

Международна научна конференција „Селекција и агротехника на полски култури”

27- 28 ноември 2014 година

Институт по Земеделие - Карнобат

VARIETY SPECIFICITY OF TWO ROWS BARLEY IN REPUBLIC OF MACEDONIA

Dragica Spasova, Sasa Mitrev, Dusan Spasov, Biljana Atanasova, Mite Ilievski *

*University Goce Delcev – Stip, Faculty of Agriculture, Goce Delcevb.b. 2400 Strumica, R. Macedonia.

dragica.spasova@ugd.edu.mk

ABSTRACT

During the 2012/13 and 2013/14 surveys were performed to analyze variety specificity of different two rows barley genotypes in Republic of Macedonia. The experiment was performed on five barley varieties (line ZJA J/31, line ZJA J/2, Hit, NS 293 and Egej). The greatest average height of two rows barley plants in two-year trials, regardless of year of examination, had a variety Egej (123,9 cm), and the lowest, in two years of examination, line ZJA J/1 (112,1 cm). Compared between varieties, there are statistically significant differences.

The lowest length of the class had variety Egej (10,2 cm in 2012/13 and 9,8 cm in 2013/14), and the highest, line ZJA J/1 (11,8 cm 2012/13 and 11,6 cm in the 2013/14). Grains number per class in both years of testing is statistically different for different varieties. The lowest number of grains in the class had a line ZJA J/2 (28.2 to 27.2 in 2012/13 and 2013/14), and most, had the domestic line ZJA J/1 (30.4 in 2012/13 and 29,7 in the 2013/14).

The grain yield in the class, in both years of testing is statistically the highest at the line ZJA J/1 (1,78 g to 1,69 g 2012/13 and the 2013/14). Compared between varieties, there are statistically significant differences. The highest average yield, regardless of the year of examination, gave line ZJA J/1 (7240 kg/ha), and the lowest (5500 kg/ha) variety Hit. Compared between varieties, there are statistically significant differences at the level of 0.05.

Key words: variety, line, yield, length of class, grain in the class

INTRODUCTION

Barley (*Hordeum vulgare* L.) is one of the oldest crops, which according to world production of cereals, belongs to the group of the four most important economic crops, after wheat, rice and maize - Kanbar (2011). This culture has a wide range of distribution, primarily because of its flexibility and the possibility of growing in different ecological-climatic conditions - Lalević et al. (2012). Nowadays, mostly, barley is used in the industry for malt and beer and in the industry for the production of animal feed. Very little is used in human nutrition. Bread produced from barley flour has no good quality, has a bad odor and dries quickly, so it is desirable to mix with wheat and rye flour. Barley comes in different proportions in the production of concentrates for livestock and poultry. As best quality crop for producing animal feed barley plant serves as animal unit balancing meals fed to livestock - Đekić et al. (2011). It should be emphasized that the two rows barley grains should be a uniform size, shape and color, fully mature, with thin and delicate glums, high absolute and hectoliter mass and germination energy, to be a good raw material for the production of beer - Vasilevski (2004). One of the main tasks in the plant breeding, to increase the production of barley, is the creation of new genotypes with inherent potential for high and stable yield, expressed through high quality grain in different agro-ecological conditions. Agronomic value of the variety depends not only on the genetic potential for grain, but also the ability to achieve their genetic potential under different conditions of cultivation - Mladenov et al. (1998). The aim of our investigations was analyzing variety specificity of morphological, biological and production features of several recognized varieties and promising lines of two rows barley, in R. Macedonia.

RESULTS AND DISCUSSION

Morphological features

Table 3. Average values of some morphological features in production of two-line barley by year

Variants	Plant height (cm)	Class length (cm)	Number of grains in class	Grain yield per class (g)	Grain yield (kg/ha)
2012/2013					
ZJA J/1	105,3	11,8	30,4	1,78	7 320
ZJA J/2	114,0	10,6	28,2	1,55	7 060
Hit	117,6	11,2	29,0	1,52	5 800
NS 293	106,0	10,4	29,0	1,49	6 200
Egej	122,6	10,2	29,2	1,52	6 560
LSD 0,05 0,01	6,7 11,0	1,05 1,73	0,98 1,62	0,06 0,10	660 ns
2013/2014					
ZJA J/1	119	11,6	29,7	1,69	6 960
ZJA J/2	121	10,0	27,2	1,50	6 760
Hit	119,3	11,1	27,9	1,46	5 200
NS 293	121,6	9,8	27,7	1,41	5 660
Egej	125,3	9,8	28,3	1,47	6 400
LSD 0,05 0,01	ns ns	1,15 1,89	0,92 1,51	0,05 0,09	780 ns

