RESEARCH ON YIELD STABILITY AND ITS QUALITY INDICATORS FOR WHEAT DIFFERENTIATED TECHNOLOGY MANAGEMENT IN LUVOSOIL SIMNIC CONDITIONS

***PĂUNESCU VICTOR CĂTĂLIN*[1]**
PhD. student, University of Craiova, Agriculture and Horticulture Faculty,
A.I.Cuza Street, no.13, Craiova

Key words: wheat, yield stability, protein stability, gluten stability, gluten index stability

ABSTRACT

For three years, 2009-2011 period, 25 wheat cultivars with different provenience was evaluated for yield, protein content, gluten content and gluten index, in conventional and ecological systems. On data base we made top list, where the equal value was assigned the same number of corresponding points taken place. The most mentioned cultivars in the positive way were: Şimnic 50, Capo, Josef, Trivale, Şimnic 30, Gruia, Izvor, Dropia and Delabrad, they were considerate the most stable for Simnic luvosoil. For yield stability, in any culture system was put in evidence the cultivars: Trivale, Gruia, Ciprian and Litera. For protein stability, in the top of list were the Romanian cultivars: Şimnic 50, Delabrad, Dropia şi Dor. Şimnic 50 presented gluten index values about 35 at all technology applied. It is recommended the best quality cultivar in all experiment.

INTRODUCTION

Under current conditions, particularly when the focus is on introducing sustainable agriculture and the private agricultural system expands, production stability is an important factor in choosing the variety to be grown in a certain area (Păunescu Gabriela şi Marinescu, 1999).

A valuable variety is characterized by good phenotype stability. The term, "stable" it is defined a genotype that gives average yields almost constant regardless of environment (Kellner, 1983). While production is the result of interrelated physiological processes developed during the vegetation, stability is maintaining and by expanding production, quality and productivity elements, regardless of environmental factors acting.

Translated by varietal adaptability output stability refers to the ability to capitalize a variety of different environmental conditions and, in our case, even differentiated technological conditions. Generally the notion is associated with a specific adaptation when the environment is more or less controlled, as in natural conditions. (Brancourt-Hulmel, 1997).

Previous studies in Romania confirmed that protein content, one of the main determinants of wheat bread making quality is affected by genetics, environmental conditions and crop management (Marinciu, 2007; Stanciu and Neacşu, 2009; Neacşu et al., 2010).

MATERIALS AND METHODS

Evaluation of stability of a genotype is obtained by cultivation in a village for many years and in many places in one year. Through this work, the evaluation deepened by the fact that 25 genotypes were grown for 3 years in a single location and in 4 different technological conditions (3 variants of conventional and ecological system).

The primary objective was to identify varieties which are distinguished by outstanding results in productivity and quality, without being limited by technological condition.

During 2009-2011, the S.C.D.A. Şimnic were located three experiments as follows:

Experience 1 - bifactorial experience in conventional system (differentiated fertilization technologies) where: the factor A – the variety with 25 graduations ; the factor B – level of fertilization with 2 graduations N16P80(conventional 1) and N100P80 (conventional 2).

Experience 2 – bifactorial experience in conventional system (delayed planting): the factor A – the variety with 25 graduation ; the factor B – seeding time with 2 graduation: seeding at October 15 (conventional 2) and seeding at October 30 (conventional 3).

Experience 3 – monofactorial experience in ecological system.

The same 25 variety autumn wheat sown in ecological field.

The tested cultivars were:: Flamura 85, Lovrin 34, Dropia, Alex, Simnic 30, Albota 69, Trivale, Boema, Crina, Delabrad, Dor, Faur, Glosa, Gruia, Izvor, Ciprian, Șimnic 50, Serina, Capo, Apache, Josef, Exotic, Kiskun Gold, Litera, Miranda.

The varieties hierarchy was made from highest value to lowest, and the equal value was assigned the same number of corresponding points taken place.

RESULTS AND DISCUSIONS

Yield stability. The first part of the table, constant, irrespective of the culture have emerged varieties Trivale, Gruia, Ciprian şi Litera. Partially, in the sense as excluding conventional 1 may fall into this category and variety Glosa (Tabelul 1).

