VARIETY SPECIFICITY OF SOFT WHEAT VARIETIES AT ORGANIC PRODUCTION

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ABSTRACT

Surveys were conducted from 2004/05 to 2007/08 on ten (10) genotypes soft winter wheat. The main objective was to determine the variety specificity on wheat in organic production and to recommend varieties that will suit for organic production.

Varieties *podobrena orovchanka, lizinka, mila, bistra, orovchanka* and *olga* are best and most stable genotypes for high yield of good quality in organic wheat production.

Key words: *wheat, organic, varieties, specification, grain*

INTRODUCTION

Soft wheat (*Triticum aestivum spp. vulgare*) is the number one crop in the world plant production, the surface that holds, and the quantity of grain that is produced. It is the most important grain throughout the world. Organic wheat production in Macedonia is defined by law for organic production which is in accordance with EU law and WTO, thus prohibiting or exceptions permitting the use of agro-chemicals and efforts under strict regulations to properly utilize soil properly managed in terms of choice of crops, plant species and genotypes, the use of crop rotation, selection and method of processing soil, proper fertilization without the use of artificial mineral fertilizers, disease prevention, pests and weeds, with pre-defined pesticides of green list and application of biological measures, choice and selection of suitable genotypes for this type of production and others.

We made an attempt to analyze specificity at certain genotypes of wheat in organic farming and recommend good varieties of producers and industry for this production system.

MATERIAL AND METHODS

Tests were carried out four years: 2004/05 2005/06 2006/07 and 2007/08 in field and laboratory conditions of the Agricultural Faculty of the University Goce Delchev "-Stip Strumica. The following varieties were examined: *milenka, bistra, lizinka, altana, mila, orovchanka, olga, agrounija prima, podobrena orovchanka* and *pelisterka*.

Experiment was set at three repetitions with ten varieties, distributed by method of random block system, with dimension of the basic parcel 5 m^2. The distance between variants was 50 cm, and between repetitions 100 cm. The seed rate was 300 kg/ha or 30 g/m^2, or 6.000.000 – 6.500.000 grains of 1 ha. Preparing the soil before sowing consisted of primary deep plowing at a depth of 35 cm, then inflicted blown cow manure in quantities of 20 t/ha. After the deployment of manure, the surface is further processed. First sowing was performed on 05.11.2004, the second year of 15.11.2005, on 15.11.2006 the third and fourth on 23.11.2007. Sowing was done manually with a hoe, a depth of 5-6 cm. Nourishment of nitrogen fertilizer was omitted, and the use of any chemicals. Intensive growth of weeds was not observed because the crop was naturally protected by closer distance between rows (10 cm). In all species the properties of class length, number of grains per class, number of spikelet in class, grain yield, absolute and hectolitar mass of grain, protein content in grain, sedimentation value, gluten index, wet gluten, dry gluten and total germination were analyzed.

The obtained results were processed statistically by the method of analysis of variance and differences tested after LSD-test.

RESULTS AND DISCUSSION

The results for length of class, number of grains per class, number of spikelet in class, grain yield, absolute and hectolitar mass of grain, protein content in grain, sedimentation value, gluten index, wet gluten, dry gluten and total germination of soft winter wheat varieties grown in a system of organic production are shown in tables 1 and 2.

Table 1. Analyzed traits in soft wheat varieties in a system of organic production

traits **variety**	**length of class** **(cm)**	**number of grains per class**	**number of spikelet in class**	**grain yield (kg/ha)**	**absolute mass of grain (g)**	**hectolitar mass of grain (kg/hl)**
Milenka	10,75	46,32	18,48	6320	50,1	75,4
Bistra	11,31	45,70	19,78	6945	48,3	78,9
Lizinka	10,53	46,71	18,83	6320	43,4	78,6
Altana	9,98	50,54	18,98	5985	41,5	78,3
Mila	10,69	48,78	19,89	7380	48,1	78,2
Orovcanka	11,23	50,24	19,72	6660	47,1	76,5
Olga	10,91	54,15	21,44	6485	42,9	77,2
Agro. prima	13,54	52,26	20,78	6875	48,9	79,8
Im. Orovcanka	10,89	49,71	19,61	6570	45,5	76,3
Pelisterka	12,40	52,81	20,79	6145	46,2	79,9
Common average	**11,22**	**50,77**	**19,83**	**6568**	**46,2**	**77,9**
LSD 0,05 **0,01**	**0,93** **1,36**	**6,61** **8,20**	**0,71** **1,05**	**485,4** **н.с.**	**2,82** **3,94**	**2,15** **3,00**

Regardless of years of examination and varieties, the general average length of the class in this way the production was 11,22 cm. Highest average length of class, regardless of year, has variety agrounija prima (13,54 cm), and the lowest (9,98 cm) variety altana, that is absolutely for 3,56 cm or relative for 35.67% more. Regardless of climatic conditions of the year, in the system of organic production varieties suitable for the formation of long class despite agrounija prima (13,54 cm) are genotypes pelisterka (12,40 cm), bistra (11,31 cm) and orovchanka (11,23 cm). Differences that arise in the length of class between varieties in the same conditions of cultivation are due to different genetic characteristics.

