

THE STUDY OF SOME POTATO CULTIVARS (*Solanum tuberosum L.*) IN NORTH MACEDONIA

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Abstract

Potatoes in North Macedonia are cultivated in an area of 13,000 ha. Its cultivation extends to plain, hilly, sub-mountainous, and mountainous areas. Cultivation technology is adapted according to the areas and soils. Cultivars that are planted in North Macedonia are imported from Holland, France, and Germany. They are tested and the most suitable cultivars are selected according to the areas. After spending several years in cultivation, they reduce the yield and replace it with a newly created cultivar and enter production gradually and step by step after a good agronomic review, testing, and adapting the cultivation technology according to the soil areas. The comparative study of cultivars is the first step to determining the most suitable cultivar according to soil areas. Twelve cultivars that were planted in the Polog region were included in the study. The sowing was done according to the randomized block scheme with twelve variants in four replications. The sowing was done on the same day and the same cultivation technology was applied. During the vegetation period, biometric measurements were made according to the methodology, and the data were processed to derive the average values of yield data and other biometric indicators. Starch analysis was done on all cultivars.

Keywords: potato, cultivar, yield, randomized, dry matter, starch.

1. Introduction

Potato (*Solanum tuberosum L.*) is an important agricultural crop which according to world production is the fourth agricultural crop after wheat, maize, and rice, while according to its use for human food, it is the third crop after wheat and rice.

The potato is cultivated in all countries of the world and has many uses, mainly for consumption in different forms. The potato is cultivated in all countries of the world and has many uses, mainly for consumption in different forms.

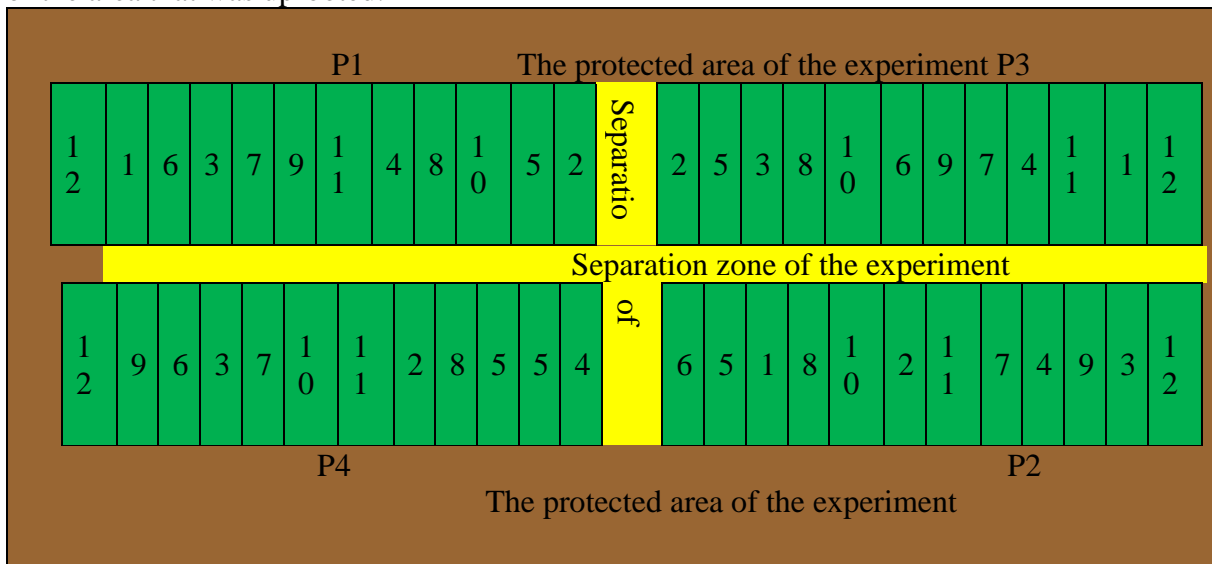
Potato tubers are also rich in amino acids such as (tryptophan, lysine, valine, methionine, etc.), very important for the human body. Potato skins and bulbs contain a specific substance known as solanine.

In addition to its nutritional value, the potato is also a very good crop from an agrotechnical point of view because it represents a very important pre-crop for many other agricultural crops. As a forage crop that feeds abundantly, it leaves the soil loose and rich in mineral matter.

In Macedonia, potatoes are cultivated on an area of 13,000 ha with a tendency for continuous growth and with an average yield of something over 13 t/ha. This yield is very low compared to the genetic potential possessed by the various potato cultivars and to the favorable climatic conditions possessed by the Republic of North Macedonia. There are many studies on the potato. The study of cultivars to determine the most suitable cultivar is always timely and greatly affects the increase in regional and global production. This two-year study aims to study potato cultivars that have different morphological, biological, biochemistry, and production characteristics.