Glosa and Gruia presented the best average yields at Fundulea study on 44 wheat cultivars. Izvor, Delabrad, Gruia, Faur and Glosa had the better yield and the most variability coefficient reported to the average of tested cultivars. (Mustățea et al. 2009).

Negative stable (constant in recent employment positions in the ranking values, irrespective of the culture) proved variety Şimnic 50, but constant partial last, late sowing in case of breaking this ranking. Almost similar behaviour had and Josef variety, in case of deviation coming from ecological system cultivation.

It should be noted that the upper rankings no variety to consistently place in the top three in any of the technological variants studied.

Protein stability. Wheat traits quality stability is an important need in bakery industry. (Shuler et al. 2007).

In a study of 25 wheat cultivars Mut et al. (2010) showed that 8 of them presented stability for weight of 1000 seeds, hectolitre weight, protein content and sedimentation index.

Without exception, the seats are occupied top spot Romanian varieties: Siminic 50 (places 1-6 but with two conventional 1 placements 1st and environmentally), Delabrad (places 2-3), Dropia (places 3-6), Dor (places3-5). Of foreign varieties were noted Josef and Capo varieties, the latter getting the most value to the table, 14% protein content under late sowing. At the bottom of the league, so stable varieties in obtaining low protein content, were placed varieties

Miranda (maximum 10,8 %), Apache (maximum 10,8 %), Trivale (maximum 10,9 %) that all recorded maximum values were obtained from conventional 3.

This cultivars appear and in another research in our country. For exemple, protein content varied between 8,5 % at Apache in ecological system and 19% at Exotic in conventional with high nitrogen dose, at Fundulea. In average, between locations where they were located the trials (Fundulea, Șimnic, Albota, Valu lui Traian), protein content varied between 11,2 % at Trivale and 13,1 % at Șimnic 50 (Amalia Neacșu, 2011).

Prevailing culture systems resulted in the extent of protein content values on a very broad segment from 9.2% in the conventional 1 to 14% in conventional 3 (Tabel 2).

Gluten content stability. The only variety which has been constantly placements in the top rankings, regardless of the technology used was Capo (places 3-7).

Partially occupied top positions varieties Şimnic 30 (places 2-3) in all versions of conventional systems; Şimnic 50 (places 1-8) with the exception of the conventional 2; Delabrad (places 1-4) with the exception of the delayed sowing, Josef (places 1-5) with the exception of the conventional 2.

At the bottom of the league were placed varieties: Kiskun Gold (maximum wet gluten content 21.6%), Cyprian (maximum wet gluten content 20.7%), taking into account data from all culture systems analyzed.

Once again, the extremely low values of this indicator is largely due to results in 2010, the year recognized as the year with very poor quality cereals straw national default under the Şimnic.

There were varieties were classified constant although not obtained in any technological alternative values above 22%, the minimum pickup namely Apache, Serina, Boema , Lovrin 34 (Table 3).

Gluten index stability. At the top of the list, ranked consistently variety Şimnic 50 (places 2-6) who presented more than 35 gluten index values at all applied technologies. In the same category entered and variety Josef (places 5-11) but placing it in relation to other species is differentiated according to technology more applied (Table 5).

Placement was good and variety Capo (places 1-9) but did not indicate ecological gluten 35. In the same category, with good variety of partial won and Dropia (places 1-7 in the conventional system), Izvor (places 2-8 in the conventional system).

At the same time there were varieties that were constantly at the end charts and gluten index were under 35 at all culture systems used, such as: Trivale (maximum 34.6) and Miranda (maximum 33.9).

CONCLUSIONS

Yield. Consistently ranked in the first part of top, no matter of cropping system, were placed the varieties Trivale, Gruia, Ciprian and Litera. As precluding the conventional 1, one may fall in this category Glosa variety.

Protein content. Without exception, the first places on the top are occupied by Romanian varieties: Simnic 50, Delabrad, Dropia, Dor. Among foreign wheat varieties were noticed the varieties Josef and Capo, the last one recording the higher position on the top with 14% protein content when the sowing was delayed.

