

RESEARCHES REGARDING THE CULTIVARS INFLUENCE ON WHEAT YIELD IN THE NORTH-WESTERN ROMANIA CONDITIONS

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Abstract. *The paper based on the researches carried out during 2009-2011 on the preluvosoil from Agricultural and Development Research Station Oradea. 5 Romanian wheat cultivars were used: Dropia, Crișana, Arieșan, Alex, Ardeal. In comparison with the Dropia there are insignificant difference statistically in Crișana, Alex and Ardeal and negative distinguish significant in Arieșan. The wet gluten and the dry gluten of the cultivars Crișana and Arieșan had not the differences statistically assured in comparison with Dropia cultivar; in Alex and Ardeal, very significant and distinguish significant differences were registered. Falling number was improve very significant statistically in comparison with Dropia in Crișana (64.3%) and Alex (20,0%) but the values are included in the class with bad falling number; in Arieșan the difference is insignificant statistically and in Ardeal the difference is negative distinguish significant. All 5 cultivars had very good values of the deformation index; the best value was obtained in Alex (4 mm) and Crișana (5 mm).***Key words:** stress, stressor, adaptation, emergency

Key words: wheat,cultivar: Dropia, Crișana, Alex, drought, yield

1. Introduction

The wheat yield quality is influenced by the world area where is cropped and the crop technology, alone or in interaction: cultivar [9] crop rotation [1,2,8], fertilization system [4], irrigation [8].

After the year 1990, the panification quality of the Romanian wheat cultivar had an unjustified appreciation. Many government factors appreciated the Romanian cultivars for fodders, only for the wheat import justification. There was a completely false appreciation because the research programmes of the National Institute for Agricultural Research and Development Fundulea and of the researches stations from Lovrin, Turda, Oradea, Suceava, Șimnic, Teleorman, had the objective to realize the cultivars with high capacity of yield, good and very good quality for panification, high degree of adaptability to the environment tolerance and adaptability to drought and frost – high tolerance and adaptability to diseases [9].

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In Agricultural Research and Development Station Oradea, Gheorghe Bunta created the wheat cultivar called *Crișana* and the paper analyzed their panification quality in comparison with other four Romanian cultivars, very known.

2. Materials and methods

The research were carried out in Agricultural Research Station Oradea on a preluvosoil characterized by a humus content of 2,1% in the Ap (0-20cm depth) horizon, pH of 6,3, phosphorus of 31,5 ppm and potassium of 190,2 ppm; the value of the bulk density is of 1,44 g/cm³ and the total porosity is about 47%. Field capacity (24,3%) and wilting point (9,1%) have the median values.

The experiment includes five Romanian cultivars: *Dropia* – the cultivar with the biggest cropped surfaces in Romania, was considered like control *Crișana* – new cultivar created by Gheorghe Bunta in Agricultural Research Station Oradea, *Arieșan*, *Alex*, and *Ardeal*. The experiment was placed in 4 repetitions after the block method. The surface of the experiment plot = 50 m². The fertilization system consists of N₁₂₀P₉₀K₆₀. All the technology elements were established like optimum ones.

3. Results and discussions

The influence of the cultivar on the level yield

In average on the studied period, the smallest wheat yield was obtained in *Dropia* 3840 kg/ha.

Table 1 The influence of the cultivar on wheat yield, Oradea 2009-2011

Cultivar	Yield		Difference		Statistical signification
	Kg/ha	%	Kg/ha	%	
2009					
1. <i>Dropia</i>	3120	100	-	-	Mt.
2. <i>Crișana</i>	3760	120,5	640	20,5	***
3. <i>Arieșan</i>	3540	113,5	420	13,5	**
4. <i>Alex</i>	3820	122,4	700	22,4	***
5. <i>Ardeal</i>	3890	124,7	770	24,7	***
LSD 5% - 190 LSD 1% - 370 LSD 0,1% - 610					
2010					
1. <i>Dropia</i>	2960	100	-	-	Mt.
2. <i>Crișana</i>	4830	163,1	1870	63,1	***
3. <i>Arieșan</i>	3610	121,9	650	21,9	**
4. <i>Alex</i>	3430	115,9	470	15,9	**
5. <i>Ardeal</i>	3210	108,4	250	8,4	-
LSD 5% - 270 LSD 1% - 425 LSD 0,1% - 790					
2011					
1. <i>Dropia</i>	5440	100	-	-	Mt.
2. <i>Crișana</i>	5960	109,6	520	9,6	**
3. <i>Arieșan</i>	5790	106,4	350	6,4	*
4. <i>Alex</i>	6110	112,3	670	12,3	***

