THE INFLUENCE OF GROWING SYSTEM ON SOME MORPHOLOGICAL FEATURES OF OAT IN STRUMICA REGION

Dragica Spasova, D. Spasov, M. Ilievski, Biljana Atanasova*
**University Goce Delcev – Stip, Faculty of agriculture, Goce Delcev b.b. 2400 Strumica, R. Macedonia.* dragica.spasova@ugd.edu.mk; dusan.spasov@ugd.edu.mk; biljana.atanasova@ugd.edu.mk; mite.ilievski@ugd.edu.mk

ABSTRACT

During the period of 2005-2007 examinations were conducted with five oat populations (*population Krivogastani, population Trebenista, population Radolista, population from Bulgaria, population Kuceviste*) and three oat varieties (*Rajac, Slavuj and Lovken*), which were set in conditions of organic and conventional production.

The main aim was to determine the differences between some morphological features of the examined populations and varieties, which influence on the yield, directly or indirectly, as well as the differences that appear as a result of the growing system, respectfully, in conditions of organic and conventional production.

The number of ears in the broom of oat grown in condition of organic production (72,2) was bigger absolutely for 1,5 or relatively for 2,1% than in the conventional production(70,7). Also the number of grains in broom in the organic production (127,7) was bigger absolutely for 6,6 or relatively for 5,2% than the average number of grains in broom in the conventional production of oat (121,1). Comparing the average length of the broom in the both growing systems, was noted that the length of the broom is variety feature and populations with floppy broom had bigger length and the growing system did not affect on the broom length.

System of organic production of oat allows better development of the above mentioned parameters.

***Key words**: oat; grain; broom; organic; conventional; length.*

ВЛИЈАНИЕТО НА СИСТЕМОТ НА ОДГЛЕДУВАЊЕ ВРЗ НЕКОИ МОРФОЛОШКИ СВОЈСТВА НА ОВЕСОТ ВО СТРУМИЧКИОТ РЕОН

Драгица Спасова, Д. Спасов, М. Илиевски, Билјана Атанасова*

**Универзитет Гоце Делчев – Штип, Земјоделски факултет, Гоце Делчев б.б. 2400 Струмица, Р. Македонија. dragica.spasova@ugd.edu.mk; dusan.spasov@ugd.edu.mk; biljana.atanasova@ugd.edu.mk; mite.ilievski@ugd.edu.mk

INTRODUCTION

The oat (*Avena sativa* L.) is a crop which is mainly grown for the grain and the straw. Today, the oat is counted in the most important cultures in the human feeding, with increased request in the modern-day culinary and the foodstuff industry.

The bigger request for oat in human feeding is a result of the higher biological value and the feeding components that oat consists. It contains also soluble diet fibers, mainly β-glucans whose contents vary from 2, 5% to 6, and 5% (**Pržulj N., et al. 1998**). The content of the β-glucans in the oat grain affects in reducing the cholesterol in the blood, so the modern-day diet feeding is based on oat flakes (**Welch, 1991,** cited by: **R. Mlinar, 1996**).

Today, in the modern day, more attention is pay on the healthy food. According to the increased percent of diseased people from different diseases, for which food got in classical way of production in which the use of chemicals is big, is the main reason, people get started of using more healthy produced food for consumption.

The world tendency for producing healthy food requires the necessity in Republic of Macedonia to make examinations in that way and to get adequate knowledge for the reaction of the oat genotypes to the used agrotechnique.

The Organic production in Republic of Macedonia is regulated with legislation for organic production that is in agreement with the EU regulative.

In our examinations we made analysis of some morphological and production features of some oat populations and varieties in conventional and organic production with one aim, to determine the differences that appear as the result of growing system.

MATERIAL AND METHODS

The examinations were done on field and in laboratory. The field experiments were set on the field of UGD, Faculty of agriculture, Strumica, and the laboratory examinations were done in the laboratories on the Faculty for Agricultural sciences and food in Skopje and on the Institute for animal husbandry in Skopje.

