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 și 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% remaining 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.
diminuarea atacurilor dăunătoarelor 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 și 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% și 97% la variantele trate față de 76% plante, cât au mai rămas la varianta martor netratată; diferențele în ceea ce privește procentul plantelor salvate dintre variantele tratate și varianta martor netratată au fost foarte semnificative. În ceea ce privește gradul de atac produs de Tanymecus dilaticollis și Crepidodera sp., între variantele tratate și 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 hecart; între variantele tratate și varianta martor netratată s-au obținut diferențe de producție foarte semnificative. Rezultatele bune, obținute în protecția culturilor de porumb, împotriva dăunătoarelor de sol, au condus la omologarea insecticidelor experimentate și 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 (Haș 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 (Trotuș and Sirițanu, 2002; Trotuș, 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 (Bărbelescu, 2001; Bărbelescu 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.
RESEARCHES ON THE PROTECTION OF MAIZE CROPS

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, Călărași 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

<table>
<thead>
<tr>
<th>No.</th>
<th>Experimental variant (control)</th>
<th>Dose, l/t</th>
<th>P% emerged plants</th>
<th>F% of attack At grain</th>
<th>At plants</th>
<th>P% saved plants</th>
<th>Tanymecus dilaticollis</th>
<th>Crepidodera sp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Untreated variant (control)</td>
<td>-</td>
<td>87</td>
<td>13</td>
<td>11</td>
<td>76</td>
<td>4.12</td>
<td>control</td>
</tr>
<tr>
<td>2.</td>
<td>Gaucho 600 FS (STD)</td>
<td>6.0</td>
<td>94</td>
<td>6</td>
<td>3</td>
<td>91</td>
<td>1.68</td>
<td>-2.44</td>
</tr>
<tr>
<td>3.</td>
<td>Poncho 600 FS</td>
<td>9.0</td>
<td>98</td>
<td>2</td>
<td>1</td>
<td>97</td>
<td>1.01</td>
<td>-3.11</td>
</tr>
<tr>
<td>4.</td>
<td>Thiacloprid 400 FS</td>
<td>20.0</td>
<td>98</td>
<td>2</td>
<td>2</td>
<td>96</td>
<td>1.56</td>
<td>-2.56</td>
</tr>
<tr>
<td>5.</td>
<td>Nuprid 600 FS</td>
<td>6.0</td>
<td>97</td>
<td>3</td>
<td>2</td>
<td>95</td>
<td>1.32</td>
<td>-2.8</td>
</tr>
<tr>
<td>6.</td>
<td>Picus 600 FS</td>
<td>6.0</td>
<td>96</td>
<td>4</td>
<td>4</td>
<td>92</td>
<td>1.34</td>
<td>-2.78</td>
</tr>
<tr>
<td>7.</td>
<td>Cosmos 500 FS</td>
<td>2.0</td>
<td>91</td>
<td>9</td>
<td>2</td>
<td>89</td>
<td>4.01</td>
<td>-0.11</td>
</tr>
<tr>
<td>8.</td>
<td>Cosmos 500 FS</td>
<td>7.5</td>
<td>96</td>
<td>4</td>
<td>2</td>
<td>94</td>
<td>2.03</td>
<td>-2.09</td>
</tr>
</tbody>
</table>

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

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

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 maize 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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