2. Material and methods

The study took place in the Polog region, on light, drained alluvial soils. The experiment was set up according to the randomized block scheme with twelve variants and four replications. The dimensions of the variants are 5 x 4 m, with an area of 20 m² for each variant and with 8 plants for each variant. The total area of the experiment is 1260 m² and the area of the experiment alone is 960 m² and the difference of 300 m² is the protection area and the separation areas between the replicates. Twelve cultivars are included in the study, namely: Desire, Condor, Ultra, Carlita, Arnova, Jely, Marabel, Rodeo, Elfe, Lucinda, Gerorgina, and Belarosa. From the germination stage, ten plants were determined for each variant and replication where biometric measurements were made, plant height, and the number of tubers per plant. The yield was determined by the harvest of the produce for each variety on the basis of the area that was uprooted.



Scheme 1. Setting up the experiment

Measurements, weighing, and analyzes for the indicators were done:

1. The height of the plant cm
2. The number of tubers per plant
3. The yield kv/ha.
4. Dry matter content (in %)
5. Starch content (in %)

3. Results and interpretation

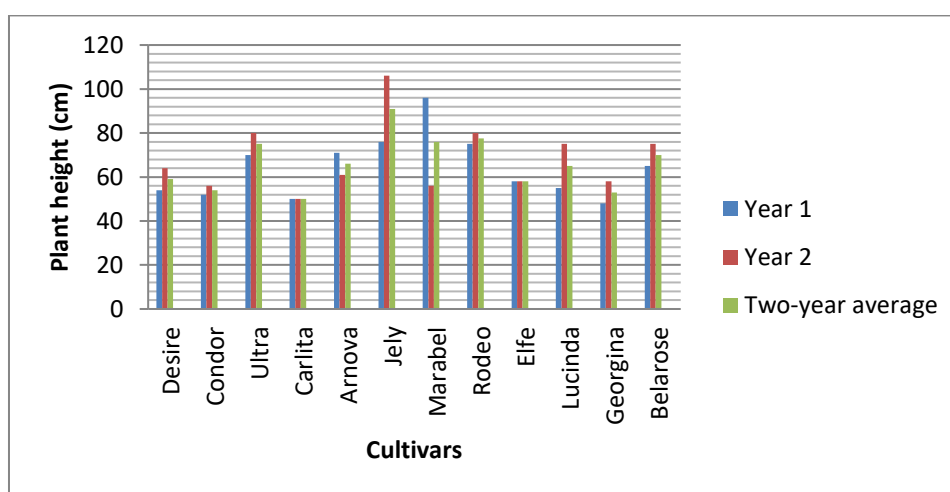
The experiment was set up according to the methodology designed at the beginning of the study. Biometric measurements and production indicators were made in full accordance with the scientific method.

Table 1. Plant height and number of tubers per plant

No	Cultivars	Plant height (cm)			Number of tubers/plant		
		Year I	Year II	Two-year average	Year I	Year II	Two-year average
1.	Desire	54	64	59.0	9.3	9.8	9.5
2.	Condor	52	56	54.0	9.1	9.2	9.1
3.	Ultra	70	80	75.0	7.6	7.9	7.7
4.	Carlita	50	50	50.0	8.3	9.7	9.0
5.	Arnova	71	61	66.0	10.3	9.9	10.1
6.	Jely	96	106	101.0	9.5	10.8	10.1
7.	Marabel	66	56	61.0	8.5	9.5	9.0
8.	Rodeo	75	80	87.5	9.4	8.5	8.9
9.	Elfe	58	58	58.0	7.6	9.6	8.6
10.	Lucinda	55	75	65.0	8.8	7.8	8.3
11.	Georgina	48	58	54.0	9.2	8.8	9.0
12.	Belarosa	65	75	70.0	9.2	9.2	9.2

Table 2 . Yield, dry matter content.

Cultivars	Yield (kv/ha)			Dry matter %			Starch %		
	Year I	Year II	Two-year average	Year I	Year II	Two-year average	Year I	Year II	Two-year average
Desire	389.7	295	342.3	19.37	18.73	19.05	13.49	12.83	13.16
Condor	467.6	279	373.3	18.53	17.93	18.23	12.68	12.24	12.46
Ultra	536.9	404	470.4	19.22	18.82	19.02	13.35	13.06	13.21
Carlita	398.4	354	376.2	20.40	19.66	20.03	14.49	13.74	14.11
Arnova	523.9	357	440.5	16.42	16.24	16.33	10.63	10.44	10.53
Jely	510.9	428	468.5	24.93	22.24	23.58	19.02	16.76	17.89
Marabel	597.5	346	471.8	26.01	22.38	24.19	19.93	15.34	17.63
Rodeo	471.9	352	412.0	23.58	21.34	22.46	18.55	12.84	15.68
Elfe	459.3	336	397.7	21.32	17.46	19.39	17.67	15.35	16.51
Lucinda	446.0	302	374.0	21.60	18.84	20.22	17.59	12.24	14.91
Georgina	474.3	356	415.1	22.22	21.23	21.72	16.26	12.48	14.37
Belarosa	519.6	365	442.3	21.12	18.08	19.60	16.01	13.08	14.54