5. Ardeal	5240	96,3	-200	-3,7	0
LSD 5% -170 LSD 1% - 360 LSD 0,1% - 580					
2009-2011					
1. Dropia	3840	100	-	-	Mt.
2. Crişana	4850	126,3	1010	26,3	***
3. Arieşan	4313	112,3	473	12,3	**
4. Alex	4453	115,9	613	15,9	**
5. Ardeal	4113	107,1	273	7,1	*
LSD 5% - 210 LSD 1% - 385 LSD 0,1% - 660					

The yield gain obtained in *Crişana* cultivar (1010 kg/ha) in comparison with *Dropia* was very significant statistically; the yield gains obtained in *Alex* (613 kg/ha) and *Arieşan* (473 kg/ha) were distingue significant statistically and the yield gain obtained in *Ardeal* (273 kg/ha) was significant only. (table 1.)

The influence of cultivar on 1000 grains weight and on test weight

In comparison with the control (*Dropia*) in average on 2009-2011 the significant increase (6,2%) of 1000 grains wheight was registered in *Crişana*, in *Arieşan* the difference (-3,5%) was unsignificant statistically, in *Alex* the difference (-12,8%) was distingue significant and in *Ardeal* the difference (-15,5%) was very significant statistically (table 2).

Table 2. The influence of the cultivar on 1000 grains weight in wheat, Oradea 2009-2011

Cultivar	1000 grains weight		Difference		Statistical signification
	g	%	g	%	
1. Dropia	46.7	100	-	-	Control
2. Crişana	49.6	106.2	2.9	6.2	*
3. Arieşan	45.1	96.5	-1.6	-3.5	-
4. Alex	40.7	87.2	-6.0	-12.8	00
5. Ardeal	39.5	84.5	-7.2	-15.5	000
LSD 5% - 1.9 LSD 1% - 3.5 LSD 0,1% - 6.4					

The best weight in *Dropia* was of 79,1 kg/hl. Only in *Arieşan* was registered a value of the test weight statistically assured 77,3kg/hl (table 3).

Table 3. The influence of the cultivar on test weight in wheat, Oradea 2007-2009

Cultivar	MH		Difference		Statistical signification
	Kg/hl	%	Kg/hl	%	
1. Dropia	79.1	100	-	-	Control
2. Crişana	78.4	99.1	-0.7	-0.9	-
3. Arieşan	77.3	97.7	-1.8	-2.3	00
4. Alex	79.3	100.2	+0.2	+0.2	-
5. Ardeal	78.6	99.4	-0.5	-0.6	-
LSD 5% - 1,1 LSD 1% - 2,1 LSD 0,1% - 4,2					

The influence of the cultivar in the gluten content

The wet gluten content of the *Dropia* grains was of 31.3%. The value determined in *Crişana* (33.0%) and *Arieşan* (30.7%) were not different significant statistically in comparison with *Dropia*. The values registered in *Alex* (24.6%) and *Ardeal* (27.1 %) are smaller than *Dropia*, very significant and distingue significant.

The same sense of the statistical significant was registered regarding the dry

gluten content of the grains. The *Crișana* cultivar had the biggest dry gluten content (21.8 %) but the difference registered in comparison with *Dropia* is insignificant statistically, in *Arieșan* the difference (0.3%; 1.4%) is insignificant statistically too. The difference registered in *Alex* (6,6%, - 30,9%) and *Ardeal* (- 3.9; -18.3%) are very significant and distingue significant respectively (table 4).

Table 4. The influence of the dry gluten content of the wheat grains, Oradea 2009-2011

Cultivar	Dry gluten		Difference		Statistical signification
	%	%	%	%	
1. Dropia	21.4	100	-	-	Control
2. Crișana	21.8	101.8	+0.4	1.8	-
3. Arieșan	21.1	98.6	-0.3	-1.4	-
4. Alex	14.8	69.1	-6.6	-30.9	000
5. Ardeal	17.5	81.7	-3.9	-18.3	00

LSD 5% - 2.5 LSD 1% - 3.8 LSD 0.1% - 6.2

The influence of the cultivar on falling number

All the studied cultivars had a bad falling numbers *Dropia's* falling number was of 70 sec. The differences very significant statistically in comparison with *Dropia* were registered in *Crișana* (64.3%) and in *Alex* (20.0%); the difference (-4.3%) registered in *Arieșan* is significant statistically and the differences (-14.3 %) registered in *Ardeal* is distingue significant (table 5).

