LIFE CYCLE OF DIABROTICA VIRGIFERA VIRGIFERA IN THE CONDITIONS FROM NORTH – WESTERN PART OF THE COUNTRY

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Abstract

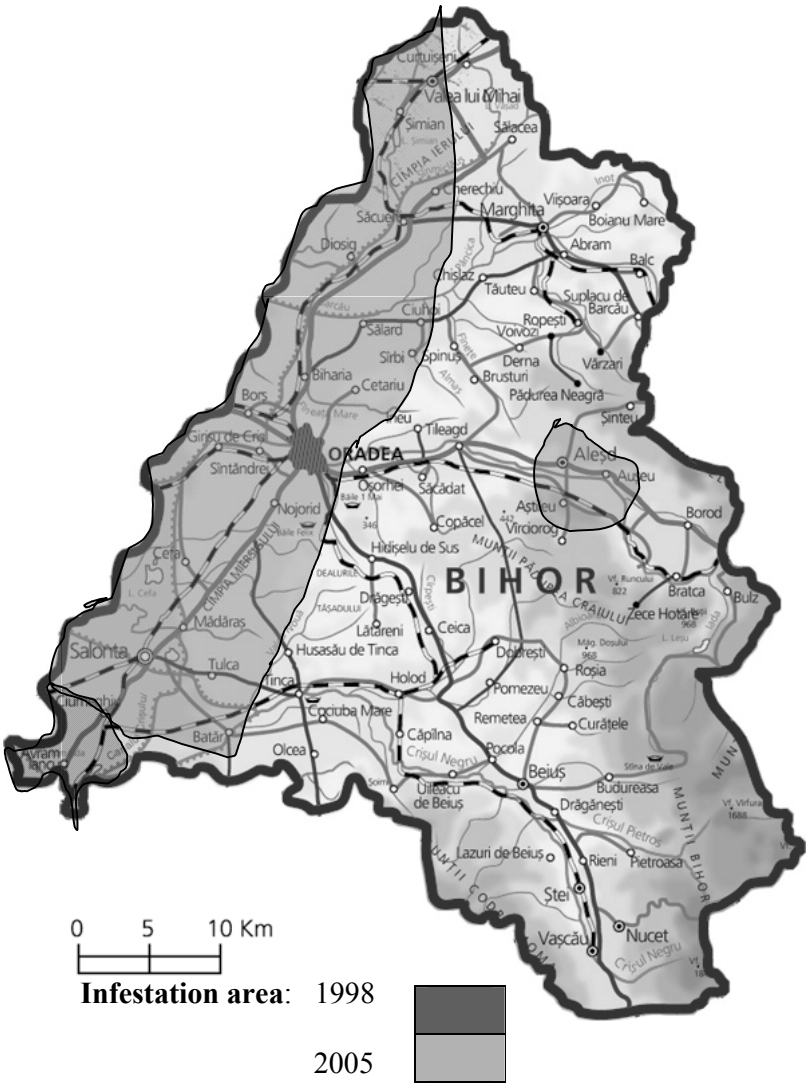
Diabrotica virgifera virgifera Le Conte was registered recently in the western part of Romania (1996) and it's spreading is higher in the most of all areas with maize crop, created in the first area an impressive population and very dangerous because of the damaged caused to the maize crops.

The monitoring of Diabrotica virgifera virgifera Le Conte behavior regarding of spreading and biology are the main components for realization of control measures and the decreasing of negative impact on yield. The main measures which have to make is stop the monoculture and using a suitable crop rotation.

Key words: *Diabrotica virgifera virgifera, life cycle, larvae, adult, trap*

INTRODUCTION

Diabrotica virgifera virgifera Le Conte was registered in Bihor since 1998 in the south part of the county, near Arad county. From here the spreading of Diabrotica virgifera virgifera Le Conte was registered along the western border in 1999 was found adults at 40 – 50 km away from the initial area (Salonta - Cefa). Since 2000 respectively 2001 was registered adults of Diabrotica virgifera virgifera Le Conte until Oradea and in the north part of border with Hungary (Valea lui Mihai), the infestation was coming from Hungary, where was registered since 1995. Based on adults captures was notified a multiplication of adults starting with 2003, but in the same time an extension of Diabrotica virgifera virgifera Le Conte spreading from inside of area to the east (Alesd), north – east (Marghita) and south – east part (Beius). In the infested areas, Diabrotica virgifera virgifera Le Conte was found favorable ecological conditions, so the pest created a considerable population and very dangerous because of the damages coused to the maize crop, especially in monoculture.



