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RESEARCHES ON THE PROTECTION OF MAIZE CROPS AGAINST SOIL PESTS

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ABSTRACT - The maize crops have been affected, in the range between seed germination - plants appearing – the development of the first 3 – 5 leave, by larvae of *Agriotes* genus, the maize leaf weevil *(Tanymecus dilaticollis)* and earth fleas *(Crepidodera sp.).* For the prevention and reduction of the groundside pests attacks, at Agricultural Research and Development Station (ARDS) of Secuieni, Neamț county, Romania, it has been experienced a range of insecticides (Gaucho 600 FS – 6.0 l/t (STD), Poncho 600 FS – 9.0 l/t, Thiacloprid 400 FS- 20.0 l/t, Nuprid 600 FS – 6.0 l/t, Picus 600 FS – 6.0 l/t, Cosmos 500FS – 2.0 l/t şi 7.5 l/t) applied in the treatment of maize grain. The experienced insecticides have insured a good protection of the plants against the larvae of *Agriotes* genus; the percentage of the saved plants at 25 days of the emergence it was between 89% and 97% at the treated variants and 76% plants remainig at the untreated variant; the differences with the percentage of saved plants between the treated variants and the untreated variant were very significant. Regarding the degree of attack produce by *Tanymecus dilaticollis* and *Crepidodera sp.,* between the treated variants and the untreated variant there were registered very significant negative differences. The good protection insured by the seed chemical treatment with the experienced insecticides it positive influence the maize production at hectare; between the treated variants and the untreated variant there were obtained very significant production differences. The good results obtained in the protection of maize crops against the groundside pests they led to the approval of the experienced insecticides and to the recommendation to use them in the large-scale production.

Key words: Attack; Insecticides; Pests; Protection; Maize.

REZUMAT. Cercetări privind protecția culturilor de porumb împotriva dăunătorilor de sol. Culturile de porumb au fost afectate, în intervalul cuprins între germinarea semințelor – răsărirea plantelor – formarea primelor 3 – 5 frunze, de larve ale genului *Agriotes*, rățişoara porumbului *(Tanymecus dilaticollis)* şi purici de pământ (*Crepidodera sp*.). Pentru prevenirea şi

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diminuarea atacurilor dăunătorilor de sol, la S.C.D.A Secuieni-Neamț s-a experimentat o gamă de insecticide (Gaucho 600 FS – 6,0 l/t (STD), Poncho 600 FS – 9,0 l/t, Thiacloprid 400 FS- 20,0 l/t, Nuprid 600 FS – 6,0 l/t, Picus 600 FS – 6,0 l/t, Cosmos 500FS – 2,0 l/t şi 7,5 l/t), aplicate în tratamentul seminței de porumb. Insecticidele experimentate au asigurat o bună protecție a plantelor împotriva larvelor genului *Agriotes*; proporția plantelor salvate la 25 zile de la răsărire a fost cuprinsă între 89% şi 97% la variantele tratate față de 76% plante, cât au mai rămas la varianta martor netratată; diferențele în ceea ce priveşte procentul plantelor salvate dintre variantele tratate şi varianta martor netratată au fost foarte semnificative. În ceea ce priveşte gradul de atac produs de *Tanymecus dilaticollis* şi *Crepidodera sp*., între variantele tratate şi varianta martor netratată s-au înregistrat diferențe negativ foarte semnificative. Protecția bună, asigurată de tratamentul chimic al seminței cu insecticidele experimentate, a influențat pozitiv producția de porumb la hectar; între variantele tratate şi varianta martor netratată s-au obținut diferențe de producție foarte semnificative. Rezultatele bune, obținute în protecția culturilor de porumb, împotriva dăunătorilor de sol, au condus la omologarea insecticidelor experimentate şi recomandarea de a fi folosite în marea producție.

Cuvinte cheie: atac dăunători; insecticide; porumb; protecție.

INTRODUCTION

The maize (*Zea mays* L.) occupies an important place in the Romanian agriculture, by the large area they occupy (on average 30% of arable land), by the yields achieved, and the many uses of maize in human food, industry and feed. Therefore, the level of production and economic efficiency of maize crops are matters of national interest (Haş *et al.,* 2010).

