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Spelt (*Triticum spelta* L.) Genotypes from the Western Balkan Countries

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Abstract

The yield components participate in the formation of the overall yield and vary within the genotype and environmental factors. The aim of this research was to evaluate yield components of spelt genotypes originating from different Western Balkan countries. Spelt genotypes were examined during two growing seasons 2015/16 and 2016/17 in the agro-ecological conditions of Banja Luka. Nine spelt genotypes were used, i.e. landrace Sitnica from Manjača mountain (the Republic of Srpska, B&H), seven Montenegrin landraces KP34LJ5-1/34 (SP1), KR16LJ5-1/16 (SP2), KR29LJ5-1/29 (SP3), KR12LJ5-1/12 (SP4), KR15LJ5-1/15 (SP5), LJ5-1/9 (SP6), KR20LJ5-1/20 (SP7) and cultivar Nirvana from Serbia. Standard production practices were applied for these spelt genotypes. Five traits were analyzed: the number of spikes m^{-2}, plant height, spike length, the number of grains spike^{-1} and spike index. A two-factorial analysis of variance was performed and significant differences between treatment means were tested by the Fisher's LSD test at $P \leq 0.05$ and $P \leq 0.01$ significance level. Genotypes SP4 (140.38 cm), SP5 (138.82 cm), Sitnica (137.66 cm) and SP6 (135.65 cm) showed tendency of forming a relatively higher plants. Sitnica had the longest spikes (14.07 cm), while Montenegrin genotypes had relatively shorter spikes of 6.79 cm on average. Genotypes SP2, SP4, SP5, SP6 and SP7 obtained the highest number of grains per spike while the highest average spike index was obtained in SP7 (0.81).

Key words: spelt wheat, productivity, landraces, cultivar

Introduction

Spelt (*Triticum aestivum* ssp. *spelta*), with genomic constitution of 2n = 6x = 42, AABBDD, has the same genome as bread wheat. Today, in the around the world spelt production is recognized as a low-input agriculture, as this crop can grow without pesticides on marginal lands (Bonifacia *et al*, 2000; Cubadda and Marconi, 2002), which is the reason why spelt is often recommended for organic production. (Lacko-Bartošovà and Korczyk-Szabò, 2011). Spelt is often used as a substitute for wheat flour in making bread, pasta, cakes as well in production of bear, gin and vodka. Spelt is also used as an additive in animal feed products. The yield and quality of spelt wheat were subject of numerous studies (Troccoli and Codianni, 2005; Zečević *et al*., 2008; Konvalina *et al*., 2014; Longin *et al*., 2014; Ugrenović *et al*., 2018) which reported variation of productive and quality traits affected by genotype and environmental conditions.

Nutritional value of spelt is considered based on the content of carbohydrates, proteins, lipids, vitamins and minerals. Spelt flour is characterized by high water solubility, which probably makes it easier to digest. The total protein content varies from 13.0 to 16.5% depending on climatic conditions in the production area (Capouchova, 2001). Spelt is an important source of genetic diversity for endosperm proteins, associated with bread-making quality in wheat (Zhi-En *et al*., 2007). Spelt wheat has been proved to be a rich-source of useful genes associated with tolerance to biotic and abiotic stress, and grain quality. But this crop plant has some undesirable traits including glume tenacity and brittle rachis (Onishi *et al*., 2006). Spelt production has been neglected very long, which is one of the main reasons for insufficient supply of its products at the domestic market (Vukoje *et al*., 2013).

The aim of this research was to evaluate yield components of spelt genotypes originating from different Western Balkan countries.

