Original scientific paper
Оригинални научни рад
UDC: 633.11-155.9:575
DOI: 10.7251/AGREN1702131K

University of Banjaluka, Faculty of Agriculture
Agro-knowledge Journal

Variability of Number of Spikes per Unit Area and Grain Yield Effected by Different Sowing Densities of Winter Wheat (*Triticum aestivum* L.)

Danijela Kondić[1], Maja Bajić[1], Đurađ Hajder[1], Desimir Knežević[2]

[1]Faculty of Agriculture, University of Banja Luka, Republic of Srpska, BiH
[2]Faculty of Agriculture, University of Priština, Lešak, Kosovo and Metohia, Serbia

Abstract

The sowing density of wheat is important for expression of number of spikes per unit area, grain yield as well as other yield components. The aim of this work is investigation of variability of grain yield and number of spikes per unit area influenced by different sowing densities under different environmental conditions. Three wheat genotypes NS 40, Prima and Nova Bosanka were studied at seven different sowing densities (384, 424, 451, 504, 544, 588 and 604 seeds m^{-2}) with four replications on experimental plot of one m^2 on field experiment in agro–ecological conditions of Banja Luka during two successive growing seasons. In all studied wheat cultivars, the lowest number of spikes m^{-2} and the lowest grain yield were found on variant of lowest sowing density (384 seeds m^{-2}), while the highest number of spikes m^{-2} and the highest grain yield were found on variant of 588 seeds m^{-2} in both years. The wheat genotype NS 40S had the highest number of spikes m^{-2}, while Nova Bosanka had the lowest at all variants of sowing densities in both years. Mainly, at all variants of sowing densities, the highest values of analyzed traits were expressed in first year of experimental investigation. Depending of year and variant of sowing density the highest grain yield were found in NS 40 and Prima, while the lowest grain yield had Nova Bosanka in both years of experiment. In general, the recommended wheat sowing rates should be confirmed in the specific area of production and for the specific genotype.

Key words: genotype, sowing rate, yield, number of spikes m^{-2}, environment

Introduction

The wheat seed yields are determined by genetic and environmental factors as well as by interaction of genotypes and environments. Among numerous factors, the sowing density have influence to seed yield of wheat. The crop density is necessary to be adjusted to the soil type, considering soil fertility, sowing time, precipitation, characteristics of genotypes, etc. The average annual wheat sown area in Bosnia and Herzegovina is approximately 60 000 ha, of which 40 000 ha is sown in the Republic of Srpska, with average grain yield of 3000 to 4000 kg ha^{-1}.

Possible reasons for this low wheat yield are the use of uncertified seeds for sowing, sowing outside of the optimal time, not abiding to genotypic differentiated sowing density, insufficient mineral nutrition and inadequate plant protection. Seed viability and seed size provide satisfying emergency and density of crops, yield and profitability of wheat production. According to Hiltbrunner *et al*. (2007) plant density is an important factor that influences the growth and wheat yield. Considering genetic diversity of wheat cultivars for yield components it is necessary to test each genotype at the wide range of sowing densities to determine optimum seeding rate (Wiersma, 2002). High yields for winter wheat can be expected if at the same time optimal number of productive tillers m^{-2} and optimal number of grains per spike have been achieved. Wheat seeding density should take into account the genotype tillering potential and agro–ecological conditions of location. According to Valerio *et al*. (2013) genotypes with low tillering potential express higher effect on grain yield and ear weight, as a function of an increase in seeding density. Qu *et al*. (2009) reported that with increasing plant density as a result of the increased spikelet number the grain yield was improved. Correlation between productive tillering and grain weight per plant were positive and high significant (Zečević *et al.*, 2004). Bavec *et al*. (2002) on the base of seven years of investigation concluded that less than 500 seeds m^{-2} can be recommended for winter wheat genotypes under optimal sowing date in Slovenian humid continental area in comparison with official recommended seeding rate from 600 to 800 seeds m^{-2}. Also, seeding density is a limiting factor for plants to capture environmental resources (Lloveras *et al*., 2004).