**Chart 1** Plant height (cm)

Cultivars present significant differences in plant height. The cultivars Jely 101.0 cm, Rodeo 87.5 cm, and Ultra 75.0 cm have the highest height, meanwhile, the lowest height has the cultivars Carlita 50.0 cm, Georgina 54.0 cm, and Condor 54.0 cm.

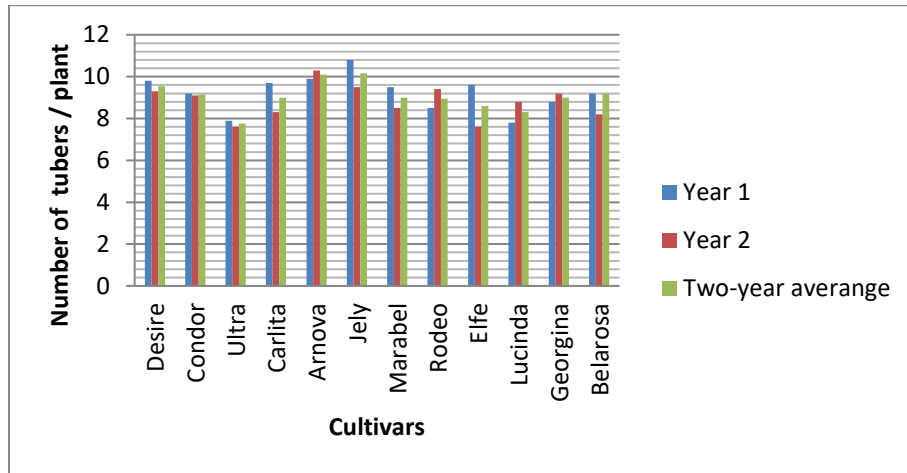


Chart 2 Number of tubers per plant

Even the number of tubers per plant is different, with the highest number of tubers: cultivars Jely and Arnova 10.1, Desire 9.5, and Condor 9.1, while the cultivars Ultra 7.7, Lucinda 8.3, and Elfe 8.6 have the lowest number of tubers.

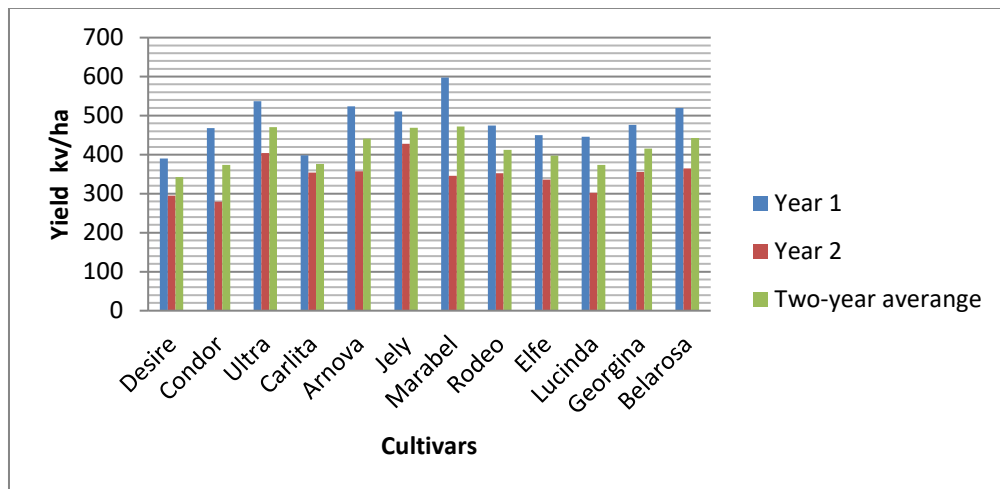


Chart 3 Yield in kv/ha

The cultivars included in the study present changes in yield and specifically the cultivar with the highest yield is the cultivar Marabel 471.8 kv/ha, Ultra 470.4 kv/ha, Jely 468.5 kv/ha and Belarosa 442.3 kv/ha.