Material and Methods

A field experiment with different winter spelt genotypes was conducted in two growing seasons: 2015/16 and 2016/17 in the area of Banja Luka (44^{o}46' N; 17^{o}11' E, and 164 m altitude). A total of nine spelt genotypes were used, i.e. landrace Sitnica from Manjača mountain (the Republic of Srpska, B&H*)*, seven Montenegrin landraces KP34LJ5-1/34 (SP1), KR16LJ5-1/16 (SP2), KR29LJ5-1/29 (SP3), KR12LJ5-1/12 (SP4), KR15LJ5-1/15 (SP5), LJ5-1/9 (SP6), KR20LJ5-1/20 (SP7) and cultivar Nirvana (the first Serbian spelt cultivar).

All spelt genotypes are stored in the Gene bank of the Institute of Genetic Resources, the University of Banja Luka. The examined spelt genotypes were sown manually, with equal sowing density of 424 seeds m^{-2}. Standard production practices were applied for these spelt genotypes. Sowing was carried out in the first decade of November and the spelt genotypes were harvested in the first decade of July in both examined years.

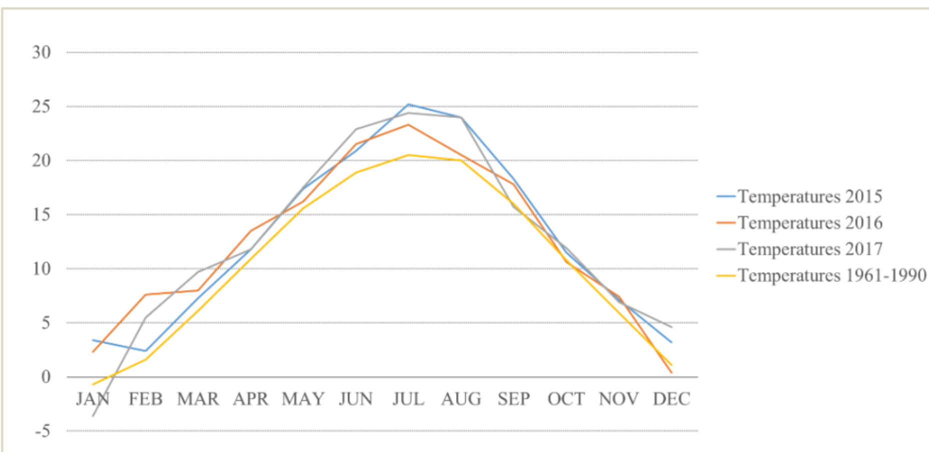
The following characteristics were analyzed: the number of spikes m^{-2}, plant height (cm), spike length (cm) and the number of grains $spike^{-1}$, by using standard measurement methods as well as spike index, determined by using the following formula:

$$Spike\ index = \frac{grain\ mass\ per\ spike}{mass\ of\ spike}$$

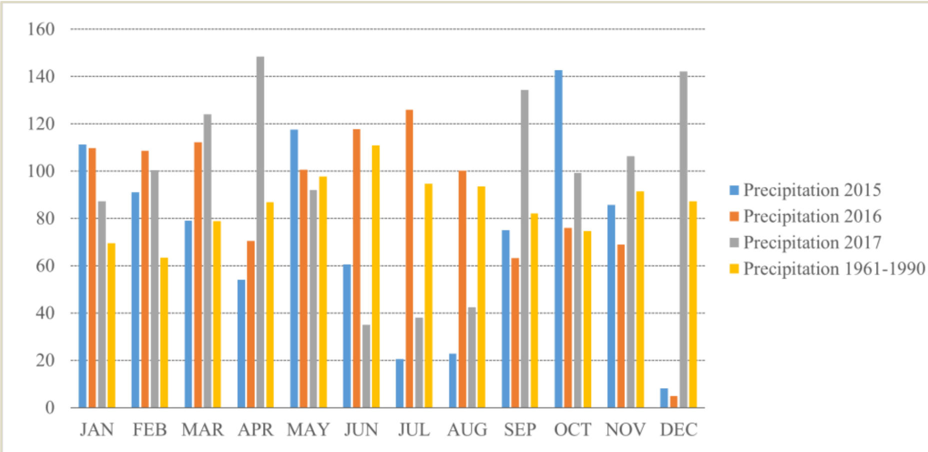
Experimental arrangement was completely randomized design, with 4 replications. A total of 30 spikes were tested in one replication.