However, wheat productivity is also strongly influenced by sowing density rates and its relation to available nutrients and water requirements (Otteson *et al*., 2007). The nitrogen fertilization have a significant role in determining yield and quality of wheat (Knežević *et al*., 2016).

Wheat yield is positively correlated with a certain sowing density when the yield is in maximum, after which a further increase of seeding rates influences the reduction of grain yield.

The aim of this work was investigation of influence of different sowing densities and different weather conditions on number of spikes m^{-2} and grain yield of wheat genotypes.

Material and Methods

Experimental material

Research was conducted in agro–ecological conditions of Banja Luka ($44^{o}46'$ N; $17^{o}11'$ E, and 164 m altitude) in two growing seasons 2013/2014 and 2014/2015, i.e. in terms of moderate continental climate on eutric cambisol. Study of wheat productivity in terms of different sowing density was done on three winter wheat genotypes: NS 40S, Prima and Nova Bosanka. All three wheat genotypes are products of regional selection institutes. The experimental arrangement was a randomized complete–block design, with genotype, sowing density, and year as factors. Wheat genotypes were sown at seven different sowing density levels: 384, 424, 451, 504, 544, 588 and 604 seeds m^{-2}. Each experimental unit size was one m^2, with four replications, making a total of 96 experimental units by one experimental year. Sowing in the experimental area was carried out manually on 4 ± 1 cm depth for each combination of factors. Standard agronomic practice for winter wheat was performed. Irrigation was not applied during the experiment. Sowing dates for growing seasons were from 6^{th} to 8^{th} of November in 2013 and from 3^{rd} to 5^{th} of November in 2014. In the first growing season, wheat was harvested on July the 14^{th}, while in the second one on July the 10^{th}. Wheat productivity was analyzed through number of spikes m^{-2} and grain yield (kg ha^{-1}) expressed at 14% moisture content.

Weather conditions

Average monthly temperatures (°C) and total monthly precipitation (mm) for 2013–2015 period is presented in Table 1.

In experimental 2013/2014 years in Banja Luka area total precipitation for november–june period was 969.9 mm, with an average temperature of 10.4 °C. In 2014/2015 years in Banja Luka area total precipitation for november–june period was 775.7 mm, with an average temperature of 10.0 °C.

Tab. 1. The average monthly air temperatures and total monthly precipitation for the region of Banja Luka in period 2013–2015
Просјечне мјесечне температуре и укупне мјесечне количине падавина на подручју Бање Луке за период 2013–2015

mon. / *мј.* year / *год.*		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
2013	°C	2.8	2.3	6.1	13.4	16.6	20.4	23.0	23.5	16.7	13.1	7.4	2.5
	mm	93.7	115.8	88.5	62.9	119.6	54.3	27.4	36.3	69.7	67.6	156.0	0.6
2014	°C	5.6	6.5	9.6	13.1	15.8	20.3	21.7	20.6	16.4	13.5	8.9	4.0
	mm	52.0	73.5	90.6	214.0	217.8	97.0	139.3	276.3	284.0	117.3	41.8	82.6
2015	°C	3.4	2.4	7.3	11.8	17.4	20.9	25.2	24.0	18.3	11.5	7.1	3.5
	mm	111.2	91.1	79.0	54.1	117.6	60.5	20.5	22.8	75.0	142.7	85.7	8.1

In the second vegetation period, in 2014, two months had extremely high rainfall, April (214.0 mm) and May (217.8 mm), considering this as a flood year with enormous total rainfall from April to November.

For 30 year time (1961–1990), average precipitation in area Banja Luka for november–june period was 685.3 mm, and average temperature was 7.4°C. Compared to the same period of the long–term averages, period of november–june in average of two successive experimental years, had more than 180 mm of precipitation, but was also warmer by 2.8 °C.

