

INFLUENCE OF FERTILIZATION ON THE CROP AND QUALITY OF SOME WHEAT TYPES FROM THE SPECIES OF TRITICUM AESTIVUM ssp VULGARE, ssp SPELTA AND TRITICUM TURGIDUM ssp. DURUM IN THE MURES – BEGA INTERFLUVE PLANE

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Abstract. This paper presents the results of the research developed during 2014-2016 in the Mures - Bega Interfluve plane. According to the Koppen classification, the researched area is included in the cfbx climate characterized by temperate climate with precipitations all year long, but low in quantity during the summer months. The soil category is low carbonate typical chernosem with mild erosion, clay loam-type. The experiments were bifactorial in which factor A was the agriculture fund: $A_1 N_{100} P_{90} K_{90}$ and $A_2 N_{150} P_{90} K_{90}$, and factor B – the wheat types: B_1 – Alex – *T. aestivum vulgare* (L) Thell ssp vulgare MK; B_2 – Ciprian – *T. aestivum vulgare* (L) Thell ssp vulgare MK; B_3 – Athos – *T. turgidum ssp. durum* (Desf) MK; B_4 – Claudio – *T. turgidum ssp durum* (Desf) MK; B_5 – Franckenkorn – *T. aestivum* (L) Thell ssp. spelta (L) Thell; B_6 – Oberkulmer rotkorn *T. aestivum* (L) Thell ssp. Spelta (L) Thell. The paper indicates the crop results and the data derived from assessments concerning the hectoliter mass, protein content, wet gluten content, and the falling number, based on each type's reaction to differentiated fertilization. Thus, on the $N_{100} P_{90} K_{90}$ agriculture fund, on an average during the experimental cycle, the average crops were between 5700 kg/ha and 6700 kg/ha., and on the agriculture fund fertilized with $N_{150} P_{90} K_{90}$, between 6200 and 7100 kg/ha. The conclusion is that by increasing the nitrogen dosage on the constant phosphorus and potassium fund, 8% crop enhancement was recorded. The average crop on the two agriculture funds for the *T. aestivum vulgare* types was 6697 kg/ha, for the *T. turgidum ssp. durum* types, 6378 kg/ha, and for the *T. aestivum ssp. spelta spelta*, 6052 kg/ha. Each year, quality tests were made and the data were presented on agriculture funds and types in the paper. The average values for the hectoliter mass varied between 76.2 and 80.6 kg/hl and the protein content was between 12.5 – 13.6% for the *T. aestivum vulgare* types, between 14.2 and 15.8% for the *T. turgidum ssp. durum* types and between 13.8 and 15.1% for *T. aestivum ssp. spelta*. The wet gluten content was between 25 and 30%, and the values of the falling number between 295 and 431 seconds. As a conclusion, the types researched ensure economic-efficient crops, with good quality indicators, in the pedoclimate conditions mentioned above.

Key words: wheat – types, fertilization, crops, and quality indicators.

INTRODUCTION

The research carried out in Bega – Timis inter-rivers plane, an area having very favorable climate conditions for the culture of wheat, on a typical chernozem (L. NIȚĂ, 2013), having a very good fertility level, have aimed some breeds of the important varieties of wheat in our country, respectively: *T. aestivum vulgare* (L) Thell ssp vulgare cultivate for bread manufacture, *T. turgidum ssp. durum* (Desf) MK cultivated for pasta, *T. aestivum* (L) Thell ssp. spelta, due to the low fertilization requirements and the good resistance to maladies. The exponential raise of the durum wheat pasta consume during the last decades is motivating the expansion of the surfaces cultivated with this variety, currently with approximately 1% of the surface cultivated with wheat in our country. The increasing demand of wheat obtained under organic conditions has drawn our attention to the spelta wheat, a variety less demanding regarding the soil and technology conditions and having a particular composition of the grain.

Due to the here above reasons, this subject under study is important and present-day related.

MATERIAL AND METHODS

The experiences have been bi-factorial, with three repetitions, having the following scaling of factors: A factor – agricultural resources : A₁-N₁₀₀P₉₀K₉₀ ; A₂- N₁₅₀P₉₀K₉₀, and B factor – wheat breeds: B₁ – Alex –*T.aestivum vulgare(L) Thell ssp vulgare MK*; B₂ – Ciprian – *T. aestivum vulgare(L) Thell ssp vulgare MK*; B₃ – Athos –*T.turgidum ssp.durum(Desf) MK* ; B₄. Claudio –*T.turgidum ssp durum (Desf)MK*; B₅ – Franckenkorn –*T.aestivum (L) Thell ssp.spelta (L) Thell*; B₆–Oberkulmer rotkorn *T.aestivum (L) Thell ssp. Spelta (L) Thell*.