Data were analyzed by a two-factorial analysis of variance, with genotypes and growing seasons (years) as main treatments. Significant differences between treatment means were tested by the Fisher's least significant difference test (LSD) at P≤0.05 and P≤0.01 significance level. Statistical analyses were done in IBM SPSS Statistics 22.0 statistical software.

The analysis of meteorological data is presented in Graphs 1 and 2.



Graph 1. The average temperatures (°C) in the 2015-2017 period in Banja Luka
Просјечне температуре у Бањој Луци у периоду 2015-2017



Graph 2. The total precipitation (mm) in the 2015-2017 period in Banja Luka
Сума падавина у Бањој Луци у периоду 2015-2017

Based on the data from Graph 1, it is evident that the average annual temperature during the experimental years was higher by 2 °C in comparison to the reference period (10.6 °C). Also, the average monthly temperatures in the growing period were higher in all months in comparison to the reference period. Total annual precipitation in the examined years was similar to the reference period (1030.8 mm), with the exception of 2015, which had the total precipitation of 868.3 mm.

According to the De Martonne Aridity Index [DI = (12×Q) / (t+10)], where *Q* is the total monthly precipitation and *t* is the average monthly temperature). In all experimental years November (sowing period) had an index greater than 20, thus we can conclude that germination of spelt plants was not affected by drought, as well as during the whole spring period until June.

Results and Discussion

The number of spikes m^{-2}

The average number of spikes m^{-2} of different spelt genotypes in two growing seasons is shown in Table 1. The analysis of variance of average number of spikes m^{-2} indicated statistically significant difference between spelt genotypes at $P \leq 0.001$. The difference between growing seasons (years) was statistically significant at $P \leq 0.05$. However, the interaction genotype × year was statistically significant at $P \leq 0.05$.

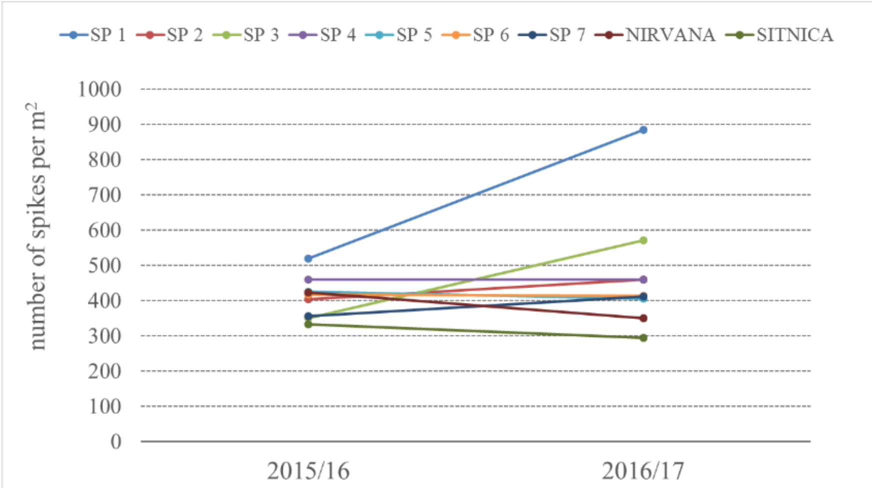
Sowing density is very important in cultivation practices, as it directly affects the number of spikes, and thus the final yield (Beres *et al*., 2012; Zecevic *et al*., 2014). In conditions of equal sowing density in our research (424 seeds m^{-2}), two years average number of spikes m^{-2} varied between 313.75 in Sitnica and 702.25 in SP1 genotype (Table 1). Spelt genotype SP1 obtained the highest number of spikes m^{-2} in both experimental years, with an increase of this trait in second year. Genotype SP3 had similar tendency, with higher number of spikes m^{-2} (570.50) in 2016/17. The remaining spelt genotypes showed different tendency, with lower number of spikes m^{-2} in both experimental years in comparison to SP1, generally lower values in 2016/17, and noticeable stability of this trait throughout the experiment.