Statistical analysis

Statistical analysis was performed using factorial analysis of variance 2×8×3 [factorial design: year(2) × sowing density(8) × variety(3)] while significant differences between treatment means were tested by Fisher's least significant difference test (LSD) at the 0.05 and 0.01 probability level. All statistical analysis were performed in MS Excel 2013.

Results and Discussion

Number of spikes m^{-2} depending on the sowing density

Average values of number of spikes m^{-2} for the tested wheat genotypes in the experimental 2013/2014 and 2014/2015 years are given in Table 2.

Observed regardless of the tested years and sowing densities, NS 40S genotype obtained the highest average number of spikes m^{-2} (540.34), while Nova Bosanka genotype obtained the lowest average number of spikes m^{-2} (435.64).

Table 2. Average number of spikes m^{-2} for analyzed genotypes HC 40C, Prima and Nova Bosanka under different sowing densities (seeds m^{-2}) in 2014 and 2015
Просјечан број класова по м² за анализиране сорте НС 40С, прима и нова босанка у условима различите густине сјетве (сјемена / м²) у 2014 и 2015

Number of seeds m^{-2} / *Број сјеменки / м²*	Cultivar *Сорта* / Year *Година*	NS 40S genotype	Prima genotype	Nova Bosanka genotype	$\bar{X} \pm s_x$ for sowing densities *(за густине сјетве)*
384	*2014*	482.00 ± 60.55	440.25 ± 43.86	386.75 ± 36.30	439.25 ± 15.19
	2015	459.25 ± 54.28	464.25 ± 14.99	403.00 ± 18.48	
424	*2014*	529.75 ± 46.06	464.25 ± 30.66	433.75 ± 42.06	470.50 ± 16.90
	2015	502.25 ± 34.65	474.00 ± 30.67	419.00 ± 38.11	
451	*2014*	492.25 ± 54.59	489.75 ± 36.39	409.25 ± 40.20	465.54 ± 20.64
	2015	502.25 ± 29.18	506.75 ± 35.72	393.00 ± 30.35	
504	*2014*	514.75 ± 53.26	486.50 ± 26.58	407.75 ± 34.90	483.67 ± 26.29
	2015	568.00 ± 21.15	517.25 ± 19.98	407.75 ± 32.27	
544	*2014*	568.75 ± 60.84	512.75 ± 29.95	455.75 ± 45.00	526.92 ± 22.62
	2015	572.00 ± 30.87	582.25 ± 22.18	470.00 ± 9.37	
584	*2014*	539.00 ± 35.52	520.50 ± 15.64	450.50 ± 27.62	494.50 ± 19.13
	2015	525.25 ± 26.05	509.50 ± 36.86	422.25 ± 19.01	
588	*2014*	594.50 ± 63.29	552.00 ± 31.19	513.75 ± 25.18	553.08 ± 14.15
	2015	589.00 ± 14.04	554.25 ± 8.11	515.00 ± 30.87	
604	*2014*	629.25 ± 60.06	574.75 ± 32.45	480.50 ± 39.93	531.13 ± 33.12
	2015	577.25 ± 29.30	522.75 ± 32.46	402.25 ± 23.64	
$\bar{X} \pm s_x$ for cultivars *(за сорте)*		540.34 ± 11.79	510.73 ± 10.16	435.64 ± 10.27	

LSD test	0.05	0.01
LSD for genotypes	27.32	36.10
LSD for sowing densities	41.73	55.15

$F_{blocking} = 2.664^{ns}$; $F_{genotype} = 31.142^{**}$; $F_{sowing\ density} = 7.805^{**}$; $F_{year} = 0.005^{ns}$; $F_{genotype \times sowing\ density} = 0.535^{ns}$; $F_{genotype \times year} = 0.479^{ns}$; $F_{sowing\ density \times year} = 1.027^{ns}$; $F_{genotype \times sowing\ density \times year} = 0.140^{ns}$. ns ($P > 0.05$), * ($P \leq 0.05$), ** ($P \leq 0.01$)

Observed regardless of the tested years and genotypes, at sowing density of 384 seeds m^{-2} the lowest average number of spikes m^{-2} was obtained (439.25) and the highest average number of spikes m^{-2} was obtained at sowing density of 588 seeds m^{-2} (553.08) (Table 2). Factorial analysis of variance 2×8×3 showed statistically significant main effects.