Diabrotica virgifera virgifera Le Conte is a dangerous species because attacked the one of the most important crop, maize, the attack manifested was at the level of roots, damage caused by the larva and the aerian part of the plant is attacked by adults. The main damage is caused by larva which leave in soil and feed the roots and the adults feeding damage on maize leaves and especially on corn silk and the maize in the milk stage, but also with other species of plants, but the multiplication of this species is assured by the maize crop (Čamprag et al, 1995).

For the limitation of spreading and damages decreasing, the knowledge of biology and ecology of this pest can create a real possibility of control this pest.

In this paper are presented some elements of biological control and control through agrophytotechnical methods.

MATERIAL AND METHOD

The researches was carried out in the stationary long term experiences with crop rotations. The experience was made in 1990 on a preluvosoil weak acid (pH – 6.5) and humus content 1.8%.

The maize is present in crop rotations as: monoculture, crop rotations of two or three years and in crop rotation by 6 years (unirrigated) which began in 1982. With this experiments was noticed the influence of date and density of sowing upon Diabrotica virgifera virgifera Le Conte adults and larvae.

The appearance of Diabrotica virgifera virgifera Le Conte was based by monitoring of adults through pheromones traps like AtraVirg (Cluj - Napoca) applied in the field before the appearance of corn silk till October and noted every week, the larva was determined through soil sample like a cub with side of 18 cm circa maize plants and then larvae numbering. Was use F 376 hybrid (FAO 500 - 600).

RESULTS AND DISCUSION

The first larvae was registered in 2005 in the monoculture of maize at the end of May and the last larvae was registered in 25 July (Table 1), but in the crop rotation by 2, 3 or 6 years this larvae wasn't point out. Medium numbers of larva on the plants was bigger at irrigated maize (1.7/plant) with variation limit between 0 – 10, the soil humidity being a factor which determined the larvae development. After few weeks, the mature larvae moving to the soil surface preparing for stern stage. First stern was found in 16 June, the stern stage having a short lifetime, the last stern was registered at the end of July.

In the maize crop sowed at different calendaristic dates (table 2), the higher number of larvae (1.8/plant) was determined at the maize planted in 15 April and the last number of larvae was registered at maize plant in 20 May (0.3 larva/plant).

Table 1

The estimation of larva numbers on the maize roots in monocrop, Oradea 2005

Period	larva numbers/plant			
	Nonirrigated	**Variation limits**	**Irrigated**	**Variation limits**
29 May	0,4	0 – 1	0,8	0 – 2
15 June	1,8	0 – 3	2,2	2 – 6
24 June	1,8	1 – 7	2,2	3 – 5
5 July	2,6	1 – 6	2,8	1 – 10
15 July	1,0	0 – 3	2,0	0 – 6
25 July	0,2	0 – 1	0,4	0 – 1
Average	1,3	0 – 7	1,7	0 – 10

Table 2

The larva number on the maize root in function of maize sowing period, Oradea 2005

Sowing period	larva numbers/plant						Average
	5 June	15 June	25 July	5 July	15 July	25 July	
15 April	1,6	1,4	1,8	2,8	2,2	1,2	1,8
25 April	0,4	1,2	0,8	1,2	0,8	0,6	0,8
10 May	0,2	1,0	0,6	1,0	0,6	0,4	0,6
20 May	0,2	0,6	0,4	0,4	0,2	0,2	0,3
Average	0,6	1,1	0,9	1,4	1,0	0,6	

The analysis of weight plant with attack aspect made by larvae (with stalk curved making are ell at the basal internodes) indicate a value of 18.6% at the maize planted in 15 April and 23.2% at maize planted in 25 April, after that the number of attacked plants is decreasing in the same time with sowing retardation (figure 1). The humidity assured by rainfalls of 67.4 mm after the maize sowing in 15 April, created the possibility of regeneration of attacked plants.

The number of larva and of attacked weight plants at the roots is variation depending on sowing density and water regime (table 3). The lowest number of larva on plant was registered at sowing density by 40.000 plants/ha and increasing to 70.000 plants/ha and in condition of irrigation.