Spelt genotypes Nirvana and Sitnica showed a decrease in the average number of spikes m^{-2} in 2016/17, with evident stability of this trait, similar to genotypes SP2, SP4, SP5 and SP6 but different from genotypes SP1 and SP3 (Graph 3).

Tab. 1. The average number of spikes m^{-2} of the examined spelt genotypes
Просјечан број класова m^{-2} *испитиваних генотипова спелте*

spelt genotypes	2015/16			2016/17			average for genotypes
SP1	519.50	±	66.20	885.00	±	61.81	702.25
SP2	404.50	±	15.94	458.50	±	98.75	431.50
SP3	349.75	±	42.33	570.50	±	84.75	460.13
SP4	458.50	±	19.89	458.75	±	105.40	458.63
SP5	424.25	±	9.58	405.25	±	78.85	414.75
SP6	416.75	±	24.59	414.00	±	56.96	415.38
SP7	356.25	±	31.27	411.75	±	100.90	384.00
Nirvana	422.50	±	21.32	349.75	±	51.54	386.13
Sitnica	333.00	±	12.43	294.50	±	59.06	313.75
average for years	409.44			472.00			
factors / interaction	A (genotypes)			B (years)			AB (genotype × year)
$F_{calculated}$	6.2567 ***			4.7482 *			2.7005 *
LSD 0.05	–			–			172.67
LSD 0.01	–			–			229.95

*Note: ns = not significant, * significant at P≤0.05, ** significant at P≤0.01, *** significant at P≤0.001.*



Graph 3. The analysis of the genotype × year interaction effect for the average number of spikes m^{-2} of different spelt genotypes
Анализа интеракцијског ефекта генотип × година за просјечан број класова m^{-2} *различитих генотипова спелте*

The seeding rate generally had no effect on yields, but had an effect on yield components; increasing seeding rates slightly increased the number of spikes per square meter and decreased the number of grains per spike (Dorval *et al*., 2015). Sowing density, as well as the tillering potential of genotypes, affects the obtained number of spikes m^{-2}, so recommended wheat sowing rates should be confirmed in the specific area of production and for a specific genotype (Kondić *et al*., 2017).

According to Troccoli and Codianni (2005), the highest productivity in the experiment with different spelt genotypes was achieved in variant with sowing density of 200 viable seeds m^{-2}, in comparison to variants with 100 and 150 viable seeds m^{-2}.

Plant height

The plant height is an important trait, since it is in direct correlation with the grain yield. Compared with bread wheat, spelt is taller and can reach up to 200 cm height (Onishi *et al*., 2006). In this study the average plant height ranged from 119.21 cm (SP1) to 140.38 cm (SP4).

The two-year results obtained for the average plant height of different spelt genotypes are presented in Table 2.

The average plant height obtained in all spelt genotypes was lower in comparison to the results obtained by Janković *et al*. (2015) with plant height ranging from 146.08 cm to 156.08 cm, but higher in comparison to results obtained by Konvalina *et al*. (2010) with plant height of 113,0 cm on average.

Tab. 2. The average plant height (cm) of the examined spelt genotypes
Просјечна висина биљака (cm) испитиваних генотипова спелте

spelt genotypes	2015/16	2016/17	average for genotypes
SP1	114.55 ± 7.19	123.87 ± 4.33	119.21
SP2	134.65 ± 8.57	126.42 ± 2.00	130.54
SP3	126.43 ± 6.60	127.72 ± 3.47	127.08
SP4	138.76 ± 2.71	142.00 ± 4.10	140.38
SP5	137.41 ± 5.86	140.23 ± 1.70	138.82
SP6	138.63 ± 2.57	132.66 ± 2.80	135.65
SP7	125.19 ± 5.14	117.11 ± 2.95	121.15
Nirvana	122.69 ± 5.62	122.42 ± 5.49	122.55
Sitnica	134.98 ± 5.76	140.34 ± 4.57	137.66
average for years	130.37	130.31	
factors / interaction	A (genotypes)	B (years)	AB (genotype × year)
$F_{calculated}$	5.5864 ***	0.0006 ^{ns}	0.7963 ^{ns}
LSD 0.05	9.80	–	–
LSD 0.01	13.05	–	–