The preceding plant has been the soya culture. The crop data have been calculated according to the method of experiment lay out in the field. Determinations regarding the hectoliter mass, protein content, wet gluten content and falling number have been performed every year.

RESULTS AN DISCUSSIONS

The crop results obtained during the experimental cycle 2014-2016 are presented in Table 1.

Table 1

Synthesis of the crop results during the experimental cycle 2014-2016

A FACTOR agricultural land	B FACTOR - SOIL						Average values of A factor			
	Alex	Ciprian	Athos	Claudio	Francken-korn	Obercul-mer rotkorn	Crop Kg/ha	%	Diff. Kg/ha	Signifi-cation
N ₁₀₀ P ₉₀ K ₉₀	6303	6659	6011	6302	5925	5704	6150	100		
N ₁₅₀ P ₉₀ K ₉₀	6790	7040	6482	6719	6330	6250	6602	108	452	XXX

DL5%=185 DL 1% =237 DL 0,1%=362

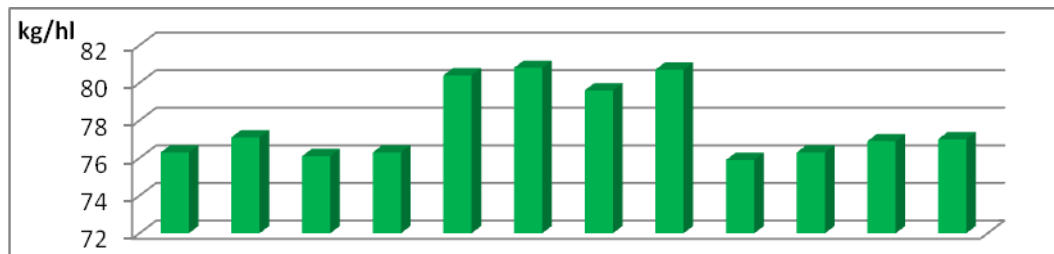
AVERAGE VALUES OF B FACTOR

Specification	Alex	Ciprian	Athos	Claudio	Francken-korn	Obercul-mer rotkorn
Crop kg/ha	6546	6849	6246	6510	6127	5977
%	100	105	96	99	94	91
Diff. Kg/ha		303	-300	-36	-419	-569
Signification		XX	XX		000	000

DL5%=172 DL 1% =277 DL 0,1%=416

It results that the increase of the nitrogen fertilizers dose from N₁₀₀ to N₁₅₀, the fertilizer being applied on a constant content of P₉₀K₉₀, as average for the 6 varieties, has led to a 8% crop increase, respectively a surplus of 9 kg of grain /1 kg N, applied in a dose higher than N₁₀₀. The highest crop has been achieved for Ciprian, an average of 6849 kg/ha for the two agricultural lands. Between the varieties, the crop of *T.aestivum vulgare* varieties has been of 6697 kg/ha, the *T. turgidum conv.durum* variety has obtained 6378 kg/ha, and those of *T.aestivum spelta* - 6052 kg/ha. According to figure 1, the hectoliter mass has been between 80

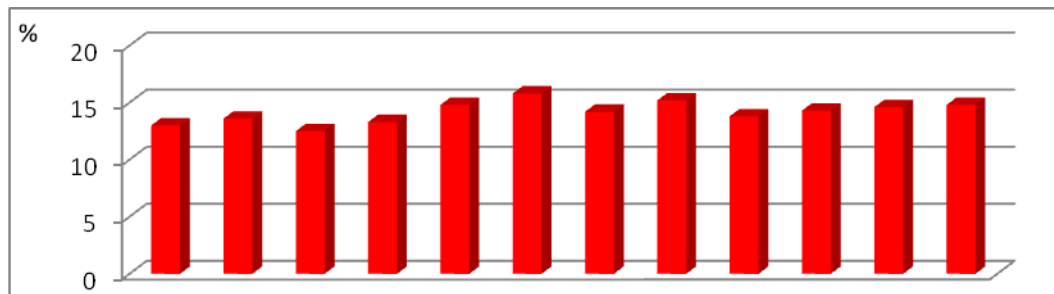
and 81 kg/hl, for the common wheat varieties, between 76 and 77 kg/hl for durum and spelta wheat varieties.