Wet gluten content. The only one wheat variety which recorded constantly higher values whatever technological system was Capo (the places 3 - 7).

Gluten index. On the first places of the top was constantly the variety Simnic 50 (the places 2 - 6) who presented high values of this index up to 35 for all technologies applied.

BIBLIOGRAPHY

Brancourt-Hulmel, M., V. Biarnes-Dumoulin, I.B., Denis - 1997, *Guiding marks on stability and genotype-environment interactions analyses in plant breeding.* Agronomie, 17 (4), 219-246

Kellner, E. - 1983, *Metode de estimare a stabilităţii producţiei*. P.G.T.A. XV nr. 1 75 – 84

Mustatea, P., N.N. Saulescu, N. N., Ittu, G., Paunescu, G., Voinea, L., Stere, I., Mîrlogeanu, S., Constantinescu, E., Nastase, **D**. - 2009, *Grain yield and yield stability of*

winter wheat cultivars in contrasting weather conditions. Romanian Agricultural Research 26: 1-8

Mut, Z., Nevzat, A., Bayramoglu, H. O., Ozcan, H. - 2010, *Stability of some quality traits in bread wheat (Triticum aestivum) genotypes.* Journal of Environmental Biology, 31: 489-495

Neacşu, A., Stanciu, G., Tuţă,. C., Toncea, I. - 2010, *Baking quality of wheat cultivars, grown in organic, conventional and low input agricultural systems.* Rom. Agric. Res., 27: 35-46.

Neacşu, A. - 2011, *Grain protein concentration and its stability in a set of winter wheat cultivars, grown in diverse environments and management practices*. Romanian Agricultural Research, NO. 28, 2011 www.incda-fundulea.ro Print ISSN 1222-4227; Online ISSN 2067-5720

Păunescu, G., Marinescu, M. - 1999, *Stabilitatea producţiei de grâu în condiţiile climatice de la SCDA Şimnic*. Lucr. Ştiinţ. volXII. 4-14. Ed. Alma ISSN 1223-4656

Schuler, S. F., Bacon, R. K., Finney P. L. & Gbur, E. E. - 1995, *Relationship of test weight and kernel properties to milling and baking quality in soft red winter wheat.* Crop Sci., 35, 949-953.

Stanciu, G., Neacşu, A. - 2008, *Effects of genotype, nitrogen fertilizer and water stress on mixing parameters in wheat (Triticum aestivum L.).* Rom. Agric. Res., 25: 29-35.

Marinciu, C. - 2007, *Genotype and nitrogen fertilization influence on protein concentration in old and new wheat cultivars*. Rom. Agric. Res., 24: 17-25.

Table1

Yield stability in different culture systems

CONV 1			CONV 2			CONV 3			ECOLOGICAL	
Exotic	53.3		Trivale	57.6		Miranda	58.4		Glosa	45.8
Apache	52.6		Alex	57.5		Ciprian	57.5		Crina	44.7
Serina	51.0		Dor	56.8		Litera	53.1		Izvor	43.9
Trivale	50.8		Gruia	56.8		Gruia	52.3		Boema	43.5
Miranda	50.7		Apache	55.3		Apache	52.3		Trivale	42.1
K. Gold	49.7		Exotic	54.8		Glosa	52		Serina	41.9
Dor	49.0		Glosa	54.3		Trivale	51.7		Gruia	41.8
Alex	47.8		Ciprian	54.3		Şimnic 50	51.2		Delabrad	41.6
Litera	47.6		Crina	54.2		Izvor	50.8		Litera	41.4
Gruia	47.2		Delabrad	53.3		Delabrad	50.7		Ciprian	41.3
Ciprian	47.0		Litera	52.7		Crina	50.3		Dor	41.0
Glosa	46.0		Albota 69	52.6		Exotic	50.2		Flamura 85	39.3
Boema	46.0		Izvor	52.5		Serina	49.7		Exotic	39.3
Izvor	46.0		Serina	52.3		K.Gold	49		Miranda	39.3
Fl.85	45.3		Lovrin 34	52.2		Alex	48.7		Apache	39.2
Capo	45.2		Miranda	51.2		Lovrin 34	48.4		Simnic 30	38.6
Delabrad	44.5		Boema	50.1		Dropia	48		Josef	38.4
Dropia	44.4		Dropia	49.6		Dor	47.7		Alex	38.3
Crina	43.8		Faur	49.5		Fl85	47.6		Albota 69	38.2
S 30	43.0		K. Gold	48.9		Şimnic 30	47.5		Lovrin 34	37.8
Faur	42.8		Fl 85	48.3		Faur	46.7		Faur	37.8
Lv34	42.5		Şimnic 30	48.2		Albota 69	45.1		Capo	37.3
Josef	42.2		Josef	46.4		Boema	44.7		Dropia	36.8
Albota	42.2		Capo	46.1		Josef	44		K.Gold	36.1
Ş50	40.6		Şimnic 50	44.7		Capo	42.5		Şimnic 50	35.1