The height of the stem is important variety characteristic which depends on the genotype, on the environmental conditions in which the variety is grown and applied agrotechnics. The most suitable varieties for achieving high and stable production are those with medium height of the plants. In our tests, measuring the height of the plants was done under full maturity of barley. The results of the height of plants in the production of two rows barley are shown in Table 3. In the first year of the examination (2012/13), the greatest height of the plants had a variety *Egej* (122,6 cm), and the lowest (105,3 cm) line *ZJA J/1*. Compared between varieties, there are statistically significant differences. In the second year of the survey (2013/14), the greatest height of the plants had variety *Egej* (125,3 cm), and the lowest (119,0 cm) line *ZJA J/1*. The greatest average height of plants in two rows barley from two-year trials, regardless the year of examination, had a variety *Egej* (123,9 cm), and the lowest in two years of examination, line *ZJA J/1* (112,1 cm).

From the results for length of the class in two rows barley (Table 3), it can be seen that in both years of testing there is statistically valid difference between varieties. In two years of testing, the smallest length of the class had a variety *Egej* (10,2 cm in 2012/13 and 9,8 cm in the 2013/14), and the highest length of class had line *ZJA J/1* (11,8 cm 2012/13 and 11,6 cm in the 2013/14). Grains number per class (Table 3) in both years of testing is statistically different for different varieties. In two years of testing, the smallest number of grains in the class had a line *ZJA J/2* (28.2 to 27.2 in 2012/13 and 2013/14), and most had a domestic line *ZJA J/1* (30, 4 in 2012/13 and 29,7 year in the 2013/14). In studies of other authors an increase of the numbers of grains in class is present in different two rows barley varieties - Pržulj, et al. (1996), Đekić et al. (2011). The yield of grain in class in both years of testing statistically is the highest at line *ZJA J/1* (1,78 g to 1,69 g 2012/13 and the 2013/14). Compared between varieties, there are statistically significant differences. In studies of other authors an increase in grain yield of class is present in different varieties of two rows barley - Đekić et al. (2011); Lalić et al. (2012).

CONCLUSION

Based on two years of research, about the variety specificity of the two row barley, in Republic of Macedonia, one can draw the following conclusions: Compared between varieties, there are statistically significant differences in plant height between two rows barley varieties tested. The greatest average height of two rows barley plants from two-year trials, regardless the years of examination, had variety *Egej* (123,9 cm), and the lowest, line *ZJA J/1* (112,1 cm). In two years of research, the smallest class length had variety *Egej* (10,2 cm in 2012/13 and 9,8 cm in 2013/14), and the highest length of class had line ZJA J/1 (11, 8 cm 2012/13 and 11,6 cm in the 2013/14). Grains number per class in both years of testing is statistically different for different varieties. In two years of testing, the smallest number of grains in the class had a line ZJA J/2 (28.2 to 27.2 in 2012/13 and 2013/14), and most had a domestic line ZJA J/1 (30, 4 in 2012/13 and 29.7 year in the 2013/14). The yield of grain in class in both years of testing statistically is the highest at line ZJA J/1 (1,78 g to 1,69 g 2012/13 and the 2013/14). Compared between varieties, there are statistically significant differences. The highest average yield, regardless of the year of examination, gave line ZJA J/1 (7240 kg/ha), and the lowest (5500 kg/ha) variety Hit.

LITERATURE

Đekić Vera, Milovanović Milivoje, Glamočlija Đorđe, Staletić Mirjana (2011): Yield and components yield grain in Kragujevac of winter barley varieties. 46th Croatian and 6th International Symposium on Agriculture. Opatija. Croatia (601-604).
Kanbar, A. (2011): Discriminating between Barley (*H.vulgare* L). Genotypes using morphological and ISSR Markers, American-Eurasian. Journal of Sustainable agriculture, 5 (3), 318-324.
Mladenov N., Przulj N., Hristov N. (1998): Year effects on wheat seed quality. International Symposium. Breeding of Small Grains Proceedinga. Kragujevac.
Lalić Alojzije, I Abičić, J. Kovačević, Gordana Šimić, G. Drezner, D. Novoselović, K Dvojković. V. Guberac (2012): Assessment of winter barley varieties under production conditions of the republic of Croatia. 47th Croatian and 7th International Symposium on Agriculture. Opatija. Croatia. 289-293
Lalević, D., Biberdzic, M. (2012): The influence of weather conditions and nitrogen fertilization of some characteristics of winter Barley. Third international scientific Symposium Agrosym Jahorina, 2012, 10.7251/AGSY 1203245L, UDK 633=631, 245-249.
Pržulj, N., Mikić Katica, Momčilović Vojislava, Malešević. M. (1996): Progress in forage and malting barley breeding. Research Institute of Field and Vegetable Crops, Novi Sad. vol.25. 291-302.
Vasilevski, G., 2004. Grain and Tuber Crops. (University book). University “St. Cyril and Methodius” - Skopje, Faculty of Agriculture Science and Food.

