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THE COMPARISON OF SOME POTATO CULTIVARS (*Solanum tuberosum L*) FOR QUANTITATIVE AND QUALITATIVE PARAMETERS

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Abstract

The objective of this study was testing some of the potato cultivars for quantitative and qualitative parameters. The cultivars of potato were with different origin and institutions. The experiment was located in the area of Vushtrria near Prishtina of 30 km. In this experiment for sowing was used the original seed from the Netherlands and Germany. The design of the experiment was random complete block with four replication. The active surface of the plot was 28 m^2 or 40 plants per plots or 4 repetition x 28 m^2 = 112 m^2. The distances between plants were 0.70 x 0.40 m or in total 35,714 plants per hectare. The investigated parameters in this study were; dry matter (DM), Starch content relative (SCR) value expressed in percentage and yield (t/ha).The starch content was determined by Nydrl's methodology. Dry matter is determined in equipment METTLER Toledo LC PR-P 43, which was responsible for this kind of study. The investigated parameters of potato cultivars were with higher significance for level 0.05 and 0.01. The total average value for dry matter (DM) at all cultivars was 16.72 to 16.84%, while the differences between them were 0.12%. The Starch content (SC) in our investigations was with average value 11.10%, with differences between cultivars were significantly higher. For average yield was obtained value 53.61 t/ha which was relatively higher average yield. The differences between cultivars for yield were +0.72 t/ha or in relative value 1.34%.
Key words: Potato cultivars, yield, dry matter, starch content.

INTRODUCTION

Data from scientific research and production experience show that from potato high yields can be achieved only when ecological and biological requirements are known and in relation to that advanced cultivation techniques are implemented. In Kosovo yield from this crop are low, even though cultivars in the market have high

production yield potential. This is associated with economic losses for local farmers and local economy. Surfaces planted with potatoes, from the group of arable crops are ranked after wheat, maize, alfa alfa and barley. Statistical data are showing that dependent from year, potato in Kosovo is planted in between 8000-10.000 ha (MAFRD, 2009). Average yield varied between 10.49 t/ha in 1996, to 13.55 t/ha in 2001 (SOK – Statistical Office of Kosovo 2009). This yield is very low compared to developed agricultural countries.

Potatoes main starch crop used for direct consumption, for industrial processing and animal fodder production *(Rusinovci, I. et al. 2001).* Potato cultivation for our conditions is economically viable for following reasons: high yield production potential, requires intensive labour and mechanization and investment in inputs, achieves high starch, protein, mineral and vitamin values, our agro-ecological conditions are appropriate for biological requirements, its is used for culinary reasons, for industrial processing, animal fodder etc. Kosovo market absorbs majority of potato production.

Potato in world is cultivated in around 20-25.000.000 ha, while 70 % of surface is in Europe where 80% of total world production is concentrated *(Fetahu, Sh. et al. 2004).* Otherwise proper cultivation of this crop is achieved only when ecological conditions are understood properly, appropriateness of different varieties with high yields for our agro-ecological conditions, cultivation conditions and in accordance with them to adapt advanced techniques of cultivation with which actually modern and competitive production is linked *(*Araji, A. et al. 2002*)*. Like this in Kosovo soon we can achieve levels of yields of Western EU countries. For human consumption today in world there are over 150 products from potato and the same is used for preparation of 700 culinary recepies. (Botorac., Bolf. 2000). In realization of low yields from potato under our conditions they are affected by following: low level of production technology, use of low quality planting material and lack of rain during the vegetation. Actually use of potato is following: 52 % for human consumption, 34 % for animal fodder, 10 % for reproduction, 3 % for starch production and 1 % for alcohol production (Abdelgadir, A. H. et al. 2003). During the 50 year period (1950-2000), production of potatoes is increased by only 40 %, while cereal production has increased much more like: for wheat by 3.42 times, maize 2.8 times *(Rusinovci I. 2002)*. Still only crop exported from Kosovo in the region is potato.

As it is impossible to realize high yields, without cultivation of high yield production potato and as well without use of proper agro technique is impossible to use production potentials of this cultivars. In this way we can realize not only high production but stable as well.

