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LONG-TERM EXAMINATION OF POTATO VARIETIES IN SARAJEVO-ROMANIJA REGION

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Abstract

In this paper the results of examination the productivity of 10 potato varieties are given. The experiment was carried out on the experimental field of Faculty of Agriculture in East Sarajevo, "KULA", on the brown valley soil in the period of five years (2007 – 2011). The aim of our studies was to determine the genetic potential of the examined varieties. In certain years of examination, the variation in yield and weight of tubers were determined. The yield was also affected by the weather conditions so that higher or lower yield variation in some varieties were recorded. The varieties with the highest yield were: Agria, Anais, Kennebec and Arnova. There is a need to expand these examinations in future, and to expand the number of examination sites with the aim of their detection and implementation into the production of stable and productive variety, and aloso the increasing of the average potato yield.

Key words: *potato, yield, variety*

Introduction

In Republic of Srpska, potato is cultivated on 14 500 hectares with an average yield of about 11 t/ha (Statistical Yearbook of Republika Srpska, 2007-2011), although some farmers achieve yield of over 30 t/ha. Larger areas sown with potato are located in lowland areas, although the potato sown with spring wheat is of great significance for hilly-mountainous regions. Several varieties are presented in a wider production.

This issue was treated by Đorđević, 2000, Ćota et al 2000, Bugarčić et al 2000, Milić and Bogdanović 2009, Milić and Kovačević, 2009.

The aim of the research was to discover the genetic potential of potato varieties in the agro-ecological conditions of Sarajevo-Romanija region.

Materials and methods

In the five-year period (2007 – 2011), the varietal trials were set on the experimental field of the Faculty of Agriculture in East Sarajevo in five replications in completely randomized block system. Examinations included 10 varieties (Agria, Aladin, Anais, Arnova, Desiree, Kennebec, Liseta, Ostara, Riviera and the Terra Gold). The biggest problem in these examinations was the purchase of seed material of certain potato varieties.

The crop planted before potato was barely. Primary tillage was conducted in autumn by 30 cm deep plowing and with mineral fertilizing ($N_{10}P_{20}K_{30}$ in the amount of 800 kg/ha). Elementary plot (25 m^2) consisted of four rows of 10 m length and the planned plant population per hectare was 40 000 plants. The seed of original category was used for planting. The soil of the experimental field is brown, valley. The number of tubers and their weight

were determined after harvest. Tuber yield per hectare was calculated. Statistical data processing was done using variance analysis method, and as for individual comparison tests, the LSD test was used.

Meteorogical conditions during the performance of the experiments

In the potato production, the climatic conditions are important, especially the amount and distribution of rainfalls. Meteorological data given in Table 1 show that there is often a lack of rainfalls during the summer or the amounts of rainfall are not equally distributed. Temperature conditions were appropriate for potato cultivation.

Table 1. Meteorogical data – Sarajevo

Months	2007		2008		2009		2010		2011		Average 1961-1990	
	°C	l/m^2	°C	l/m^2	°C	l/m^2	°C	l/m^2	°C	l/m^2	°C	l/m^2
I	-2.4	28.6	0.2	28.6	-1.3	82.2	0.3	118.3	0.2	12.9	-0.8	74
II	0.1	14.5	2.0	14.5	1.2	29.8	0.8	63	0.6	22.6	1.7	69
III	4.1	144.2	5.4	144.2	4.9	62.4	5.0	55.6	5.2	27.8	5.5	73
IV	11.9	83	11.0	62.3	12	35.6	10.3	45.4	11.0	31.4	10.0	76
V	15.9	48	16.2	59.2	16.2	72	14.5	63.2	14.0	70.4	14.8	85
VI	20.1	79	19.9	86	17.8	116.6	18.1	147.8	18.9	23.4	17.7	94
VII	22.0	67	20.3	85.5	20.7	40.4	20.6	26.0	20.5	93.4	19.7	83
VIII	21.6	109	20.7	7.8	20.2	42.6	20.9	31.8	21.7	4.4	19.4	73
IX	15.2	148	14.1	60	16.3	12.8	14.6	95.4	19.1	45	15.9	73
X	13.3	19	11.2	47.4	9	125.4	8.3	48	9.2	47.8	10.9	79
XI	8.2	25	6.6	92.4	6.6	43.8	8.7	113	3.7	22	5.6	98
XII	1.3	58	1.2	86.7	2.0	87.2	0.6	100.1	2.3	80.6	0.4	88
Average / Total	10.9	823.3	10.7	774.6	10.5	750.8	10.2	907.6	10.5	481.7	10.1	965

In 2007, the average annual temperature in Sarajevo was 10.9°C and the total amount of rainfall 823.3 l/m^2 . The average monthly temperatures during the conduction of the trial were higher than average. During the spring, there were enough rainfalls, while in summer there was their.

In 2008, the average monthly temperature during the conduction of the trials were higher than average. During the spring, there were enough rainfalls, while there was a deficit of the rainfalls in summer.

In 2009, the average annual temperature in Sarajevo was 10.5°C, and the total amount of rainfall 750.8 l/m^2 . The average monthly temperatures during the vegetation period of potato were extremely higher than the average. Throughout the year, there were enough in rainfalls.

In 2010, the average annual temperature Sarajevo was 10.2°C. It was extremely hot in 2010, but the amount of rainfall of 907,6 l/m^2 was also extreme.

In 2011, the average annual temperature was 10,5°C. It was very hot in 2011, but also very dry, 481.7 l/m^2.

