DAMAGE OF THE COTTON BOLLWORM, *Helicoverpa armigera*, ON COTTON

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Abstract

Helicoverpa armigera (Hubner*)* presents a wide geographical distribution and it is registered in several countries. In March 2013 was officially reported in Brazil where it was considered a quarantine pest. *H. armigera* has a high destructive potential and has brought concerns to Brazilian farmers because of the difficulty of its control and the lack of information about its management in Brazil. This study aimed to evaluate and quantify the damage caused by *H. armigera* caterpillar on cotton crop thereby assisting in the establishment of its level of control. The experiment was conducted on cotton plants grown in plastic pots of 14 liters, filled with soil and organic compost, kept in a greenhouse. The caterpillars used were obtained from breeding kept in the Entomology Laboratory in Campus II of UNESP/Ilha Solteira. The design was a completely randomized with six treatments and four replications. The treatments consisted of infestation levels, ranging from 0 (control),1 ,2, 3, 4 and 5 larvae per plot. Each plot had five plants. The evaluations were performed daily after the infestation until the larvae turned pupae by counting the total number of reproductive structures produced by cotton plants, the number of reproductive structures attacked by the caterpillars, number of fallen reproductive structures and the number of attacked fallen reproductive structures. Data were subjected to analysis of variance and the averages compared by Duncan test (5%). The amount of structures consumed by each caterpillar was 9.7 and the average of attack in the fallen structures was 73.4%.

Introduction

Cotton is grown in more than seventy countries. The main objective of cotton production relates to obtaining fiber and seeds. Currently, the area planted with cotton in Brazil occupies approximately 1.4 million hectares (3.5 million acres). The Central-Western region of Brazil accounts for 64% of the country's cotton production, followed by the Southeastern region at 30%, and the Southern region at 15%. Modern agriculture no longer admits the utilization of chemical products with a broad spectrum of action, which normally causes undesirable effects in the agricultural ecosystem, such as pest resurgence, pest status changes from secondary to primary and environmental impacts such as intoxication problems in animals and humans. Due to the great number of pests that attack cotton, producers must adopt measures for a rational insect control management. *Helicoverpa armigera* (Hubner) presents a wide geographical distribution and it is registered in several countries. In March 2013 was officially reported in Brazil (Cezepak et al., 2013), where it was considered a quarantine pest. *H. armigera* has a high destructive potential and has brought concerns to Brazilian farmers because of the difficulty of its control and the lack of information about its management in Brazil. *H. armigera* is recorded in several countries (Guo, 1997); But until March 2013 had not been officially registered in Brazil. *H. armigera* is a highly polyphagous species with high mobility and high survivability even in adverse conditions, and can complete several generations per year (Fitt, 1989). These biological characteristics give the pest high damage production capacity and bring concern to Brazilian cotton farmers, due to the difficulty of its control and the lack of information regarding this pest in Brazil. This study aimed to evaluate and quantify the damage caused by the bollworm, *H. armigera* on cotton crop in Brazil, helping to establish its level of control.

Methods

The experiment was conducted with cotton plants grown in plastic pots of 14 liters, kept in a greenhouse. The bollworms used came from the rearing stock maintained in the Laboratory of Integrated Pest Management at São Paulo State University/Ilha Solteira/SP/Brazil. The design was completely randomized with 6 treatments and 4 replications. The treatments consisted of different levels of infestation with larvae of *H. armigera* of second instar, being: 0 bollworms (control), 1 bollworm, 2 bollworms, 3 bollworms, 4 bollworms and 5 bollworms per plot; each plot consisted of five plants. The assessments were performed daily after infestation until the caterpillars turned into

pupae, by counting the total number of reproductive structures produced by cotton plants, number of structures attacked by caterpillars, number of fallen structures and the number of attacked fallen structures. At the end of the cycle was estimated the total number of structures damaged by each bollworm.

Results

The attack of the caterpillars it was significantly larger as the number of caterpillars increased, not differing significantly just in the treatments with 4 and 5 caterpillars/plot. The production of reproductive structures, during the period of infestation of the caterpillars (12 days) did not differ significantly among the treatments (Figure 1).