If we achieve to increase average yields country wide with advanced technology from 10-13 t/ha, up to 20 t/ha at level of Czech Republic, Poland, Hungary etc, this except that doubles production, at the same time will decrease cost of production *(*NASS, 2002). Agronomic resources and ways exist for this purpose. This is given from our research and experimental trials executed during 2009 in Pestova. Objectives of the research were to test some potato cultivars of different origins for quantity parameters (yield) and quality (high content of dry matter and starch).

MATERIAL AND METHODOLOGY

Experiment was set in Pestova, Vushtrri municipality 30 kilometres from Prishtina, during 2009. In research we included 8 potato cultivars (4 from Holland and 4 from Germany) in four repetitions, based on random system. Main preparation of land was done in autumn while land preparation for planting in spring. For basic fertilization combination NPK 15:15:15 (800 kg/ha) was used. Re fertilization was done with KAN 27 % N 200 kg/ha. Previous culture was wheat. Distance in planting was: 70 x 40 cm achieving 3,57 plants/m^2 (35.714 plants/ha), longitude of lines 4 m and distance between plots 2 m. Surface of experimental plot was 12 m^2. Planting was finished on 17. 04. 2009. Pesticides used were: Glifosat in autumn while during vegetation Sencor and Foksin. Potato was harvested with potato harvester. Mechanical damages were at very low level or less than 1 % for all repetitions. For each variant two middle lines and packed in separate marked bags for each variant. After that bags were measured and results from four repetitions we divided by four. Values were divided with number of plants in lines harvested finding average weight of plant for each cultivar. The same we multiplied with number of plants per hectare finding yield per hectare.

Climate Conditions

Between ecological factors limiting potato production are climate conditions. These we can not change, but we can understand them and use them to increase yields of this crop. Potato is weak on higher and lower levels of temperature and humidity. Optimum conditions for germination are 15°C, for flowering 20°C and for tubers 17-19°C. In temperature over 29 % tubers stop development. Temperatures over 30 % for long time during tuber formation creates 'ecological degeneration'. As a result normal creation of matters is difficult, diseases are present, production and tuber quality is lower.

In table.1 we present temperature conditions related to biological demands of potato (IHMK, 2009). It presents that biological conditions of potato are appropriate for the cultivation region and ecological conditions.

If we compare humidity curve with biological requirements, we see difference since this amount of rain are not satisfactory in July and August when plants are characterised with high vegetative and reproduction development. This can be confirmed in most of the production regions with low yields realized till now.

Table 1. Temperatures and average rainfall during 2009 (°C and mm)

Months	Air temperature (°C)	Rainfall (mm)
January	0.0	19.0
February	3.4	4.5
March	7.0	93.5
April	11.3	16.4
May	15.3	64.9
June	20.0	113.4
July	21.1	68.6
August	22.5	20.4
September	15.3	44.0
October	12.5	44.2
November	7.3	46.9
December	3.2	105.8
Maximum (°C & mm)	22.5	113.4
Average (°C & mm)	54.80	53.46
Minimum (°C & mm)	0.0	4.5
Yearly total (°C & mm)	657.7	641.6
Potato biological requirements (ideal)		
Germination 13-15 °C	*Flowering-tuber development 18-20 °C*	Maturity *18 °C*

RESULTS AND DISCUSSION

From variance analysis our results for analyzed parameters differences were highly significant for both levels 0.05 and 0.01 that are presented in table 3.

