

DIVERSITY OF MAIZE PESTS AND THEIR DAMAGING EFFECT IN AN AGROECOSYSTEM FROM THE WESTERN SIDE OF THE COUNTRY

Ioana GROZEA*, Ana Maria BADEA, F. PRUNAR, Floarea ADAM
Banat University of Agricultural Sciences and Veterinary Medicine, Timisoara

ABSTRACT - Maize is one of the most important plants in the western side of Romania. During 2002-2005, the research carried out in untreated culture, in the Experimental Field from Jimbolia (Timiș County) pointed out the presence of many damaging species. The most important damaging species concerning the attacked percentage were: *Tanymechus dillaticolis* (47-69.5%), adults of *Diabrotica virgifera virgifera* (34.6-40.33%), *Oulema melanopa* (27.9 - 32.5%), *Opatrum sabulosum* (17.5-31.0%), *Ostrinia nubilalis* (18.87-25.5%) and *Aphis maidis* (7.13-16.6%). Larvae of *Diabrotica virgifera virgifera* caused characteristically stalk bending in 4.42-11.08% plants from all the investigated plants. The presence of these pests caused significantly yield decrease.

Key words: maize, diversity, pests, Western Plain

REZUMAT - Diversitatea dăunătorilor porumbului și daunele produse într-un agroecosistem din partea vestică a țării. Porumbul ocupă un loc important în rândul culturilor din partea de vest a țării. În perioada 2002-2005, cercetările efectuate într-o cultură netratată din Câmpul Experimental Jimbolia-județul Timiș au evidențiat prezența mai multor specii dăunătoare. Cele mai importante specii dăunătoare au atacat plantele de porumb, astfel : *Tanymechus dillaticolis* (47-69.5%), adulții de *Diabrotica virgifera virgifera* (34.6-40.33%), *Oulema melanopa* (27.9 - 32.5%), *Opatrum sabulosum* (17.5-31.0%), *Ostrinia nubilalis* (18.87-25.5%) și *Aphis maidis* (7.13-16.6%). Larvele de *Diabrotica virgifera* au cauzat îndoiri caracteristice la 4.42-11.08% din plantele analizate. Larvele și adulții de *Diabrotica* v., *Oulema* m. și *Ostrinia* n. (larve) sunt considerați cei mai importanți dăunători ai porumbului, cu importante implicații economice.

Cuvinte cheie: porumb, diversitate, dăunători, câmpia vestică

* E-mail: ioana_entomol@yahoo.com

INTRODUCTION

Maize growing is very important in the western side of Romania, requiring the knowledge of the damaging insects. Maize growing and development are negatively influenced by pests (Grozea et al., 2001).

In our country and in other European countries, pests can be a serious problem for most of farmers (Bărbulescu et al., 2001; Furlan et al., 2001, Tsitsipis et al., 2001). Some of these pests are new for European maize growing, such as *Diabrotica virgifera virgifera* species (Grozea et al., 2001; Riedel, 1994; Ratcliffe et al, 2003). The economic impact is great (Edwards, 1994), therefore, the knowledge of dynamics and attack percentage is necessary.

MATERIALS AND METHODS

Research was carried out under the field conditions of the western side of Romania. The observations were made on untreated maize crop, in a location near Jimbolia (Timiș County). Continuous cropping has been practiced for two years.

For establishing the damaging pest species, readings were made every 10-15 days, during May-September, by soil sampling and direct observations on crop. For the most important pests we have tried to establish the number and the percentage of attacked plants. The samples were examined under laboratory conditions. For details, we have used the magnifying glass.

RESULTS AND DISCUSSION

Because of the practice of continuous cropping system, maize crop was invaded by many pests during the testing period (2002-2004). The biodiversity of species was great: *Tanymechus dillaticolis* (Coleoptera: Curculionidae), *Diabrotica virgifera virgifera*, *Oulema melanopa*, *Phyllotreta vittula*, *Phyllotreta atra*, *Chaetocnema arridula*, *Phytodecta fornicata* (Coleoptera: Chrysomelidae), *Agriotes sp.* (Coleoptera: Elateridae), *Opatrum sabulosum* (Coleoptera: Tenebrionidae), *Zabrus tenebrioides* (Coleoptera: Carabidae), *Anisopliasp.* (Coleoptera: Scarabeidae), *Ostrinia nubilalis* (Lepidoptera: Pyraustidae), *Scotia sgetum* (Lepidoptera: Noctuidae), *Oscinis frit* (Diptera: Chloropidae), *Aphis maidis* (Homoptera: Aphididae) and *Cicadidae sp.* (Homoptera: Cicadellidae (Table 1).