The examination started at 2005 and lasted until 2007. Five oat population, of which four are home population and one is introduced from Bulgaria (*population Krivogastani, population Trebenista, populationRadolista, population from Bulgaria and population Kuceviste*), and three oat varieties (*Rajac, Slavuj and Lovken*) introduced from Serbia were analyzed.

Two experiments were set, one in condition of organic and one in condition of conventional production, in which all oat genotypes were maintained. The experiments consisted of 8 variants in four repetitions, arranged by randomized block system, with dimension of the basic parcel of 5 m^2. The distance between variants is 0,50 m, and between repetitions 1,0 m. The distance between lines at conventional production was 20 cm, and at organic production was 10 cm.

The seed range in both types of production was 550 grains per 1m^2, in other words, 5 500 000 grains per 1ha. In all years of examination the soil was prepared in the same way. During the autumn the surface was plowed in deepness of 30 – 35 cm, than the surface was separated and fertilized by methodological principle, so the surface predicted for conventional production was fertilized with 300 kg/ha NPK fertilizer in combination of 15:15:15, while the surface predicted for organic production, 20 t/ha organic fertilizer was inserted. After fertilizing the surface was additional cultivated and was leveled. The seed in all years of examination was done in March, 17.03.2005, 28.03.2006 and 06.03. 2007, when the conditions for seeding were optimal. The seeding was made by hand in rows, on 5-6 cm in deepness.

Before yield, from each parcel is taken material from 1 m^2 for laboratory analyses. In the laboratory were analyzed number of ears in the broom and the number of grains in broom. For these analyses 30 plants from each parcel were used, respectfully 120 plants by each variant.

The obtained results are elaborated by statistical analyses of variance, and the differences are tested by LSD-test.

RESULTS AND DISCUSION

Number of ears in broom

The number of ears in the broom is direct indicator for fertility of some genotype, which is depended on the soil and climatic conditions, used agrotechnical measures, genetic potential of the variety and etc. Results for the number of ears in the broom in the conventional production are shown in Table 1. Results for the number of ears in the broom in the organic production are shown in Table 2.

Table1. Number of ears in the broom in conventional oat production

Variety/population	year			Average by variety/population 2005/07
	2005	2006	2007	
Krivogastani	64,6	62,6	50,5	59,2
Trebenista	69,5	74,6**	63,0**	69,0
Radolista	70,9	67,7	50,5	63,0
Bugarija	71,6	78,4**	65,1**	71,7
Kuceviste	78,3	88,8**	58,2*	75,1
Rajac	88,6	76,7**	64,8**	76,7
Slavuj	86,7	72,5*	66,9**	75,4
Lovken	82,0	77,2**	67,5**	75,6
Average by year	76,5	74,8	60,8	70,7
LSD 0,05 **0,01**	H.C. H.C	7,99 11,57	7,20 10,43	

Table2. Number of ears in the broom in organic oat production

Variety/population	year			Average by variety/population 2005/07
	2005	2006	2007	
Krivogastani	69,9	52,7	50,3	57,6
Trebenista	82,9	78,5**	68,0**	76,5
Radolista	71,9	75,2**	53,3	66,8
Bugarija	81,9	77,2**	68,9**	76,0
Kuceviste	77,5	83,4**	61,3*	74,1
Rajac	96,7**	75,7**	66,0**	79,5
Slavuj	79,5	74,7**	67,2**	73,8
Lovken	80,0	73,4**	66,4**	73,3
Average by year	80,0	73,8	62,7	72,2
LSD 0,05 **0,01**	19,9 24,5	11,85 17,15	9,86 12,93	

The way of oat production showed some increasing of the number of the ears in the broom. At organic production, the number of the ears in the broom (72.2) is bigger absolutely for 1.5 or relatively for 2.1 % from the number of ears in the broom at conventional production (70,7). These differences are result of the different agrotechnics that was used in the both production systems.

