

Scientific note

A scientific note on observations of the small hive beetle, *Aethina tumida* Murray (Coleoptera, Nitidulidae), in Florida, USA

Patti J. ELZEN*, James R. BAXTER, David WESTERVELT**, Charlotte RANDALL***, William T. WILSON

USDA-ARS, Kika de la Garza Subtropical Agricultural Research Center, 2413 E Hwy 83, Weslaco, TX 78596, USA

(Received 18 February 2000; revised 3 April 2000; accepted 18 May 2000)

Aethina tumida / *Apis mellifera* / small hive beetle / biology

Observations of the small hive beetle, *Aethina tumida*, were made at Umatilla, Florida, USA, near the mid-central region of the state in June 1999. We conducted preliminary tests on flight activity, sex ratio of captured flying adult beetles, and food preference of adult and larval beetles.

Flight activity was monitored as described in Elzen et al. [1]: plastic bucket traps baited with 10 g honey, 5 g pollen, and 50 ml live adult honey bees (*Apis mellifera* L.) were hung 2 m above the ground in an infested bee yard. Four holes cut in the sides of the traps were covered with 8 mesh (ca. 4 mm screen openings) hardware cloth to allow adult beetles to enter the traps (bees could not enter or leave traps through mesh). Because the traps were hung high above the ground, all subsequently captured beetles were assumed to have flown to enter the traps. The numbers of beetles found in the ten baited traps and five control (unbaited) traps were checked every 4 h from 08.00 until 20.00 h and repeated the following day. Approximate temperature during flight time was 30 °C. Weather conditions on the first day were overcast and rainy; on the second day, only partly cloudy skies occurred. Results of these observations showed significant (> 600 beetles) flight activity from 16.00–20.00 h on the first check day, well before sundown (complete sundown was after 21.00 in June). In his detailed studies of flight activity in Africa, Schmolke [2] found in the beetle's home range that there was no flight activity before sundown. Our results indicate that perhaps flying

adult beetles respond to other cues in addition to photoperiod. It is interesting to note that on the day when so many beetles were caught between 16.00–20.00 h, there was a slight rain shower immediately preceding this time period.

The sex ratio of these captured beetles was significantly skewed toward males at the 16.00–20.00 h collection period, when most beetles were caught, with a 60.7:39.3 male to female ratio ($n = 617$, *chi-square* analysis with expected 1:1 ratio, $P < 0.001$). The following morning at 08.00 h, the ratio of males to females was not significantly different from 1:1 ($n = 178$; $P = 0.524$). Early in the flight cycle, before 16.00 h, only 13 beetles were caught, and 92.3% of these were males. Thus, our preliminary data indicate that males are earlier fliers than females, or that they respond to fresh food sources more readily than females.

Food preference by adult and larval beetles was determined in a laboratory test, giving the larvae and adults a choice between honey, pollen, and bee brood. Six honey bee pupae (purple eye stage), ca. 5 g honey and 2 g pollen, were introduced into 15 new glass 473 ml jars. In five of these jars we placed five adult beetles; in the other five we placed early instar larvae; the remaining five jars contained no adults or larvae and served as controls. The adults and larvae were allowed to feed on the provided food sources for 4 days. Observations made during this time clearly indicated that beetles fed on the bee pupae since the pupae quickly became

* Correspondence and reprints

E-mail: pelzen@weslaco.ars.usda.gov

** Florida Dept. Agric., Division of Plant Industry, Gainesville, FL 32604.

*** Randall's Wax Works, 389 S. Central Ave., Umatilla, FL 32784.

reduced to chitinous shells. At the end of 4 days, the combined weight of the control pupae was 549.6 mg and these pupae were entirely intact. The weight of bee pupae in the adult beetle-feeding jar was 186.7 mg, less than the control weight (t -test; $P < 0.05$); these bee pupae were amorphous shells of exoskeleton. The weight of the bee pupae in the larval beetle-feeding jar was 334.7 mg, again significantly less than the control bee pupal weight; these bee pupae were amorphous and unrecognizable as intact bee pupae. Ample honey and pollen were left at the end of the test. Thus, even in the presence of honey and pollen, small hive beetle adults and larvae preferred to feed on honey bee pupae.

Given the results of these preliminary studies, more information has been gained on a species that has proven to be a serious pest in the south-eastern US. Further detailed studies will be conducted on honeybee/beetle interactions and control of beetles in honey processing and storage facilities.

Note scientifique sur des observations concernant le petit coléoptère des ruches, *Aethina tumida* Murray (Coleoptera, Nitidulidae) en Floride, États-Unis.

Eine wissenschaftliche Notiz über Beobachtungen des Kleinen Beutenkäfers, *Aethina tumida* Murray (Coleoptera, Nitidulidae), in Florida, USA.

REFERENCES

- [1] Elzen P.J., Baxter J.R., Westervelt D., Randall C., Delaplane K., Cutts L., Wilson W.T., Field control and biology studies of a new pest species, *Aethina tumida* Murray (Coleoptera, Nitidulidae), attacking European honey bees in the Western Hemisphere, *Apidologie* 30 (1999) 361–366.
- [2] Schmolke M.D., *Aethina tumida*: the small hive beetle, M.S. thesis, University of Rhodesia, 1974, 181 p.