

DETERMINATION OF SOME QUANTITATIVE AND QUALITATIVE CHARACTERISTICS OF SOME POTATO CULTIVARS IN THE REGION OF POLOG

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Abstract

The purpose of the experiment was to investigate some quantitative and qualitative characteristics of some potato cultivars cultivated in the Polog region such as: crop yield, yield per hectare, share of dry matter, starch and sugars and determination of specific gravity.

For this purpose, the field experiment was set up in the locality of Sellarcë e Epërme in the production year 2020. The experiment was set up according to the randomized method with three replications. For the experiment were taken the following cultivars: Jelly, Marabel, Georgina, Lucinda, Laura and Actris.

Based on the obtained results, it was concluded that the cultivar with the highest average weight of tubers per plant resulted in the Jelly cultivar with 1200 gr / plant, while the cultivar with the lowest weight of tubers per plant resulted in the Marabel cultivar 1020 gr / plant.

The highest average yield of tubers per hectare was the Jelly cultivar at 51600 kg / ha and the lowest at the Marabel cultivar 43860 kg / ha.

The obtained results show that the highest percentage of dry matter was found in the Laura cultivar 20.43% while the lowest Lucinda cultivar 17.98%.

The percentage of starch that is in direct correlation with dry matter, in higher values was found in the cultivar Laura 14.05% while in the lowest value in the cultivar Lucinda 11.7%.

Based on the obtained results we can conclude that the highest percentage of sugars had the cultivar Georgina 0.431% while the lowest cultivar Laura 0.039%.

Also, the specific weight as a qualitative characteristic is higher in Laura and Marabel 1,082 cultivars, while the lower cultivar is Lucinda 1,069.

Keywords - cultivar, starch, tubers, dry matter, specific gravity.

Introduction

Potato (*Solanum tuberosum* L) is a plant of great importance for human food, industry and pet food. One kilogram of potatoes gives about 800 calories. It serves as a starting point for the food industry by producing from potato many products such as: starch, alcohol, dextrose, glucose, rubber and many other products such as: perfumes, plastics, special paints, etc. It is an important agricultural crop which is cultivated in 125 countries of the world and consumed by 1 billion people.

According to world production, potato is the fourth agricultural crop after wheat, corn and rice, while according to the use for human consumption it is the third crop after wheat and rice.

In Macedonia, potatoes are cultivated in an area of 13,000 ha with a tendency for continuous growth and with an average yield of just over 13 t / ha.

In order to increase the yield of potatoes in North Macedonia, we should mainly work towards:

- planting varieties more adaptable to our climatic conditions
- use of the most advanced agro-techniques
- the greatest participation of science as well as the greatest involvement of scientific achievements
- the best food
- best protection.

The purpose of the research

The aim of our one-year research was to analyze in field conditions some quantitative and qualitative parameters of five potato cultivars, including: Jelly late cultivar, Lucinda cultivar moderately late, Marabel early cultivar, Georgina medium cultivar, Laura medium cultivar and Electra medium cultivar.

The analyzed parameters were:

- yield per plant
- yield per hectare
- dry matter participation
- starch participation
- sugars participation
- specific weight
- amount of dry matter per hectare
- amount of starch per hectare

Material and method of work

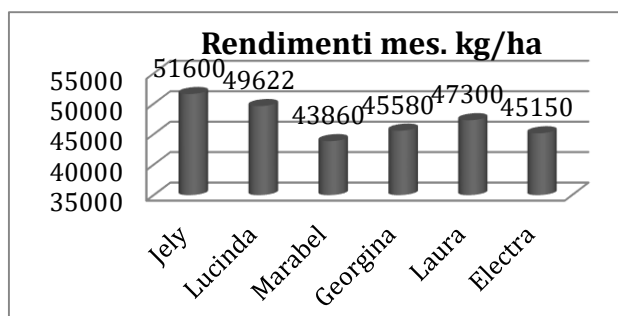
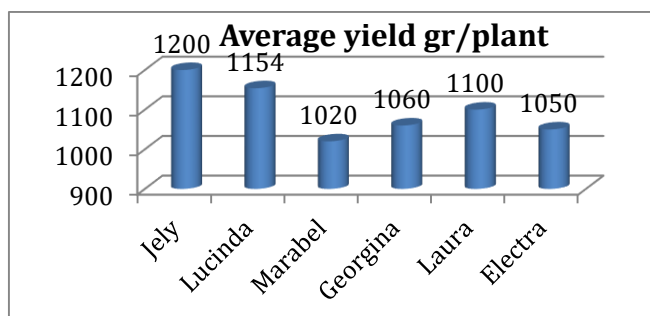
The research was conducted in the vegetative season 2020 in the locality Sedlarca e Epërme - Tetovo. The research material was five potato cultivars with three replications. The following cultivars have been researched in the field: Jelly, Lucinda, Marabel, Georgina, Laura and Electra. The experimental scheme was a randomized block with three replications with the size of experimental plots of 10.5 m². Material for the experiment were potato tubers where from each variety were planted 43 tubers at a distance of 70 x 33 cm. Based on this distance it results that the number of plants per area is 43000 plants / ha.