Corn yields are quality and quantity reduced by some pathogen agents and pests, production losses were on average 23% only for pests. Harmful entomofauna to corn crops is plentiful, but of all insect species inventoried, for the central area of Moldavia, economic importance by the damage they cause have the soil pests that affect crops in the period between germination of seed – plant emergence – formation of the first 3 – 5 leaves (Trotuş and Siriţanu, 2002; Trotuş, 2007).

Application of some integrated measures, effective, to prevent attacks and to reduce crop losses but also to maintaining a healthy enviroment start from the knowledge of the pests, the mode of their attack and the protective measures (Bărbulescu, 2001; Bărbulescu *et al.,* 2002; Popov *et al.*, 2001; Popov, 2002; Popov *et al.*, 2008).

In this paper we present the results obtained in preventing the attacks produced by soil pests by chemical treatment of maize seeds with different insecticides.

MATERIALS AND METHODS

The researches were conducted at ARDS Secuieni, Neamț county, during 2006 – 2010, and consisted of experimenting with a variety of insecticides applied to maize seed treatment.

The experiments were placed in the experimental field of plant protection Laboratory, on a typical chernozem cambic soil, with 6.2 pH in water, infested with larvae of *Agriotes* genus, their density ranged between 6 – 8 specimens/sqm. The settlement of the experiences was achieved after the randomized block method, in four repetitions, the experimental plots had an area of 35 sqm.

The maize hybrid used in the experiment was Fundulea 376, the seed was received treated with different insecticides from National Institute for Agricultural Research and Development Fundulea, Călăraşi county, Romania. The sowing was done manually, using a single grain for nest, at a distance of 20 cm between grains per row and 70 cm between rows.

The observations and notes made from plant emergence to adulthood were consisted in determining the pests attack on grains sprouting in progress, at the 1 – 3 leaf stage plants, the percentage of plants saved at 25 days after emergence and the influence of insecticides applied in seed treatment on maize production at hectare. Statistical data were calculated using analysis of variance.

RESULTS AND DISCUSSION

Observations and measurements made at the maize crops have shown that the interval between seed germination – emergence – formation of the first 3 – 5 leaves, the plants were attacked by: larvae of *Agriotes* genus, known popularly as wire worms, *Tanymecus dilaticollis* (maize leaf weevil) and *Crepidodera* sp. (earth fleas).

Looking to the percentage of the emergenced plants was found out a 87% average in the untreated variant and ranged between 91% and 98% in treated variants, the differences in the sprouting sown seeds up to 100% due to larvae of *Agriotes* genus attack, attack produced to the soil seed germination, which was 13% in the untreated control and between 2% and 9% in the treated variants (*Table 1*).

The attack of wire worms continued also at the emergenced plants until the 3 – 5 leaf stage; the attack occurred in the package zone, the attacked plants become yellow, withered and dry. The frequency of plant attack was 11% in the untreated control and from 1% to 4% in treated variants (*Table 1*).

The percentage of saved plants as a result of the attack made by wire worms (*Agriotes* sp.), at 25 days after emergence of plants, ranged between 89% (Cosmos 500 FS – 2.0 l/t) and 97% (Poncho 600 FS – 9.0 l/t) at the variants treated with insecticides to 76% of plants that they remained at the untreated control (*Table 1*).

The degree of attack produced by *Tanymecus dilaticollis* was 4.12 % in the untreated control and between 1.01% (Poncho 600 FS – 9.0 l/t) and 4.01% (Gaucho 500 FS – 2.0 l/t); the differences in the degreea of attack between treated and untreated variants were highly negative significant to all insecticides tested, except the variant treated with Cosmos 500 FS – 2.0 l/t (*Table 1*).

