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Comparative Quality evaluation of some Romanian and foreign winter wheat cultivars under conditions of Timis County, Romania

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Abstract The purpose of the researche is to follow the influence of the biological factor on quality of eighteen varieties of winter wheat: Element, Apache, Renan, Sorrial, Sobbel, Lovrin 34, Renesansa, SO-207, Ciprian, Palesio, Andalou, Mulan, Dropia, Boema, Kalango, Soissons, Exotic and Pobeda. The experimental field was placed in Banat County in 2011, on a cambic chernozem and the fertilisation level was $N_{120}P_{60}K_{60}$. Quality parameters that were monitored are: moisture, protein content, gluten content and Zeleny sedimentation index. In 2011 agricultural year, under conditions of Banat area, the winter wheat cultivars: Ciprian, Soissons and Lovrin 34, registered the best quality parameters and the lowest quality was registered by Andalou winter wheat varieties.

Key words

winter wheat cultivar, protein content, gluten, Zeleny index

Wheat quality, especially protein content and bread-making quality is influenced by type of soil, climate conditions, nitrogen fertilisation, plant protection and genotype (4, 5, 6, 8, 1). The introduction of new local and foreign varieties in the production requires ecological and qualitative knowledge of these varieties grown in a certain area (9).

The mineral fertilization can increase the protein content with 26- 42% comparative to non fertilized (control). Other authors (5) appreciate that the stability of wheat quality is strongly dependent on

Treating winter wheat with herbicides is a necessary economic measure if we take into account that it eliminates the strong competion from weeds(2).

Material and Method

Eighteen wheat varieties were used in this experience, 14 (Element, Apache, Renan, Sorrial, Sobbel, Renesansa, SO-207, Palesio, Andalou, Mulan, Kalango, Soissons, Exotic, Pobeda) of foreign origin and 4 (Lovrin 34, Dropia, Ciprian and Boema) of Romanian origin. The experience was placed on a cambic chernozem, with the following properties: N_{index}=2,71; P_2O_5=18,7 ppm; K_2O=290ppm.The genotypes, agricultural production technology, soil fertility, nitrogen fertilization and water availability(10).

The Zeleny sedimentation value describes the degree of sedimentation of flour suspended in a lactic acid solution during a standard time interval and this is taken as a measure of the baking quality. The sedimentation value of flour depends on the wheat protein composition and is mostly correlated to the protein content, the wheat hardness, and the volume of pan and hearth loaves(7).

fertilization level was $N_{120}P_{60}K_{60}$. The herbicide application was Buctril universal (bromoxynil+2,4-D)-1l/ha. Sampling was done from the mass of wheat grain after harvest. Wheat samples were processed after were cleaned of foreign matter. Moisture, protein content, gluten content, and sedimentation index were the quality parameters that were monitored to determine the quality of winter wheat cultivars. We used the OmegAnalyzer G device for the determination of protein, moisture and sedimentation index (Figure 1). The OmegAnalyzer G is a German engineered whole grain and seed NIR analyser with pour through sample presentation for rapid analysis operating in the 730 nm to 1100 nm wavelength range.

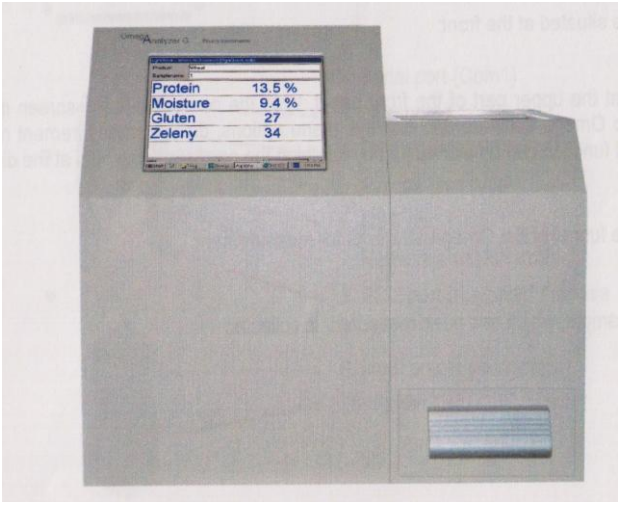
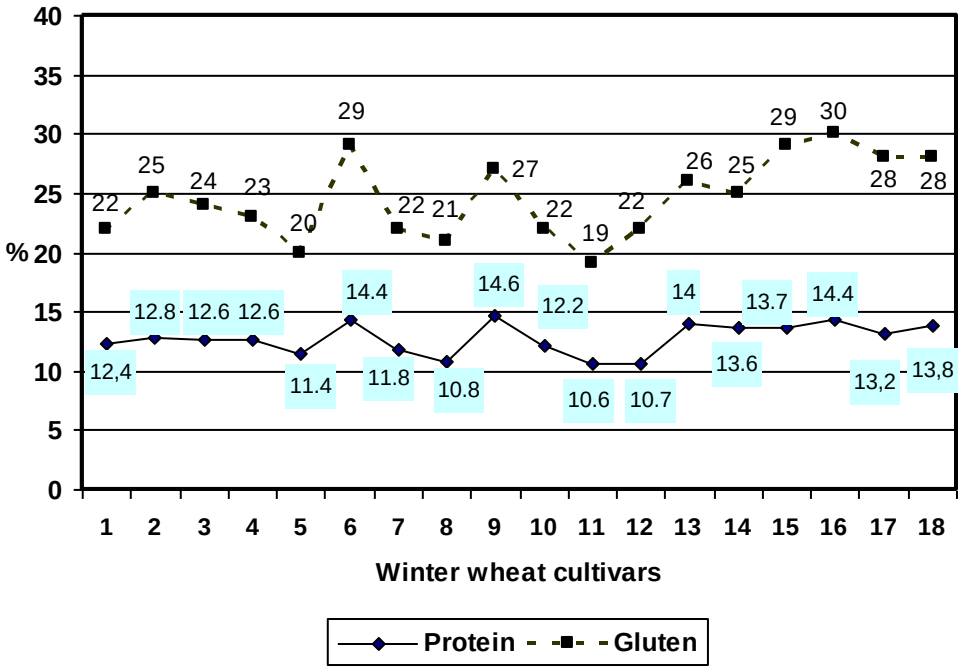


