IDENTIFICATION OF MALE-SPECIFIC VOLATILES FROM NEARCTIC AND NEOTROPICAL STINK BUGS (HETEROPTERA: PENTATOMIDAE)

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Abstract—Males of the Central American stink bug species, Euschistus obscurus, produce an attractant pheromone composed of a blend of compounds characteristic of North American Euschistus spp. and the South American soybean pest, E. heros. The range of E. obscurus extends into the southern United States, the species is easy to rear, and males produce an exceptionally large quantity of pheromone (>0.5 μg/day/male). These factors made E. obscurus useful for characterizing the novel pheromone components of E. heros without importing this pest species into the United States. Euschistus obscurus males produce methyl (2E,4Z)-decadienoate (61%) in abundance, which is characteristic of North American species, and methyl 2,6,10-trimethyltridecanoate (27%), the main male-specific ester of E. heros. The chirality of Euschistus spp. methyl-branched esters, and field activity of synthetic formulations, remain to be determined.

Key Words—Heteroptera, Pentatomidae, pheromone, attractant, Euschistus, soybean, methyl 2,6,10-trimethyltridecanoate.

INTRODUCTION

Methyl (2E,4Z)-decadienoate is the major male-specific volatile of five Nearctic stink bugs (Heteroptera: Pentatomidae): Euschistus conspersus, E. tristigmus, E. obscurus, E. heros, and E. servus. These species are easy to rear and produce large quantities of pheromone, making them useful for characterizing the novel pheromone components of E. heros without importing this pest species into the United States.
E. servus, E. politus, and E. ictericus (Aldrich et al., 1991). Females, males, and nymphs of the first four of these species were significantly attracted to this ester in the field. Tests in Maryland also demonstrated that parasitic tachinid flies use the unsaturated methyl-ester as a host-finding kairomone (Aldrich et al., 1991). In a sixth species, E. obscurus, whose northern range extends into Texas and Florida (Froeschner, 1988), methyl (2E,4Z)-decadienoate was reported to be a relatively minor male-specific component, with the major component being tentatively identified as methyl 2,6-dimethyltetradecanoate (Aldrich et al., 1991).

Establishment of a prolific laboratory colony of E. obscurus has enabled us to reinvestigate the tentative identification of methyl 2,6-dimethyltetradecanoate from E. obscurus, which was based on analysis of a single field-collected male. We recently found that the main volatile from males of the South American soybean pest, E. heros, is identical to the ester tentatively identified in E. obscurus (ignoring chirality), giving added significance to structural verification of the novel E. obscurus pheromone component.

We correct here our earlier misidentification of the major male-specific volatile from E. obscurus (Aldrich et al., 1991) and provide more detailed information on the presence of other male-specific volatiles for this species and for E. heros.

METHODS AND MATERIALS

Insects. Euschistus heros used in the study were obtained from a colony started from adults collected near the Centro Nacional de Recursos Geneticos e Biotechnologic, Brasilia D.F., Brazil, and E. obscurus was obtained from a laboratory colony of Dr. Walker Jones (USDA-ARS, Weslaco, Texas). Euschistus heros was reared in Brazil on fresh green beans, raw peanuts, and water at 26 ± 1°C with a 16:8-hr light-dark photoperiod. Euschistus obscurus was reared in the Beltsville laboratory under similar conditions except that sunflower seeds were used instead of peanuts. The sunflower seeds were glued onto sheets of brown wrapping paper with wallpaper paste, and cut into 10-cm squares that were discarded after depletion by the insects.

Extractions. Airborne extracts were prepared from Euschistus spp. in the respective laboratories by confining 20-50 insects in a glass column (ca. 1 liter), drawing air for 24 hr by vacuum (100 ml/min) through ca. 30 mg of activated charcoal inside a Swinney Luer-lock filter holder (13 mm; Thomas Scientific, Philadelphia, Pennsylvania), and extracting the filter with 100-200 µl of CH₂Cl₂ or heptane (Aldrich et al., 1989, 1991).

Chemical Analyses. Brazilian samples were analyzed initially by gas chromatography (GC) on a bonded methyl silicone column (0.25 µm film, 30 m ×