THE EXPERIMENTED RESULTS WITH DIFFERENT SPRING CEREALS IN THE CROP CONDITIONS FROM ARDS OF SUCEAVA (2004 - 2008)

Alina-Nicoleta BEŞLEAGĂ[1], E. ZAMĂ[1]

[1] S.C.D.A Suceava

e-mail: alinamacovei2006@yahoo.com

In the Agricultural Research and Development Station of Suceava in the last period was achieved many researches concerning the crop behavior of some cultivars belonged differentiated both biological point of view and utilization mode of them: bakery (wheat, rye) and non bakery (triticale, barley and oat). In this paper we present the differences between 19 genotypes (4 spring wheat cultivars, one rye cultivar, five Triticale cultivars, eight spring barley cultivars and one oat cultivar) and the spring barley cultivar Speranta used like standard.

During experimentation period from yield capacity point of view were remarked the spring barley cultivars Maria and Narcisa, which surpassed during 5 years the middle yield of the standard cultivar with 11% that mean 329 k/ha and respectively 334 kg/ha. Also, the middle yield of standard cultivar was surpassed by the spring barley cultivars Suceava 3, Daciana, Stindard and Aura, with insignificant increases, comprises between 3% and 7%.

For spring wheat only the polish cultivar Henika surpassed the middle yield on 2932 kg/ha of the standard cultivar Speranta with an increase on 3% that mean 87 kg/ha. The rest of experimented cultivars gave more less yields face to middle yields of the standard cultivar, such as the oat cultivar Mures which achieved 68% from its yield capacity, resulting a minus significant yield on 947 kg/ha.

The ecological crop conditions from the North West of Moldavia offer the favorable possibilities but very differentiated for different spring cereals species. Between them, the spring barley emphasizes an efficient ecological response, quantified through high middle yields comprise between 3036 and 3266 kg/ha.

***Key words**: spring cereals, advanced cultivar, production, resistance*

The evolution in time of the spring cereals crops in Moldova and especially in the north-east part of the country, has known important changes with regard to their structure and especially the cultivated areas [1, 2].

This way, beginning with the second half of the past year, there has been registered a progressive restraining of cultivated with spring wheat and rye, that have reached this period up to almost total disappearance from the culture.

Significant decreases of surfaces have been registered also for the unscheduled cereals.

Moreover , the long lasting of the genetic and amelioration researches have determined the cereal cultivated advanced cultivar, especially the ones unscheduled, to be very poor and with a low production potential, and this way ceding easily to the extension pressure in the culture of the autumn forms , represented by a large biodiversity and well improved [3, 4].

The development of the researches concerning the amelioration of the spring has become opportune in the transition period towards a long lasting agriculture, being imposed in the first place by the necessity of increasing the agricultural yield on the cultivated surfaces in the agricultural private exploitations, individual, familial and associative [5, 6, 7].

Having into consideration all these factors, at ARDS of Suceava, there have been carried out researches concerning the acknowledgement of the ecological favorability for different species of spring cereals and the identification of new landraces, valorous for the culture in the north-east part of Moldova.

MATERIAL AND METHOD

During the period 2004-2008 at SCDA there have been experimented numerous advanced cultivars, belonging to a large group of spring cereals, differed through the biology and the using way: bakeries (wheat, rye), and un bakeries (triticosecale, barley and oat).

From all these there are presented five spring wheat advanced cultivars, from which Speranta is a autochthon advanced cultivar and the other ones come from the European germplasm, an advanced cultivar of rye –IMPULS-created at SCDA Suceava and approved in 1995, five advanced cultivars of triticale, two of them being autochthon, created at ARDS of Turda, and the other three come from the germplasm received from CIMMYT, eight advanced cultivars of spring barley, all of them being autochthon, the first six being creations of ARDS of Suceava, and the next two of ARDS of Turda, the majority of them being spread in the crop and one oat advanced cultivar –MURES- also autochthon, created at ARDS of Turda.

The experiences have been carried out following the comparative cultures method, In blocks, with 20 variants in three replications, with a surface of plot harvested equal to 5 m^2, on leached chernozem, with loamy clay texture. In all the years, the placing of the experiences had been made after the potato, that was meant for the seed production.