Fig. 1. Front view of the OmegAnalyzer G

Results and Discussions

The winter wheat cultivars registered the following values of humidity: Element (11,3%), Apache (12,0%), Renan (11,1%), Sorrial (11,1%), Sobbel (11,1%), Lovrin 34 (12%), Renesansa (11,4%), SO-207 (11,2%), Ciprian (11,0%), Palesio (11,4%), Andalou (11,4%), Mulan (11,3%), Dropia (11,1%), Boema (11,0%),Kalango (10,9%), Soissons (11,7%), Exotic (12,3%) and Pobeda (12%).

Analyzing the Figure 2 we observe the directly correlation between protein and gluten content for all the cultivars. We can see in this figure that protein content registered values between 10,6% (Andalou) and 14,6% (Ciprian), and gluten between 19%(Andalou) and 30% (Soissons). Lovrin 34 and Ciprian registered very good results (14,4%- 14,6% protein content and 29-27% gluten).

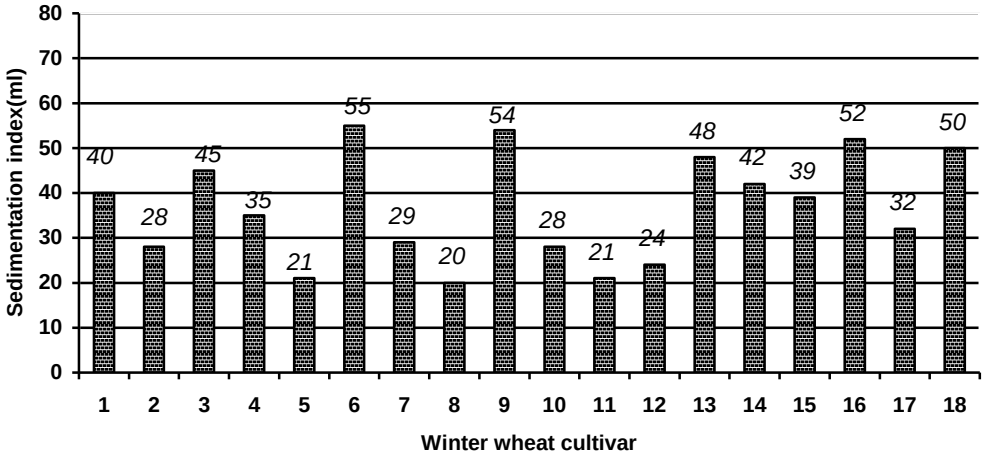


1-Element; 2-Apache; 3-Renan;4-Sorrial; 5-Sobbel;6-Lovrin 34; 7-Renesansa; 8-SO-207; 9-Ciprian;10-Palesio;11-Andalou; 12-Mulan; 13-Dropia;14-Boema;15-Kalango;16-Soissons;17-Exotic, 18-Pobeda.

Fig. 2. Graphical representation of the protein and wet gluten content of winter wheat cultivars.

Regarding the sedimentation index (Zeleny), values between 20ml - 24ml recorded SO-207, Andalou, Sobbel and Mulan (Figure 3).The following winter wheat cultivars: Apache, Palesio, Renesansa,

Kalango, Exotic, Sorrial, Element, Boema, Renan and Dropia registered values between 28-48 ml. Very heigh levels of this parameter registered Pobeda (50 ml), Soissons (52 ml), Ciprian (54ml) and Lovrin 34 (55ml).



1-Element; 2-Apache 3-Renan;4-Sorrial; 5-Sobbel;6-Lovrin 34; 7-Renesansa; 8-SO-207; 9-Ciprian;10-Palesio;11-Andalou; 12-Mulan; 13-Dropia;14-Boema;15-Kalango;16-Soissons;17-Exotic, 18-Pobeda.
Fig. 3. Graphical representation of Zeleny sedimentation index corresponding to the winter wheat cultivars

Conclusions

Cultivated on a cambic chernozem (west of Romania), under climatic conditions of the agricultural year 2011, with a moderate fertilisation level ($N_{120}P_{60}K_{60}$), Ciprian, Soissons and Lovrin 34 winter wheat cultivars registered the best quality parameters, followed very close by Dropia and Pobeda varieties.

Regarding protein and gluten content, very good results recorded Ciprian (14.6% protein and 27% gluten), Soissons (14,4% protein content, 30% gluten) and Lovrin 34 winter wheat variety (14,4% protein and 29% gluten).

The highest levels of Zeleny sedimentation values registered Pobeda (50 ml), Soissons (52 ml), Ciprian (54ml) and Lovrin 34 (55ml) winter wheat cultivar.

The lowest quality parameters were registered by Andalou winter wheat varieties.

Our results demonstrated that quality indices for winter wheat are strongly influenced by the biological factor.

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