

NOVA BOSANKA – NEW VARIETY OF WINTER WHEAT

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Highly yielding, early maturing, excellent technological quality, resistant to lodging, optimal seed size, good resistance to plant diseases. New variety of winter wheat under the name Nova Bosanka was created by crossing the genetically divergent parents. According to overall three-year average, the variety Nova Bosanka achieved an average yield of 6.918 kg ha⁻¹ which is 479,3 kg or 7,45% more than the values of standard variety Tina. Three-year average of protein content was 12,8%, water absorption 59%, energy of dough 100 cm², belongs to B1 – quality group. By the trait of resistance to lodging variety is at the level of standard.

Key words: wheat, breeding, variety, yield, quality.

INTRODUCTION

Wheat is a plant species mainly used in human nutrition with about 535% in developed countries and about 85% in developing countries, but it is also used in livestock feeding, and slightly less for industrial purposes (PENA, 2007).

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The variety is one of the decisive factors in the production of wheat and other plant species, both in quantitative and qualitative level. About the varieties, as one of the decisive factors, many authors gave their opinions and represented their results (BOROJEVIĆ, 1983, MLADENOV *et al.*, 2007, DENČIĆ *et al.*, 2003, 2009, 2010).

One of the main tasks of the Department for small grains of the Agricultural Institute of RS is the creation of wheat varieties that will integrate more positive traits, such as high genetic potential, good technological characteristics, excellent resistance to low temperatures and lodging, tolerance to plant diseases, major biological adaptability, early ripening. Our recent results show that it is possible to integrate more of these traits in to one genotype, but it is quite difficult to unify these traits at the higher level and to have more of these properties at an optimal level (MANDIĆ *et al.*, 1997, 2001, 2006). Variety Nova Bosanka possesses most of the above mentioned traits on a truly higher level, compared to our earlier varieties.

Although, in recent years, our areas under wheat tend to decrease, it is necessary to emphasize that there is an interest of serious producers for this production, but they are more demanding when it comes to new variety or hybrid. The producers are still interested in early maturing and quality varieties (MLADENOV *et al.*, 2002). It is known that the mentioned problems can not be solved by increasing of arable areas. With creation of new varieties that have good adaptability, stability and high yield, and with optimal use of modern farming methods higher production can be achieved, which is imperative (DENČIĆ *et al.*, 2008). In recent times the value of one wheat variety is not valued only by the amount of grains yield, than by the basis of yield of finished products.

MATERIALS AND METHODS

The variety Nova Bosanka as material for this research was created by process of hybridization of our varieties BL 1-94 x Proteinka. Donors of many essential genes were varieties used in earlier processes of crossbreeding, from which there were transferred parts of the germplasm in these two genotypes, that were later utilized as parental components. Donors of many genes as indicators of technological quality (Glue and other genes) and genes for the reduction of plant height, lodging resistance, resistance to low temperature and tolerance to plant diseases, are varieties that were formed from the direct crossbreeding. Hybrid material was created on the basis of pedigree method, along with a continuous selection of a typical plants. Variety Nova Bosanka was selected from phenotypically homogeneous materials from F6 generation, and then tested in preliminary and comparative trials with more standards, and after on the basis of our results reported to the Commission for variety registration (Federal Institute of Agriculture, Sarajevo, B&H).

Testing of this variety for recognition is performed according to the methodology on how to test varieties of winter wheat at two localities (Butmir and Živinice) over three years (2006/07, 2007/08, 2008/09). The trials were set up according to a random block system (randomized system). The basic plot size is 5m² with 5 replications. Variety Tina was used as standard. Grain yield of variety was

processed using the joint analysis of variance, and evaluation of the significance based on LSD test.

RESULTS AND DISCUSSION

Genetic potential is a direct effect of gene expression that determines a specific properties or processes (MLADENOV *et al.*, 2007). Genetic potential is characteristic of plant, while production potential results from interaction between genetic and environmental factors, so that the production potential is a relevant term always defined by variety, environmental conditions, their interaction and management systems (MAC KEY, 1979). Genetic potential is yield that variety achieves in environmental factors with plenty of nutrients and when other important factors, essential for the realization of yield, are under control (EVANS and WARDLAW, 1976).

Modern varieties of wheat have a number of benefits for the successful cultivation: the ability of growing on poor soils, higher harvest index, resistance to low temperature and drought, a high potential for grain development and green mass of very good quality (MANDIĆ *et al.*, 2010).

In the three-year average tested variety Nova Bosanka achieved a grain yield of 6.918,62 kg ha⁻¹, which is 479,33 kg ha⁻¹ or 7,45% more than the standard variety Tina. This difference is highly significant. In the three-year average coefficient of variation rose to 0,09%. Based on our results of comparative trials, the locality of the Agricultural Institute of Republic of Srpska, Banja Luka, this variety achieved three-year average yield of 8.020 kg ha⁻¹. According to research in the same period it was analyzed the influence of factors of variety and locality on yield, where it was recorded a highly significant and significant impact of tested varieties (Table 1.).

