

ELECTROPHYSIOLOGICAL AND BEHAVIORAL RESPONSES OF CITRUS ROOT WEEVIL

Fernando Otálora-Luna¹, Jennifer A. Hammock¹, Rocco T. Alessandro²,
Steve L. Lapointe², and Joseph C. Dickens¹

¹USDA ARS, Beltsville Agricultural Research Center, Plant Sciences Institute, Invasive Insect Biocontrol and Behavior Laboratory, Beltsville, MD 20705

²USDA ARS, Horticultural Research Laboratory, Fort Pierce, FL 34945

ABSTRACT

The tropical root weevil *Diaprepes abbreviatus* (L. 1758) (Coleoptera:Curculionidae) is a polyphagous insect from the Caribbean Islands and an invasive insect in the southern U.S. where it is a pest of citrus crops and ornamental trees. Adults feed upon foliage where aggregation, mating, and oviposition take place. Here, the headspace volatiles from *Citrus macrophylla* Wester (Rutaceae), a host plant of *D. abbreviatus*, and adults feeding on this plant, were collected by aeration and solid-phase microextraction (SPME) and then analyzed by gas chromatography-linked mass spectrometry (GC-MS). Electrophysiological responses of weevil antennal receptors to volatile headspace extracts and synthetic compounds were recorded by gas chromatography-linked electroantennographic detection (GC-EAD) and electroantennograms (EAGs). Separation of volatiles

using GC revealed a preponderance of monoterpenes in the headspace of citrus leaves and adults feeding on the leaves. Antennal responses were recorded to (R)-(-)-linalool, citronellal, nerol, citral, and carvacrol. When comparing EAGs between (+/-)-linalool and (R)-(-)-linalool, no significant difference was found; responses to (R)-(+)-citronellal were larger than for (S)-(-)-citronellal. An open T-track dual choice olfactometer measured behavioral responses to electrophysiologically active compounds and several blends. Among the individual compounds and blends tested, only the blend of (+/-)-linalool, cis-3-hexen-1-ol, and carvacrol (source dose 25:25:2.5 µg) elicited significant attraction. The biologically active compounds found here likely play a role in host finding by *D. abbreviatus* and other interactions of the insect with its host plant.