PEST CONTROL OF *HELICOVERPA ARMIGERA* HÜBNER IN MAIZE IN THE WESTERN PLAIN (ROMANIA)

ASPECTE PRIVIND COMBATEREA DĂUNĂTORULUI *HELICOVERPA ARMIGERA* HÜBNER LA CULTURA DE PORUMB ÎN CÂMPIA DE VEST (ROMÂNIA)

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Abstract: *In this paper, we present results of a study on the pest Helicoverpa armigera Hb. in maize at the Didactic Station in Timişoara in 2006. We made observations concerning the behaviour of the pest and we tested the efficiency of some insecticides in order to control it.*

Rezumat: *În lucrarea de faţă prezentăm rezultatele obţinute în urma studiului efectuat asupra dăunătorului Helicoverpa armigera la cultura de porumb în Staţiunea Didactică Timişoara în anul 2006. Au fost efectuate observaţii privind modul de manifestare a atacului dăunătorului şi a fost testată eficacitatea unor insecticide în vederea combaterii dăunătorului.*

Key words**:** *Helicoverpa armigera, maize, behaviour of the pest, pest management*
Cuvinte cheie: *Helicoverpa armigera, porumb, mod de dăunare, combatere*

INTRODUCTION

The *Helicoverpa armigera* Hb. species, known mainly as a pest of cotton, is again of interest because of its massive presence in Western Romania, as it attacks crops such as maize, sunflower, tobacco, pepper, tomato, etc. Starting with 2000, there has been a steady increase of the area of this pest in the Western Plain, which can be explained by the changes in climate these last years.

The steady increase these last years of the area occupied by this pest, the poly-phagy manifested, and massive attacks of maize crops have been important reasons in studying this pest. In this paper, we aimed at presenting some results concerning some observations on the way the pest *Helicoverpa armigera* Hb. damages maize crops, as well as results concerning the efficiency of some insecticides used in controlling the pest, data necessary in establishing an efficient strategy for the integrate control of the pest.

MATERIAL AND METHOD

Research was carried out at the Agricultural and Veterinary University of the Banat in Timişoara, on the trial field of the Didactic Station, between May and October 2006.

We made observations concerning the aspect of the attack in the field conditions in maize, and we assessed the attack by calculating frequency (F%), and establishing the number of larvae per 50 plants.

Research concerning chemical control was carried out in the trial field set on a cambic chernozem with poor acid reaction, low humus content, medium nitrogen index, and poorly supplied in phosphorus and mobile potassium. We seeded the hybrid Fundulea 376 (April 26, 2006), using 14.5 kg/ha (55 thousand grains/ha), at a row distance of 70 cm and at a plant distance of 20-25 cm. maintenance works consisted of chemical fertilisers (urea – 200 kg/ha), and weed control was done by mechanical tillage and by applying the herbicide Titus Plus.

For chemical control, the trial was set after the randomised block method with 5 variants and 3 replications.

In order to study the chemical control of the pest, we tested 4 insecticides belonging to the following groups: 4th group – VICTENON 50 WP (bensultap 50 %) 0.75 kg/ha, ACTARA 25 WG (thiametoxam 25 %) 0.100kg/ha, ACTELIC (pirimifos methyl 50%) 0.1%; 3rd group – SINORATOX 35 CE (dimetoat 35 %) 0.1 %. Insecticides were applied on August 26, 2006, by manual spraying of the plants.

Results were read 7 days after applying the treatment.

RESULTS AND DISCUSSION

Between May and June, adult females of *Helicoverpa armigera* Hb. lay ages isolated or in small groups on the plants' generative organs, particularly on the silk, but also on other organs of the plants (panicle, leaf, and stem).

Female butterflies prefer the silk, since neonate larvae feed first on silk, and then penetrate the cob through its apical side where, at the beginning, they eat the tip of the cob and then the grains whose content they destroy either totally or partially. There is usually a single larva on the cob; young larvae either migrate on other plants or cobs, or they are eaten by other larvae, cannibalism being met both in larvae of the same age and in youngest ones. Low age larvae that have just hatched are in numbers of 2-5 on the silk.

When migrating on other plants, cob penetration can be done not only through its tip, but also through its lateral parts; they chew the leaves, the stem, and even the tip of the cob, where one can notice circular orifices. In a single case, the larva penetrated the cob at its basis, leaving chews on the stem and on the leaf basis.

Only in 2 exceptional cases we could see on the same cob 2 low age larvae (I-II) on the silk and an older larva (IV) inside the cob, which is not mentioned in literature. A possible cause for the appearance of larger numbers of neonate larvae in the 2nd and 3rd decades of July is the butterfly behaviour, which can migrate from one area to another in search for food and partners. This is the time when maize is the preferred host of female butterflies for laying eggs, as there are enough food resources for the development of further stages. As a result of observations in the field, we could see that old larvae (IV-V) drill sometimes galleries within the cob penetrating its tip and sometimes its sides, i.e. the grain basis. This could be seen also in younger larvae (II-III).