From the results one can see obvious difference in the number of spikelet in the class at examined varieties. The highest average number of spikelet in the class had variety olga (21.44) and lowest (18.48) cultivar milenka, that is absolutely for 2.96 more or relatively for 16.02%.

Regardless of the year of cultivation and climatic conditions, genotypes with predisposition to form a larger number of spikelet in class in the system of organic production at tested varieties are olga (21.44), pelisterka (20.79), agrounija prima (20.78) and mila (19.89). The differences that arise are due to genetic specificity that has examined varieties.

Analyzing the above results, one can see obvious difference in the number of grains per class in the tested varieties. Regardless of age and varieties, the general average for the number of grains per class was 50.77. It can be concluded that the highest average number of grains per class in wheat, grown in a system of organic production, regardless of the year, had a variety olga (54.15) and lowest (45.70) variety bistra, that is absolutely for 8.45 or relatively for 18.49% grains more. Regardless of climatic conditions in the years of research, in organic production system, most

suitable varieties of tested genotypes, despite olga (54.15) are pelisterka (52.81), agrounija prima (52.26), altana (50.54) and orovchanka (50.24). These are the most suitable genotypes for this system of production with respect to this feature. These varieties can serve as a future basic genetic material in selection, to create varieties with which we want to emphasize this feature.

From the results obtained for grain yield in kg/ha in organic wheat production in Table 1, may be ascertained that the highest average yield, regardless of year, gave variety mila (7380 kg/ha), and lowest (5985 kg/ha), variety altana, which is absolutely for 1395 kg/ha more or relative for 23.31% more. Regardless of climate conditions in the years of testing in the system of organic production, the most yieldable varieties are mila (7,380 kg/ha), bistra (6945 kg/ha) and agrounija prima (6,875 kg/ha). These genotypes are most suitable for this system of production, to achieve relatively high returns in future organic production we recommend to introduce in production. It can conclude that the differences that occur between varieties in the same conditions of cultivation are due to different genetic determination of varieties to create a high yield of grain.

Regardless of climatic conditions in the years of research, in organic production system, most suitable varieties for the grain with high absolute mass are varieties milenka (50,1 g), agrounija prima (48,9 g), bistra (48,3 g) and mila (48,1 g).

The highest hectolitar mass at this system of production had variety Pelisterka (79,9 kg/hl), and the lowest (75,4 kg/hl) variety milenka, which is absolutely for 4,5 kg/hl, or relative for 5.97% more.

Table 2. Chemical and biological characteristics of soft wheat varieties in a system of organic production

traits **variety**	**protein content in grain (%)**	**sedimentation value (ml)**	**gluten index (%)**	**wet gluten (%)**	**dry gluten (%)**	**total germination of grain (%)**
Milenka	13,2	29,6	65,13	27,5	9,0	95,7
Bistra	13,1	28,4	60,41	28,4	9,9	95,4
Lizinka	14,8	32,5	64,60	34,4	11,1	98,0
Altana	13,4	29,7	76,95	28,7	9,4	96,7
Mila	13,2	25,1	53,87	30,2	10,1	94,4
Orovcanka	13,8	28,4	88,78	27,7	9,7	96,4
Olga	13,8	26,9	80,43	25,9	9,0	96,2
Agro. prima	12,5	20,9	61,77	21,1	7,2	95,1
Im.Orovcanka	13,9	35,2	81,05	30,1	10,4	94,6
Pelisterka	13,2	27,0	60,89	27,3	8,9	97,2
Common average	**13,2**	**28,3**	**69,34**	**28,1**	**9,4**	**95,9**
LSD 0,05 **0,01**	**1,03** **1,43**	**20,4** **28,5**	**17,98** **25,13**	**0,14** **н.с.**	**н.с.** **н.с.**	**н.с.** **н.с.**

From the results of protein content in grain in organic wheat production, in Table 2, can be concluded that the highest protein content in grain, regardless of the year, had a variety lizinka (14.8%) and lowest (12.5%) cultivar agrounija prima, which is absolutely for 2.3% or relatively for 17.69% more protein. Regardless of the year and climatic conditions, good protein content in grain, during the breeding system had other examined varieties. Regardless the climate conditions in the years of research, in organic production system, most suitable varieties for high protein content in grain are lizinka (14.8%), podobrena orovchanka (13.9%), olga and orovchanka (13.8%). These

genotypes are best for organic production system in relation to this property and recommend the same to such production are introduced. Variety lizinka (14.8%), can serve as a future basic genetic material selection for the creation of new varieties for organic production whose purpose is to obtain high grain content proteins. It can conclude that the differences that occur between varieties in the same conditions of cultivation are due to variety specificity.