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Table 1
Diversity of maize pest species in Jimbolia, Timiș district, 2002-2005

Order	Family	Species
Homoptera	Aphididae	<i>Aphis maydis</i> Fich.
	Cicadellidae	<i>Cicadidae</i> sp.
Coleoptera	Chrysomelidae	<i>Diabrotica virgifera virgifera</i> Le Conte
		<i>Oulema melanopa</i> L.
		<i>Phyllotreta vittula</i> Red.
		<i>Phyllotreta atra</i> F.
		<i>Chaetocnema arridula</i> Gyll.
		<i>Phytodecta fornicata</i> Brugman.
	Curculionidae	<i>Tanymechus dilaticollis</i> Gyll.
	Elateridae	<i>Agriotes</i> sp.
	Tenebrionidae	<i>Opatrum sabulosum</i> L.
Carabidae	<i>Zabrus tenebrioides</i> Goeze	
Scarabeidae	<i>Anisoplia</i> sp. Hbst.	
Lepidoptera	Pyraustidae	<i>Ostrinia nubilalis</i> Hb.
	Noctuidae	<i>Scotia segetum</i> Schiff.
Diptera	Chloropidae	<i>Oscinis frit</i> L.

Table 2
Number of attacked plants (from 600 studied plants) by different pests, in a maize crop from Jimbolia, 2002

Species	Percentage of attacked plants (%)								Mean %
	15 May	2 June	16 June	4 July	17 July	2 Aug	16 Aug	3 Sept.	
<i>Tanymechus dilaticollis</i> *	60.0	40.0	-	-	-	-	-	-	50.0
<i>Opatrum sabulosum</i>	27.0	35.0	-	-	-	-	-	-	31.0
<i>Diabrotica v. virgifera</i> (larvae)**	-	1.5	2.0	3.5	7.0	9.5	11.5	-	11.08
<i>Diabrotica v. virgifera</i> (adults)***	-	-	4.5	27.5	34.0	45.5	48.5	51.0	35.17
<i>Oulema melanopa</i> ***	-	-	12.0	23.0	33.5	44.5	49.5	-	32.5
<i>Ostrinia nubilalis</i> ***	-	-	8.0	28.0	30.5	31.5	-	-	32.0
<i>Phyllotreta vittula</i>	4.5	9.0	9.5	-	-	-	-	-	24.5
<i>Aphis maydis</i>	8.5	13.0	28.5	-	-	-	-	-	16.6
<i>Agriotes</i> sp.	1.5	2.5	3.0	-	-	-	-	-	2.33
<i>Cicadidae</i>	-	2.5	3.0	7.5	13.5	-	-	-	6.62

*superficial attack

**plants with "goose neck" bending stalk

***strong attack

Research (2002) has shown the presence of *Tanymechus dilaticollis*, *Aphis maidis*, *Agriotes sp.* and *Phyllotreta vittula* in the first vegetation period, respectively, at the beginning of maize growing. In June, the following species appeared: *Diabrotica virgifera virgifera*, *Oulema melanopa*, *Ostrinia nubilalis* and *Cicadidae*. The last pests observed in the field were the adults of *Diabrotica v. virgifera* (at the beginning of September). The same results were registered in 2003. In 2004, delayed pest appearance was noticed in these species, because of the low temperatures registered in April and May.

As concerns the percentage of attacked plants, the importance of some species could be noticed: *Tanymechus dillaticolis* (47-59.5%), adults of *Diabrotica virgifera virgifera* (34.6-40.33%), *Oulema melanopa* (27.9- 32.5%), *Opatrum sabulosum* (17.5-31.0%), *Ostrinia nubilalis* (18.87-24.62%) and *Aphis maidis* (7.13-16.6%) (Tables 2, 3, 4; Figure 1)

Table 3
Number of attacked plants (from 600 studied plants) by different pests,
in a maize crop from Jimbolia, 2003