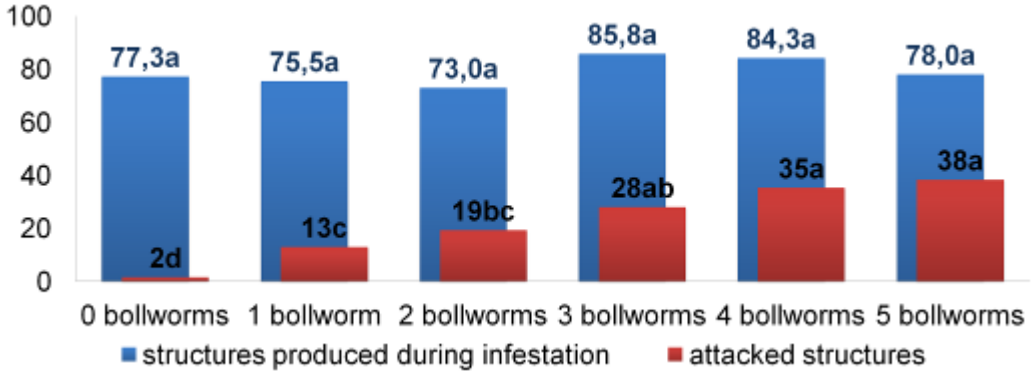

Figure 1: Number of structures produced during infestation and number of attacked structures (average of 5 plants).
(* Means followed by the same letter do not differ significantly at the 0.05 level of probability)

It was verified that the plots that had more intense attack of the pest produced in the end of the cycle more reproductive structures in way to compensate the damage in the attacked structures (Figure 2). That characteristic was reported by Chiarappa (1971) and Stern (1973), however these structures fell prematurely, or if its turned damaged, in other words, structures that didn't reach the appropriate maturation and therefore its were unviable for crop.

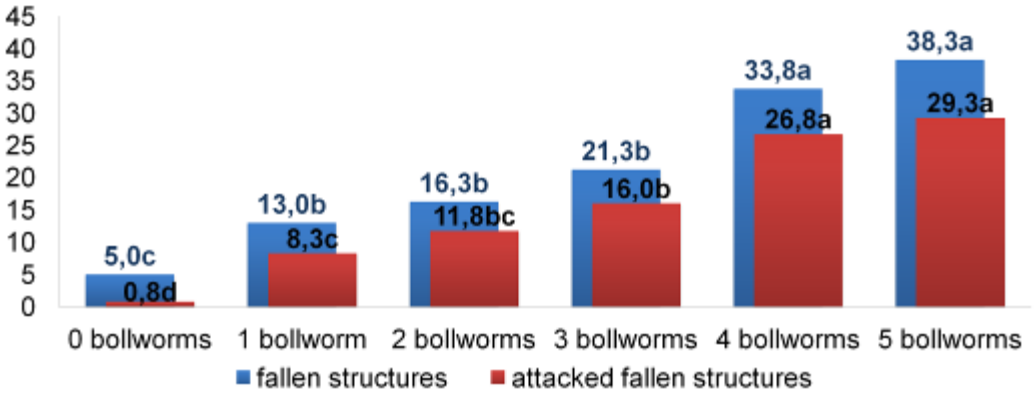

Figure 2: Number of total and attacked fallen structures (average of 5 plants).
(* Means followed by the same letter do not differ significantly at the 0.05 level of probability)

It was observed that the attack percentage (number of structures attacked in relation to the number of structures produced total) it was higher in the treatments where infestation was larger, evidencing the destructive potential of the curse, mainly when this reaches high populations (Lammers; Macleod, 2007). As for the number of structures attacked by each caterpillar, the feeding in the treatments with less individuals was of 13 structures attacked by

caterpillar, while where the population is larger, due to competition among the caterpillars of *H. armigera*, the feeding for the caterpillars individually was of 7.7 structures attacked by caterpillar. The average of structures attacked by caterpillar was of 9.7 structures. (Table 1).

Table 1 - Total number and average number of attacked structures by *Helicoverpa armigera*, percentage of attack, number of structures attacked by caterpillar and attack average by caterpillar. 2014.

Treatments	total	average	% of attack	number of structures attacked by caterpillar	Average by caterpillar
0 caterpillar	6	2d*	2	0 b*	9,7
1 caterpillar	52	13c	17	13.0 a	
2 caterpillars	77	19bc	26	9.6 a	
3 caterpillars	112	28ab	33	9.3 a	
4 caterpillars	141	35a	42	8.8 a	
5 caterpillars	153	38a	49	7.7 a	

Conclusion

The amount of structures consumed by each caterpillar was 9.7 and the average of attack in the fallen structures was 73.4%.

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