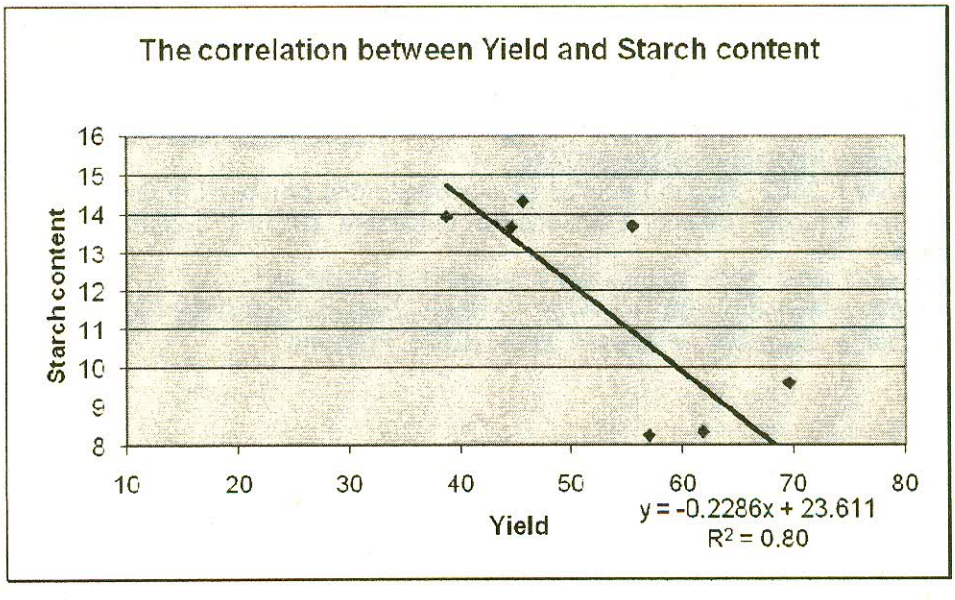
Table 2. Production realized for quantity & quality parameters on researched cultivars

Nr.	Cultivars	Yields kg/plant	Yield t/ha	Dry matter %	% Starch
1.	Kondor	1.95	69.62	15.22	9.60
2.	Virgo	1.73	61.82	14.06	8.33
3.	Impalla	1.57	64.94	12.63	7.03
4.	Amarosa	1.57	56.98	14.02	8.24
5.	Sempra	1.05	38.76	19.72	13.94
6.	Diana	1.57	55.57	19.04	13.68
7.	Panda	1.25	44.61	19.52	13.64
8.	Sirius	1.28	45.65	20.01	14.30
LSD 0.05 0.01		0.076 0.103	1.69 2.30	0.34 0.46	0.18 0.25

From table 2 it results that different cultivars for crop yield are realizing different production yields even though agro ecological conditions were the same. Kondor cultivar in our research achieved higher average value compared to other cultivars, difference was 0.95.

During 2009 around 50 % of higher production was realized by Kondor cultivar (69.62 t/ha), compared to the lowest yields realized from cultivar Sempra (38, 76 t/ha). Differences between them were + 30.86 t/ha highly significant for both levels 0.05 =1.69 and 0.01=2.30. High yields as well were realized by cultivar Impalla (64.92 t/ha) and Virgo (61.82 t/ha). Other cultivars realized yields between this value. This is about the yields realized. Results presented in table 2 about the quality realized (dry matter and starch content), differences between cultivars were as well significant. Average total value in our research for DM was 16.78 %. While the highest value of DM was achieved in cultivar Sirius with average value of 20.01 %, while the lowest value of DM was realized at cultivar Impalla with average value 12.63%. Differences between them were +7.38 %. From our research we can conclude that the highest content of DM and starch was realized at German cultivars compared with Holland one. This can be noticed with starch content where Sirius cultivar achieved the highest starch content (14.30 %) and Sempra (13.94 %), while the lowest is Impalla (7.03 %). Differences between cultivars were +7.27%, highly significant difference for both levels 0.05 and 0.01. Table 2. Correlation value between parameters Yield and % of starch was r= 0.80.

Graph 1: The correlation between yield and starch content in (%)



Conclusions

From the research data about potato production, in our agro-ecological conditions following conclusions are reached:

1. Agro-ecological conditions are favourable for intensive potato production, because it was achieved yields between 40-60 ton/ha, but while average country yield is 10-13 ton/ha.
2. Highest yield was achieved by cultivar Kondor (69.62 t/ha), Impalla (64. 94 t/ha) and Virgo (61.82 t/ha), while the lowest Sempra cultivar (38.76 t/ha).
3. Production potential of potato cultivars is much higher compared with average production which is realized in Kosovo. Farmers need to take and improvement all agro techniques steps in long chain of potato production.

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