OBSERVATION CONCERNING ZEA MAYS – FUSARIUM ROSEUM AND ZEA MAYS – USTILAGO MAYDIS PATHOGENIC SYSTEM AT MAIZE HYBRIDS CREATED BY PIONEER DUPONT COMPANY

OBSERVAȚII CU PRIVIRE LA PATOSISTEMELE ZEA MAYS – FUSARIUM ROSEUM ŞI ZEA MAYS – USTILAGO MAYDIS, LA HIBRIZII DE PORUMB CREAȚI DE PIONEER DUPONT COMPANY

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Abstract: *Corn hybrids PR 39D81 (extra-early), PR 38R92 (early), PR 38A24 (half-early), PR 37D25 (half-early), PR 37M34 (half-early), PR 37W05 (half-early), PR 35P12 (half-late), PR 36K67 (half-late) are tested in Arad County area (Şagu – SC. Agrogil) for natural infection with Fusarium roseum and Ustilago maydis parasite fungi. The company specifies tolerance for Ustilago maydis in case of PR 38R92 and PR 37W05 hybrids, but they have any reference for Fusarium roseum, this situation influencing our decision concerning the realisation of this study. Fusarium roseum fungus aggressiveness oscillates between 4.79% and 45.0% registered in case of PR 35P12 and PR 38R92. In comparison with PR 37D25 tester variant are registered infection increases statistically provided by PR 38R92 (early), PR 37W05 (half-early) and PR 36K67 (half-late). In case of PR 35P12 is registered a decrease of infection from statistical point of view, this hybrid maintaining also the signification trend in comparison with the experience average (-25.77%). Ustilago maydis attack is extremely damaging in hybridising plots, but in our case is low except control variant – PR 37D25 where the aggressiveness is 8.54% and PR 37W05 half-early hybrid (14.5%). In the case of these two variants, the results are statistically provided as very distinctively significant in comparison with the experience average that is 7.58%. There are not registered an attack in case of PR 38A24, PR 37M34 and PR 36K67, which will be studied during the next years. There is recommended special protection measures for kernels affected by Fusarium roseum during storage and Ustilago maydis in hybridising plots and especially in case of ice drops falling down.*

Rezumat: *Hibrizii de porumb PR 39D81 (extratimpurii), PR 38R92 (timpurii), PR 38A24 (semitimpurii), PR 37D25 (semitimpurii), PR 37M34 (semitimpurii), PR 37W05 (semitimpurii), PR 35P12 (semitardivi), PR 36K67 (semitardivi) au fost testaţi în Zona Arad (Şagu – SC. Agrogil), la infecţiile naturale cu ciupercile parazite Fusarium roseum (putregaiul roşu al tulpinilor şi ştiuleţilor) şi Ustilago maydis (tăciunele "băşicat" sau cu "pungi"). Compania specifică toleranţă la tăciunele cu "pungi" a hibrizilor PR 38R92 ŞI PR 37W05, dar nu face nici o referire la fuzarioză, situaţie care ne-a determinat să facem observaţiile cuvenite. Agresivitatea ciupercii Fusarium roseum a oscilat între 4,79 şi 45,0 procente înregistrate de hibrizii PR 35 P12 şi PR 37 W05. Faţa de varianta martor PR 37D25 s-au înscris cu plusuri de infecţie asigurate statistic hibrizii PR 38R92 (timpurii), PR 37W05 (semitimpurii) şi PR 36K67 (semitardivi). Realizează un minus de infecţie foarte distinct semnificativ hibridul semitardiv PR 35 P12, hibrid care îşi menţine semnificaţia şi faţă de atac per experienţă – 25,77%. Atacul de Ustilago maydis, extrem de păgubitor în loturile de hibridare, a fost scăzut, exceptând varianta martor –PR 37D25 la care agresivitatea a fost de 28,54% şi hibridul semitimpuriu PR 37W05(14,5), variante care de fapt sunt asigurate cu plusuri de infecţie foarte distinct semnificative faţă de media experienţei 7,58%. Nu s-a înregistrat atac la hibrizii PR 38A24, PR 37M34 şi PR 36K67, care vor fi ţinuţi sub observaţie şi ani următori. Se recomandă măsuri de protecţie speciale faţă de ştiuleţii fuzariaţi la depozitare şi faţă de tăciune, în loturile de hibridare şi mai ales în cazurile de cădere de grindină.*

Key words*: Fusarium roseum, Ustilago maydis, Zea mays, pathosystem, aggressiveness*
Cuvinte cheie*: Fusarium roseum, Ustilago maydis, Zea mays, patosistem, agresivitate*

INTRODUCTION

First researches concerning corn genetic resistance to *Fusarium roseum* are realised in IOWA State (USA) by S. JINAHION, W. A. RUSSEL (1969); A.L. HOOKER, K.M.S. SAXENA (1971) and others. In Romania, this aspect is studied by researchers from Turda Research Station (I. CĂBULEA, POMPILIA ARDELEAN, FOCKE INGEBORG, I. MUNTEAN, 1977) and ICCPT Fundulea (SARCA TRAIAN, MARINA TÎRCOMNICU, 1974; D. CRAICIU, 1980 and others). Corn resistance to *Fusarium roseum* is determined by minor genes or polygenes, or by minor genes blocks placed on 5, 6, 8, and 9 chromosomes from corn genome (S. JINAHION, W.A. RUSSEL, 1969). After I. CĂBULEA *et al.* (1977), the corn diseasing with *Fusarium roseum* is the result of a powerful interaction between corn genome and climatic conditions. During 1980, they were admitting that in the same time with polygenic (horizontal) resistance is possible to find oligogenic (vertical) resistance forms controlled by major genes, this feature being demonstrated in present (L.M. REID *et al*., 1993; L.M. REID, R.I. HAMILTON, 1997; A. BATA *et al*., 2001).