*Note: ns = not significant, * significant at P≤0.05, ** significant at P≤0.01, *** significant at P≤0.001.*

The analysis of variance of average plant height indicated the difference between spelt genotypes at P≤0.001. The difference between growing seasons was not significant as well as the genotype × year interaction effect.

The LSD-test performed indicated that the highest average plant height, obtained in genotypes SP4 (140.38 cm), was not statistically significant in comparison to genotypes SP5 (138.82 cm), Sitnica (137.66 cm) and SP6 (135.65 cm), but it was significantly higher at P≤0.05 in comparison to SP2 and at P≤0.01 in comparison to remaining genotypes. The plant height of examined spelt genotypes was very similar in two successive years (130 cm on average).

Spike length

The average spike length of different spelt genotypes in two growing seasons is shown in Table 3. The spike length is a genetically controlled trait, but highly dependent on environmental factors (Zečević *et al*., 2008). The analysis of variance of the average spike length indicated that the difference between spelt genotypes was statistically significant at P≤0.001, while the difference between years was statistically significant at P≤0.05. The genotype × year interaction effect for the average spike length was not significant.

According to the LSD-test, the highest average spike length was obtained in genotype Sitnica (14.07 cm), and it was statistically significant at P≤0.01 in comparison to remaining genotypes. In Sitnica the longest spikes in both tested years were obtained. In cultivar Nirvana the average spike length of 11.60 cm was obtained, which is similar to the results obtained by Konvalina *et al*. (2010). Montenegrin spelt genotypes had relatively shorter spikes of 6.79 cm on average. Also, the average spike length was significantly higher (at P≤0.05) in the second year (8.34 cm) than in the first year (7.93 cm).

Tab. 3. The average spike length (cm) of the examined spelt genotypes
Просјечна дужина класа (cm) испитиваних генотипова спелте

spelt genotypes	2015/16	2016/17	average for genotypes
SP1	6.47 ± 0.25	6.15 ± 0.12	6.31
SP2	6.96 ± 0.36	6.79 ± 0.24	6.87
SP3	5.86 ± 0.42	6.55 ± 0.25	6.21
SP4	6.75 ± 0.19	7.45 ± 0.22	7.10
SP5	6.91 ± 0.08	7.61 ± 0.30	7.26
SP6	6.83 ± 0.21	6.82 ± 0.14	6.82
SP7	6.69 ± 0.14	7.21 ± 0.20	6.95
Nirvana	11.43 ± 0.41	11.77 ± 0.23	11.60
Sitnica	13.43 ± 0.32	14.71 ± 1.05	14.07
average for years	7.93	8.34	
factors / interaction	A (genotypes)	B (years)	AB (genotype × year)
$F_{calculated}$	122.4207 ***	6.1466 *	1.0421 ns
LSD 0.05	0.71	0.33	–
LSD 0.01	0.94	0.44	–

*Note: ns = not significant, * significant at P≤0.05, ** significant at P≤0.01, *** significant at P≤0.001.*

The number of grains per spike

The number of grains spike^{-1} of nine spelt genotypes in two examined years varied from 19.49 (SP1) to 30.34 (SP5), as presented in Table 4. Spike characteristics are always observed with particular attention, because they directly affect plant productivity. The analysis of variance of the average number of grains spike^{-1} indicated the difference between genotypes at $P \leq 0.001$, while the difference between growing seasons was not statistically significant, as well as the genotype × year interaction effect.