Factorial analysis of variance showed statistically very significant effect of different genotypes and sowing densities on the number of spikes m^{-2}, while the effect of the year was not statistically significant. There were no statistically significant interactions (Table 2). In both experimental years genotypes have shown an increase in the number of spikes m^{-2} with increasing sowing density. This results are in accordance with Bavec *et al*. (2002) and Bokan and Malešević (2004). Regardless of the tested years and sowing densities wheat genotype NS 40S had in average 540.34 spikes m^{-2} which is significantly higher in comparison with genotype Prima (510.73 spikes m^{-2}) and very significantly higher in comparison with genotype Nova Bosanka (435.64 spikes m^{-2}). Regardless of the genotypes and sowing densities the lowest average number of spikes m^{-2} was achieved at sowing density 384 seeds m^{-2} (439.25 spikes m^{-2}) which was lower in comparison with average number of spikes m^{-2} at sowing densities 504, 544, 584, 588 and 604 seeds m^{-2}, but there was no significant difference between sowing density 384 seeds m^{-2} and sowing densities 424 and 451 seeds m^{-2} concerning number of spikes m^{-2}.

The highest average number of spikes m^{-2} observed regardless of the genotypes and sowing densities was achieved at sowing density 588 seeds m^{-2} (553.08 spikes m^{-2}) which was very significantly higher in comparison with number of spikes m^{-2} at sowing densities 384, 424, 451 and 504 seeds m^{-2}. There was no statistically significant difference between sowing density 588 seeds m^{-2} and sowing densities 544 and 604 seeds m^{-2} concerning number of spikes m^{-2}. All of the tested sowing densities can be divided into two groups: the group with sowing densities of 384 to 451 seeds m^{-2} with an average number of spikes of 458.43 spikes m^{-2}, and the group with sowing densities of 544 to 604 seeds m^{-2} with an average number of spikes of 537.04 spikes m^{-2}. However, higher density provides a greater number of primary tillers per square meter, which contribute to the developing of grains with larger size, mass and higher yield. The highest seed yield (Kristó *et al*., 2007) was found at the sowing density of 600 seeds m^{-2}, and highest number of spikes m^{-2} was found with seeding rate of 600 in comparison to 480 seeds m^{-2} (Dubis and Budzyński, 2006). Crops with a lower density are characterized by greater number of secondary tillers which produce smaller seeds with less mass and quality (Baloch *et al.*, 2010).

Grain yield depending on the sowing density

Average values of grain yield for the tested wheat genotypes in the experimental 2013/14 and 2014/2015 years are given in Table 3.

Table 2. Average grain yield (kg ha^{-1}) for analyzed genotypes HC 40C, Prima and Nova Bosanka under different sowing densities (seeds m^{-2}) in 2014 and 2015
Просјечан принос зрна (kg/ha) за анализиране сорте HC 40C, прима и нова босанка у условима различите густине сјетве (сјемена по м^2) у 2014 и 2015