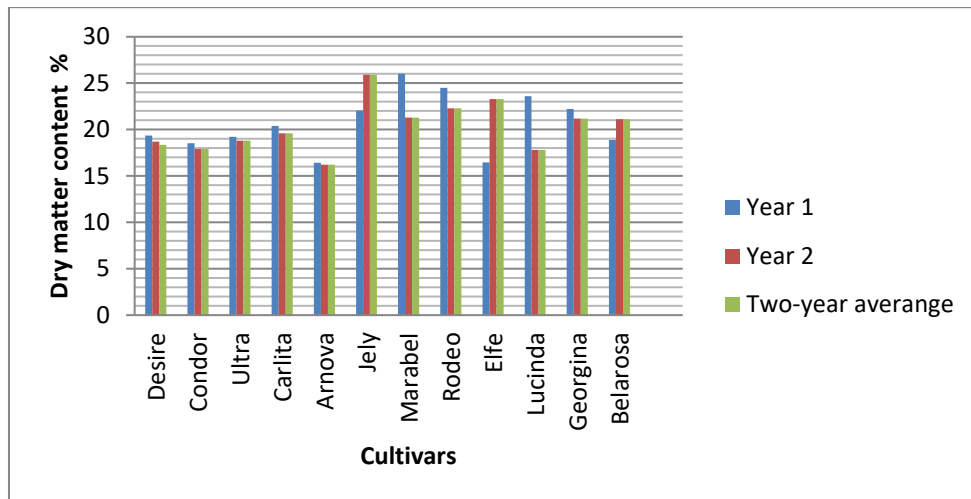


Chart 4 Dry matter content (%)

The content of dry matter presents differences between cultivars, also affecting the purpose of use. The cultivars with the highest dry matter content are Marabel 24.19%, Jely 23.58%, Rodeo 22.46%, and Georgina 21.72%.

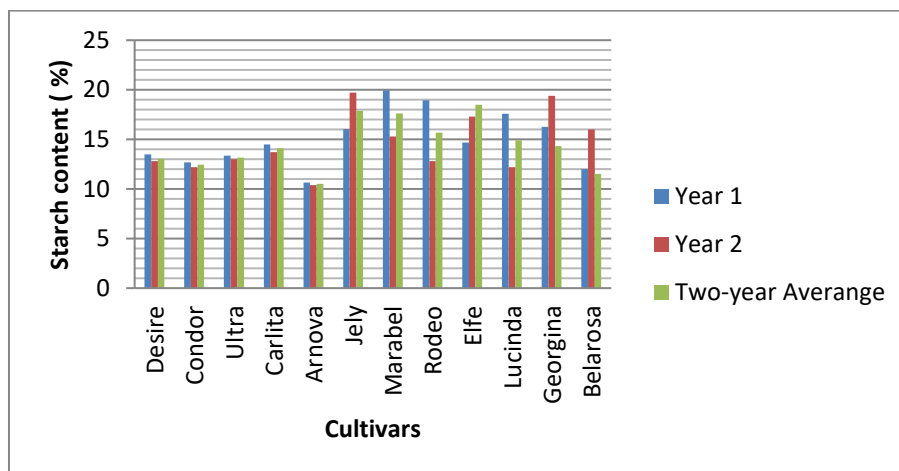


Chart 5 Starch content (%)

Even the starch content is different, differentiating the cultivars with the highest starch content, which are: Jely 17.89%, Marabel 17.63%, Elfe 16.51%. While the cultivars have the lowest starch content: Arnova 10.53%, Condor 12.46%, and Desire 13.16%.

4. Conclusions and recommendations

From the analysis of the morphological and productive indicators of the potato cultivars as well as from the processing of the data, we manage to draw some conclusions and give advice on the best cultivars that can be spread in wide production.

1. The two-year study shows that the plants have changes in the height of the plant, this is also clearly visible in the graphic presentation. It results that Jely and Rodeo cultivars have the highest height.
2. The number of grains/plant varies between cultivars. From the graphic presentation, it is clear that the cultivars: Jelly and Arnova have a larger number of tubers.
3. The cultivars included in the study present changes in yield and specifically, the cultivars with the highest yield are Marabel, Ultra, Jely, Arnova.

4. The content of dry matter presents differences between cultivars, also affecting the purpose of use. The cultivars that have the highest dry matter content are Jely, Marabel, and Rodeo.
5. Even the starch content is different distinguishing the cultivars with the highest starch content which are Jely, Marabel and Elfe.
6. From the obtained results it is also observed that in the first year in all cultivars the percentage of dry matter and starch was higher compared to the second year. This is because the first year of the research was characterized by an arid climate, while the second year by a humid climate.

As a recommendation, we will mention the fact that regardless of the purpose of cultivation, we must determine for those cultivars that possess characteristics that correspond to the purpose of use, i.e. certain cultivars will be used for: chips, French fries, or dishes.

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