According to the LSD-test, the highest number of grains spike^{-1}, obtained in genotype SP5 (30.34) was not statistically significant in comparison to genotypes SP7 (29.62), SP4 (28.71), SP2 (28.30) and SP6 (27.85), but it was significantly higher at $P \leq 0.05$ in comparison to cultivar Nirvana (27.00) and at $P \leq 0.01$ in comparison to the remaining genotypes. The obtained average number of grains spike^{-1} are in accordance with Konvalina *et al*. (2010).

Tab. 4. The average number of grains spike^{-1} of the examined spelt genotypes
Просјечан број зрна у класу инспитиваних генотипова спелте

spelt genotypes	2015/16	2016/17	average for genotypes
SP1	20.33 ± 1.30	18.65 ± 1.36	19.49
SP2	28.88 ± 2.63	27.73 ± 1.31	28.30
SP3	25.50 ± 2.17	23.80 ± 2.56	24.65
SP4	28.44 ± 0.67	28.98 ± 1.22	28.71
SP5	28.43 ± 0.97	32.25 ± 1.54	30.34
SP6	27.22 ± 0.53	28.48 ± 1.57	27.85
SP7	29.93 ± 0.58	29.30 ± 1.86	29.62
Nirvana	25.53 ± 1.64	28.48 ± 1.29	27.00
Sitnica	23.10 ± 1.46	25.30 ± 2.17	24.20
average for years	26.37	27.00	
factors / interaction	A (genotypes)	B (years)	AB (genotype × year)
$F_{calculated}$	8.9456***	0.6799^{ns}	0.8228^{ns}
LSD 0.05	3.22	–	–
LSD 0.01	4.29	–	–

*Note: ns = not significant, * significant at P≤0.05, ** significant at P≤0.01, *** significant at P≤0.001.*

Spike index

The average spike index of different spelt genotypes in two growing seasons varied in ration from 0.60 (SP1) to 0.81 (SP7). In the first year of investigation spike index varied in ration from 0.63 (Sitnica) to 0.79 (SP7) while in the second year spike index varied in ratio from 0.55 (SP1) to 0.83 (SP7), as presented in Table 5.

The spike index was calculated as a ratio between the grain yield and the biological yield of spike. According to the analysis of variance, the difference between spelt genotypes was statistically significant at $P \leq 0.001$, while the difference between growing seasons was statistically significant at $P \leq 0.05$. The genotype × year interaction effect was not statistically significant.

Tab. 5. The average spike index of the examined spelt genotypes
Просјечан индекс класа испитиваних генотипова спелте

spelt genotypes	2015/16	2016/17	average for genotypes
SP1	0.65 ± 0.024	0.55 ± 0.014	0.60
SP2	0.71 ± 0.012	0.64 ± 0.021	0.67
SP3	0.71 ± 0.014	0.62 ± 0.023	0.67
SP4	0.71 ± 0.020	0.66 ± 0.006	0.69
SP5	0.67 ± 0.009	0.65 ± 0.006	0.66
SP6	0.66 ± 0.020	0.63 ± 0.017	0.65
SP7	0.79 ± 0.050	0.83 ± 0.133	0.81
Nirvana	0.66 ± 0.015	0.64 ± 0.027	0.65
Sitnica	0.63 ± 0.002	0.62 ± 0.008	0.62
average for years	0.69	0.65	
factors / interaction	A (genotypes)	B (years)	AB (genotype × year)
$F_{calculated}$	4.8489^{***}	4.7665^{*}	0.6669^{ns}
LSD 0.05	0.074	0.035	–
LSD 0.01	0.099	0.047	–

*Note: ns = not significant, * significant at P≤0.05, ** significant at P≤0.01, *** significant at P≤0.001.*

According to the LSD-test, the highest spike index obtained in spelt genotype SP7 (0.81) was statistically significant at $P \leq 0.01$ in comparison to the remaining genotypes. Also, the average spike index was significantly higher (at $P \leq 0.05$) in the first growing season (0.69).

