INVESTIGATIONS CONCERNING THE CORN EARWORM EXTERNAL MORPHOLOGY

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Abstract: *The corn earworm (Helicoverpa armigera Hb.) is a cosmopolitan, widespread species. The pest is a very harmful in Asia (India, China), Africa, Australia, and in the last time in Eastern and Central Europe between northern latitude 46º and 47º Helicoverpa armigera Hb. is a recently identified pest of the maize cultivations from the Romanian West Plain. The pest's caterpillars are little known in zone and frequently are mixed up with other species. In this context the work bring some contributions to knowledge of some external morphological peculiarities for better pest identification. In all European zones in which were signalled the corn earworm attacks, complexes investigations were carried out. In our country the researches are incipient or in some regions are absent. The researches were effect on the larvae and pupae, collected in four years from the maize cultivation of S.D. Timişoara. On the larvae ages, the body length and the head - capsule diameter of the caterpillars and also, pupae body length were measured. The obtained results were statistical interpreted. So data are absent in our country. According to obtained results the body length of the mature larvae (L_5-L_6) oscillated between 23,00 mm and 45,00 mm and for young larvae (L_1-L_2) between 1,50 mm and 10,00 mm. The head capsule diameter was in average 0,37±0,064 for young larvae (L_1-L_2) and 2,53±0,50 for mature larvae (L_5-L_6). The pupae body length was in average 18,8±0,19 and varied between 15,00 mm and 20,00 mm. New obtained data can be compared with the existent data from neighbouring countries where the pest caused important damages. The knowledge of the larvae ages depending by the body length and head - capsule diameter are necessary data in prognosis and warning activity for the optimal treatment application moment establishment. The obtained results contribute to the existent knowledge completion concerning the external morphology, of the new maize pest and generally for plant protection from Romania.*

Key words: *corn earworm, maize, larvae, pupae, body-length, head capsule, diameter, age, treatment warning.*

INTRODUCTION

The corn earworm (*Helicoverpa armigera* Hb.) is a widespread polyphage which is harmful for many field and vegetable crops as: maize, sunflower, soybean, cotton, tobacco, tomato, pepper, eggplant, melon etc. In West part of Romania the pest were recently identified on maize cultivations. The caterpillars are little known in zone and frequently mixed up with other harmful species. In this context the work bring some contributions to know some external morphology peculiarities for a better pest's identification. The caterpillar's age evaluation establishment are important in the treatments warning for the corn earworm control.

The pest has been and still is in the focus of scientific attention from the entire world. The external morphology of larvae and pupae were studied by some authors. Data concerning body length and head – capsule diameter of larvae, also body length of pupae were communicated by COMSTOCK (1962), BALACHOWSKY (1972), VASILIEV (1975), INJAC (2003), ČAMPRAG (2004), and coll. In Romania data regarding the pest were noticed by MANOLACHE (1957), MANOLACHE and coll. (1969), SĂVESCU (1961), ROGOJANU PERJU (1979), PERJU (1999), PAŞOL and coll. (2008) and all.

In the West Plain of Romania the first pest identification in maize cultivations on large areas was, signalled by ANDRU (2004). Researches concerning the spreading, biology, ecology, attack and control of the earworm from maize cultivation were made by PĂLĂGEŞIU and coll. (2007) and STAN (2008).

MATERIAL AND METHODS

The researches were carried out on the Didactic Station Timişoara, experimental fields in 2003-2007 periods. In each year were collected and measured larvae and pupae. The body length and head-capsule diameter on the differed ages larvae were determined. So in 2003 on 29 larvae in 2004 on 28 larvae, in 2005 on 35 larvae, in 2006 on 35 larvae, and 2007 on 84 larvae were measured. The body length of pupae were also measured on 16 is samples in 2005, 27 samples, in 2006 and 69 samples in 2007. The measurements were realised at binocular stereomicroscope with micrometric scale. The obtained results were statistically interpreted.

RESULTS AND DISCUSSIONS

The caterpillars dimensions, body length and head capsule diameter varied with age.