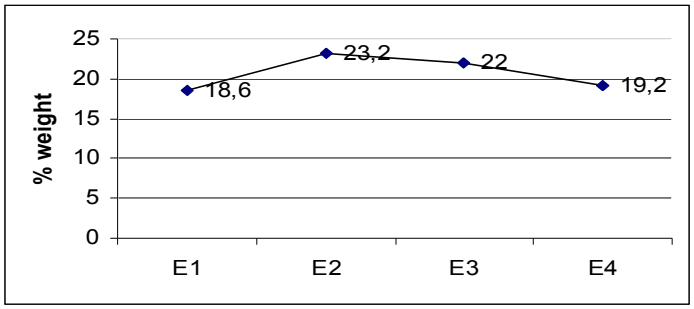


Fig. 1. The percentage of plants whith attack aspects on the maize roots in function of sowing period, Oradea 2005

Table 3

The larva number on the maize roots in function of sowing density, Oradea 2005

Plant density/ha	larva numbers/plant			
	Nonirrigated	Variation limits	Irrigated	Variation limits
40.000	2,8	1 - 6	3,0	2 – 9
55.000	4,8	2 - 11	5,0	2 – 8
70.000	4,6	1 - 9	5,2	1 – 10
85.000	3,6	2 - 7	4,4	3 - 9

The attacked weight plants increasing from 40.000 plants/ha to 70.000 and 80.000 plants/ha, from 33.8% to 39.7% and increasing in the irrigation conditions, respectively from 35.5% to 41.6% (figure 2).

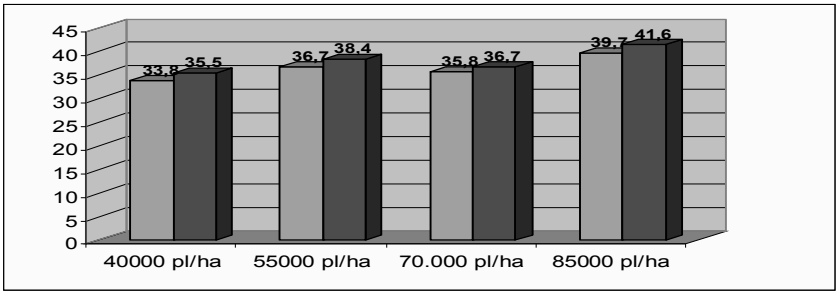


Fig. 2. The percentage of attacked maize plants by larva in function of sowing density, Oradea 2005

The firsts adults in 2005 was registered in 29 June on sunflower crop and the monitoring was made starting with July 1st. In the experiences crop rotation the biggest number of adults was registered in the irrigated

monoculture crop (387) and the lowest in the experience with crop rotation by 6 years and in the unirrigated conditions. (figure 3)

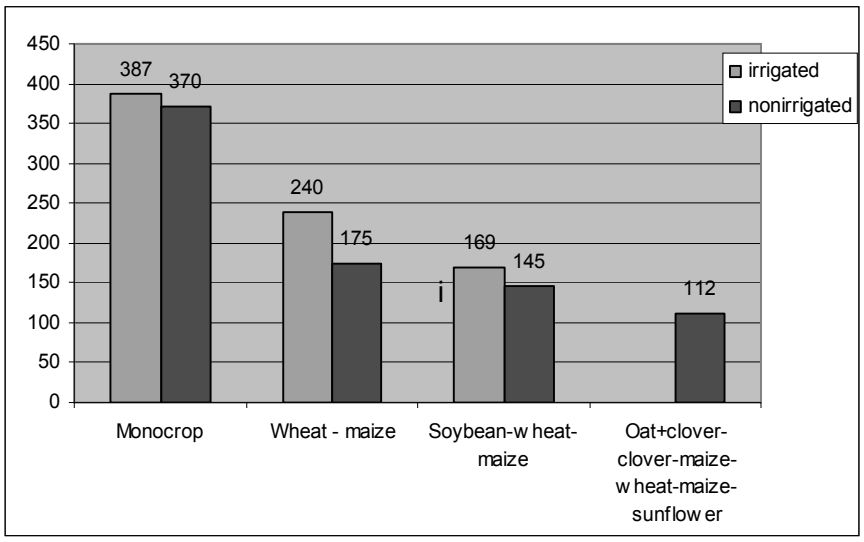


Fig. 3. The adults number/trap captured in period 1 July – 4 October in function of crop rotation, Oradea 2005

Depending on sowing time, maximum number of adults (345) was registered at the maize planted later in 10 May and in 25 May (319) and the lowest number of adults was registered in 15 April (209) (figure 4).