Conclusion

This study has shown that expression of variation of morphological traits is in dependence to genotype and environmental factor. The genotype had significant influence for all analyzed traits and growing season (year) significantly affected spike length and spike index, while interaction genotype × year was statistically significant in the average number of spikes m^{-2}. Certainly, spelt genotype SP1 obtained the highest number of spikes per unit area in both experimental years. Genotype SP3 had similar tendency, with higher number of spikes m^{-2} in the second year (570.50). The average plant height of examined spelt genotypes in two successive years was very similar (130 cm on average).

The spelt genotypes SP4 (140.38 cm), SP5 (138.82 cm), Sitnica (137.66 cm) and SP6 (135.65 cm) showed the tendency of forming a relatively higher plants. The local landrace Sitnica obtained the highest spike length (14.07 cm on average), while the Montenegrin genotypes had relatively shorter spikes of 6.79 cm on average. The highest productivity, in terms of the average number of grains per spike, was obtained in the Montenegrin genotypes SP5 (30.34), SP7 (29.62), SP4 (28.71), SP2 (28.30) and SP6 (27.85), respectively.

References

Beres, B.L., McKenzie, R.H., Carcamo, H.A., Dosdall, L.M., Evenden, M.L., Yang, R.C. and Spaner, D.M. (2012). Influence of seeding rate, nitrogen management, and micronutrient blend applications on pith expression in solid-stemmed spring wheat. *Crop Sci*., *52*, 1316–1329.

Bonifácia, G., Galli, V., Francisci, R., Mair, V., Skrabanja, V. and Kreft, I. (2000). Characteristics of spelt wheat products and nutritional value of spelt wheat based bread. *Food Chem*., *68*(4), 437–441.

Capouchova, I. (2001). Technological quality of spelt (*Triticum spelta*) from ecological growing system. *Scientia Agriculturae Bohemica*, *32*, 307–322.

Cubadda, R., Marconi, E., Belton, P.S. and Taylor, J.R.N. (2002). *Spelt wheat, Pseudocereals and less common cereals: grain properties and utilization potential* (pp.153–175). Berlin/Heidelberg: Springer-Verlag.

Dorval, I., Vanasse, A., Pageau, D. and Dion, Y. (2015). Seeding rate and cultivar effects on yield, yield components and grain quality of spring spelt in eastern Canada. *Can. J. Plant. Sci.*, *95*(5), 841–849.

Janković, S., Ikanović, J., Popović, V., Rakić, S., Pavlović, S., Ugrenović, V., Simić, D. and Dončić, D. (2015). Morphological and productive traits of spelt wheat–*Triticum spelta* L. *Agriculture & Forestry*, *61*(2), 173–182.

Kondić, D., Bajić, M., Hajder, Đ. and Knežević, D. (2017). Variability of number of spikes per unit area and grain yield effected by different sowing densities of winter wheat (*Triticum aestivum* L.). *Agroznanje* (*Agro-knowledge Journal*), *18*(2), 131–141.

Konvalina, P., Capouchova, I., Stehno, Z. and Moudry, J. (2010). Agronomic characteristics of the spring forms of the wheat landraces (einkorn, emmer, spelt, intermediate bread wheat) grown in organic farming. *Journal of Agrobiology*, *27*(1), 9–17.

Konvalina, P., Stehno, Z., Capouchová, I., Zechner, E., Berger, S., Grausgruber, H. and Moudrý, J. (2014). Differences in grain/straw ratio, protein content and yield in landraces and modern varieties of different wheat species under organic farming. *Euphytica*, *199*(1-2), 31–40.

Lacko-Bartošovà, M. and Korczyk-Szabò, J. (2011). Indirect baking quality and rheological properties of spelt wheat (*Triticum spelta* L.). *Res. J. Agric. Sci.*, *43*, 73–78.

