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RESPONSE OF ANASTREPHA OBLIQUA (DIPTERA: TEPHRITIDAE) TO FRUIT ODORS AND PROTEIN-BASED LURES IN FIELD TRIALS

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The West Indian fruit fly, *Anastrepha obliqua* (Macquart), has been recorded from the USA (Florida and Texas) to South America, including the Caribbean Islands. This is a species of fruit flies that causes serious damage to several economically important fruit crops, such as mango, sapodilla, and guava (Hernández-Ortiz & Aluja 1993).

Lures based on organic compounds such as putrescine, ammonium acetate, or liquid hydrolyzed protein have been used successfully as attractants in programs for detection and monitoring of several species of fruit flies (Heath et al. 1997). Volatiles from fruit odors also have been investigated as attractants for fruit flies (Reynolds & Prokopy 1998; Robacker & Heath 1996; Prokopy & Vargas 1996; Nigg et al. 1994). Recently, Cruz-López et al. (2006) showed that both sexes of *A. obliqua* are strongly attracted to a blend of 9 synthetic compounds of volatiles of hogplum (*Spondias mombin* L.). The combination of nitrogenous lures and fruit odors may improve the catches of *A. obliqua*, but this approach remains to be investigated in field tests. The aim of this paper was to evaluate the response of feral flies of *A. obliqua* to a synthetic 9-component blend of hogplum volatiles (*S. mombin*), in combination with putrescine and ammonium acetate.

Field trials were conducted in an unsprayed commercial orchard of mango Cv. Ataulfo located in Tapachula, Chiapas, Mexico from May to Jun 2006. Multilure traps (Better World Manufacturing Inc., Fresno, CA) were hung from branches of fruit trees 4 m above the ground, and 15 m apart. The traps were baited with the following treatments: (1) ammonium acetate (AA) (Suterra LLC, OR, USA) + synthetic blend of *S. mombin* fruits (SM); (2) putrescine (Pu) (Suterra LLC, OR) + SM; (3) AA + Pu + SM; (4) AA + Pu; (5) SM alone; and (6) hydrolyzed protein (HP) Captor 300 (Promotora Agropecuaria Universal S.A. de C.V., Mexico City) used as control. Each trap contained 250 mL of water, and 2 mL of Tween 80 (ICI, Wilmington, DE), which were added to retain flies, while others traps were baited with 10 mL of the hydrolyzed protein mixed with 5 g of borax dissolved in 235 mL of water per trap. The synthetic blend of *S. mombin* fruits were prepared as described elsewhere (Cruz-López et al. 2006), and 100 µL of synthetic blend were loaded in a rubber septum (Sigma-Aldrich, Toluca, Mexico). The rubber septa were put in the lure compartment of the Multilure trap. Each row of trees contained a trap of each treatment, and there were 5 replicates per treatment. Traps were collected every 3 d and the position of traps within each row was rotated

The captures of *A. obliqua* were analyzed by analysis of variance (ANOVA), and means were separated by the Tukey test (α= 0.05). Data were transformed by $y^{0.4}$ for total flies analysis, and $y^{0.5}$ for females and males analysis by the Box-Cox family of power transformation (Box & Cox 1964) to stabilize variances before analysis. Data analysis was performed with Statistica ver. 6 (Statsoft, Inc., Tulsa, OK).

In total, 950 adults of *A. obliqua* were captured in all traps, 615 flies were females, and 335 were males. In addition, traps captured individuals of *Anastrepha ludens* and *Anastrepha serpentina* (Wiedemann). We found that the catches were significantly affected by treatment (total flies F = 34.38; df = 5, 20; $P < 0.001$; females F = 45.60; df = 5, 20; $P < 0.001$; males F = 12.66; df = 5, 20; $P <$ 0.001). Traps baited with HP, AA + Pu + SM, and AA + Pu caught more females and total flies than the traps baited with AA + SM, Pu + SM, and SM alone. While the traps baited with HP, AA + Pu, and AA + Pu caught more males than the traps baited with AA + SM, Pu + SM, and SM alone. Flies males captures by traps baited with AA + Pu + SM were not significantly different from the catches by traps baited with HP, AA + Pu, or AA + SM. Number of males *A. obliqua* caught by traps baited with AA + SM was not significantly different from the catches by traps baited with Pu + SM, and SM alone. The traps baited with Pu + SM, and SM alone captured the fewest males (Fig. 1).