In five years the body length of young larvae ($L_1 – L_2$) measured between 1,50 mm and 10,00 mm and was in average of 3,57 ±1,99 mm. The head capsule diameter measured between 0, 30 mm – 0, 50 mm and was in average of 0, 37 ± 0,064 mm (Table 1).

Table 1

Body length and capsule – head diameter of the young larvae ($L_1 – L_2$)

Year	Body length mm	Average mm	Head, capsule diameter mm	Average mm
I	2,00-9,00	3,26	0,30-0,40	0,36
II	1,80-9,00	3,70	0,30-0,40	0,37
III	1,50-9,00	3,80	0,30-0,40	0,37
IV	2,00-10,00	5,55	0,30-0,50	0,50
V	2,00-10,00	3,78	0,30-0,50	0,36
	X= 3,57±1,99		**X = 0,37±0,064**	

The obtained results are comparable with data presented by Vasiliev (1975) body length 1,50/7,00 mm and head capsule diameter 0,30/0,40 mm and by somer (1966) mentioned by Čamprag et cool. (2004), body length 1, 35 - 6, 00 mm, head-capsule diameter 0,27 – 0,45. The mean aged caterpillars (L_3-L_4) measured between 10, 00 and 23, 00 mm body length and in average 15, 48 ± 2, 65 mm. The head capsule diameter oscillated between 0, 30 to 1, 50 mm in average 1, 14±0,347 mm (Table 2).

Table 2

Body length and capsule diameter of the mean age larvae ($L_3 – L_4$)

Year	Body length mm	Average mm	Head, capsule diameter mm	Average mm
I	10,00-22,00	13,26	0,30-0,40	0,35
II	10,00-20,00	14,22	0,60-1,50	0,85
III	10,00-22,50	18,29	0,80-1,50	1,21
IV	11,20-23,00	18,09	1,00-1,50	1,37
V	11,23-23,00	18,65	0,60-1,50	1,31
	X= 15,48±2,65		**X = 1,14±0,347**	

The results are also comparable with another obtained data. Şanov (1966) in Čamprag (2004), body length 8, 85 – 18, 83, head capsule diameter 0,50-1,60 mm.

The body length of mature larvae (L_5-L_6) varied between 23,00 mm and 45, 00 mm, in average 31, 51 ± 3,92 mm. The head capsule diameter measured between 1, 60 mm and 3, 00 mm in average was of 2, 53 ± mm.

Table 3

Body length and head capsule diameter of the mature larvae (L_5 – L_6)

Year	Body length mm	Average mm	Head, capsule diameter mm	Average mm
I	23,00-45,00	31,18	2,20-2,80	2,50
II	24,50-38,00	30,28	1,90-2,90	2,48
III	23,00-45,00	30,38	2,00-3,00	2,68
IV	24,00-40,00	29,63	1,80-3,00	2,34
V	24,00-40,00	32,11	1,60-3,00	2,14
	X= 31,51±3,927		**X = 2,53±0,50**	

The obtained data correspond generally with the results obtained by Comstock (1962), Balachowsky (1972), Injac and coll. (2003), Manolache (1957), body length of 30 mm - 40 mm, Vasiliev (1975) body length of 22,60 mm - 41,30 mm and head capsule diameter 2,18 mm - 3,20 mm, Somov (1966) in Čamprag (2004) body length varied between 22,50 mm and 45,00 mm with head-capsule diameter between 1,70 mm and 5,00 mm, Săvescu (1961) 38-42 mm, body length Rogojanu, Perju 35-45 mm,

The body length of pupae was in average 18, 80±0,191 mm and oscillated between 15,00 mm and 20,00 mm. The most numerous were small pupae (Table 4).

Table 4

Body length of pupae

Year	Body length	Number
2008	15,00	21
	16,00	6
	17,00	9
	18,00	8
	19,00	5
	20,00	11

The body length of pupae are similar with other obtained results Manolache and coll. (1969) 15-18 mm, Rogojanu. Average body length developed at the six caterpillar age from 3, 26 mm to 31, 51 mm (Figure 1).

