SETTING ATTACK FREQUENCY PRODUCED BY THE LARVAE OF DIABROTICA VIRGIFERA VIRGIFERA LE CONTE IN THE ARAD AREA

STABILIREA FRECVENȚEI ATACULUI PRODUS DE LARVELE DĂUNĂTORULUI DIABROTICA VIRGIFERA VIRGIFERA LE CONTE ÎN ZONA ARAD

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Abstract: *Diabrotica virgifera virgifera (western corn rootworm) is certainly the most damaging pest among the pest species found in corn crops from the western part of Romania. Attack frequency of this pest is analyzed in an experience placed near Şagu locality – S.C. Agrogil, Arad County area. The purpose of this work is to establish the damages produced by Diabrotica virgifera virgifera pest larvae on corn plants. In this way, during 2006 there were studied eight corn hybrids from different maturity groups with American origin. These researches will allow us to establish the role of this pest on the amplifying of corn pathological systems under epidemic view (Zea mays - Fusarium roseum, Zea mays - Ustilago maydis, Zea mays - Helminthosporium turcicum, pathogens monitored during 2006). After the result analysis we can conclude the next: Diabrotica virgifera virgifera larvae attack amplitude varies between 5.17% and 13.78%, values registered in case of PR 36K67 and PR 39D81 hybrids. Control variant is represented by PR 37D25 a half-early hybrid and it has shown a 5.45% attack percentage. Statistically are registered very distinctively significant and distinctively significant attacks in case of PR 39D81, PR 38R92 and PR 37M34 hybrids in comparison with the tester. The other hybrids show small differences in comparison with the tester, not statistically provided, but these differences are important from practical point of view.*

Rezumat*: Dintre speciile dăunătoare întâlnite în partea de vest a ţării la cultura porumbului, Diabrotica virgifera virgifera (viermele vestic al rădăcinilor de porumb) este cu siguranţă cea mai păgubitoare. Frecvenţa atacului acestui dăunător, a fost urmărită, de noi, într-o experienţă amplasată lângă localitatea Şagu -S.C. Agrogil, zona Arad, cu scopul de a stabilii pagubele produse de larvele dăunătorului Diabrotica virgifera virgifera asupra plantelor de porumb. În acest sens, în anul 2006, au fost luaţi sub observaţie opt hibrizi de porumb, din grupe de maturitate diferite, de provenienţă americană. Aceste cercetări ne vor permite să stabilim rolul acestui dăunător în amplificarea patosistemelor porumbului sub aspect epidemic (Zea mays - Fusarium roseum, Zea mays - Ustilago maydis, Zea mays - Helminthosporium turcicum, patogeni monitorizaţi în anul 2006). În urma rezultatelor obţinute putem concluziona următoarele: amplitudinea de atac a larvelor de Diabrotica virgifera virgifera a variat între 5,17% şi 13,78%, valori înregistrate la hibrizii PR 36K67 şi PR 39D81. Varianta martor reprezentată de hibridul semitimpuriu PR 37D25 a înregistrat un procent de atac de 5,45%. Statistic se înregistrează plusuri de atac foarte distinct şi distinct semnificative faţă de martor la hibrizii de porumb PR 39D81, PR 38R92 şi PR 37M34; ceilalţi hibrizi manifestă diferenţe mici faţă de martor, de fapt, neasigurate statistic, dar importante din punct de vedere practic.*

Key words**:** *Diabrotica virgifera virgifera Le Conte, hybrid, corn, larvae, frequency*
Cuvinte cheie: *Diabrotica virgifera virgifera Le Conte, hibrid, porumb, larvă, frecvenţă.*

INTRODUCTION

Insect species *Diabrotica virgifera virgifera Le Conté* or western corn rootworm is the most damaging corn pest in western Romania. The problems of this pest are known concerning spreading (I. VONICA, 1998; IOANA GROZEA, 2003; C.H. ENGELBERG, 2004),

morphology (IOANA GROZEA, 2003; 2006), biology (H.C. CHIANG, 1973; D. ČAMPRAG *et al*., 1995; IOANA GROZEA, 2002, 2003; R.P. CHARLES *et al*., 2005; C.M.F., PIERCE and M.E., GRAY , 2006), ecological and edaphical aspects (AL. BĂRBULESCU, 1999; R.C. EDWARDS, 2000; F.B. PEAIRS, 2006), climatic needs (R.C. EDWARDS, 2000; IOANA GROZEA 2002, 2003), trophic needs (J. MOESER, S. VIDAL, 2003; IOANA GROZEA, 2003, 2006), and the control under technological, chemical aspect (F.C. BAČA, 1997; IOANA GROZEA, 2003; C.H. KRUPKE *et al*., 2006), and biological control.