Larvae also eat leaf, stem, and panicle epidermis.

Usually, the oldest larvae leave the cobs and go down on the soil, where they pupate. As a result of our observations, we could see that some of the larvae having drilled galleries within the cob never got down on the soil, but pupated within the cob.

In 2006, on the trial field of the Didactic Station in Timişoara, the attack by the larvae of *Helicoverpa armigera* Hb. Was seen starting with July 26, 2006 and ending with maize harvesting, on September 27, 2006.

On samples of 50 plants analysed for the period we recorded attacks oscillating between 8 and 16 plants, the number of larvae oscillating between 3 and 23. The largest number of larvae and plants attacked was between August 3, 2006 and September 21, 2006. Attack frequency had values oscillating between 4 and 32%, between August 19, 2006 and September 11, 2006. (Table 1)

Table 1

Frequency of the attack by *Helicoverpa armigera* Hb. larvae in 2006

Date	Number of larvae/50 plants						
	0-3 mm	3 -10 mm	10-23 mm	>23 mm	Total larvae	Plants attacked	Frequency of the attack (%)
26.07.06	4	-	-	-	4	2	4.00
30.07.06	-	2	1	-	3	3	6.00
01.08.06	-	2	3	-	5	5	10.00
03.08.06	3	8	3	1	15	13	26.00
08.08.06	4	6	2	2	14	11	22.00
13.08.06	3	-	3	4	10	8	16.00
15.08.06	5	2	4	2	13	10	20.00
19.08.06	6	8	4	5	23	16	32.00
24.08.06	5	5	1	2	13	10	20.0
28.08.06	8	4	6	1	19	14	28.00
01.09.06	3	6	6	-	15	13	26.00
05.09.06	-	2	9	4	15	15	25.00
11.09.06	-	-	11	3	14	14	28.00
21.09.06	2	3	7	2	14	13	26.00
25.09.06	-	-	7	2	9	9	18.00
27.09.06	harvested	-	-	-	-	-	-

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Results of testing herbicides used for the control of the caterpillar of *Helicoverpa armigera* Hb. Capsules in field conditions in 2006 were interpreted using the method of variance analysis. Data show that all tested insecticides proved particularly significant compared to the control variant (Table 2). The number of larvae/100 plants had the lowest values when treated with the insecticide Sinoratox 35 CE 0.1% and Actellic 50 CE 0.1%. Data confirm previous results.

Table 2

Testing some insecticides used in the control of
Helicoverpa armigera Hb. larvae at the Didactic Station in Timişoara in 2006

Variant	Insecticide	Concentration /dose	Number of living larvae /100 plants	Difference	Significance
V_1	Victenon 50 WP(Bensultap)	0.75 kg/ha	7.00	14.00	ooo
V_2	Actara 25 W (Thiametoxam)	0.100 kg/ha	5.66	15.34	ooo
V_3	Actelic (Pirimifos methyl)	0.1%	5.00	16.00	ooo
V_4	Sinoratox 35 CE (Dimetoat)	0.1%	4.33	16.67	ooo
V_5	Control	-	21.00	-	-

DL 5%= 3.014; DL 1%= 4.384; DL 0.1%= 6.577

Observations made in the field after applying treatments allow us to conclude that younger larvae are more affected than older ones. This can be explained by the fact that younger larvae feed on silk and older ones feed within the cob, where insects cannot reach. Thus, they are practically protected by the panicles.

CONCLUSIONS

The attack by the pest *Helicoverpa armigera* Hb. starts where larvae hatch, most often on the silk, and then they penetrate the tip of the cob and eat the grains.

Helicoverpa armigera Hb. also eats leaf, stem, and panicle epidermis, but they usually prefer milk grains and milk-wax grains.

Analysing the frequency, intensity, and degree of the attack, we could notice that maximum of attack was between mid-August and mid-September. This could be explained by the fact that II larvae overlap I larvae.

Tests concerning the efficiency of the insecticides bensultap, thiametoxam, pirimifos methyl, and dimetoat show that all tested insecticides proved very significant compared to the control variant, the best results being in insecticides based on dimetoat and pirimifos methyl.

As a result, we can say that, in order to apply an efficient strategy of controlling this maize pest it is necessary to observe the following steps:

- Monitoring regularly *Helicoverpa armigera* Hb. activity in maize crops;
- Observing proper cultivation technologies in order to get healthy, vigorous plants and weed-free crops;
- Monitoring useful entomo-fauna in maize crops;
- Monitoring the PED and applying chemical treatments upon warning;
- Using the recommended insecticides in the chemical control and monitoring insect resistance to the treatment.

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