

COMPARATIVE STUDY BETWEEN ROMANIAN AND FOREIGN WINTER WHEAT VARIETIES REGARDING YIELD POTENTIAL, DURING 2004-2011 PERIOD ON THE LUVOSOIL FROM SIMNIC

OLARU LIVIU¹, PĂUNESCU GABRIELA², ONCICĂ FRAGA²

¹ University of Craiova, Agriculture & Horticulture Faculty Craiova

² Agricultural Research & Development Station Simnic

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ABSTRACT

During eight years 2004-2011 have been tested over 100 wheat varieties with different origin, on the luvosoil from ARDS Simnic. Data were calculated using t test to compare two series with different numbers. On average the Rumanian varieties obtained yield by 4310 kg/ha. In general the yield difference between Romanian and foreign wheat varieties was significant for the first group. Mainly the Romanian varieties were superior those coming from Austria, ex-soviet space, from USA, other countries of the EU (Bulgaria, Spain, Italy, U.K., Czech Republic, Portugal) and Israel showing significant yield differences. We did not find significant differences among Romanian and French, Hungarian or Serbian varieties. The highest average yield was recorded by Glosa (5504 kg/ha) and maximum yield was recorded by Gruia (8420 kg/ha), both Romanian varieties.

INTRODUCTION

All over the world a big part of the yield increase at wheat is the attribute of the new cultivars with high productive potential (Mustătea & Săulescu, 2011).

Wheat production is influenced by genotype, environmental conditions and the interaction of these two factors (Peterson et al. 1992).

Also, yield increase in the last five decades was the result of a combination involving management, genetic gain and climatic conditions (McCaig & DePaw, 1995).

In generally, farmers chosen cultivars with improved characteristics and restricted those with lower yield potential, limited biodiversity and influenced by adverse effects of the climatic conditions and pathogens.

In Canada, for instance, they have the tendency to select more after agronomic considerations like improvement of yield, of vegetation period and lodging resistance and less after protein content and diseases resistance (Walburger et al., 1999).

In Kansas, wheat producers select significantly the cultivars with productive characteristics like yield stability, variety oldness and only at the end after quality performances (Barkley & Porter, 1996).

Many cultivars are spread and trade by commercial companies, included on the market with an aggressive marketing, before tests and evaluations for performances on appropriate locations (Thomason & Phillips, 2006).

There for are necessary these kind of studies.

MATERIAL AND METHOD

When Romania joint in the European Union, for all cultivated species started a real competition, a normal and wished process for farmers which are informed before choosing a variety for growing. In support of this purpose, at least at wheat, at ARDS Simnic during eight years were tested over 100 Romanian and foreign varieties after yield potential. So that, all the beneficiaries of these products may choose knowing well, based on long and

profundity studies, avoiding so unpleasant experiences with financial losses connected with this technological part of the plant cultivation activity -the selection of the variety.

Have been studied:

Romanian varieties: Albota 69, Alex, Aniversar, Beti, Boema, Ciprian, Crina, Delabrad, Dor, Drobeta, dropia, Eliana, Essential, Faur, Flamura 85, Fundulea 4, Gabriela, Gasparom, Glosa, Grandios, Gruia, Iasi 2, Izvor, Livada, Lovrin 34, Magistral, Moldova 83, Rapid, Romulus, Simnic 30, Simnic 50, Trivale and Voronet.

Wheat varieties from French: Andalou, Apache, Autan, Azimut, Aztec, Cezanne, Defence, Enesco, Exotic, Guadalupe, Isengrain, Meunier, Oratorio, Orqual, Renan, and Texel.

Cultivars created in Austria and Germany: Agron, Bitop, Brutus, Capo, Cornelius, Cubus, Dunai, Esquisit, Exclusiv, Fridoline, Josef, Nathan, Moldau, Optimus, Paulus, Pegassos, SW Maxi and Saturnus.

From Hungary: Carolina, GK David, GK Elet, GK Miska, GK Mura, GK Petur, GK Othalom, GK Pinka, GK Gobe, GK Hargita, GK Hattyu, GK Kalasz, GK Verecke, Linda, MV Madrigal, Mandolin, Mv Emese, Mv Mambo, Mv Mariska, Mv Martina, Mv Plma, Mv Kolo, Mv Pesma, Mv Magvas, Mv Marsall, Mv Palatos, Mv Toborzo, Kiskun Serina

Wheat varieties from ex-soviet space: Bezostaia, Demetra, Khvylya, Kjajna, Kroshka, Krasnodar, Mironovskaia 61, Novokubanska, Ofeliya, Strumok, Vesta, Karlygash, Georgia 1

From countries of the European Union: Spain, Holland, Bulgaria, Great Britain were tested: Albatros, Acrobat, Bancal, Bercy, Cordiale, Giava, Meritto, Negev, Pinzon, Pobeda, Preloma, Rheia

The tested varieties from Serbia were: Evropa, Frini, Kristina, Liliana, Mina, Novisad 7000, Partizanka, Renesansa, Romansa, Stamena

From USA and Mexico: Columna, Hoff, Masson, Orion, Patton, Piopio, Rowhide, Solomon, Vista, Vorona

From Israel have been tested: Bhash, Dariel, Galil, Hzera 305, Shoham

It was applied the following technology:

Previous crop it was the pea

Planting was realized during the optimal period with 550 g.k./m²; 12,5 cm distance between rows; 4-5 cm planting depth and seed rate calculated for each variety depending on germination, purity and 1000 kernel weight.

The seed was chemically treated before planting using specific products.