The best results for the average number of ears in the broom in the three year examinations, irrespective the varieties and populations, in the organic and conventional oat production were got in 2005 (80.0 and 76.5

Irrespective the year, soil and climatic conditions and growing system, the best genotype from the examined varieties and populations for giving bigger number of ears in the broom is the variety Rajac. That variety in the organic production reached average number of ears in the broom of 79.5, and in the conventional production 76.7.

Nimber of grains in broom

The number of grains in the broom depends on the soil and climatic conditions, used agrotechinal measures, genotype etc. The number of grains in the broom is proportional with the yield.

The results for the number grains in the broom at organic production are shown in table 4, and for conventional production are shown in Table 4.

Table 3. Number of grains in the broom at organic oat production

Variety/population	year			Average by variety/population 2005/07
	2005	2006	2007	
Krivogastani	120,8	101,1	91,8	104,6
Trebenista	122,5	122,0	112,2	118,9
Radolista	121,1	109,7	110,5	113,8
Bugarija	133,3	129,7	120,5	127,8
Kuceviste	117,1	131,0	118,6	122,2
Rajac	143,0	122,8	125,1	130,3
Slavuj	126,8	128,5	120,5	125,3
Lovken	130,0	119,8	127,3	125,7
Average by year	126,8	120,6	115,8	121,1
LSD 0,05	H.C.	23,12	17,8	
0,01	H.C	H.C.	25,8	

According to the averages of number of grains in the broom in both growing systems, irrespective the years, genotypes and climatic conditions, and depending to the used agrotechnical measures, it could be said that the number of the grains in the broom at organic production (127.7) is bigger absolutely for 6.6 or relatively for 5.2 % than the number of the grains in the broom at conventional production (121.1).

Comparing the number of the grains in the broom by years in both growing systems, irrespective the varieties and populations and depending of the used agrotechnical measures it could be said that at organic production the number of grains in the broom is bigger than in the conventional production. Also, it could be noticed that agrotechnical measures used in the organic production had positive effect on increasing of the number of the grains in the broom at oat.

Irrespective the year, soil and climatic conditions and growing system, the best genotype from the examined varieties and populations that gave biggest number of grains in the broom was variety Rajac. At organic production variety Rajac reached average 138.7 grains in the broom, and in the conventional production 130.3 in average.

CONCLUSIONS

Based on the three years examinations of some morphological and production features of oat, produced in organic and conventional conditions, the following conclusions could be made:

- All varieties grown in conditions of organic production have bigger average number of ears in the broom for absolutely 1.5 or relatively for 2.1 % than those grown in conventional production.
- Variety Rajac have reached the highest average number of ears in the broom, 79.5 ears in organic production and 76.7 ears in conventional system.

Table 4. Number of grains in the broom at organic oat production

Variety/population	year			Average by variety/population 2005/07
	2005	2006	2007	
Krivogastani	121,1	109,7	94,8	108,5
Trebenista	134,7	121,2	121,8	125,9
Radolista	127,9	117,2	115,5	120,2
Bugarija	154,1*	126,1	125,4	135,2
Kuceviste	115,3	132,4	128,8	125,5
Rajac	144,8	138,3	130,4	137,8
Slavuj	136,3	136,5	125,9	132,9
Lovken	138,3	140,0	128,0	135,4
Average by year	134,1	127,7	121,3	127,7
LSD 0,05	33,1	26,5	10,10	
0,01	H.C.	H.C.	14,59	

- Number of grains in the broom at organic production (127.7) is bigger absolutely for 6,6 or relatively for 5.2 % than the number of grains in the broom at conventional production (121.1).
- Variety Rajac have reached the highest average number of grains in the broom, 137.8 ears in organic production and 130.3 ear in conventional system.

- Oat organic production allows better development of the crop in respect of these parameters.

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