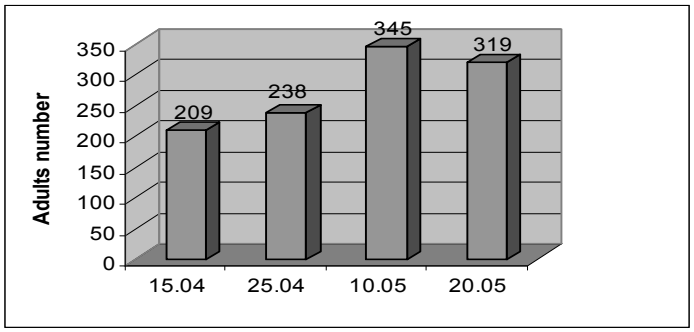


Fig. 4. The adults number/trap 1 July – 4 October in maize crop in function of sowing period

Regarding to variation of adults numbers depending on density sowing and water regime, it noticed a bigger number of adults in the irrigation conditions and their increasing from density by 40.000 plants/ha (305) to density of 85.000 plants/ha (390), respectively in the unirrigated conditions it increasing from 157 to 420 (figure 5).

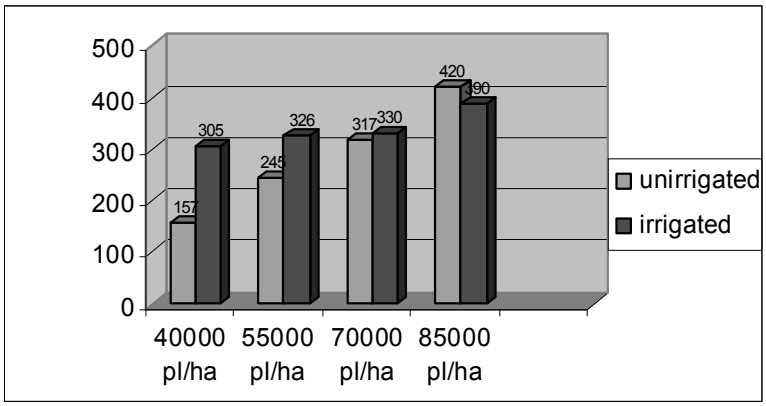


Fig. 5. Number of adults in function of the seeding density and water regime

CONCLUSIONS

- ✓ Based on the data researches obtained it can noticed that larva stage is phasing from the end of May to the end of July, and the stern stage is phasing from the middle of June till the end of July.
- ✓ The Diabrotica virgifera virgifera Le Conte adults are present in the maize crop since the end of June till the first decade of October.
- ✓ The crop rotation of maize with other plants interrupt the biological cycle of the pest, the larva can not survive if the maize it missing, only in monoculture was registered larva which was favorized by an favorable humidity regime 1.7 larva/plant in the irrigation regime respectively 1.3 larva/plant in the unirrigated conditions.
- ✓ The sowing time which is very late can be one of the agrophytotechnical methods of larva multiplication control.
- ✓ A high density of plants favorized the development of larva, the most indicated is the density recommended by maize technology.
- ✓ The weight of attacked plants (with the stall curved on the ground) produced by larva is bigger in the irrigation condition and increasing with the increase of sowing density.
- ✓ Using the hybrid Fundulea 376 (FAO 500-600) planted at different dates, the number of adults increasing from the optimum sowing time to the delayed sowing.
- ✓ The high density of sowing and the optimum humidity regime of the soil assured through irrigation determined the increasing of adults number.

REFERENCES

1. Bărbulescu Al., 2005 – „ Protejarea culturilor de porumb împotriva atacului adulților de Diabrotica virgifera virgifera". Sănătatea plantelor nr. 7/2005.
2. Čamprag D, Bača F., Sekulic R., 1995 – Diabrotica virgifera nova Steticina Kukuruza u Jugoslaviji, Zbaroic radova, Beograd IX Savetovanje Agronoma i Technologa, Smederevo, 45-50..
3. Dicke F., 1962 – Najvainije stetocine kukuruza (In: Sprage, G.F. Kukorozi unapredjenje njegove proizvodnje, Beograd), p. 537 – 614.
4. Grozea Ioana, 2003 – Diabrotica virgifera virgifera Le Conte viermele vestic al rădăcinilor de porumb. Editura Mirton Timişoara.
5. Krnjajic S., 1995 – Doktorska disertacija a Diabrotica virgifera Le Conte (rukopis), Novi Sad, Poljoprivredni fakultet.
6. Moeser J., Vidal S., 2001 – Alternative food resources for adult Diabrotica virgifera virgifera in Southern Hungary, XXI IWGO Conference, VIII Diabrotica Subgroup Meeting, Legnaro-Padua-Venice-Italy, Oct.27, 19-24.
7. Vonica I., 1996 – Monitoring for Diabrotica virgifera in Romania, IWGO Newsletter XVI, 2, 15.
8. Vonica I., 2000 – The results of monitoring Diabrotica virgifera virgifera Le Conte in Romania in 2000, IWGO Newsletter, Wien, XXI, 1-2, 32.