Variety	Alex		Ciprian		Athos		Claudio		Franckenkorn		Oberkulmer rotkorn	
Agrofond	a ₁	a ₂	a ₁	a ₂	a ₁	a ₂	a ₁	a ₂	a ₁	a ₂	a ₁	a ₂
Hectoliter mass	76,3	77,1	76,1	76,3	80,4	80,8	79,6	80,7	75,9	76,3	76,9	77,0
Average content	76,7		76,2		80,6		80,1		76,1		76,9	

Fig.1. Variation of hectoliter mass (kg/hl) depending on the agricultural land and variety

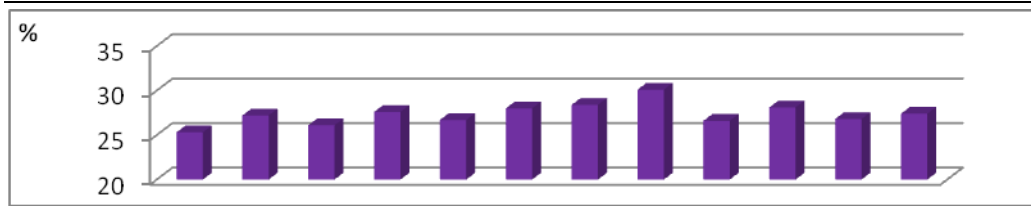
According to figure 2 the common wheat varieties had the lowest content of protein, between 12,2 – 12,4%, the highest content has been calculated for the durum wheat between 14,7 and 15,3%, and for the spelta wheat varieties between 13,8 and 14,8%. The increase of the nitrogen dose from N₁₀₀ to N₁₅₀ has influenced favorably the protein content for all varieties.



Variety	Alex		Ciprian		Athos		Claudio		Franckenkorn		Oberkulmer rotkorn	
Agrofond	a ₁	a ₂	a ₁	a ₂	a ₁	a ₂	a ₁	a ₂	a ₁	a ₂	a ₁	a ₂
Protein %	13,0	13,6	12,5	13,3	14,8	15,8	14,2	15,2	13,8	14,3	14,6	14,8
Average content	13,3		12,9		15,3		14,7		14,1		14,7	

Fig.2. Variation of protein content depending on the agricultural land and variety

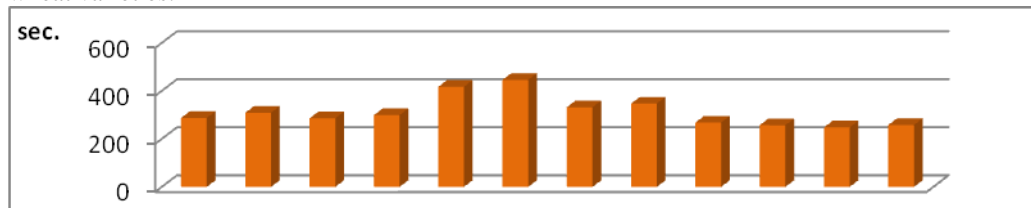
The wet gluten content had similar tendencies as the protein content. The average for the two agricultural lands has been between 26 and 27% to the common wheat varieties, between 27 and 30% to the durum wheat and between 27 and 28% to spelta wheat varieties.



Variety	Alex		Ciprian		Athos		Claudio		Franckenkorn		Oberkulmer rotkorn	
Agrofond	a ₁	a ₂	a ₁	a ₂	a ₁	a ₂	a ₁	a ₂	a ₁	a ₂	a ₁	a ₂
Gluten content	25,3	27,2	26,1	27,6	26,7	28,0	28,4	30,1	26,6	28,1	26,8	27,4
Average content	26,25		26,85		27,35		29,25		27,35		27,10	

Fig. 3. Variation of wet gluten content depending on the agricultural land and variety

The figure no. 4 is presenting the variation of the falling number depending on the agricultural land and on the researched variety. It results that the average falling number of the two agricultural lands has been between 290 and 300 seconds for the common wheat varieties, between 300 and 450 seconds for the durum wheat and between 250 and 270 for the spelta wheat varieties.



Variety	Alex		Ciprian		Athos		Claudio		Franckenkorn		Oberkulmer rotkorn	
Agrofond	a ₁	a ₂	a ₁	a ₂	a ₁	a ₂	a ₁	a ₂	a ₁	a ₂	a ₁	a ₂
Falling number	287	309	286	299	417	446	332	347	268	257	248	258
Average content	298		295		431		339		262		253	

Fig.4. Variation of falling number depending on the agricultural land and variety

CONCLUSIONS

The highest crop between the breeds pertaining to the *T. aestivum ssp. vulgare* variety has been achieved for Ciprian breed, between the breeds pertaining to the *T. turgidum conv. durum* variety for the Claudio breed and for the *T. aestivum ssp spelta* variety to the Franckenkorn breed.

Therefore these breeds can be recommended for production in the reference area assuring economically efficient crops.

The calculated quality indexes are between the limits specific to the studied breeds.

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