Table 2

Protein content stability in different culture systems

CONV 1			CONV 2			CONV 3			ECOLOGICAL	
Ş50	11.0		Josef	11.2		Capo	14		Şimnic 50	11.9
Delabrad	10.9		Delabrad	11.2		Faur	12.8		Faur	11.3
Dropia	10.8		Capo	11.1		Delabrad	12.5		Delabrad	11.3
Josef	10.8		Albota 69	11.1		Josef	12.4		Flamura 85	11.2
Capo	10.6		Dropia	11.0		Dor	12.3		Dor	11.2
Fl85	10.6		Şimnic 50	11.0		Dropia	12.2		Dropia	11.1
Dor	10.5		Dor	10.9		Şimnic 50	12.2		Boema	11.1
Boema	10.5		Flamura 85	10.8		Ciprian	12.1		Izvor	11.0
Faur	10.4		Simnic 30	10.7		Boema	11.8		Crina	10.9
S 30	10.4		Gruia	10.7		Albota 69	11.7		Josef	10.9
Glosa	10.2		Serina	10.6		Exotic	11.6		Gruia	10.6
Izvor	10.2		Alex	10.6		Flamura 85	11.5		Capo	10.6
Albota 69	10.1		Crina	10.6		Lovrin 34	11.5		Glosa	10.6
Serina	10.1		Ciprian	10.6		Gruia	11.5		Lovrin 34	10.4
K.Gold	10.1		Boema	10.5		Alex	11.4		Kiskun Gold	10.4
Crina	10.0		Trivale	10.4		Simnic 30	11.4		Albota 69	10.4
Gruia	10.0		Faur	10.4		Serina	11.4		Alex	10.3
Alex	9.9		Exotic	10.4		Litera	11.3		Exotic	10.3
Ciprian	9.9		Kiskun Gold	10.3		Trivale	10.9		Litera	10.3
Apache	9.9		Apache	10.3		Glosa	10.9		Simnic 30	10.3
Lovrin 34	9.8		Izvor	10.2		Izvor	10.8		Miranda	10.1
Exotic	9.6		Glosa	10.2		Apache	10.8		Serina	10.0
Trivale	9.4		Litera	10.2		Miranda	10.8		Ciprian	9.9
Litera	9.2		Lovrin 34	10.1		Crina	10.7		Apache	9.6
Miranda	9.2		Miranda	9.3		Kiskun Gold	10.5		Trivale	9.4