Number of seeds m^{-2} / *Број сјеменки / м^2*	Cultivar / *Сорта* — Year / *Година*	NS 40S genotype	Prima genotype	Nova Bosanka genotype	$\bar{X} \pm s_x$ for sowing densities *(за густине сјетве)*
384	*2014*	7815.2 ± 1917.5	7324.2 ± 1188.6	6073.5 ± 1135.7	7380.42 ± 324.01
	2015	8034.0 ± 699.9	8144.0 ± 790.7	6891.5 ± 696.4	
424	*2014*	8584.5 ± 1339.1	7360.7 ± 832.7	6592.0 ± 796.9	7636.96 ± 328.07
	2015	8157.3 ± 792.1	8227.5 ± 908.0	6899.8 ± 1027.6	
451	*2014*	8078.0 ± 1195.3	8393.5 ± 1170.1	7502.0 ± 764.2	7834.04 ± 259.26
	2015	7823.0 ± 1041.1	8448.8 ± 732.6	6759.0 ± 771.1	
504	*2014*	8095.7 ± 1038.1	7939.5 ± 966.5	6813.7 ± 977.5	7706.38 ± 339.29
	2015	8526.8 ± 655.9	8333.0 ± 366.0	6529.5 ± 374.8	
544	*2014*	9420.5 ± 1187.2	8495.0 ± 696.7	7703.7 ± 1018.4	8438.83 ± 326.34
	2015	8149.3 ± 347.2	9327.8 ± 376.5	7536.8 ± 332.4	
584	*2014*	9567.0 ± 1429.1	8874.5 ± 306.5	8873.7 ± 622.2	8242.50 ± 296.10
	2015	8847.0 ± 483.9	9152.0 ± 116.1	7687.0 ± 423.9	
588	*2014*	8557.7 ± 242.4	8415.7 ± 354.6	7702.7 ± 810.5	8833.54 ± 255.43
	2015	8623.5 ± 549.6	8817.3 ± 450.2	7330.8 ± 355.5	
604	*2014*	7815.2 ± 1917.5	7324.2 ± 1188.6	6073.5 ± 1135.7	8241.29 ± 239.96
	2015	8034.0 ± 699.9	8144.0 ± 790.7	6891.5 ± 696.4	
$\bar{X} \pm s_x$ for cultivars *(за сорте)*		8475.42 ± 131.21	8329.64 ± 138.67	7312.67 ± 198.97	

LSD test	0.05	0.01
LSD for genotypes	600.55	793.76
LSD for sowing densities	917.36	1212.49

$F_{blocking}$ = 6.550**; $F_{genotype}$ = 10.552**; $F_{sowing\ density}$ = 2.445*; F_{year} = 0.0001^{ns}; $F_{genotype \times sowing\ density}$ = 0.140^{ns}; $F_{genotype \times year}$ = 1.097^{ns}; $F_{sowing\ density \times year}$ = 0.354^{ns}; $F_{genotype \times sowing\ density \times year}$ = 1.164^{ns}. ns (P > 0.05), * (P ≤ 0.05), ** (P ≤ 0.01)

Observed regardless of the tested years and sowing densities, NS 40S genotype obtained the highest average grain yield (8475.42 kg ha^{-1}), while Nova Bosanka genotype obtained the lowest grain yield (7312.67 kg ha^{-1}).

Observed regardless of the tested years and genotypes, at sowing density of 384 seeds m^{-2} the lowest average grain yield was obtained (7380.42 kg ha^{-1}), while the highest average grain yield was obtained at sowing density of 588 seeds m^{-2} (8833.54 kg ha^{-1}).

Factorial analysis of variance 2×8×3 showed statistically very significant effect of different genotypes and statistically significant effect of different sowing densities on grain yield, while the effect of year was not statistically significant. There were no statistically significant interactions (Table 3). The recommended sowing rate for winter wheat in Bosnia and Herzegovina is often 650–700 seeds m^{-2}. Also, sowing density of 650 seeds m^{-2} resulted in high quality of wheat flour (Zečević et al., 2014). According to Flasarova (1994) lower sowing density levels, like 250, 400 and 550 seeds m^{-2} resulted in optimal relation between yield components and higher grain yield. Factorial analysis of variance in our research showed that genotypes and applied sowing densities had significant effect on wheat yield. This is in accordance with Hiltbrunner *et al*. (2007). However, according to Ahmadi *et al*. (2011) the sowing density had no significant effect on grain yield, but some yield components were affected significantly by the sowing density. Average grain yield observed regardless of years and sowing densities was highest in NS 40S genotype (8475.42 kg ha^{-1}), which is very significantly higher in comparison with Nova Bosanka genotype (7312.67 kg ha^{-1}). There were no significant differences between NS 40S and Prima genotypes when it comes to grain yield. Nevertheless, all three tested wheat genotypes had above–average yield in comparison with the average grain yield in Bosnia and Herzegovina. Lowest average grain yield observed regardless of the genotypes and sowing densities was achieved at sowing density of 384 seeds m^{-2} (7380.42 kg ha^{-1}) which was significantly lower in comparison with grain yield at sowing densities 588 seeds m^{-2} (8833.54 kg ha^{-1}) and 544 seeds m^{-2} (8438.83 kg ha^{-1}). There was no statistically significant difference between sowing density 384 seeds m^{-2} and sowing densities 424, 451, 504 seeds m^{-2}.

