TRAPPING OF *SCYPHOPHORUS ACUPUNCTATUS* (COLEOPTERA:CURCULIONIDAE) WITH TWO NATURAL BAITS IN A FIELD OF *POLIANTHES TUBEROSA* (LILIALES:AGAVACEAE) IN THE STATE OF MORELOS, MÉXICO

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The plant locally called "tuberose", *Polianthes tuberosa* L. (Liliales: Agavaceae) is endemic to México. It is used to make flower ornaments and to extract volatile compounds for perfume manufacturing (Conzatti 1981; Watson & Dallwitz 1999). The black weevil *Scyphophorus acupunctatus* Gyllenhal (Coleoptera: Curculionidae) is a pest of *P. tuberose*. The highest percentage of plants damaged by this weevil, observed in Coatlán del Río, was reported as 69% (Camino et al. 2002a,b). It also attacks the *Agave salmiana* Otto ex. Salm-Dyck "pulque" and *A. fourcroydes* Lemaire "henequén" (MacGregor & Gutiérrez 1983; Morón & Terrón 1988). Ramírez-Choza (1993) found it in all regions where agave is cultivated. It is the main pest of sisal, causing damage of up to 50% of this crop. It has caused damage in "tequila" agave (*A. tequilana* Wever var. Blue), accounting for 10% loss of crops (Valenzuela 1994; Solís et al. 1999). Solís et al. (2001) reported up to 24.5% damage by *S. acupunctatus* in the *A. tequilana* heads. Recently in Morelos state "tequila" agave culture was introduced and Cabrera & Orozco (2002) reported that Counter (terbufos) controlled this insect in tuberose culture. Camino et al. (2000a, b) reported the use of 20 different bait types consisting of fruits and plant residues in two trap types (different from the ones used in the present work), where fermented agave, ripe pineapple, banana, and guava apple captured the highest number of adult *S. acupunctatus*; no natural baits were reported previously as attractive for this insect species.

This study was conducted to assess the response of *S. acupunctatus* towards two natural baits (Camino et al. 2002a), and the effectiveness of two trap types (a commercial one plus a funnel-type homemade one) for capturing adult weevils.

Fieldwork was conducted from August to October, 2001, in Morelos, México (18°53'N-99°11'W) at an altitude of 1350 m. A 1.2-ha parcel planted with offshoots of *P. tuberosa* was used as an experimental field and was divided into 18 plots (28 × 35m), with one trap placed in the center of each plot. A two-factor design (two trap types and two bait types) including six treatments and three replicates was used. The traps evaluated were the Victor (V) trap made of transparent plastic measuring 9 × 16 × 7 cm (depth:height:width) with a black cap having four 1 cm-diameter orifices at its base and with a yellow umbrella-shaped cap measuring 7 cm in diameter (Fig. 1a) and a yellow

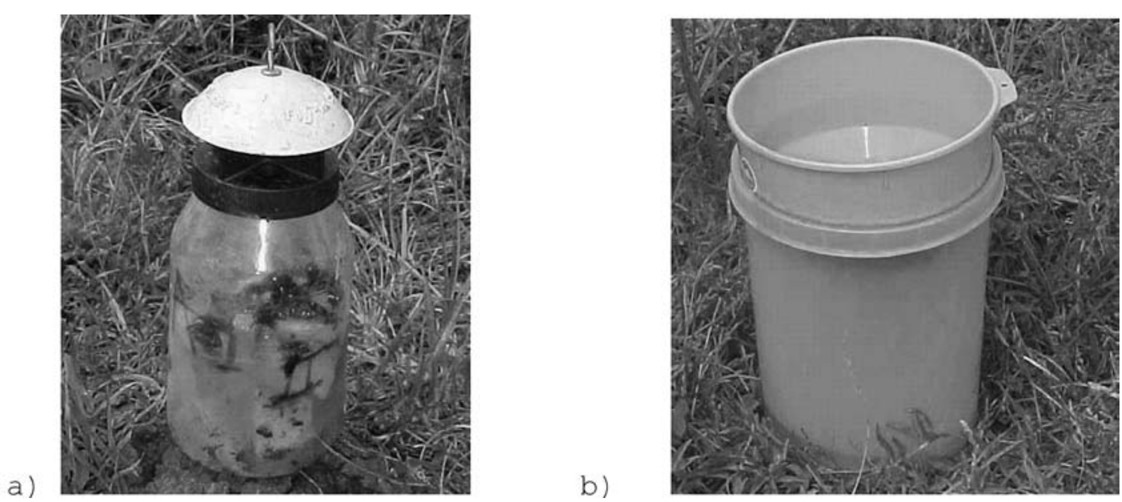

Fig. 1. Traps used for capturing the tuberoses black weevil *S. acupunctatus*: a) Victor trap, and b) Funnel trap.

funnel (F) trap consisting of a cylindrical 20 × 32 × 20-cm (depth:height:width) plastic container, with a plastic funnel measuring 25 × 27 × 22 cm (depth:height:width) (Fig. 1b). The bait types were ripe chopped pineapple (*Ananas comosus*) and fermented maguey (*A. salmiana*); additionally, water was used as control. The traps were randomly distributed. Baited traps were rotated at one-week intervals to avoid any position-related bias, for a total period of three months.