The work for the soil has consisted of a deep plowing that was made in autumn and a work with disc harrow GD-4 in aggregate with adjustable corner harrows, in the spring, some days before the sowing. In the spring, when preparing the germinative bed, the land was fertilized with 100 Kg/ha ammonium nitric, crude substance (34,7 N a.s.)

The sowing has been carried out in the optimum period, assuring all the species a density with a 450 germinable seeds at one square meter.

The climatic conditions – were in general favorable in the experimentation years except the year 2004 –when because the rain lack (-80,6 mm in comparison with the normal one) the vegetation has been influenced by negatively, obtaining the smallest productions in the last period of the year 2008 when there has been registered a humidity excess of 213 mm in comparison with the normal one, from which 213 mm in July, near the harvesting and its depreciation (*tab. 1*).

Table 1

The temperatures and precipitations regimes during vegetation period of the spring cereals

Period	Precipitations (mm)									
	2004		2005		2006		2007		2008	
	Total	± in comp. with multiannual average*)	Total	± in comp. with multiannual average *)	Total	± in comp. with multiannual average *)	Total	± in comp. with multiannual average *)	Total	± in comp. with multiannual average *)
January - march	75.1	-10.9	95.9	9.9	97.7	11.7	97.1	11.1	45.5	-40.5
April	19.0	-29.2	100.6	52.4	73.0	24.8	32.9	-15.3	135.2	87.0
May	43.2	-37.0	108.5	28.3	70.7	-9.5	53.9	-26.3	91.5	11.3
June	18.4	-74.7	116.9	23.3	164.7	71.1	30.7	-62.9	99.2	5.6
July	160.7	72.1	45.3	-43.3	119.6	31.0	105.8	17.2	301.6	213.0
Total	316.4	-80.6	467.2	71.2	525.7	128.7	320.4	-76.6	673.0	276.0

*) Precipitations: 1945 – 2008 (64 ani)

Temperature: (^{0}C – monthly average ± in comparison with multiannual average)										
January - march	-3.2	-0.8	-4.6	-2.2	-3.8	-1.4	3.1	5.5	1.7	4.1
April	8.9	0.9	8.2	0.2	9.0	1.0	9.2	1.2	9.6	1.6
May	13.4	-0.3	14.2	0.5	13.4	-0.3	16.3	2.6	13.7	0.0
June	17.6	0.7	16.5	-0.4	16.6	-0.3	19.9	3.0	18.3	1.4
July	19.5	1.1	19.5	1.1	19.8	-1.4	21.5	3.1	19.2	0.8
Total	8.9	1.0	7.7	-0.2	7.8	-0.1	10.0	2.1	8.9	1.0

RESULTS AND DISSCUSSIONS

Productivity. The adaptability grade to the crop-specific conditions characteristic for the influence area of ARDS of Suceava, has been appreciated through the comparison of the average conditions reached in the experimentation years of the genotypes for each of the cultivated species.

The final reaction, quantified through the level of the obtained productions, shows that the different behavior in the culture of the experimented cereals species (*tab. 2*).

From all these, a favorable ecological answer has been registered by the spring barley, represented by big productions on 3057 Kg/ha, bigger than of the spring wheat on 2812 Kg/ha and than the average on 2554 Kg/ha reached out on the whole experience, with obvious increases of 9% and 20% (*tab. 3*). Likely, a good behavior has shown during the experiment the spring wheat that, except the year 2004 , it has given big harvest close and stably held between 2855 kg – 3978 kg/ha.