Highest average grain yield observed regardless of genotypes and sowing densities was achieved at sowing density 588 seeds m^{-2} (8833.54 kg ha^{-1}) which was significantly higher in comparison with grain yield at sowing densities 384, 424, 451 and 504 seeds m^{-2}. There were no statistically significant differences between sowing density 588 seeds m^{-2} and sowing densities 544 and 604 seeds m^{-2} concerning grain yield. Also, in this tested trait two groups appear: the group with sowing densities of 384 to 451 seeds m^{-2} with an average yield of 7617.14 kg ha^{-1}, and the group with sowing densities of 544 to 604 seeds m^{-2} with an average yield of 8504.55 kg ha^{-1}.

Conclusion

Obtained results showed that the smallest investigated sowing density 384 seeds m^{-2} resulted in doubled yield compared to the average yield of our country, i.e. adequate sowing density, arrangement and positioning of seeds to the appropriate depth can result in significantly higher wheat yield with the rational use of seeding rates. All three tested wheat genotypes had above–average yield in comparison to the average wheat yield in Bosnia and Herzegovina. Also, according to the two years period of research results, there are different relations between sowing densities and number of spikes m^{-2} and grain yield for different wheat genotypes. It is clear that the recommended wheat sowing rates should be confirmed in the specific area of production and for the specific genotype.

Acknowledgements

This research was financially supported by the Ministry of Science and Technology of the Republic of Srpska and research project TR 31092 supported by the Ministry of Education, Science and Technological Development of Republic Serbia.

References

Ahmadi, G.H., Kahrizi, D., Mohammadi, G. and Shirkhani, A. (2011). Effects of sowing density on yield and yield components of irrigated bread wheat cultivars. *Biharean biol*., *5*(2), 91–95.

Baloch, S.M., Shah, I.T., Nadim, M.A., Khan, M. I. and Khakwani, A.A. (2010). Effect of seeding density and planting time on growth and yield attributes of wheat. *The J. Anim. Plant Sci.*, *20*, 239–240.

Bavec, M., Bavec, F., Varga, B. and Kovacevic, V. (2002). Relationships among yield, its quality and yield components in winter wheat (*Triticum aestivum* L.) cultivars affected by seeding rates. *Die Bodenkultur*, *53*(3), 143–151.

Bokan, N. and Malešević, M. (2004). The planting density effect on wheat yield structure. *Acta Agric. Serb.*, *9*(18), 65–79.

Dubis, B. and Budzyński, W. (2006). Response of winter wheat to the date and density of sowing. *Acta Sci. Pol., Agric.*, *5*, 15–24.

Flasarova, M. (1994). Formation and reduction of yield components in winter wheat. *Rostl. Vyroba.*, *40*, 517–527.

Hiltbrunner, J., Streit, B. and Liedgens, M. (2007). Are seeding densities an opportunity to increase grain yield of winter wheat in a living mulch of white clover? *Field Crops Res.*, *102*(3), 163–171.

Knežević, D., Maklenović, V., Kolarić, Lj., Mićanović, D., Šekularac, A. and Knežević, J. (2016). Variation and inheritance of nitrogen content in seed of wheat genotypes (*Triticum aestivum* L.). *Genetika*, *48*(2), 579–586.

Kristó, I., Gyuris, K., Torma, M., Hódi-Szél, M. and Petróczi, I.M. (2007). Investigation of sowing date and seeding rate on the yield of winter wheat. *Cereal Res. Commun.*, *35*(2), 685–688.