Were used complex fertilizers with NPK formula in 200 kg/ha dose

In spring the crop was fertilized with ammonium nitrate – 200 kg/ha

In spring we used specific herbicide to control weeds competition

We also applied treatments against pests.

Data were collected from comparative cultures, micro cultures and demonstrative plots

It was calculated the yield obtained during each year, average yield for the whole experimental period and maximum yield pointed out during testing.

It was calculated t test that allows comparing two data series different like number. If calculated „t, was lower than critic „t,, the differences were not significant but when calculated t was higher then critic t, the differences were significant.

Climatic characterization showed during the experimental period a very favourable year (2004), four favourable (2005, 2009, 2010 and 2011), two medium favourable (2006 and 2008) and a dry year (2007).

RESULTS AND DISCUSSIONS

On average during testing period, the Romanian varieties obtained 4310 kg/ha, a diminished yield by the 2007 dry year production (table 1)

Table 1

Yield differences between Romanian and foreign wheat varieties based on t test, on 8 years average

Varieties group	Average yield (Kg/ha)	Entries number	T calculated	T critic	Differences
Romanian varieties	4310	27	control	-	-
French varieties	4360	13	0,650	2,024	insignificant
Austrian & Germany varieties	3826	12	2,980	2,026	significant
Hungarian varieties	4042	15	2,017	2,021	insignificant
Russian varieties	3338	13	5,100	2,024	significant
Serbian varieties	4281	10	0,210	2,030	insignificant
USA & Mexican varieties	2949	11	6,550	2,028	significant
EU varieties	3688	9	2,880	2,032	significant
Israel varieties	3345	5	5,180	2,042	significant
Other foreign varieties	3729	88	2,726	2,004	significant

Although the French varieties had a 50 kg/ha yield increase it was not enough to obtain significant differences. These varieties were the only of the whole experiment with the average yield higher than Romanian cultivars. In the same category of varieties with insignificant yield differences comparative with the Romanians were those coming from Hungary and Serbia. These results suggest that Romanian, French and Hungarian varieties are equal at average yield obtained during experimental period (8 years).

Inferior to the Romanian varieties were tested cultivars from Austria and Germany (on average 3826 kg/ha), from ex-soviet space (on average 3338 kg/ha), USA and Mexico (on average 2949 kg/ha), from other countries of the EU (on average 3688 kg/ha) or from Israel (on average 3729 kg/ha).

If we consider all these proveniences like a group- foreign varieties group-and we compare it with Romanian varieties group, t test shows this last group superiority against the first regarding yield potential.

Researches conducted by Păunescu Gabriela & Boghici Nicoleta (2008) on a group with 66 Romanian and foreign varieties, during 2005-2007 on the Simnic soil showed also like this one, that Romanians average yield (4225 kg/ha) was higher comparative with the Hungarians (3644 kg/ha), the Austrians (4166 kg/ha), Russians (3819 kg/ha), French (4034 kg/ha), Israel (3064 kg/ha) and also higher than the average yield of the varieties with other different origins (3725 kg/ha).

Another study conducted by Egesel et al. (2012), during two years, on wheat varieties from Bulgaria, Serbia, Hungary and Russia showed that yield level oscillated from 3571 to 4324 kg/ha and the best variety, ZA-77 was a Serbian one.

After the average yield during whole experimental period (eight years), it was pointed out Glosa variety (5504 kg/ha) followed by Gruia and Orion. The lowest level of the yield was registered by an American wheat Patton– 1200 kg/ha. In another study, under ARDS Simnic conditions, during 2005-2007 also Glosa obtained a high average yield level (6820 kg/ha) comparative with other different proveniences (Păunescu Gabriela & Boghici

Nicoleta, 2008). Maximum yields were obtained more in 2004 and less in 2005 for all tested origins (Table 2).

Table 2

Maximum yields obtained by tested varieties during 2004-2008

Variety	Yield (kg/ha)	Year
Gruia	8420	2004
Cezanne	8270	2004
Glosa	7780	2004
Izvor	7710	2004
Madrigal	7760	2004
Mariska	7660	2004
Exotic	7560	2005
Preloma	7220	2004
Orion	7110	2004
Cubus	7005	2005

The highest maximum yield was recorded by a Romanian variety Gruia-8420 kg/ha, followed by a French wheat Cezanne with 8270 kg/ha, the only with yields over 8000 kg per ha. On the same list there are another two Romanian cultivars (Glosa and Izvor), two Hungarians (Madrigal and Mariska), a French variety (Exotic), a Bulgarian one (Preloma), an American (Orion) and an Austrian wheat (Cubus).

Most of the varieties with over 3000 kg/ha were from Romania-7, from French-3 followed by USA and Hungary with one cultivar (Table 3).

Table 3

Wheat varieties with average yield over 3000 kg/ha during 2004-2011

No.	Variety	Minimum average yield obtained during 2004-2011
1	Albota 69	3300
2	Alex	3500
3	Aztec	3370
4	Boema	3090
5	Cezanne	3010
6	Crina	3130
7	Exotic	3704
8	Flamura 85	3060
9	Glosa	3330
10	Gruia	3100
11	Martina	3380
12	Orion	3670
13	Romulus	3040

CONCLUSIONS

On eight years average the yield differences between Romanian and foreign wheat varieties were significantly in the favour of the Romanians.

Autochthon varieties were superior to the Austrians, Russians, Americans and other varieties coming from Bulgaria, Spain, Italy, U.K., Czech Republic, Portugal and Israel, recording significant differences.

The differences were not significant between Romanians and French, Hungarian and Serbian varieties. The highest average yield was recorded by Glosa (5504 kg/ha) and the maximum yield level belongs to Gruia (8420 kg/ha), both Romanian varieties.

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