Table 5. The influence of the falling number in wheat crop, Oradea 2009-2011

Cultivar	Falling number		Difference		Statistical signification
	Sec.	%	Sec.	%	
1. Dropia	7.0	100	-	-	Control
2. Crișana	115	164.3	+45	64.3	***
3. Arieșan	67	95.7	-3	-4.3	-
4. Alex	84	120.0	+14	20.0	***
5. Ardeal	60	85.7	-10	-14.3	00

LSD 5% - 5 LSD 1% - 9 LSD 0,1% - 13

The influence of cultivar on deformation index

All the cultivars had very good deformation index. In comparison with the control, *Dropia*, the values of the deformation index improved distingue significant statistically (-26,9%) in *Crișana*. The values of the deformation index increased in comparison with *Dropia* distingue significant in *Arieșan* and significant statistically in *Ardeal* (table 6).

Table 6. The influence of cultivar on deformation index in wheat crop, Oradea 2009-2011

Cultivar	Deformation index		Difference		Statistical signification
	mm	%	mm	%	
1. <i>Dropia</i>	7	100	-	-	Control
2. <i>Crișana</i>	5	71.4	-2	-29.6	0
3. <i>Arieșan</i>	10	142.8	+3	42.8	**
4. <i>Alex</i>	4	57.1	-3	-42.9	00
5. <i>Ardeal</i>	9	128.5	+2	28.5	*

LSD 5% - 1.5 LSD 1% - 2.7 LSD 0.1% - 5.6

The experiment emphasized the importance of the wheat cultivar choice especially regarding the yield quality because there is an important difference between the cultivars quality.

Conclusions

The researches carried out during 2009-2011 in Oradea, using 5 Romanian wheat cultivars determined the following conclusions:

- (1) In comparison with the *Dropia*, the cultivar with the biggest cropped surfaces, in the cultivar *Crișana*, very significant statistically yield gain was obtained; the yield gains obtained in *Alex* (15,9%) and *Arieșan* (12,3%) are distinguished significant and the yield gain obtained in *Ardeal* (7,1%) is significant, only;
- (2) Regarding the 1000 grains weight only in *Crișana* was registered the positive difference significant statistically. Regarding the test weight, the difference in comparison with *Dropia* are insignificant difference statistically in *Crișana*, *Alex* and *Ardeal* and negative distinguished significant in *Arieșan*.
- (3) Wet gluten and dry gluten of the cultivars *Dropia*, *Crișana* and *Arieșan* had not the differences statistically assured. In comparison with *Dropia* cultivar, in *Alex* and *Ardeal*, very significant and distinguished significant differences were registered.
- (4) Falling number was improved very significant statistically in comparison with *Dropia* in *Crișana* (64,3%) and *Alex* (20,0%) but the values are included in the class with bad falling number, in *Arieșan* the difference is insignificant statistically and in *Ardeal* the difference is negative distinguished significant.
- (5) All 5 cultivars had very good values of the deformation index. The best value was obtained in *Alex* (4 mm) and *Crișana* (5 mm).

References

- [1] Ardelean I., 2006, Contribuții la cunoașterea și modificarea influenței rotației culturilor asupra cantității și calității recoltei de grâu cultivat pe solurile acide din nord-vestul țării. Teză de doctorat. USAMV Cluj-Napoca
- [2] Bandici Gh., 1997, Contribuții la stabilirea influenței premergătoare și a fertilizării asupra dinamicii acumulării biomasei la grâu de toamnă cultivat pe soluri cu exces de umiditate în centrul Câmpiei de Vest a României. Teză de doctorat. USAMV Cluj-Napoca

- [3] Bunta Gh., 2009, Plantele și aluminiul. Genetica și ameliorarea toleranței. Ed. Universității Oradea , 205-211
- [4] Ciobanu Gh., 2003, Agrochimia, Ed. Universității din Oradea
- [5] Domuța C., 2006, Agrotehnica diferențiată, Ed. Universității din Oradea
- [6] Domuța C., 2006, Tehnică experimentală, Ed. Universității din Oradea
- [7] Domuța C., 2007, Asolamentele în Câmpia Crișurilor, Ed. Universității din Oradea
- [8] Domuța C., 2008, Asolamentele în sistemele de agricultură, Ed. Universității din Oradea
- [9] Pușcă I., Wagner L., Pop G., Niță S., Gorinoiu G., Prodan M., 2008, - Buletin Agir nr. 1-2/2008, pp. 3-6
- [10] Zăhan P., Lochli D., 2005, Fitotehnia plantelor cultivate pe solurile acide din nord-vestul României, Ed. Universității din Oradea, pp. 156-230