Table 2

The seed production at the different crop small grain cereals

Crops	The experime-ntated cultivars number	Production: kg					Middle production		
		2004	2005	2006	2007	2008	kg/ha	% faţă de	
								Wheat	Experi-ments average
Wheat	5	698	2885	3205	3294	3978	2812	100	110
Rye	1	1450	3110	2984	2456	2826	2565	91	100
Tritico secale	5	1674	2813	2533	2536	2189	2349	83	92
Barley	8	2132	4562	3100	3085	2403	3057	109	120
Oat	1	810	2580	2400	2914	1223	1985	70	78
The average on crops	20	1353	3190	2844	2857	2524	2554	-	100

The IMPULS rye advanced cultivar , created at SCDA Suceava , is outlined in the last years through its increased productivity, reaching productions of over 4000kg/ha. For **the spring tritico secale** – not only the Romanian cultivars but also the ones obtained from the CIMMYT- that are very late also, have proved to be less productive, placing themselves under the average of the Speranta advanced cultivar with differences held between 403 kg/ha şi 724 kg/ha.

From the barley advanced cultivars experimented, there have been outlined through a big production capacity: Narcisa, Maria, Suceava 3, Daciana, Stindard and Aura, that have reached average productions between 3036 kg/ha and 3266 kg/ha, placing itself above the Speranta wheat advanced cultivar with increases production on 104Kg/ha and 334 kg/ha, which represents 3% and 11%.

In comparison with the winter cereals, the oat has generally shown a very weak behavior, reaching an average production of1985 kg/ha, which represents only 78% of the average reached out during the whole experience (tab. 2).

The main physiologic features: resistance to diseases

The observations concerning the behavior to the foliar diseases attack have obviously mode the difference between the experimental cereal genotypes (tab. 4).

This way, the majority of the advanced cultivars have behaved as being resistant and medium resistant to the powdery mildew attack ((Erisiphe graminis f. sp. hordei March), (FAO notes 3 – 4 and 5 - 6) the most sensitive advanced cultivars to this disease have proved to be Speranta and Ixos, and also the barley advanced cultivars Succes, Suceava 3, Aura şi Daciana (FAO note 6).

The presence of the **Septoria leaf spot disease** (*Septoria tritici*) attack was identified in all the experimentation years. The advanced cultivars of the bakeries cereals have proved to be resistant and very resistant (note 2 - 3). With regard to the wheat and the rye, the advanced cultivars have had a different reaction in comparison with the septoria leaf spot disease, easily sensitive to being Broma and Ixos (note 5 - 6) and sensitive Speranţa (note 7). The rest of the advanced cultivars have behaved as medium resistant.

Table 3

The grain production obtained at the experimented spring cereals

Variant	Production (kg/ha)					Average			Signification
	2004	2005	2006	2007	2008	kg/ha	%	± kg/ha	
Grâu									
Speranţa (standard)	819	2571	3510	3600	4161	**2932**	100	-	Standard
Ixos	367	2428	3014	2728	3486	2405	82	-527	
VR89-D_{0-11}	757	2714	3469	3476	3651	2813	96	-119	
Broma	767	3141	3044	3569	3936	2892	99	-40	
Henika	778	3571	2990	3097	4658	3019	103	+87	
Secară									
Impuls	1450	3110	2984	2456	2826	2565	87	-367	
Triticale									
Ţebea	1950	3050	2486	2763	2394	2529	86	-403	
T.T.32-87	1610	1980	2483	2790	2100	2393	82	-539	
Fahad	1508	2714	2515	2310	2130	2235	76	-697	
Currency	1580	2800	2698	2515	2300	2379	81	-553	
Rahno “S”	1720	2520	2481	2300	2020	2208	75	-724	
Orzoaică									
Maria	2062	4718	3568	3608	2348	3261	111	+329	
Avânt	2033	4906	3077	2756	1825	2919	99	-13	
Succes	2119	4815	2848	2559	1996	2861	97	-71	
Suceava 3	2350	4853	2911	2488	3089	3138	107	+206	
Stindard	2345	5042	3092	2759	2356	3119	106	+187	
Narcisa	2787	4243	3263	3645	2390	3266	111	+334	
Aura	1939	4703	2990	3313	2235	3036	103	+104	
Daciana	1421	4685	3052	3553	3014	3145	107	+213	
Ovăz									
Mureş	810	2580	2400	2914	1223	1985	68	-947	0

Kernel blight (*Pyrenophora terres* Drechs .attacked more the spring barley advanced cultivar in all these five experimental years (FAO notes 5 - 7).

