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INTRODUCTION

The study of the species complex *Anastrepha fraterculus* (*Af* complex) in Brazil is especially important in a taxonomical, evolutionary and pest management context, because there are evidences that some of them may occur in sympatry. Here, we present the results obtained so far, on the identification of the chemical signals involved in the communication between males and females, which act as long- and short-range pheromones (male-produced volatiles and cuticular hydrocarbons, respectively). The role of volatile compounds from fruit hosts as potential attractants for mated females is presented as well. Finally, the research gaps in the field of the chemical ecology of the *Af* complex are highlighted.

MALE-PRODUCED VOLATILES

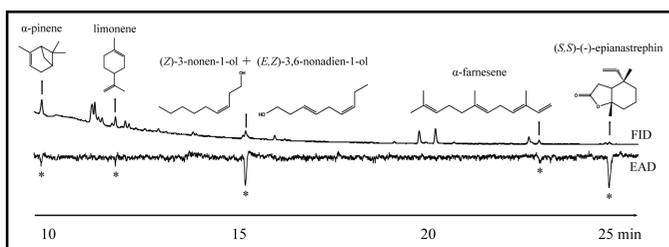


Fig. 1. Gas chromatographic separation of a headspace extract of *Anastrepha fraterculus* males by conventional detection (GC-FID) and electroantennographic detection (GC-EAD) using antennae of con-specific females. Asterisks indicate antennal depolarization.

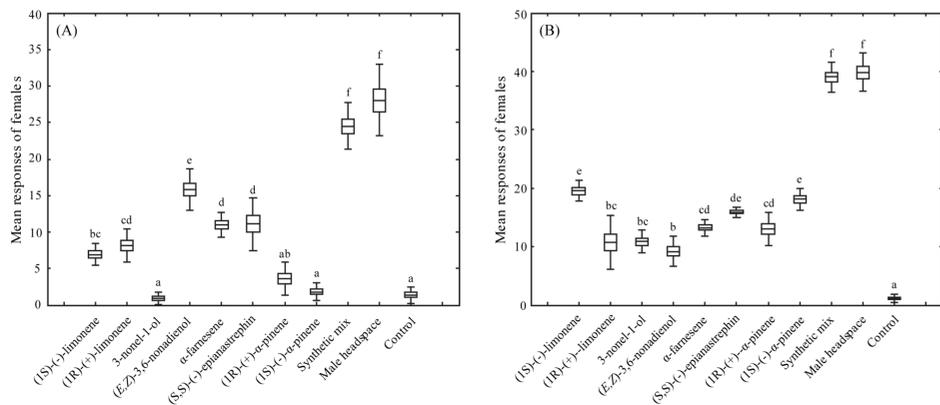


Fig. 2. Mean responses of *A. fraterculus* females to EAD-active synthetic compounds (tested individually or as a blend), male headspace extracts, and a hexane control in laboratory assays. (A) Touch the odor source and remain for more than 2 min and (B) Agonistic and searching behavior near the chemical source. Box and whisker represent standard error and deviation, respectively. Distinct letters indicate significant differences among treatments (Tukey's Post Hoc HSD test, $P < 0.05$).

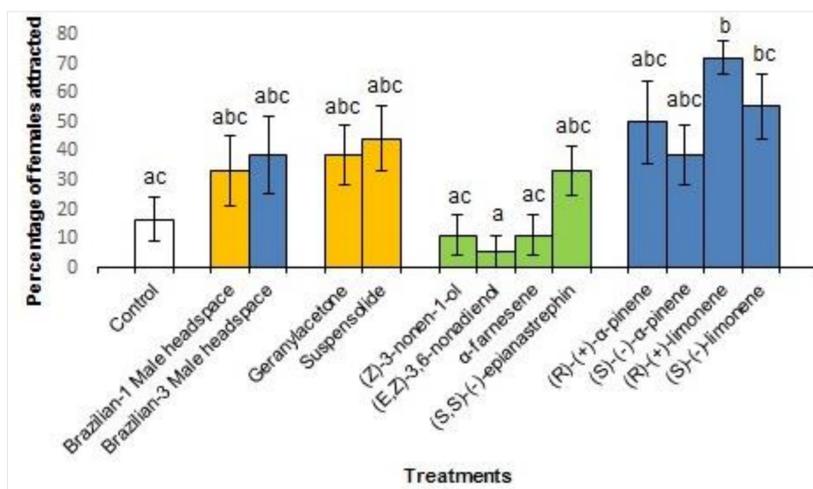


Fig. 3. Mean percentage of females of *A. fraterculus* attracted to identified EAD-active compounds for Brazilian-1 morphotype. Orange bars represent the compounds EAD-active identified for the Brazilian-1 morphotype. Blue bars indicate the compounds identified as EAD-active for the Brazilian-3 morphotype. Green bars represent the EAD-active compounds common to both morphotypes. Bars with the same letters are not significantly different (Tukey test). Six replicates were performed per each treatment.

