

CONVENTIONAL AND YG CORN HYBRIDS, UNDER GENETICALLY DIFFERENT TROPHIC BASIS, OF *OSTRINIA NUBILALIS* – *FUSARIUM ROSEUM* – *ZEA MAYS* SYSTEM, IN THE WEST SIDE OF THE COUNTRY

PRODUCȚIA HIBRIZILOR DE PORUMB, ÎN CONDIȚII DE BAZĂ TROFICĂ DIFERITĂ GENETIC, CONVENȚIONALĂ ȘI DE TIP YG, A SISTEMULUI *OSTRINIA NUBILALIS* – *FUSARIUM ROSEUM* – *ZEA MAYS*, ÎN PARTEA DE VEST A ȚĂRII

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Abstract: *The herein paper shows the average production and the mean of production differences (kg/ha, % ha) between conventional corn hybrids and Yield Gard (MON 810) corn hybrids made up in a comparative lot, in Horia, Arad county. As a result of hybrid production research, we've established the followings: - production amplitude varied from 5,538 kg/ha (DK 315) to 6,375 kg/ha (DKC 5783) – in the case of conventional corn and 6,017 kg/ha -7,327kg/ha, in the case of YG corn YG (DKC 3946 and DKC5784); - the mean production difference between the 4 conventional hybrids, compared to the 4 genetically modified hybrids (MON 810) varied from 479 kg/ha, at DKC 315 hybrid (290 FAO) up to 1009 kg/ha – DKC 5143 hybrid (410 FAO); - in percentages, production losses varied from 7.95% DK 315 hybrid up to 14.17% at DKC 5143 – table 67, percentage average of production losses, in the case of our experiment was of 11.03%, which means a great economic loss.*

Rezumat: *În această lucrare este prezentată producția medie și media diferențelor de producție (kg/ha, % ha) dintre hibridii de porumb convențional și de tip Yield Gard (MON 810) constituiți într-un lot comparativ, în localitatea Horia, județul Arad. În urma cercetărilor efectuate, referitor la producția hibridilor, am constatat următoarele: - amplitudinea de producție a variat de la 5.538 kg/ha (DK 315) la 6.375 kg/ha (DKC 5783) – în cazul porumbului convențional și 6.017 kg/ha -7.327kg/ha, în cazul porumbului YG (DKC 3946 și DKC5784); - diferența medie de producție între cei 4 hibridi convenționali față de cei 4 hibridii modificați genetic (MON 810) a variat de la 479 kg/ha, la hibridul DKC 315 (290 FAO) până la 1009 kg/ha – hibridul DKC 5143 (410 FAO); - în procente pierderile de producție au variat de la 7,95% la hibridul DK 315 până la 14,17% la DKC 5143 – tabelul 67, media procentuală a pierderilor de producție, în cazul experienței noastre a fost de 11,03%, ceea ce reprezintă o pierdere importantă economică.*

Key words: *production, conventional corn, YG corn, Ostrinia, Fusarium*

Cuvinte cheie: *producție, porumb convențional, porumb YG, Ostrinia, Fusarium*

INTRODUCTION

The presence of *Ostrinia nubilalis* pest in corn cultures cost the farmers 1.1 billion dollars, that is a production loss of 5% (C. BLANCHARD et al., 2009). Production losses can reach 50-60% (F. PAULIAN et al., 1962; MUREȘAN FELICIA and D. MUSTEA, 1994, 2000; D. MUSTEA 1999; AL. BĂRBULESCU, 2000). The loss/plant, determined by each larvae which reached full development is equivalent to 3% of that plant's production (T.A. BRINDLEY and T.F. DIKE, 1963).

Each gallery existent during the autumn season inside the corn strain has a loss/plant of 1-2% of production (JARVIS, 1961, quoted by T. PERJU et al, 2004). For our country, F. PAULIAN (1976) established for each larvae that reached maturity, a loss of approximately 20g of beans at 14% humidity.

In the US, *Fusarium* pathogen represents a major threat for grain cultures and causes production losses, such as: in Ohio, production losses are annually estimated at 5-15% (P.E. LIPPS et al., 2001), in Illinois, it annually reduces the productions with 10-20% (D.K. MALVIK, 1995), in Virginia – production losses have been of 40%, in North Carolina of 10% (ABBEY LYNN SUTTON, CRISTINA COWGER, 2003).

In Romania, it is considered one of the most spread and damaging disease, with severe consequences in humid areas, where losses are of 10-20% of production. Attack frequency in many culture areas have been of 65-80% and is a major problem in healthy seed production, especially in the West side of the country (EUGENIA ELIADE, 1985, FLOAREA ADAM, GH. POPESCU, 2008).

MATERIALS AND METHOD

Our experiment was placed in Horia locality, Arad county, on a field with a 2 years monoculture. The hybrids analyzed, 8.4 conventional hybrids (DK 315, DK 440, DKC 4626 and DKC 5143) an 4 genetically modified hybrids (MON 810 - DKC 3946, DKC 4442, DKC 5018 and DKC 5784), of different groups of maturity (290, 330, 410 and 490 FAO) made up the biological material.

Within each experiment there were 3 repetitions, and within each repetition all the 8 hybrids mentioned above were cultivated and each hybrid was sowed on 6 rows (one variant) with a 150 m length, constituting a variant of 630 m².

We mention that the hybrids have been tested under the same technological conditions, the difference between them being the resistance of Yield Gard hybrids (MON 810) at the attack of the European corn borer – *Ostrinia nubilalis*.