Species	Percentage of attacked plants (%)								Mean
	15 May	2 June	16 June	4 July	17 July	2 Aug	16 Aug	3 Sept.	
<i>Tanymechus dilaticollis</i> *	74.0	45.0	-	-	-	-	-	-	69.5
<i>Opatrum sabulosum</i>	23.0	35.0	-	-	-	-	-	-	29.0
<i>Diabrotica v. virgifera</i> (larvae)**	0.5	3.5	5.0	6.5	7.0	10.5	-	-	5.5
<i>Diabrotica v. virgifera</i> (adults)***	-	-	7.5	27.5	44.0	49.5	54.5	59.0	40.33
<i>Oulema melanopa</i> ***	-	-	11.0	24.0	30.5	34.5	39.5	-	27.9
<i>Ostrinia nubilalis</i> ***		-	10.0	20.5	32.5	35.5	-	-	24.62
<i>Phyllotreta vittula</i>	4.5	9.0	9.5	-	-	-	-	-	7.66
<i>Aphis maydis</i>	8.5	10.0	20.5	-	-	-	-	-	13.0
<i>Agriotes sp.</i>	0.5	1.5	2.0	-	-	-	-	-	1,3
<i>Cicadidae</i>	-	1.5	3.5	7.5	14.5	-	-	-	9.0

*superficial attack

**plants with" goose neck" bending stalk

***strong attack

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Table 4
 Number of attacked plants (from 600 studied plants) by different pests, in a maize crop from Jimbolia, 2004

Species	Percentage of attacked plants (%)								Mean %
	15 May	2 June	16 June	4 July	17 July	2 Aug	16 Aug	3 Sept.	
<i>Tanymechus dilaticollis</i> *	50.0	54.0	-	-	-	-	-	-	47.0
<i>Opatrum sabulosum</i>	15.0	20.0	-	-	-	-	-	-	17.5
<i>Diabrotica v. virgifera</i> (larvae)**	-	0.5	1.0	3.5	5.0	6.0	10.5	-	4.42
<i>Diabrotica v. virgifera</i> (adults)***	-	-	-	17.5	24.0	39.5	45.5	46.5	34.6
<i>Oulema melanopa</i> ***	-	-	-	23.0	28.0	34.5	40.5	-	31.5
<i>Ostrinia nubilalis</i> ***	-	-	-	6.0	13.5	25.0	31.0	-	18.87
<i>Phyllotreta vittula</i>	3.5	7.0	7.5	10.5	-	-	-	-	7.13
<i>Aphis maydis</i>	7.5	11.0	25.5	-	-	-	-	-	14.66
<i>Agriotes sp.</i>	1.0	1.5	1.5	-	-	-	-	-	1.66
<i>Cicadidae</i>	-	0.5	1.0	6.5	11.5	-	-	-	6.37

*superficial attack

**plants with "goose neck" bending stalk

***strong attack

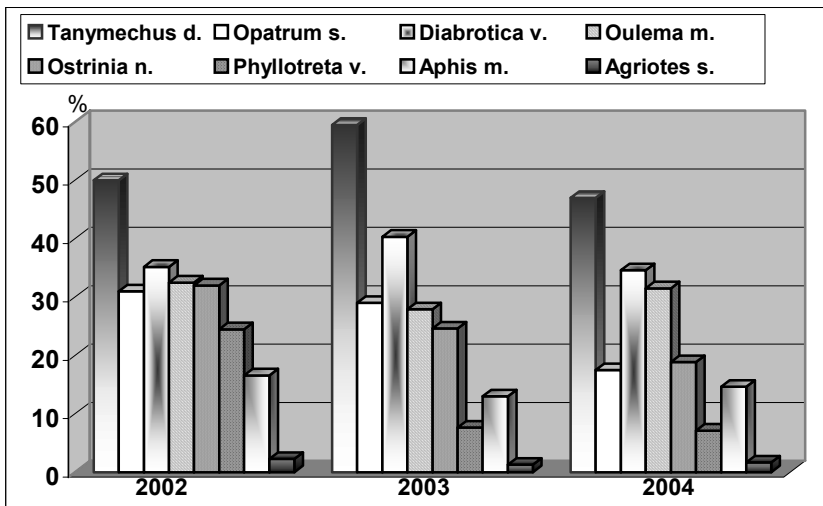


Figure 1 - Dynamics of major pests as concerns the percentage of attacked plants

The frequency of *Tanymechus dilaticollis* was great, but not so aggressive. The attack was superficial. The climatic conditions were unfavourable to the development of the adults. The other pests *Phyllotreta vitula*, *Agriotes sp.* and *Cicadidae* had a low impact on maize crop. *Diabrotica v. virgifera* larvae were present from May (2002 and 2003) and June (2004) until the beginning of August. Larvae of *Diabrotica v. virgifera* caused characteristically stalk bending at 4.42-11.08% of all the investigated plants.

As concerns the damaging percentage at the stage of silking and cob formation, the importance of three species frequently grown in the Western side of the country was noticed: *Ostrinia nubilalis*, *Diabrotica virgifera virgifera* and *Oulema melanopa* (Figures 2, 3, 4). In 2005, the values registered were the highest in all the studied years.