Results and commentary

4.1. Yield per plant

Plant yield was determined in such a way that from each cultivar three replications were taken by random method and the tubers were weighed from one plant from which the average weight of tubers per plant was calculated.

Cultivar	Average yield gr/plant	Average yield kg/ha	Dry matter %	Starch %	Specific weight	Sugars %	Dry matter kg / ha	Starch kg/ha
Jelly	1200	51600	19.52	13.63	1.077	0.064	10072.32	7033.08
Lucinda	1154	49622	17.98	11.70	1.069	0.182	8922.036	5805.774
Marabel	1020	43860	20.43	14.01	1.082	0.115	8960.598	6144.786
Georgina	1060	45580	18.13	11.84	1.072	0.431	8263.654	5396.672
Laura	1100	47300	20.47	14.05	1.082	0.039	9682.31	6645.65
Electra	1050	45150	19.23	12.88	1.075	0.217	8682.345	5815.32



Based on the obtained results we can conclude that the highest average weight of tubers per plant had the Jelly cultivar and that 1200 gr / plant while the lowest weight of tubers per plant had the Marabel cultivar 1020 gr / plant.

4.2. Yield per hectare

The yield per hectare was determined in such a way that from each cultivar were taken from three replications by random method and the tubers were weighed from one plant from which the average weight of tubers per plant was calculated, we multiplied this average weight of tubers per plant by number of plants per hectare.

Based on the obtained results we can conclude that the highest average yield of tubers per hectare had the Jelly cultivar and 51600 kg / ha while the lowest Marabel cultivar 43860 kg/ha.

4.3. Participation of dry matter and starch

The dry matter content is determined by the specific gravity or potato density method using the formula $d = W_o / (W_o - W_u)$ g / ml

d-density of potatoes

W_o = pasha of sample out of water

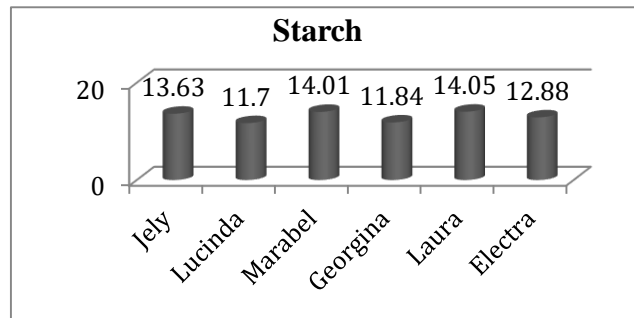
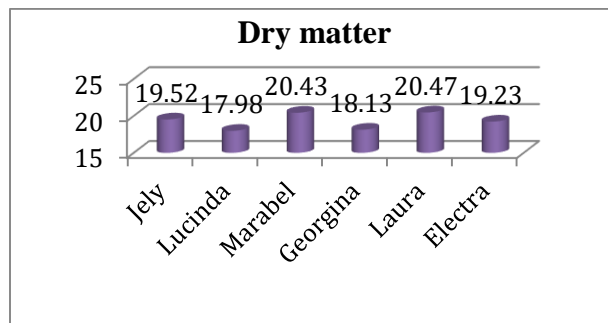
W_u = weight of the sample in water

$d_{potato} = 5050: (5050-352) d = 5050: 4698 d = 1,075$ g / ml

$Mth = (d_{potato} - 1.01506) / 0.0046051\%$

$Mth = (1.075 - 1.01506): 0.0046051 Mth = 0.056: 0.0046051 = 13.0$

Even in this case from each cultivar were taken from three replications with the random method and the percentage of dry matter was determined from which the percentage of starch was calculated.



