaluations of these semiochemicals and other potential attractants are underway. Tests of known pheromones were unrewarding. Among the plant formulations tested so far, traps baited with combinations of compounds A, B, C, D, and E (Figure 1) showed initially more catches than control traps, but the effect of trap position (false positive) could not be completely ruled out. Further experiments with randomized blocks and perhaps greater replication will be carried out when the adult populations once again reach higher densities. Screening of additional compounds from host plant extracts will also be carried out.

REFERENCES

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