Results and discussion

Number of tubers.

The number of stolons and the number of formed tubers (Knowles, 2003) depends on the genetic capacity of the plant, as well as on the conditions of growth and development of the inner physiological factors that enables this ability to materialize. Tuber formation takes place in 4 – 5 weeks after germination, and in normal years, there are tubers formed on each

stolon. Lack of moisture in this period leads to weaker stolon formation and thus fewer number of tubers (Pisarev and Moros, 1991; Postic et al., 2011)

Table2. Tuber Number

Variety	2007	2008	2009	2010	2011
Agria	9.8	8.7	9.4	10.3	9.6
Aladin	8.2	9.4	8.7	8.8	7.8
Anais	13.4	-	12.5	12.5	12.8
Arnova	10.6	-	11.3	10.5	-
Desiree	7.5	9.5	9.2	9.3	8.5
Kennebec	-	-	10.5	11.8	11.4
Liseta	9.5	-	9.6	8.9	-
Ostara	-	6.5	5.3	5.9	5.3
Riviera	10.1	8.2	11.2	8.9	8.5
Terra Gold	-	9.5	9.2	9.5	-
LSD $_{0,05}$	1.859	1.245	0.794	0.957	0.853
$_{0,01}$	2.454	1.804	1.268	1.435	1.375

At Ostara variety, we have found the smallest number of tubers in all years of examination, while Anais, Kennebec, and Arnova varieties formed more than ten tubers per plant (Table 2). The Riviera had the highest variations in number of the formed tubers, and Terra Gold had the lowest. The size of the tubers is a varietal characteristic but it also depends on the number of agro-technical measures, the soil type and its structure, as well as on meteorological conditions during the vegetation period of potatoes (Ilin et al., 2000).

Table 3. Tuber Weight (g)

Variety	2007	2008	2009	2010	2011
Agria	77.20	79.51	72.42	75.32	77.56
Aladin	75.35	70.54	72.95	74.23	71.32
Anais	53.54	-	54.43	50.85	52.45
Arnova	65.22	-	68.00	63.20	-
Desiree	68.84	58.50	59.63	56.97	57.34
Kennebec	-	-	60.14	62.24	60.55
Liseta	62.30	-	65.51	66.93	-
Ostara	-	72.11	77.11	73.51	74.21
Riviera	65.21	69.10	68.24	66.37	65.45
Terra Gold	-	65.21	65.12	62.22	-
LSD $_{0,05}$	9.005	7.540	6.549	8.351	5.436
$_{0,01}$	12.085	9.813	8.841	12.022	8.638

Tuber weight.

Anais and Desiree varieties had the smallest, while Agria variety had the biggest tubers (Table 3). The differences found were statistically significant. Achieving high potato yield depends on a series of factors. Along with the favorable climatic factors during the growing season of potatoes, the determining factors are variety, the use of adequate amount of fertilizers, as well as appliance of appropriate tillage systems and crop care.

Tuber yield.

In 2007, variety Desiree had the lowest tuber yield (20.65 t/ha), and Agria variety had the highest tuber yield (30.24 t/ha). The differences found were significant. Varieties Anais, Riviera and Arnova had high yields, while varieties Aladin and Liseta lower than 25 t/ha.

Tabele 4. Tuber yield in t/ha

Variety	2007	2008	2009	2010	2011
Agria	30.24	27.65	29.14	31.03	29.78
Aladin	24.70	26.42	25.56	26.12	22.25
Anais	27.65	-	26.75	25.42	26.85
Arnova	27.64	-	27.25	26.54	-
Desiree	20.65	22.19	21.77	21.19	19.49
Kennebec	-	-	28.32	29.37	27.61
Liseta	23.65	-	23.09	23.82	-
Ostara	-	18.65	17.93	17.34	15.73
Riviera	26.32	22.65	24.64	23.62	22.25
Tera Gold	-	24.75	24.75	23.64	-
LSD $_{0,05}$	2.547	2.856	1.857	3.457	2.251
$_{0,01}$	3.587	3.896	2.894	5.032	3.362

In 2008, variety Ostara had the lowest tuber yield (18.65 t/ha), and variety Agria the highest one (27.65 t/ha). In the crop of Aladin variety was also measured high yield (26.42 t/ha).

In 2009, variety Agria gave the highest ŧ yield (29.14 t/ha), and variety Ostara had the lowest one (17.93 t/ha). The differences found were significant. Varieties Kennebec and Arnova had the high yields, too.

In 2010, in the crop of Ostara variety was measured the lowest tuber yield (17.34 t/ha), while variety Agria had the highest one (31.03 t/ha). The differences found were significant. Varieties Kennebec, Aladin and Arnova gave also high yield.

In 2011, variety Ostara gave the lowest (15.73 t/ha), and variety Agria the highest tuber yield (29.78 t/ha). The differences found were significant.

In all years of examination, varieties Liseta, Arnova and Terra Gold had the lowest and, Aladin and Riviera the highest variation.

Conclusion

On the basis of the five-year (2007 – 2011) varietal examinations set on the experimental field of Faculty of Agriculture in East Sarajevo, we can conclude the following:

Varieties Agria, Anais, Kennebec and Arnova had the highest yield. The lowest variations in yield, during the years of examination, were recorded at varieties Agria and Desiree, and the highest ones at varieties Ciklon and Jaerla.

Variety Ostara had the lowest, and Anais, Kennebec and Arnova the highest number of tubers per plant. Variety Agria had the biggest, and Desiree and Anais the smallest tubers.

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