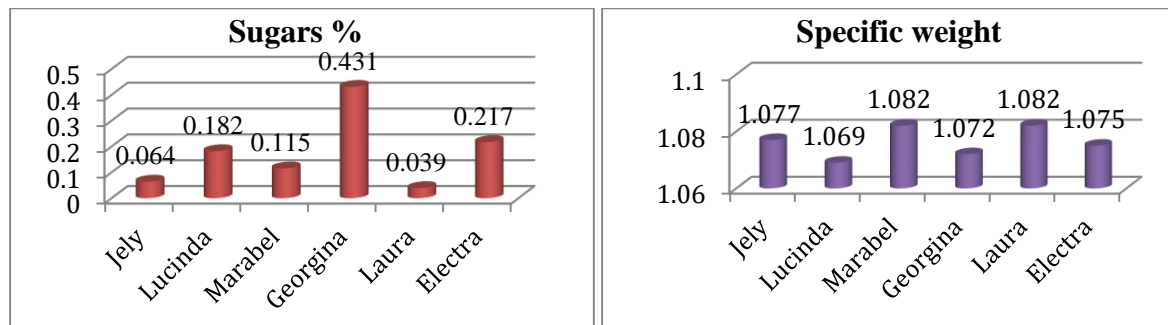
Based on the obtained results we can conclude that the highest percentage of dry matter had the Laura cultivar 20.43% while the lowest Lucinda cultivar 17.98%.

Based on the obtained results we can conclude that the highest percentage of starch had the Laura cultivar 14.05% while the lowest Lucinda cultivar 11.7%.

According to the results of **Barbara Sawicka, Piotr Pszczółkowski (1996-1998)** it turns out that the percentage of dry matter and starch in some potato cultivars is in the values of 17.82-26.7%, respectively 9.75-17.85%.

According to the results of **Alicja Joanna Baranowska (2015-2017)** it turns out that the amount of dry matter in the area of one hectare is around 9 t/ha, while starch is 6.3 t/ha.

Our results show that the average dry matter per hectare for the six cultivars included in the experiment is 9.1 t/ha while the average of starch per hectare for the six cultivars included in the experiment is 6.1 t/ha.



Based on the obtained results we can conclude that the highest percentage of sugars had the Georgina cultivar 0.431% while the lowest Laura cultivar 0.039%.

Based on the obtained results we can conclude that the highest specific weight had Laura and Marabel cultivars 1,082 while the lowest Lucinda cultivar 1,069.

According to the results of Salt Tuhin Suvra Roy et al. (2017) it turns out that the average specific gravity is around 1,088, while for the same parameter the average specific gravity for cultivars included in our experiment has an average value of 1,076.

According to Haase (2003) cited by Abul H. et al. (2015) potato used for blush is preferred the one with higher specific gravity.

According to Lisińska (2006); Zgórska and Grudzińska, (2012) tubers should contain 18-22% dry matter and up to 1% total sugars because when this level is exceeded the potato gets a sweet taste. The sugar content in our results for the cultivars included in the experiment ranges in values 0.064 - 0.431 and average value 0.174 <1% from the dry matter share.

6. Conclusion

Based on the obtained results we can conclude that in all five cultivars most of the analyzed parameters are the same with their characteristics described by the producers.

In terms of crop yield and yield per hectare, these parameters are in direct correlation with each other where although the yield per plant and yield per hectare is characteristic of the cultivar but it also depends on the agro-technique of cultivation and climatic and soil conditions, the researched cultivars have achieved a high yield that corresponds to the genetic potential possessed by the mentioned cultivars.

Even the share of dry matter and starch in the researched cultivars is close to the values given by the producers and to the researches done years ago.

From this research we can draw the following conclusions:

- The weight of tubers for plants is higher in Jelly cultivar 1200 gr/plant, smaller in Marabel cultivar 1020 gr/plant.
- Average yield per hectare is higher in Jelly cultivar 51600 kg / ha, lowest in Marabel cultivar 43860 kg / ha.
- The highest percentage of dry matter reached the Laura cultivar 20.47%, the lowest Lucinda cultivar 17.98%.
- The highest percentage of starch has reached the Laura cultivar 14.05%, the lowest Lucinda cultivar 11.70%.
- The highest percentage of sugars has reached Georgina cultivar 0,431, the lowest Laura cultivar 0,039.
- The highest specific gravity was reached by Marabel and Laura cultivars 1,082, the lowest Lucinda cultivar 1,069.
- All cultivars are suitable for cultivation in agro-ecological conditions of the Polog region, both in terms of achieved yield and in terms of the participation of dry matter and starch.

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