Longin, C.F.H. and Würschum T. (2014). Genetic variability, heritability and correlation among agronomic and disease resistance traits in a diversity panel and elite breeding material of spelt wheat. *Plant breeding*, *133*(4), 459–464.

Onishi, I., Hongo, A., Sasakuma, T., Tawahara, T., Kato, K. and Miura, H. (2006). Variation and segregation for rachis fragility in spelt wheat, *Triticum spelta* L. *Gen. Res. Crop Evol.*, *53*(5), 985–992.

Troccoli, A. and Codianni, P. (2005). Appropriate seeding rate for einkorn, emmer, and spelt grown under rainfed condition in southern Italy. *European Journal of Agronomy*, *22*(3), 293–300.

Ugrenović, V., Bodroža Solarov, M., Pezo, L., Đisalov, J., Popović, V., Marić, B. and Filipović, V. (2018). Analysis of spelt variability (*Triticum spelta* L.) grown in different conditions of Serbia by organic conditions. *Genetika*, *50*(2), 635–646.

Vukoje, V., Psodorov, Đ. and Živković, J. (2013). Profitability of production of pasta from spelt flour. *Economics of Agriculture*, *60*(2), 265–275.

Zecevic, V., Boskovic, J., Knezevic, D. and Micanovic, D. (2014). Effect of seeding rate on grain quality of winter wheat. *Chilean Journal of Agricultural Research*, *74*(1), 23–28.

Zečević, V., Knežević, D., Mićanović, D. and Madić, M. (2008). Genetic and phenotypic variability of spike length and plant height in wheat. *Kragujevac Journal of Science*, *30*, 125–130.

Zhi-En, P., Yu-Ming, W., You-Liang, Z. (2007). Genetic Variations of Gliadin and HMW Glutenin Subunits in Spelt Wheat. *Italian Journal of Agronomy*, *1*, 41–46.

Генотипови спелте (*Triticum spelta* L.) земаља западног Балкана

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Сажетак

Компоненте приноса учествују у формирању коначног приноса и варирају у складу са факторима генотипа и спољашње средине. Циљ овог истраживања је евалуација компоненти приноса генотипова спелте поријеклом из различитих земаља западног Балкана. Током двогодишњих истраживања 2015/16 и 2016/17 године у агро-еколошким условима Бање Луке испитивани су различити генотипови спелте. У раду је коришћено девет генотипова, локална популација спелте ситница поријеклом са Мањаче (Република Српска, БиХ), седам локалних популација из Црне Горе: KP34LJ5-1/34 (SP1), KR16LJ5-1/16 (SP2), KR29LJ5-1/29 (SP3), KR12LJ5-1/12 (SP4), KR15LJ5-1/15 (SP5), LJ5-1/9 (SP6), KR20LJ5-1/20 (SP7) и сорта нирвана из Србије. Примјењена је стандардна агротехничка пракса за производњу спелте. Анализирано је пет особина: број класова по m^2, висина биљака, дужина класа, број зрна по класу и индекс класа. Статистичка обрада података продуктивности генотипова спелте извршена је двофакторијалном анализом варијансе, док је значајност разлика утврђена Фишеровим LSD тестом на нивоу значајности $P \leq 0.05$ и $P \leq 0.01$. Генотипови SP4 (140,38 cm), SP5 (138,82 cm), ситница (137,66 cm) и SP6 (135,65 cm) су показали тенденцију формирања релативно виших биљака. Генотип ситница је имао просјечно најдужи клас (14,07 cm), док су генотипови поријеклом из Црне Горе имали релативно краће класове, у просјеку 6,79 cm. Генотипови спелте SP2, SP4, SP5, SP6 и SP7 су остварили просјечно највећи број зрна по класу, док је просјечно највећи индекс класа остварио генотип SP7 (0,81).

Кључне ријечи: крупник, продуктивност, локална популација, сорта

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