CUTICULAR HYDROCARBONS

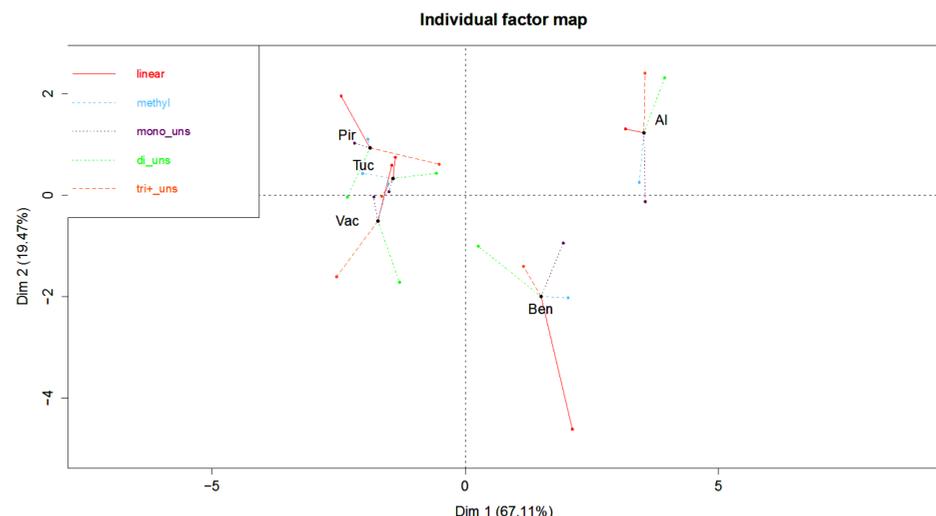


Fig. 4. Multiple factor analyses (MFA) of transformed GCxGC-TOF/MS data of 69 cuticular hydrocarbons (HCHs) found in five *A. fraterculus* studied populations. The graph represents the score plot describing the studied populations and chemical classes modalities of the first two factors. The following abbreviations stand for the studied populations: Tuc-Tucuman, Vac-Vacaria, Pir-Piracicaba, Ben- Bento Gonçalves, Al-Alagoas and HCHs classes: red A(1-15): linear HCs; blue B(1-28): monomethyl branched HCs; lilac C(1-17): monounsaturated HCs (alkenes); green D(1-7): diunsaturated CHs (alkadienes); yellow E(1-2): triunsaturated HCs (alkatrienes) and squalene.

VOLATILE COMPOUNDS FROM FRUIT HOSTS AS ATTRACTANTS FOR MATED FEMALES

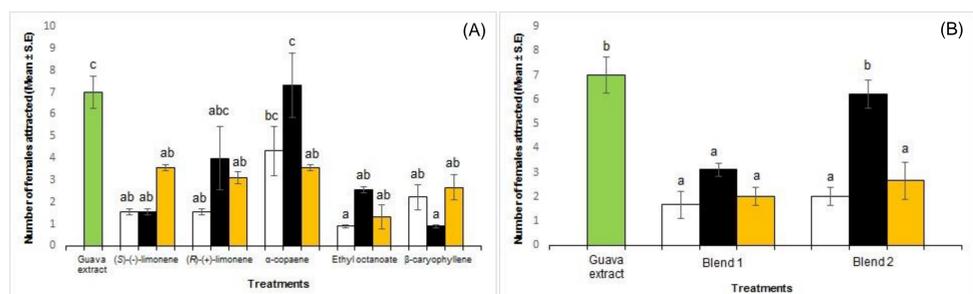


Fig. 5. Number of mated females of *A. fraterculus* attracted to volatile compounds released by guavas. The responses of mated females to solutions of individual compounds and guava headspace extract is represented in (A) and the responses given to mixtures of the compounds and guava extract is represented in (B). Bars with the same letters are not significantly different (Tukey test). Six replicates were performed per each treatment.

RESEARCH GAPS

- Identify the volatiles which enhance male sexual performance
- Identify the chemicals used as host-marking pheromone
- Find out if among the volatiles released by different fruit hosts there is an specific mixture which enable fruit flies to select them

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