Table 1. Grain yield of variety Nova Bosanka (kg ha⁻¹) tested by years and localities

Tested variety	2006/2007		2007/2008		2008/2009		Average
	Butmir	Živinice	Butmir	Živinice	Butmir	Živinice	
Nova Bosanka	6.928	6.680 ⁺	7.000 ⁺	6.880 ⁺	7.000 ⁺	7.020 ⁺⁺	6.970
Tina	6.540	6.216	6.420	6.340	6.620	6.500	6.560
Average	6.852	6.352	6.610	6.540	6.750	6.720	6.725
LSD _{0,05}	401,20	403,27	484,10	367,30	287,10	227,68	
LSD _{0,01}	563,2	566,05	679,6	515,57	403,00	319,59	
CV(%)	4,24	4,60	5,31	4,07	3,08	2,45	

At the locality Butmir variety achieved three-year average grain yield of 6.737,34 kg ha⁻¹, which is 199,67 kg ha⁻¹ or 3,06% more than the locality Živinice. This difference is significant. Tested variety has achieved higher yield than the standard variety for 133 kg ha⁻¹. Four varieties were also tested at the same locality, and their values determine the average of locality. (Table 2).

Table 2. Influence of varietal factors on grain yield in three-year average

Tested variety	kg/5m ²	kgha ⁻¹	Relative yield (%)	Significance
Nova	3,459333	6.918,67	107,45	++
Bosanka				
Tina	3,219667	6.439,34	100,00	
LSD _{0,05}	253,31			
LSD _{0,01}	336,47			

Table 3. Influence of locality factors on grain yield in the three-year average

Tested variety	kg/5m ²	kgha ⁻¹	Relative yield (%)	Significance
Butmir	3,36	6.737,34	103,06	+
Živinice	3,26	6.537,67	100,00	
LSD _{0,05}	179,12			
LSD _{0,01}	237,92			

Average values of quality parameters are: 1000-kernel weight is higher by 0,67 g, hectoliter mass is higher by 0,02 kg, the proportion of grain fraction > 2,8 mm is higher by 0,48%, raw protein content is higher for 0,43%, compared with the standard. Varieties with good technological properties and with the same or higher yield, which is definitely better, have a higher yield of flour or bread per hectare (ĐURAŠINOVIĆ *et al.*, 2010).

Absolute and volume weight are essential indicators of grain quality. These two high values are a reliable indicator of the excellent biological plasticity and its capacity to adapt to different ecological conditions. Both of these values are higher than the values of standard variety. The absolute weight of about 42 g is the optimal value of this trait that is essential for the production and for technology.

Great importance for obtaining products of wheat milling and baking wheat flour have a high-quality content and composition of proteins in grain. Content and quality of protein structure depends of genotype and environmental factors, or the level of agrotechnics and interaction of genotype – ecological environment. This variety was better for about 43% compared to the standard variety Tina, bearing in mind that the variety Tina is classified in B2-quality group.

This variety is characterized by good wet gluten content 29,3%, factor of water absorption should be an indicator of the quality and if this value is greater the higher is the yield of bread. Higher quality code also indicates the better quality of raw proteins, that number here is 57,3%, for example - variety Partizanka, value in the first year was 56,7% and in the second year 72,9%, the energy of dough in a single year was 64 cm² and in the second year 107 cm². Value of energy for this variety according to sample from one year research is 100 cm².

Other traits

Compared with one of the earliest varieties which are grown in our area, NSR-5, variety Nova Bosanka matures 4 days later, one of the earliest of our varieties. This represents a good result when we consider frequent occurrence of drought and temperature stress in the period of wheat maturity (temperature over 35 degrees), which is adversely for the grain filling period, total yield and quality. With the average plant height that is about 84 cm and optimum thickness variety Nova Bosanka provides excellent lodging resistance and optimum use of nitrogen fertilizers for achieving appropriate yield. This wheat variety shows satisfactory tolerance plant diseases. Optimum value for these two traits is a good basis for excellent technological quality, or the higher protein content. According to the protein content this variety is classified in B1-quality group.

CONCLUSION

The tested variety Nova Bosanka, in all three years of testing, at both localities, achieved significantly higher yield compared to the standard. In the three-year average it achieved yield of 6.873 kg ha⁻¹ to 494 kg ha⁻¹ or 7,75% more than standard variety Tina. Based on the most important technological and agronomic traits variety Nova Bosanka is at the level of standard.

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NOVA BOSANKA – NOVA SORTA OZIME PŠENICE

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I z v o d

Visokoprinosa, ranostasna, vrlo dobrog tehnološkog kvaliteta, otporna na polijeganje, optimalne krupnoće zrna, zadovoljavajuće otpornosti na važnije biljne bolesti. Nova sorta ozime pšenice nastala je metodom križanja genetički divergentnih roditelja pod nazivom Nova Bosanka. Prema ukupnom trogodišnjem prosjeku, sorta Nova Bosanka je ostvarila prosječan prinos od 6.918 kg ha⁻¹ što je za 479,3 kg ili 7,45% više od sorte standarda – Tina. Trogodišnji prosjek sadržaja proteina je 12,18%, moć upijanja vode 59%, energija tijesta 100 cm², pripada B1 kvalitetnoj klasi. Po otpornosti na polijeganje je u nivou standarda.

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