Table 3

Gluten content stability in different culture systems

CONV 1		CONV 2		CONV 3		ECOLOGICAL	
Josef	24.4	Delabrad	23.8	Albota 69	28.1	Simnic 50	25.5
Simnic 50	24.0	Albota 69	23.4	Simnic 30	27.5	Delabrad	25.3
Simnic 30	23.8	Gruia	23.0	Trivale	27.2	Capo	24.7
Delabrad	23.5	Simnic 30	23.0	Capo	26.8	Dor	24.6
Glosa	23.1	Glosa	22.7	Josef	26.0	Josef	24.4
Capo	22.8	Trivale	22.6	Izvor	25.0	Glosa	24.0
Dropia	22.7	Dor	22.5	Litera	24.6	Crina	23.9
Izvor	22.0	Capo	22.3	Simnic 50	24.5	Fl 85	23.3
Apache	21.8	Crina	21.8	Miranda	24.5	Izvor	23.2
Albota 69	21.7	Simnic 50	21.7	Alex	24.0	Faur	23.1
Trivale	21.4	Josef	21.7	Glosa	23.0	Albota 69	23.0
Fl 85	21.3	Serina	21.3	Gruia	22.9	Simnic 30	21.7
Crina	21.2	Dropia	21.2	Fl 85	22.9	Dropia	21.7
Serina	21.0	Fl 85	20.9	Exotic	22.7	Boema	21.6
Litera	20.7	Izvor	20.8	Delabrad	22.6	Exotic	21.0
Faur	20.5	Exotic	20.8	Dropia	22.4	Serina	20.9
Gruia	20.2	Litera	20.5	Lv 34	21.9	Miranda	20.8
Boema	20.2	Miranda	20.4	Serina	21.7	Ciprian	20.7
Ciprian	19.7	Boema	20.1	K. Gold	21.6	K. Gold	20.6
Lv 34	19.6	Faur	20.0	Boema	21.6	Alex	20.5
Miranda	19.4	Alex	19.8	Apache	21.4	Litera	20.3
Dor	19.4	Apache	19.2	Dor	21.3	Gruia	20.2
Exotic	19.1	Ciprian	18.6	Crina	20.6	Lv 34	20.2
Alex	18.8	Lv 34	18.2	Faur	18.8	Trivale	18.7
K. Gold	17.7	K. Gold	18.0	Ciprian	17.4	Apache	17.5

Table 4

Gluten index stability in different culturel systems

CONV 1			CONV 2			CONV 3			ECOLOGICAL	
Dropia	38.5		Dor	40.4		Capo	40.4		Dor	40.2
Simnic 50	38.3		Gruia	40.3		Izvor	39.8		Albota 69	37.8
Delabrad	37.4		Delabrad	40.3		Alex	37.5		Simnic 30	37.6
Izvor	36.5		Capo	38.7		Fl 85	37.1		Ciprian	36.8
Josef	36.4		Glosa	38.5		Simnic 50	36.7		Josef	35.8
Apache	35.6		Dropia	38.2		Josef	36.2		Simnic 50	35.7
Capo	35.6		Fl 85	37.5		Dropia	36.1		K. Gold	35.3
Serina	35.6		Simnic 50	37.5		Boema	35.8		Izvor	32.2
Glosa	35.3		Crina	37.4		Gruia	35.7		Capo	32.0
Lv 34	35.3		Albota 69	37.4		Albota 69	35.4		Apache	31.6
Litera	35.2		Izvor	37.3		Simnic 30	35.2		Gruia	31.5
Fl 85	35.1		Simnic 30	36.9		Dor	34.6		Serina	30.5
Faur	34.7		Boema	36.2		K. Gold	33.8		Dropia	26.9
Gruia	34.5		Josef	36.1		Litera	33.3		Lv 34	26.5
Simnic 30	34.2		Serina	35.9		Lv 34	33.3		Faur	25.3
Dor	34.0		Exotic	35.6		Exotic	33.2		Boema	25.0
Ciprian	32.7		Faur	35.3		Miranda	32.9		Miranda	24.8
Boema	32.5		Alex	35.0		Apache	32.8		Alex	24.2
Trivale	31.6		Trivale	34.6		Glosa	32.6		Delabrad	24.1
Crina	31.2		Litera	34.0		Delabrad	32.1		Litera	22.5
Exotic	30.8		Miranda	33.9		Trivale	31.4		Trivale	21.8
K. Gold	30.6		Apache	33.6		Serina	31.4		Crina	19.8
Alex	30.4		Ciprian	33.6		Crina	30.5		Exotic	19.4
Miranda	30.1		Lv 34	31.9		Faur	29.5		Fl 85	18.7
Albota 69	29.8		K. Gold	31.7		Ciprian	28.6		Glosa	18.5