Researches realised on *Ustilago maydis* have clarified the morphology, cellular and biochemical structure, physiologic races and their sexual dimorphism, produced metabolites and toxins, genetics, chemical control, genetic resistance for fungicide (J. RUIZ HERERA, 1992; F. BANUETT, 1995; J. RUIZ HERERA *et al*., 1996; P. ALONSO SANCHEZ *et al*., 1996; I. BRUENN, 1997; P. ALONSO SANCHEZ, P.GUZMAN, 1998; N. LI *et al*., 1999; J. RUIZ HERRERA *et al*., 1999; M.E. VALVERDE *et al*., 2000; M.J. GAGE *et al.*, 2001).

Knowledge on corn hybrids resistance shows practical interest also for the establishing of it, having in view localisation of *Fusarium roseum* on kernels, this aspect being more damaging in comparison with his presence on the other aerial parts of the corn plant (ANETA ELENA DRĂCEA, 1968, 1979).

MATERIAL AND METHOD

Corn hybrids have American provenance (PIONEER DUPONT COMPANY), they being from different maturity groups (extra-early, early, half-early, and half-late). They have been tested in Arad County area (Șagu-S.C. AGROGIL) for natural infection with parasitic fungi as *Fusarium roseum* and *Ustilago maydis*. From the pathogenic agents features we have analysed their aggressiveness expressed as attack percentage, these being established with the common method. The limit differences of the hybrids were reported to control variant (PR 37D25), and in comparison with the fungus average aggressiveness on those hybrids.

RESULTS AND DISCUSSIONS

Obtained results concerning the comportment of those American corn hybrids in case of the attack of *Fusarium roseum* fungus are presented in table 1. There the attack is marked on kernels, which are damaged on the top, where they are not covered by kernel leaves. Attack percentage registered is 4.54% and 45.0% for PR 37W05 and PR 38R92. This result determinates the sensitive mark for those hybrids. In fact, those hybrids showed very distinctively significant increases in comparison with the PR 37 D 25-tester variant (19.95%) and with experience average (25.77%). The other hybrids tolerate *Fusarium roseum* fungus (19.95-27.8%) excepting PR 35P12 hybrid that shows an attack frequency lower then 5%.

Ustilago maydis attack is represented in table 2. During 2006 there were not ice drops falling down, this meteorological factor being able to heart the corn plants ant to start an *Ustilago maydis* epidemic. Attack variation amplitude is among 5.19-28.54% (PR 38R92 and PR 37D25), being determined by biologic destructive factors (insects) or abiotic (dust particles removed by the wind). There is registered the attack of *Ustilago maydis* on kernels because this

localisation is more harmful in comparison with the other vegetative plant organs (ANETA ELENA DRĂCEA, 1979).

PR 37D25 hybrid has the mark tolerant resulted from its comportment (28.54%), being also resistant for *Helminthosporium turcicum.* Having in view the low pathogeny of this fungus and the lack of the infection in case of PR 38A24, PR 37M34 and PR 36K67 (table 2) hybrids the observations for this disease are continuing.

Table 1

Difference signification in comparison with the control and experience average in case of *Fusarium roseum* fungus attack during 2006

No.	Hybrid	X	% from control	Difference in comparison with the control	Signification	Difference in comparison with X	Signification
1	PR 39D81	23.14	115.98	319.00	-	-2.63	-
2	PR 38R92	45.00	225.52	25.05	xxx	19.22	xxx
3	PR 38A24	21.54	107.93	1.58	-	-4.23	-
4	PR 37D25 (Mt.)	19.95	100	0	-	5.82	xx
5	PR 37M34	21.45	107.48	1.49	-	-4.32	-
6	PR 37W05	42.54	213.17	22.58	xxx	16.76	xxx
7	PR 35P12	4.79	24	-15.16	ooo	-20.98	ooo
8	PR 36K67	27.8	139.30	7.84	xxx	2.02	-
X	25.77						

DL 5% - 4.72
DL 1% - 6.54
DL 0.01% - 9.09

Table 2

Difference signification in comparison with the control and experience average in case of *Ustilago maydis* fungus attack during 2006

No.	Hybrid	X	% from control	Difference in comparison with the control	Signification	Difference in comparison with X	Signification
1	PR 39D81	6.72	23.56	-21.81	ooo	-0.85	-
2	PR 38R92	5.19	18.19	-23.35	ooo	-2.38	-
3	PR 38A24	0.00	0.00	-28.54	ooo	-7.58	ooo
4	PR 37D25 (Mt.)	28.54	100	0.00	-	20.96	xxx
5	PR 37M34	0.00	0.00	-28.54	ooo	-7.58	ooo
6	PR 37W05	14.51	50.84	-14.03	ooo	6.93	xxx
7	PR 35P12	5.66	19.84	-22.80	ooo	-1.91	-
8	PR 36K67	0.00	0.00	-28.54	ooo	-7.58	ooo
X	7.58						

DL 5% - 2.57
DL 1% - 3.56
DL 0.01% - 4.95

CONCLUSIONS

Fusarium roseum fungus attack has oscillated between 4.79% (PR 35P12 hybrid) and 45.0% (PR 38R92 hybrid); PR 35P12 has a attack frequency under 5% and is framed as resistant, the others, with 42.54-45.0% infection percentage are showing an infection increase very distinctively significant being considered as sensitive (PR 37W05 and PR 38R92), and the other hybrids attacked in 19.95-27.8 % percentage is tolerating fusarium ear rot (PR 37D25, PR 37M34, PR 38A24, PR 39D81, PR 36K67).

Ustilago maydis (in kernel) is less intense, 7.58% in average, and for a characterisation of corn hybrids the observations will continue.

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