RESULTS AND DISCUSSION

The results obtained following the determinations established by the attack of *Ostrinia nubilalis* pest and *Fusarium roseum* pathogen, and the harvesting were the followings:

- at the conventional hybrid DK 315, the production achieved was of 5538 kg/ha, and at hybrid DKC 3964 YG – 6017 kg/ha – table 1 (the same hybrid only genetically modified MON 810, containing the Cry 1 Ab protein gene, which makes it resistant at the attack of *Ostrinia nubilalis* insect); the mean production difference at the two hybrids was of 479 kg/ha, which represents 7.95%, the quantitative loss of the production total). The pest attack at the level of the same hybrid varied between 97% larval organic aggressiveness and 100% perforation aggressiveness, while larval organic intensity was of 4.01 larvae/plant and the perforation one of 5.23 vents/plant. From a qualitative point of view, we can say that the production was negatively influenced due to the difference of 46.15% of aggressiveness resulted from the aggressiveness of *Fusarium* pathogen, which at conventional corn was of 56.4%, while at Yield Gard corn (MON 810) was much lower, that is of 10.25%;
- table 2 shows that the mean production difference at DK 440 hybrid (6058 kg/ha - conventional) and DKC 4442 YG hybrid (6658 kg/ha - MON 810) was of 600 kg/ha, in case of larval organic aggressiveness of 89% and perforation aggressiveness of 92%, but also of larval organic intensity of 3.3 larvae/plant and 5.16 vents/plant. Chening this mean production difference in percentages, we have a production loss of 9.01% (table 3) at conventional corn compared to MON 810 hybrid.
- In the case of DKC 5143 hybrid, of 410 FAO group, one of the most cultivated hybrids in the world, with a production of 6107 kg/ha (table 1) we can notice that the average production was diminished with 1009 kg/ha (table 2) by *Ostrinia nubilalis* insect, compared to DKC 5018 YG (MON 810) hybrid, which had a production of 7116 kg/ha. In percentages, this difference was of 14.17%, which means an important loss for the farmers

(table 3). Quantitative production losses are owed to the high frequency of European corn borer, that is 88% in case of larval organic aggressiveness and 97% for perforation aggressiveness, but also of intensity which was of 2.45 larvae/plant and 3.63 vents/plant (table 2). Tracking the aggressiveness of *Fusarium*, which was of 55.33% at DKC 5143 hybrid and 8.33% at DKC 5018 YG hybrid, we can conclude that harvest qualitative losses due to differences of aggressiveness (44.25%) are significant at conventional hybrid compared to Yield Gard hybrid (MON 810), which represented a highly superior harvest from a qualitative point of view;

- The last hybrids of our experiment have been DKC 5783 (6375 kg/ha) with the group of maturity 490 FAO, which was compared from a production point of view, to its homologous DKC 5784 YG hybrid (7327 kg/ha – table 1). Also in the case of these corn hybrids, the mean production differences are significant, precisely 952 kg/ha in favor of MON 810 corn, which in percentages it means a loss of 12.99%/ha (table 3). The attack of this pest was quantitative in table 3, which shows a larval organic aggressiveness of 83.0%, a perforation aggressiveness of 89%, a larval organic intensity of 2 larvae/plant and a perforation intensity of 3.5 vents/plant. The aggressiveness of *Fusarium* pathogen oscillated between 8.3 and 44.44%, percentages achieved by DKC 5783 and DKC 5784 YG hybrids, with an important aggressiveness loss (36.11%), so that we can estimate a higher qualitative production loss in the case of conventional corn compared to MON 810 corn.

Table 1

Average production and the mean production difference (kg/ha,% ha) between conventional corn hybrids and YG corn hybrids (MON 810) made up in a comparative lot in Horia locality, Arad county

No.	HYBRID	Humidity	Production/ha		Difference YG/conventional	Difference YG/conventional
			physical	STAS (15%)		
			%	kg	kg.	KG/ha
1	DK 315	16.3	5624	5538	479	7.95
2	DKC 3946YG	16.6	6132	6017		
3	DK 440	16.6	6175	6058		
4	DKC 4442YG	16.5	6778	6658		
5	DKC 5143	16.5	6217	6107	1009	14.17
6	DKC 5018YG	16.8	7270	7116		
7	DKC 5783	18.0	6608	6375		
8	DKC 5784YG	17.8	7577	7327	952	12.99

CONCLUSIONS

Thus, we can conclude that

- The mean production difference between the 4 conventional hybrids compared with the 4 genetically modified hybrids (MON 810) varied from 479 kg/ha, at DKC 315 hybrid (290 FAO) up to 1009 kg/ha –DKC 5143 hybrid (410 FAO) – the average difference per experiment was of 760 kg/ha.
- In percentages, production losses varied from 7.95% at DK 315 up to 14.17% at DKC 5143 hybrid – table 67, the percentage mean of production losses, in the case of our experiment was of 11.03%, which represents an important loss.

- Analyzing the differences between the aggressiveness mean of *Fusarium* pathogen at conventional corn (51.22%) MON 810 corn (9.34%) it was established that there is a difference of 41.88% higher in the case of conventional corn, this aggressiveness difference (41.88%) doing nothing else but confirming the fact that there have been significant qualitative production losses between conventional and YG corn.
- The attack of *Ostrinia nubilalis* pest and *Fusarium roseum* pathogen causes important damages to conventional corn cultures, having as witness the Yield Gard corn (MON 810, in fact the same corn hybrids, but resistant to the attack of *Ostrinia nubilalis* pest).

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