



Fly aggression behavior and infestation rates of *Senotainia tricuspis* (Meigen, 1838) (Diptera, Sarcophagidae) in an apiary in Central Italy (Pisa province)

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INTRODUCTION



METHODS

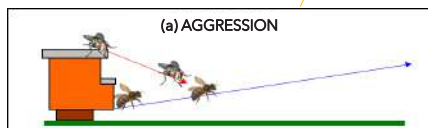
N=1 Apiary

Pisa Province

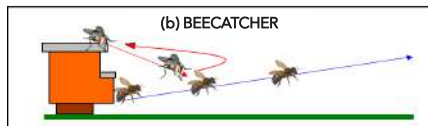
2004, 2005

Direct and Indirect observations from June to November

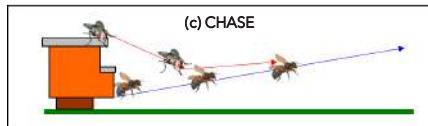
(a) AGGRESSION



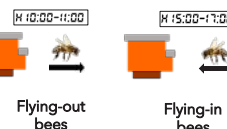
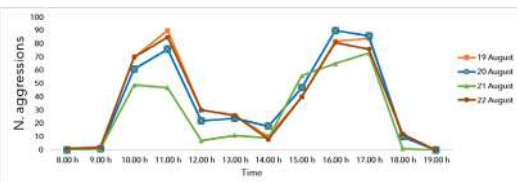
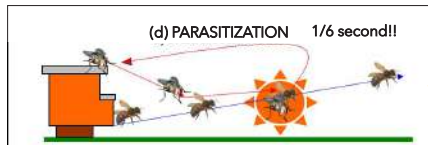
(b) BEECATCHER



(c) CHASE



(d) PARASITIZATION 1/6 second!!



FIRST INSTAR LARVAE DEPOSITION

512-602 LARVAE

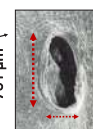
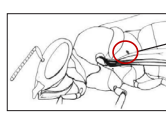


800-1000µm

100-130µm

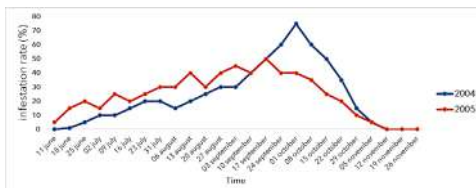
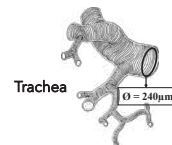
PENETRATION

Prothoracic spiracles

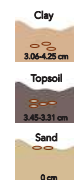


185 µm

SECOND INSTAR LARVAE DEVELOPMENT



Type of soil	Boxes	N° developed pupae (tot=25)	Sink depth (cm)	Average sinking depth (cm)
Clay	1	4	3.0 3.4 4.7 5.9 - - -	4.25
	2	6	1.1 2.2 2.3 3.7 4.0 5.1 -	3.06
Topsoil	1	6	1.5 2.0 2.8 3.9 4.8 5.7 -	3.45
	2	7	0.8 1.2 1.2 3.9 4.0 5.6 6.5	3.31
Sand	1	0	- - - - - - -	-
	2	2	0 0 - - - - -	0



CONCLUSIONS

The peak of infestation of *S. tricuspis* in apiaries occurs in early autumn, and during the morning hours, flies seem to attack the honey bees when leaving the hives, while in the afternoon, they tend to attack the honey bees returning to the hives.

The aggressive behavior of *S. tricuspis* is modulated in four different behavioral events, and contact with the honey bees occurs only during the parasitization event, which lasts 1/6 s.

Measurements of the first instars allowed us to hypothesize a penetration in the honey bee body through its thoracic spiracles.

Third instars successfully pupate if sinking occurs in topsoil or clay soil. The high value of the mortality rate of larvae in sandy soil allows us to suggest that mulch and/or minimum soil tillage could prevent severe senotainiosis in apiaries.



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Senotainia tricuspis (Meigen, 1838) (Diptera, Sarcophagidae) is an endoparasitoid of *Apis mellifera* L., that causes myiasis in several North African, Middle Eastern, and European countries. Despite the availability of data on the infestation percentages and the increasingly growing awareness of the senotainiosis damage in beekeeping, the aggression and parasitization behavior of *S. tricuspis* towards *A. mellifera* remains poorly investigated. In order to identify further tools for the control of senotainiosis in beekeeping, this investigation aimed to provide the infestation rate of *S. tricuspis*, to describe its aggressive behavior and to provide data on pupation and adult emergence. Data were collected once a week from June to November 2004 and 2005 in an apiary in province of Pisa (Tuscany, Italy), where observations of aggressive behavior were conducted indirectly by using video camera and directly by an observer. In 2004, a peak of 75% of infestation on the 1st of October was recorded, while in 2005, the peak of infestation (45%) occurred on the 3rd of September. Four behavioral categories of the attack were described, for a total of 55 aggressions, 21 beecatchers, 104 chases and 6 parasitization events recorded with the camera. Through four days of direct observations, a total of 1633 aggression events were recorded. The daily temporal pattern of the number of aggressions showed two main peaks: one during the morning from 10:00 to 11:00 and one in the afternoon from 15:00 to 17:00. The morphometric data on the first-instars of *S. tricuspis* allowed to hypothesize a penetration in the bee through its prothoracicspiracle as a modality of entrance in the host body. Third-instars successfully pupated when sinking occurred in topsoil or clay soil, and adults emerged when a 4 °C diapause of 6 months occurred, despite the minimum duration of exposure to the same cold period remains unknown. Moreover, the high value of the mortality rate of larvae in sandy soil allowed to suggest that mulch and/or minimum soil tillage could prevent severe senotainiosis in apiaries.