Lloveras, J., Manent, J., Viudas, J., Lopez, A. and Santiveri, F. (2004). Seeding rate influence on yield and yield components of irrigated winter wheat in a Mediterranean climate. *Agron. J.*, *96*(5), 1258–1265.

Otteson, B.N., Mergoum, M. and Ransom, J.K. (2007). Seeding rate and nitrogen management effect on spring wheat yield and yield components. *Agron. J.*, *99*(6), 1615–1621.

Qu, H.J., Li, J.C., Shen, X.S., Wei, F.Z., Wang, C.Y. and Zhi, S.J. (2009). Effects of plant density and seeding date on accumulation and translocation of dry matter and nitrogen in winter wheat cultivar Lankao Aizao 8. *Acta Agron. Sin.*, *35*(1), 124–131.

Valério I.P., De Carvalho, F.I.F., Benin, G., Da Silveira, G.J., Da Silva, A.G., Nornberg, R., Hagemann, T., De Souza Luche, H. and De Oliveira, A.C. (2013). Seeding density in wheat: the more, the merrier? *Sci. Agric.*, *70*(3), 176–184.

Zečević, V., Knežević, D. and Mićanović, D. (2004). Genetic correlations and path-coefficient analysis of yield and quality components in wheat (*Triticum aestivum* L.). *Genetika*, *36*(1), 13–21.

Zečević, V., Bošković, J., Knežević, D. and Mićanović, D. (2014). Effect of seeding rate on grain quality of winter wheat. *Chil. J. Agric. Res.*, *74*(1), 23–28.

Wiersma, J.J. (2002). Determining an optimum seeding rate for spring wheat in Northwest Minnesota. *Crop Management*, *18*, 1–7.

Варијабилност броја класова по јединици површине и приноса сјемена у различитим густинама сјетве озиме пшенице (*Triticum aestivum* L.)

Данијела Кондић[1*], Маја Бајић[1], Ђурађ Хајдер[1], Десимир Кнежевић[2]

[1]Пољопривредни факултет, Универзитет у Бањој Луци, Република Српска, БиХ
[2] Пољопривредни факултет, Универзитет у Приштини, Лешак, Косово и Метохија, Србија

Сажетак

Густина сјетве пшенице је један од фактора који значајно утиче на остваривање приноса сјемена. Обзиром да просјечни приноси пшенице у БиХ варирају између 3000 и 4000 kg/ha, поред избора сјетвених површина и генотипа, потребно је прилагодити густину сјетве у датим агро–еколошким условима. У раду је анализирана продуктивност генотипова NS 40S, прима и нова босанка, која је оцјењена на основу броја класова/m^2 и приноса сјемена/ha у условима различитих густина сјетве. Експеримент је спроведен са три генотипа пшенице у седам различитих густина сјетве 384, 424, 451, 504, 544, 588 и 604 сјеменки/m^2 у четири понављања у агро–еколошким условима Бање Луке у току 2013/2014 и 2014/2015 сезоне. У истраживању је код генотипова установљен најмањи број класова, као и најмањи принос сјемена у варијанти са најмањом густином сјетве од 384 сјеменки/m^2, а највећи у варијанти са густином сјетве од 588 сјеменки/m^2 у обје године. Код генотипа НС 40С су установљене највеће вриједности испитиваних параметара у свим варијантама густине сјетве у обје године, а најмање вредности су установљене код генотипа нова босанка. У циљу одређивања оптималне густине сјетве, обзиром на постојање генетичке дивергентности пшенице, потребно је за сваки генотип појединачно истражити која је густина сјетве одговарајућа у датим агроеколошким условима.

Кључне ријечи: генотип, норма сјетве, принос, број класова/m^2, принос сјемена, агроеколошки услови

Danijela Kondić
E-mail address*: danijela.kondic@agro.unibl.org*

Received: December 12, 2017
Accepted: December 21, 2017