The nine V and F traps were baited as follows: three, with 300g of ripe, chopped pineapple plus 250 ml of water, three with 500 ml of fermented maguey, and three traps contained 250 ml of water only. Traps were rotated, checked every 8 days at 0900 h to collect adult weevils, and baits were replaced at each sampling interval. There were 10 sampling events. Captured weevils were placed in separate plastic containers and taken to the laboratory for counting.

The numbers of weevils captured were compared during the 3- month test by a two-way ANOVA. Means were separated by a Student Newman-Keuls test. Data were analyzed with the computer software SigmaStat for windows, version 2.03 (SigmaStat 1995).

Trap V captured significantly more weevils (a total of 1726 specimens) than trap F (F = 7.620, df = 1,114, P = 0.007) (Fig. 2) In August, the V trap captured 277 organisms, and the number increased to 385 in September, with maximum capture of 2232 in October. The V-trap design includes 4 orifices in the cap, which may lead to better release of volatiles. Weevils captured by the F trap were always lower than those for the V trap; however, the trend in counts over the course of the investigation were similar to those observed for V traps, namely less than 50 specimens captured in August and September followed by an increase in early October, with a peak totaling 2894 insects captured with both bait types, then decreasing and remaining at low numbers until the end of the experiment. This may be because of trap design, which only presents one opening for the volatilization of fermentation products. No captures were recorded in the control treatments throughout the experiment.

The fermented maguey was the most attractive bait for *S. acupunctatus* in August, but pineapple accounted for the highest counts in September-October. No statistical differences were observed between baits (F = 0.106, df = 2,114, P > 0.05) (Fig. 3). This might be explained by the fact that some of the fermentation products are identical or similar in both bait types; according to Figueroa et al. (2001) the major component in both pineapple and fermented maguey is ethanol, with minor components including acetaldehyde, acetic acid, and ethyl acetate. A difference between sampling events was detected (P < 0.001), with sampling 7 being the most significant one (748 insects). Data obtained for the sugar cane weevil *M. hemipterus sericeus* (Giblin-Davis et al. 1994a) and palm weevils *R. palmarum* and *R. cruentatus* (Camino et al. 1992; Oehlschlager et al. 1993; Giblin-Davis et al. 1994b; Oehlschlager et al. 1995) suggest that fragrances and fermentation products (ethyl acetate, ethyl lactate, ethyl isobutyrate, ethanol, butanol, acetic acid, hexanoic acid, and lactic acid) derived from a variety of plants or fruits are attractive for these insects.

The statistical comparison of traps and baits revealed no significant differences; however, substantial capture may contribute to decreasing the size of populations feeding on and damaging tuberose crops.

The Victor type was the most effective trap for capturing *S. acupunctatus*, suggesting that this

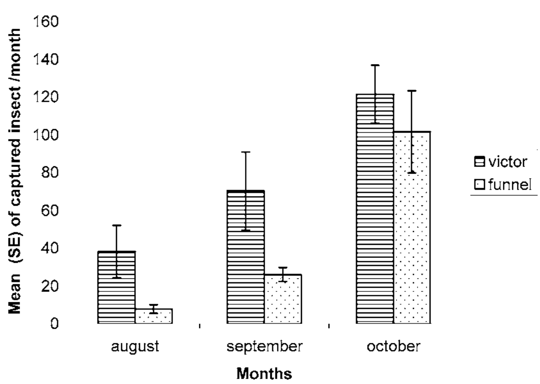

Fig. 2. Capture of *S. acupunctatus* adults in the field with two natural baited traps in Morelos Mexico (F = 7.620, df = 1,114, P > 0.007). Bars show SE.

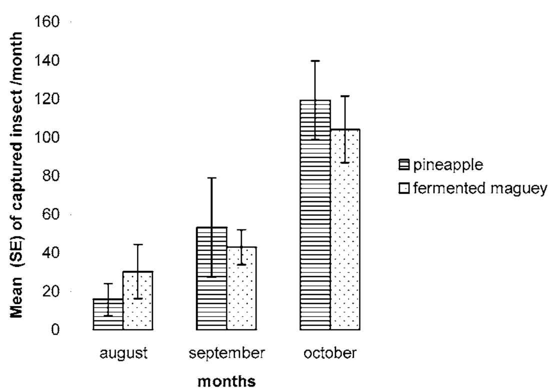

Fig. 3. Capture of *S. acupunctatus* adults in the field using two natural baits in Morelos Mexico. There is not statistical difference observed between fermented maguey and pineapple (F = 0.606, df = 2,114, P > 0.05). Bars show SE.

trap design allows a better volatile dissemination. Hence, this trap type can be recommended to monitor weevil populations, or as an aid to reduce the population size of this pest as part of an Integrated Pest Management program.

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SUMMARY

Tests were conducted to assess the attraction of *Scyphophorus acupunctatus* to two natural baits (fermented maguey and pineapple) in two trap designs (Victor and funnel) in 2001 in fields planted with offshoots of *Polianthes tuberosa* in Emiliano Zapata, Morelos, México. There was a statistically significant difference between traps, with the Victor-type trap giving the largest catches.

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