The results are specific for the *Helicoverpa armigera* Hb. populations from the maize cultivation from West Plain. The head-capsule diameter development and also the body length stated the caterpillars ages. Precise knowledge of the ages contributes to a better control treatments warning.

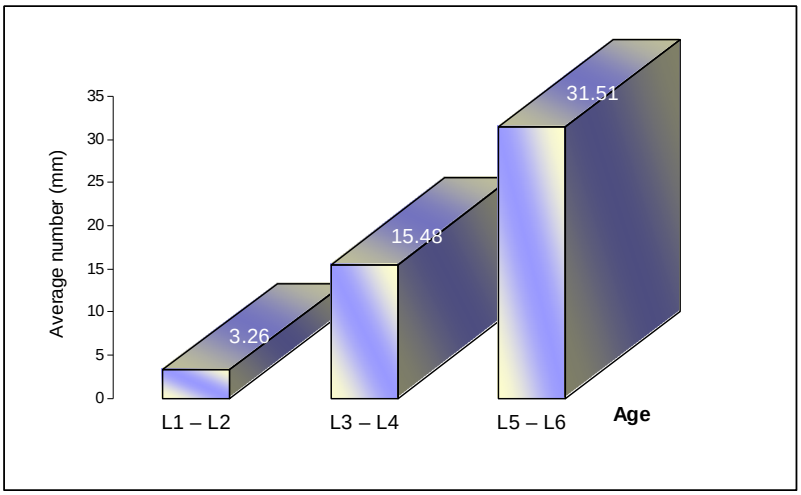

Figure 1. Average length of caterpillar's development

Head-capsule diameter developed at the caterpillar ages from 0,37 mm, to 2,53 mm (Figure 2).

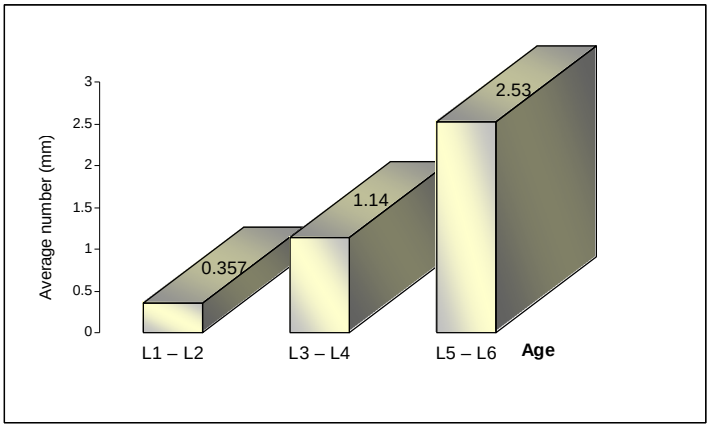

Figure 2 - Head capsule diameter of caterpillar development

CONCLUSIONS

The young earworm caterpillars (L_1-L_2) body length oscillated between 1,50 mm to 10,00 mm, and was in average of 3,57±1,99 mm. The young corn earworm caterpillar's (L_1-L_2) head capsule diameter oscillated between 0,30 mm to 0,50 mm and was in average on 0,37±0,06 mm.

The mean age caterpillar's (L_3-L_4) body length varied between 10,00 mm and 23,00 mm and was in average of 14,48±2,65 mm.

The mean age caterpillar's (L_3-L_4) head-capsule diameter varied between 0,30 mm to 1,50 mm and was in average of 1,14±0,30 mm.

The mature caterpillar's body length had the dimensions between 23,0 mm to 45,oo mm and average was of 31,5±3,29 mm.

The mature caterpillar's head capsule diameter had the dimensions between 1,60 mm to 3,00 mm and was in average of 2,53±0,5 mm.

The body length of pupae varied between 15,00 mm to 20,00 mm and was in average of 18,00±88 mm.

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