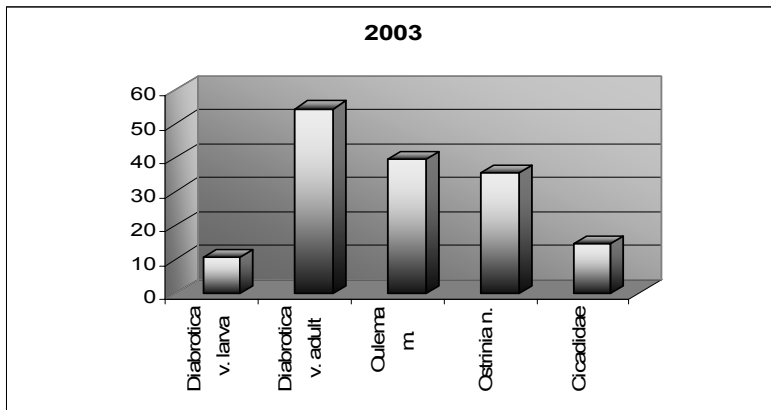


Figure 2 - The percentage of attacked plants at the stage of silking and cob formation

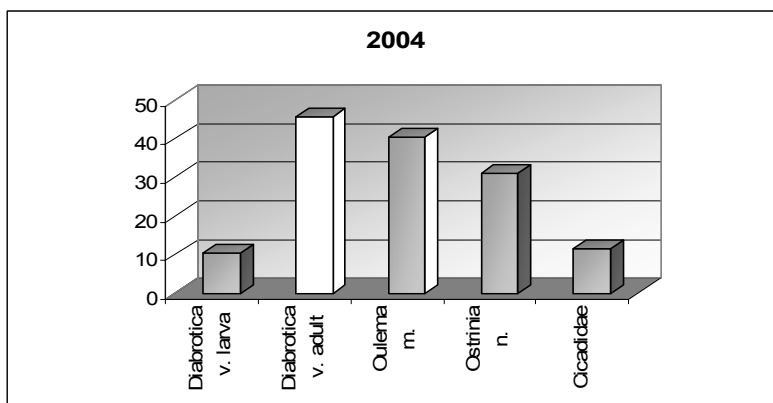


Figure 3 - The percentage of attacked plants at the stage of silking and cob formation

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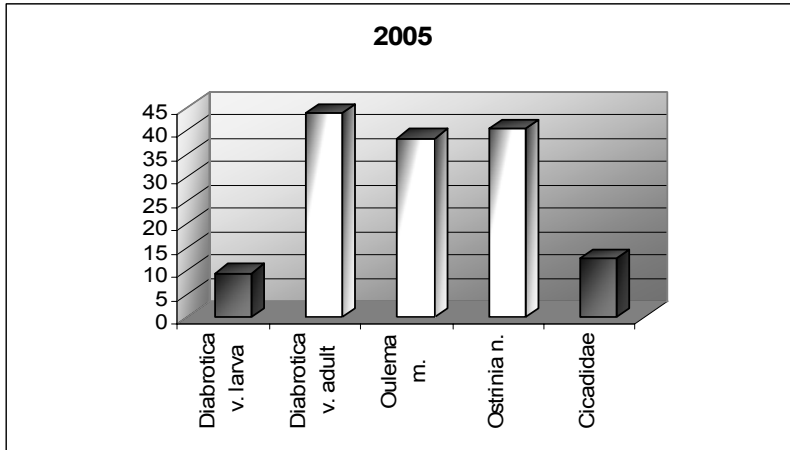


Figure 4 -The percentage of attacked plants at the stage of silking and cob formation

CONCLUSIONS

The biodiversity of maize pests was great. The most important pest species were: *Tanymechus dillaticolis* (47-69.5%), adults of *Diabrotica virgifera virgifera* (34.6-40.33%), *Oulema melanopa* (27.9- 32.5%), *Opatrum sabulosum* (17.5-29.0%), *Ostrinia nubilalis* (18.87-25.5%) and *Aphis maidis* (7.13-16.6%).

Tanymechus dilaticollis, *Opatrum sabulosum* and *Aphis maidis* were present at high number, but their attack was not aggressive.

Larvae and adults of *Diabrotica v.*, *Oulema m.*, and *Ostrinia n.* (larvae) are the most important maize pests.

The year 2003 was very favourable to pest development. In 2003, the lowest values were registered, because of the presence of rainfall and low temperatures, especially at the first vegetation stages.

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