From the results of sedimentation value, in Table 2, can be concluded that, regardless of the year, it was the greatest at variety podobrena orovchanka (35,2 ml), and the lowest (20,9 ml) at agrounija prima, that is absolutely for 14, 3 ml or relative for 68,42% more. Regardless of climatic conditions in the years of research in organic production system, most suitable varieties of high sedimentation value enhanced orovchanka (35,2 ml), lizinka (32,5 ml), altana (29,7 ml) and milenka (29.6 ml). These genotypes are most suitable for organic production system in relation to this property. While genotypes podobrena orovchanka (35,2 ml) and lizinka (32,5 ml) can serve as a future basic genetic material at selection for the creation of new varieties for organic production, whose purpose is to obtain high grain sedimentation value.

From the results of glutens index for organic wheat production, in Table 2, can be concluded that regardless of the year, he was the most at variety orovchanka (88.78) and lowest (53.87) in variety mila, that is absolutely for 34,9 1 or relative for 64.80% more. Regardless of climatic conditions in the years of research, in organic production system, most suitable varieties, with high value of gluten index are orovchanka (88.78), podobrena orovcanka (81.05), olga (80.43) and altana (76.95).

Regardless of climatic conditions in the years of research, in organic production system, most suitable varieties with high content of wet gluten are lizinka (34.4%), milanka (30.2%) and podobrena orovchanka (30.1%). It can conclude that the differences that occur in wet gluten content between varieties in the same conditions of cultivation are due to variety specificity. From the results of the dry gluten content in organic wheat production, in Table 2, can be concluded that regardless of the year, it was highest in the variety lizinka (11.1%) and lowest (7.2%) in agrounija prima that is more absolute for 3.9% or relative for 54.17%. Regardless of climatic conditions in the years of research in organic production system most suitable varieties with high content of dry gluten is lizinka (11.1%), podobrena orovchanka (10.4%) and mila (10.1%).

Comparing the total germination of wheat (95.9%) in this system of production with total germination for each variety, one can see that it is greater than the total germination of varieties milenka, bistra, mila, orovchanka, agrounija prima and podobrena orovchanka, and less of the total germination of varieties lizinka, Altana, orovchanka, olga and pelisterka.

CONCLUSIONS

Based on the four surveys (2004/05 2005/06 2006/07 2007/08) of variety specificity of soft wheat, grown in a system of organic production, can draw the following conclusions:

Highest average length of class, regardless of year, there was variety agrounija prima (13,54 cm), and the lowest (9,98 cm) variety Altana, that is absolutely 3,56 cm or more relative to 35.67%.

Varieties with a predisposition to form a larger number of spikelet in class in the system of organic production are examined genotypes olga (21.44), pelisterka (20.79), agrounija prima (20.78) and mila (19.89).

Moreover, it can be concluded that the highest average number of grains per class in wheat grown in a system of organic production, regardless of the year, had a variety olga (54.15) and lowest (45.70) cultivar bistra, that is absolutely for 8,45 or relative for 18.49% more grain.

The highest average yield, regardless of year, gave variety mila (7380 kg/ha). Thereby it can be concluded that the differences that occur between varieties in the same conditions of cultivation due to different genetic determination of varieties to create a high yield of grain.

Most suitable varieties with high protein content in grain are lizinka (14.8%), podobrena orovchanka (13.9%), olga and orovchanka (13.8%).

Most suitable varieties of high sedimentation value enhanced orovchanka (35,2 ml), lizinka (32,5 ml), altana (29,7 ml) and milenka (29,6 ml).

Most suitable varieties with high value of gluten index are orovchanka (88.78), podobrena orovchanka (81.05), olga (80.43) and altana (76.95).

Thereby it can be concluded that the differences that occur between varieties in almost all examined properties, at equal conditions of cultivation are due to variety specificity and, of course, of growing systems.

Varieties podobrena orovchanka, lizinka, mila, bistra, orovchanka and olga can be recommended as most suitable and most stable genotypes for high yield of good quality in organic wheat production.

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