There are well known the prophylactic and therapeutic measures of this pest (R. WRIGHT *et al*., 1993; AL. BĂRBULESCU, 2000; F.B. PEAIRS, S.D. PILCHER, 2006), but these are always in actuality through the variation of the new created corn genotypes. In this way, we find as proper the study of some corn hybrids under the aspect of the resistance reaction to *Diabrotica virgifera virgifera Le Conté* larvae attack. In addition, the role of this pest is important because of the amplifying of corn pathological systems under epidemic and pandemic aspect.

MATERIAL AND METHOD

Diabrotica virgifera virgifera Le Conté or western corn rootworm attack frequency is established during 2006 in an experience placed near Șagu locality – S.C. Agrogil (Arad County area).

The plot structure is represented by eight corn hybrids as are PR 39D81 (extra-early maturity group), PR 38R92 (early maturity group), PR 38A24, PR 37D25, PR 37M34, PR 37W05 (half-early maturity group), PR 35P12, PR 36K67 (half-late maturity group). Obtained values are analysed from dynamic point of view (15 June, 3 July, 17 July, and 1st August) and are expressed as percentage and are reported with the control variant (PR 37D25) and with experience average.

RESULTS AND DISCUSSIONS

The frequency of "goose neck" damage is characteristic for *Diabrotica virgifera virgifera Le Conté* larvae (AL. BĂRBULESCU, 1999, 2000; IOANA GROZEA, 2000, 2003). This kind of damage is represented for a corn hybrids comparative crop with American origin, as is shown in table 1 and figure no. 1.

Attack amplitude of *Diabrotica virgifera virgifera Le Conté* larvae vary between 5.17% and 13.78%, these values being registered in case of PR 36K67 and PR 39D81. Control variant is represented by PR 37D25 and is registered an attack frequency of 5.45%. This amplitude is realised on the background of the optimal limits of the thermal and hydric needs for the larvae of this pest. In this way are confirmed the data existent in literature (N.C. ELLIOTT, G.L. HEIN, 1994; AL. BĂRBULESCU, 2000; IOANA GROZEA, 2000, 2003; M.M. ELLSBURY, R.E. LEE JR., 2004). Between climatic factors and larvae aggressiveness on corn hybrids is a positive direct correlation (figure no. 1).

From our data we have obtained statistically that extra-early and early hybrid are registering attack intensities very distinctively significant and distinctively significant in comparison with PR 37D25 control. The other hybrids show small differences in comparison with the tester, not statistically provided, but these differences are important from practical point of view.

Comparing the larvae attack average per experience, which is 7.52% (registered in 1st August), the corn hybrids response is similar to the tester, and the tester hybrid PR 37D25 and half-late hybrid PR 36K67 show attack minuses. The obtained result in this way is similar with the tester, and is confirming the research results obtained by other researches (AL. BĂRBULESCU, 1999, 2000).

Table 1

"Goose neck" damage type frequency characteristic for Diabrotica virgifera virgifera Le Conté larvae in corn hybrids and the signification of the differences in comparison with control variant and experience average (during 15 June and 1 August 2006)

No.	Hybrid	15 June			03 July			17 July			01 August		
		X	Signification for difference with control	Signification for difference with experience average	X	Signification for difference with control	Signification for difference with experience average	X	Signification for difference with control	Signification for difference with experience average	X	Signification for difference with control	Signification for difference with experience average
1	PR 39D81	6.32	x x x	x x	8.33	x x x	x x x	11.2	x x x	x x x	13.78	x x x	x x x
2	PR 38R92	4.02	-	-	5.46	x x	-	6.89	x x x	-	9.7o	x x x	x
3	PR 38A24	3.44	-	-	4.02	x	-	5.17	x	-	6.32	-	-
4	PR 37D25	1.72	-	-	2.oo	-	o o	3.44	-	o o	5.45	-	0
5	PR 37M34	2.29	-	-	3.15	-	-	4.3o	-	-	7.18	x x	-
6	PR 37W05	3.15	-	-	4.02	x	-	5.45	x	-	6.6o	-	-
7	PR 35P12	2.58	-	-	3.44	-	-	4.3o	-	-	5.96	-	-
8	PR 36K67	2.58	-	-	3.44	-	-	4.02	-	0	5.17	-	o o
Experience average		7.02			4.23			5.60			7.52		
DL - 5%		2.32			2.00			1.54			1.65		
DL - 1%		3.22			2.77			2.14			2.28		
DL - 0,1%		4.48			3.85			2.97			3.17		

In this moment, corn genotypes show tolerance against *Diabrotica virgifera virgifera Le Conté* larvae attack (AL. BĂRBULESCU, 1999, 2000; F.I. BAČA *et al*., 2000; IOANA GROZEA, 2003), and no natural genetic resistance.