Table 1 - The influence of some insecticides applied in the maize seed treatment on the attack of some soil pests, Secuieni, Neamț county, 2006-2010

No.	Experimental variant	Dose, l/t	P% emergenced plants	F% of attack		P% saved plants	*Tanymecus dilaticollis*			*Crepidodera sp.*		
				At grain	At plants		DA%	Dif. DA% unt. var., %	Signif.	DA%	Dif. DA% from unt. var.	Signif.
1.	Untreated variant (control)	-	87	13	11	76	4.12	control	control	3.64	mt	control
2.	Gaucho 600 FS (STD)	6.0	94	6	3	91 xxx	1.68	-2.44	000	0.87	-2.77	000
3.	Poncho 600 FS	9.0	98	2	1	97 xxx	1.01	-3.11	000	0.65	-2.99	000
4.	Thiacloprid 400 FS	20.0	98	2	2	96 xxx	1.56	-2.56	000	0.65	-2.99	000
5.	Nuprid 600 FS	6.0	97	3	2	95 xxx	1.32	-2.8	000	0.84	-2.80	000
6.	Picus 600 FS	6.0	96	4	4	92 xxx	1.34	-2.78	000	0.91	-2.73	000
7.	Cosmos 500 FS	2.0	91	9	2	89 xxx	4.01	-0.11	-	2.97	-0.67	-
8.	Cosmos 500 FS	7.5	96	4	2	94 xxx	2.03	-2.09	000	1.17	-2.47	000
	DL 5%		1.80			1.81	1.21	1.31		0.79	0.73	
	DL 1%		2.50			2.52	1.67	1.81		1.17	1.08	
	DL 0,1%		3.74			3.47	2.32	2.51		1.99	1.71	

Table 2 - The influence of some insecticides applied in the seed treatment on the maize production (stas grain/ha) Secuieni, Neamț county, 2006-2010

No.	Experimental variant	Dose, l/t	Production, kg/ha	Dif. of prod from unt. var., kg/ha	Signif.	Dif. of prod. from standard, kg/ha	Signif.
1.	Untreated variant (control)	-	5154	control	control	- 932	000
2.	Gaucho 600 FS (STD)	6.0	6086	932	XXX	std.	std.
3.	Poncho 600 FS	9.0	6350	1196	XXX	264	-
4.	Thiacloprid 400 FS	20.0	6330	1176	XXX	244	-
5.	Nuprid 600 FS	6.0	6285	1131	XXX	199	-
6.	Picus 600 FS	6.0	6130	976	XXX	44	-
7.	Cosmos 500 FS	2.0	5836	682	XXX	-250	-
8.	Cosmos 500 FS	7.5	6280	1126	XXX	194	-
	DL 5%		315 kg/ha				
	DL 1%		390 kg/ha				
	DL 0.1%		453 kg/ha				

In the period of emergence – formation of the first 3 – 5 leaves the maize plants have been also affected by earth fleas (*Crepidodera* sp.), the recorded attack degree was 3.64% at the untreated control and at the treated variants ranged between 0.65% (Thiacloprid 400 FS – 20.0 l/t) and 2.97% (Cosmos 500 FS – 2.0 l/t), the differences in the attack degree between treated and untreated variants were negative very significant with the exception of the variant treated with Cosmos 500 – 2.0 l/t (*Table 1*).

The good protection provided by the insecticides applied in the seed treatment against soil pests (*Agriotes* sp., *Tanymecus dilaticollis*, *Crepidodera* sp.) positively influenced the production of maize per hectare.

The average production of stas grains for the period 2006 – 2010 was 5154 kg/ha at the untreated control and ranged between 6086 kg/ha and 6350 kg/ha at the variants treated with insecticides.

The production differences recorded between treated and untreated variants were highly significant (*Table 2*). Comparing the maize production produced in the variants treated with new insecticides with the standard version production (Gaucho 600 FS – 6.0 l/t) were obtained similar values so that the production differences were not statistically ensured (*Table 2*).

CONCLUSIONS

The tested insecticides in the maize seed treatment have provided a good protection for plants by reducing the attacks of *Agriotes* sp., *Tanymecus dilaticollis*, *Crepidodera* sp.

Cosmos 500 FS insecticide, at a dose of 2.0 l/t, provided a good protection for the plants, close to the standard product only in the attack prevention of *Agriotes* sp.

When using Cosmos 500FS insecticide at 7.5l/t dosage it protected maize plants against the following species *Agriotes* sp., *Tanymecus dilaticollis* and *Crepidodera* sp.

The good protection provided by the tested insecticides in the seed treatment had a positive effect on miaze yield per hectare.

The good results obtained in maize crops protection against soil pests have led to the approval of the tested insecticides and to the recommendation to be used in mass production.

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