Stem rust of wheat (*Puccinia recondita* Rob. et Desm. f. sp. Tritici) did not affect but only spontaneous and in certain years the spring cereal crops. The un bakeries cereals advanced cultivars tritico secale, barley and oat (FAO note 2 - 5) have proved to be resistant and very resistant and more sensitive the ones bakeries cereals – wheat and rye (notes 5 - 7).

The resistance **to root lodging**. From this point of view, the majority of the experimental advanced cultivars have characterized themselves through a good and very good resistance (notes 1 - 4). The Impuls rye advanced cultivar, the tritico secale advanced cultivars Ţebea and barley advanced cultivars Aura and Daciana which, have proved to be an medium sensitive , and they also has the highest plant height, between 76 cm and 130 cm (*tab. 4*).

Table 4

Some of traits of the experimented advanced cultivars

Variant	Resistance to the foliar diseases*)				Root lodging resistance	Plant height -cm-	Precocity± days in comparison with standard at maturity
	Powdery mildew	Septoria leaf spot disease	Kernel blight	Stem rust of wheat			
Wheat							
Speranţa (st.)	6	7	2	6	2	73	0 (20 VII)
Ixos	6	6	2	7	2	60	0
VR89-D_{0-11}	4	4	3	5	3	58	+2
Broma	3	5	2	6	1	82	+3
Henika	4	4	2	5	2	84	+4
Rye							
Impuls	4	4	2	5	5	130	-6
Tritico secale							
Ţebea	2	3	2	2	5	101	+5
T.T.32-87	2	3	2	3	3	98	+5
Fahad	2	2	1	3	2	94	+10
Currency	2	3	2	2	2	95	+11
Rahno “S”	2	2	2	2	3	97	+11
Spring barley							
Maria	5	3	6	5	4	76	-4
Avânt	5	3	6	4	3	77	-5
Succes	6	3	7	3	4	76	-6
Suceava 3	6	2	6	3	3	73	-6
Stindard	5	2	6	3	4	77	-5
Narcisa	5	2	5	3	2	70	-7
Aura	6	3	7	4	5	84	-5
Daciana	6	3	7	5	5	76	-4
Oat							
Mureş	2	2	1	2	3	87	+2

Precocity. After the vegetation period, there has been outlined the Impuls rye advanced cultivar, that has reached the maturity six days earlier than the Speranta wheat advanced cultivar. Moreover, all the eight barley advanced cultivars have proved to be earlier, reaching the maturity 4-7 before wheat cultivars.

The latest advanced cultivars have proved to be the tritico secale cultivars, with a larger vegetation period with 5-11 days. Among these, the germplasm received from CIMMYT Fahad, Currency and Rahno “S” have proved to be very late. Also, more lately have proved to be the wheat advanced cultivars VR 89-D_{0-11}, Broma şi Henika.

CONCLUSIONS

1. The ecologic conditions and the crop conditions from the north-west part of Moldova offer favorable possibilities, but different from the production for different species of spring cereals. Among these the spring barley , represented through autochthones advanced cultivars, constantly outlines an efficient ecological answer m quantified through average increased productions , between 3085 kg/ha and 4562 kg/ha.

2. From the cereals experimented bakeries advanced cultivars, there have been seen as having a good behavior in the vegetation and a big production capacity the polish wheat Henik – that already exists in crop culture in Romania.

3. For the un bakeries cereals, there have been remarked the barley advanced cultivars Narcisa and Maria, that have overdone the medium production for five years of the Speranta standard, with productivity increases 334 kg/ha, which in relative values represents 11%.

4. Until the creation and introduction in the culture of some new advanced cultivars for these species, more productive and better adapted for the environment conditions, specific, there will be cultivated the existent advanced cultivars, which are: Henik advanced cultivar; for the rye , the Impuls advanced cultivar , for the tritico secale, Tobea advanced cultivar, for the spring barley the autochthones advanced cultivars, created at ARDS of Suceava Maria, Bogdana (Avânt), Succes and Narcisa, and at oat the advanced cultivar Mureş.

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