Our results showed that combination of ammonium acetate and putrescine with synthetic blend of *S. mombin* fruits did not improve the captures of both sexes of feral *A. obliqua*. Similar results to those found in the present study have been reported in *A. ludens*, when a blend of 4 synthetic compounds of volatiles of yellow chapote: 1,8-cineole, ethyl hexanoate, ethyl octanoate, and hexanol in combination with putrescine, ammonium bicarbonate, and methylamine HCl did not increase the captures compared with the traps containing metabolites of amino acids alone (Robacker 1998). In the course of this experiment, we observed that flies fed on fallen ripe mangoes, and this may affect the response of feral flies to AA + Pu + SM, and SM alone. In semi-natural condi-

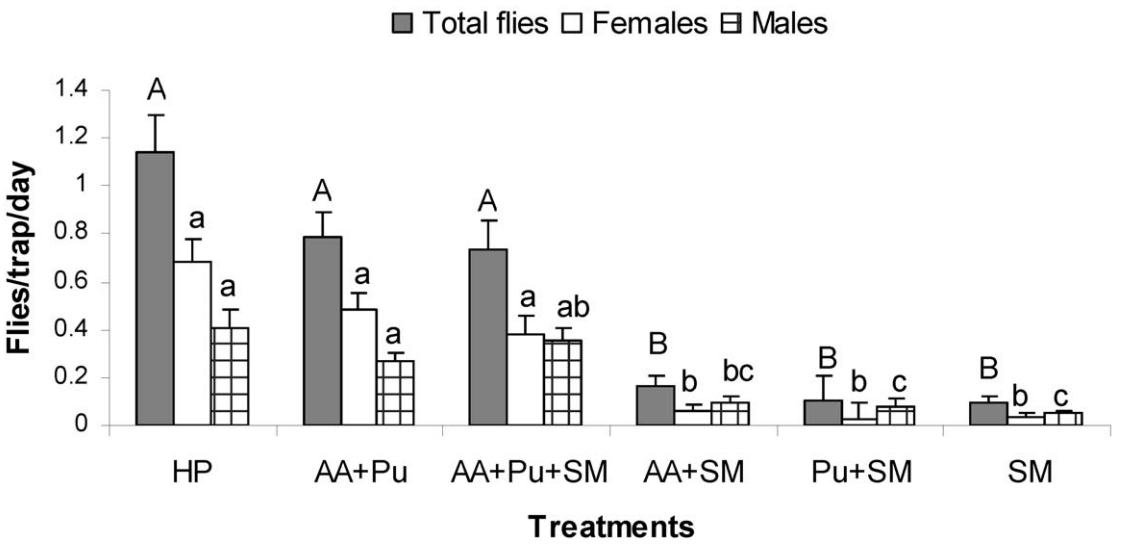

Fig. 1. Mean (+SE) captures of *A. obliqua* by Multilure traps baited with different lures. HP = Hydrolyzed protein; Pu = Putrescine; AA = Ammonium acetate; SM = synthetic blend of *S. mombin* fruits. Bars with the same color capped with the same letter are not significantly different (Tukey, $P < 0.05$).

tions, virgin and mated *A. obliqua* males and females fed with hydrolyzed protein were more attracted to SM alone than to AA + Pu. In contrast, sugar-fed virgin fruit flies preferred AA + Pu over SM alone, while sugar-fed mated flies did not show any preference for AA + Pu or SM alone (López-Guillén 2008).

In conclusion, the results of this study demonstrated that both sexes of *A. obliqua* were attracted similarly to traps baited with AA + Pu + SM, and AA + Pu.

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Summary

The addition of hogplum fruit (*S. mombin*) volatiles to proteinaceous-derived lures did not improve the catches of *A. obliqua* in a mango orchard.

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