MATERIAL AND METHODS

The experiment was carried out for two years as follows: 2012/13 and 2013/14. The analyses were performed in field conditions in the experimental field of the Faculty of Agriculture in Strumica, “Goce Delchev” – University, Stip. The laboratory tests were performed in the laboratories of the Faculty of Agriculture. Five genotypes of winter, two rows barley, from which 3 registered varieties (*Hit*, *NS 293* and *Egej*) and two promising lines (line *ZJA J/1* and *ZJA J/2*) were used for analyses. Varieties Hit and Egej are selections of Agricultural Institute – Skopje, variety NS 293 is a selection of Institute for crop and vegetable production in Novi Sad, and the lines are selections of the Faculty of Agriculture, of the University “Goce Delcev” – Stip. Experiment consisted of five variants in three repetitions, distributed by the method of random block system, with dimension of the main parcel 5 m². The distance between the variants was 0,50 m, and between repetitions - 1,0 m. The distance between rows was 20 cm. Sowing was performed manually, in rows, at a depth of 4-5 cm. During the vegetation, standard agrotechnics for field production of barley was used. The height of all barley plant, 20 plants from each iteration, was measured, and the average was taken from 60 plants (3 x 20 plants). The yield of the grain is calculated in kg/ha, based on the weight of the grains obtained from each parcel, reduced to a unit area. Before harvest, from each parcel, material from 1m² for laboratory analysis was taken. In the laboratory were analyzed: length of class, number of grain in class and grain yield in the class. The obtained results are calculated according to statistical analysis of variance method and tested according to LSD-test.

CLIMATIC CONDITIONS

The average monthly temperatures prevailing in the vegetation period is considered as good for growing barley. Well hardened in winter barley plants serving low temperatures from -10 to -12 ° C - Vasilevski (2004), and is known as a culture that does not put special requirements to heat and is considered as resistant to lower temperatures.

Table 1. Average monthly temperatures in degrees

Year	Months												Annual sum of temp.	Aver. ann. temp.
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII		
2012	-0,3	0,8	9,1	13,5	17,7	24,0	27,6	25,1	20,6	15,3	9,6	1,5	5000,5	13,7
2013	3,4	6,1	8,8	15,3	20,1	22,0	23,6	25,8	19,0	13,5	9,8	1,9	5146,5	14,1
2014	4,7	7,5	10,2	12,8	17,4	21,7	24,1	24,0	18,2	13,8				
2001/2011	2,1	3,9	8,0	13,0	18,5	22,7	25,5	24,9	19,0	13,5	7,3	3,0	4783,5	13,4

Table 2. Amount of monthly rainfall in mm

Year	Months												Annual sum of rainfall in mm
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
2012	40,9	50,0	35,5	48,2	155,4	15,3	30,4	67,4	97,8	77,2	32,6	53,3	704,0
2013	75,3	162,5	62,3	51,3	42,8	129,3	28,6	1,0	37,0	52,8	71,6	30,8	745,3
2014	42,1	13,1	71,0	125,5	78,7	56,3	344	56,9	100,7	54,6			
2001/2011	43,7	36,8	42,7	41,9	56,9	52,3	33,6	41,6	60,2	83,2	44,5	78,8	548,1

According to Vasilevski, G. (2004), the ice at the end of the winter, at temperature of -10 to -12 °C causing harm. During the vegetation barley well bear high temperatures. From the data in Table 2, it can be noted that in the years of the examination schedule of rainfall is relatively good to meet the needs of barley for water, so there is no need for intervention irrigation.

The yield that is obtained from cultivated plants has always been the center of attention in humans. Therefore, in most scientific papers, yield is a parameter from which meaningful conclusions can be received and made. The yield is very variable feature that mostly depends on soil and climatic conditions, the applied agro-technical measures and genotype. The results of the grain yield in the production of two rows barley are shown in Table 3. The highest average yield, regardless of the year of examination, gave line *ZJA J/1* (7240 kg/ha), and the lowest (5500 kg/ha) variety *Hit*. Regardless the year of examination and weather conditions, high average grain yield gave line *ZJA J/2* (6910 kg/ha). These varieties can serve as a future major genetic material in the plant breeding to create varieties in which we want to emphasize this property. It can be concluded that the differences that occur between varieties under the same conditions of cultivation are due to the variety specificity, ie the specific genetic characteristics that possess the tested genotypes. Significant variations in the grain yield, depending on the impact of genotype and year of research, found also Đekić et al. (2011) and Mladenov et al. (1998).