They are manifesting only artificially (transgenic) resistance, and the protein toxic for larvae is produced by CRY 3Bb gene transferred from *Bacillus thuringiensis* bacteria, this being able to increase the insecticides efficiency through synergy in the control of this pest (L.H. ENGLISH *et al*., 2000; T.A. WILSON, J.J. TOLLEFSON *et al*., 2002; D.P. WARD *et al*., 2005).

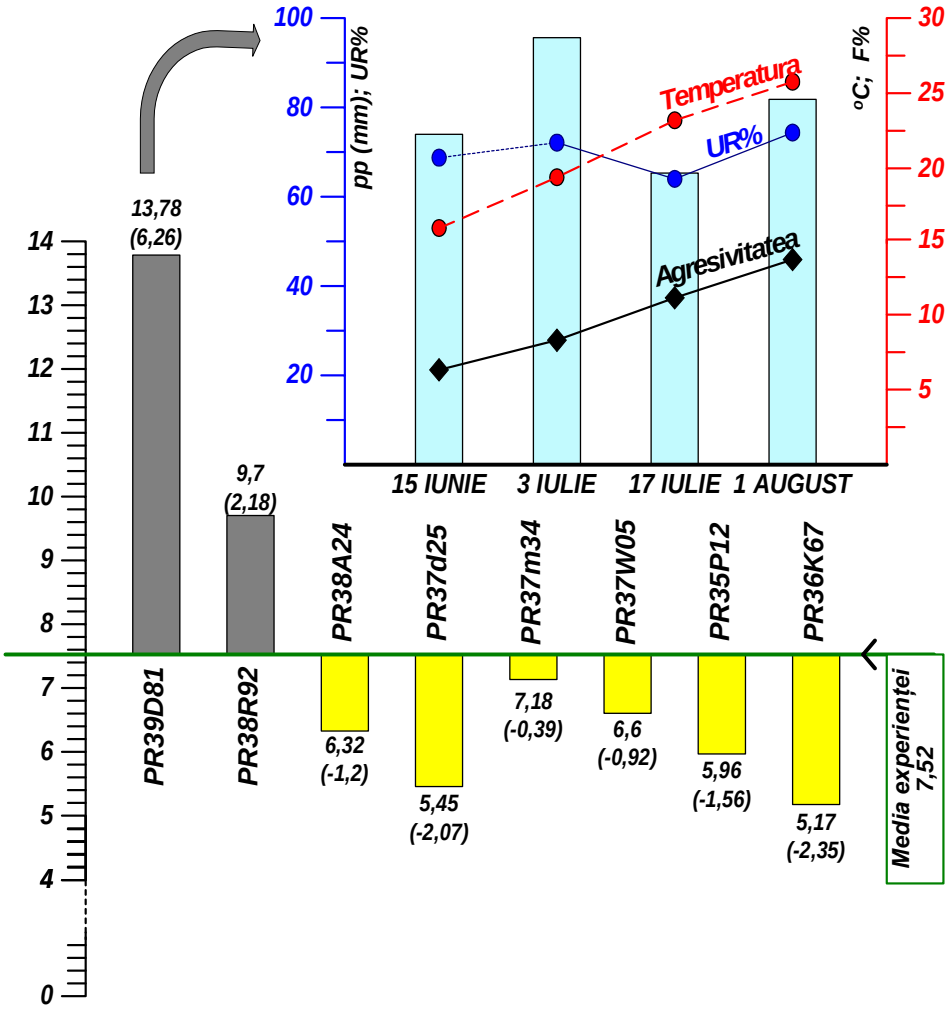

Fig. 1. “Goose neck” damage type differences realised by corn hybrids in comparison with experience average, and the direct positive correlation among climatic factors and pest aggressiveness

CONCLUSIONS

The hybrids from extra-early and early maturity group as are PR 39D81 and PR 38R92 are more powerful affected by "goose neck" damage type, while half-early corn hybrids (PR 38A24, PR 37D25, PR 37M34 and PR 37W05) and half-late hybrids (PR 35P12 and PR 36K67) are manifesting tolerance. This tolerance is not the result of some specific genes expression, these being non-specific. In fact, the tolerance is specific to the corn genotypes with high degree of root branching, associated with drought resistance or a long vegetation period (stable tolerance is realised through the synergism of these three features). Drought resistance is associated with mentioned features in case of extra-early and early hybrids and they have not manifest tolerance for this pest.

The main conclusion is that mentioned features were not created as a protection threat, these being adaptation elements. They are realising the "tolerance" because of the happening, this phenomenon being noticed also in the case of plant pathogens (GH. POPESCU, 1998).

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