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Professional paper

EVALUATION OF MORPHOBIOLOGICAL INDICATORS AND PRODUCTION OF SWEET POTATO (*Ipomoea batatas Poir*) IN THE REGION OF MYZEQE, LUSHNJE

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Abstract

Sweet potato (*Ipomoea batatas Poir*) is one of the plants with a special chemical composition that is more complete with nutritional values for different ages, mainly for the ages of childhood and old age. It is very good food for people who have stomach problems and who have poor metabolism. Sweet potato is rich in starch, sugars, proteins, vitamins and chemical elements such as potassium, iron, magnesium, etc. Two sweet potato cultivars were included in the study: Covington and O'Henry. Seedlings were obtained in Ioannina, Greece, and planted in Divjaka, in sandy soils suitable for sweet potato cultivation. In both cultivars, measurements were made for morphological and productive indicators: number of shoots/plant, length of shoots/plant (sum), longest shoot, shortest shoot, number of leaves/plant, leaf color, flower color, leaf shape, tuber shape, tuber skin color, tuber pulp color, tuber placement, yield/plant (kg/plant), number of tubers/plant, weight average tuber kg, weight of the largest tuber (kg), weight of the smallest tuber kg, the yield kv/ha.

Keywords: Sweet potato, shoots, leaves, shape, production, tuber, yield.

1. Introduction

The sweet potato is little known and widespread. In recent years, it has become known and spread in several countries such as Japan and China. It has special dietary nutritional value.

2. The scientific methodology

2.1. Aim of study: The study of sweet potato cultivars is aimed at determining the best cultivar for the agroecological and soil conditions of Lushnja.
For the realization of the purpose and objectives of this scientific study, the experiment was set up, and the following indicators were evaluated:
- The study of morphological and productive indicators of some cultivars of sweet potato (*Ipomoea batatas*)
The field experiments were carried out during the period of May-September 2022, in Sulzotaj, Divjakë municipality. Three cultivars of sweet potato were included in the study, specifically; O'Henry, Georgia jet, and Covington

2.2. Objectives: To evaluate the morphological and productive indicators of the cultivars and to determine the best cultivar, to carry out the chemical analyses of the tubers.

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2.3. Morphological indicators

1. Number of shoots/plant
2. Length of shoot/plant (sum)
3. The longest shoot
4. The shortest shoot
5. Number of leaves/plant
6. The color of the leaf
7. The color of the flower
8. The shape of the leaf
9. The shape of the tuber
10. The color of the skin of the tuber
11. The color of the tuber pulp
12. Placement of buds on the tuber

2.4. Indicators of production

1. Production/plant (Kg/plant)
2. Number of tubers/plant
3. The average weight of the tuber (kg)
4. Weight of the largest tuber (kg)
5. Weight of the smallest tuber (kg)
6. Yield Kv/ha

Methodologies used for chemical analysis of sweet potato

1. The dry matter

By drying in a thermostat to constant weight.

2. Ash S SH ISO 5520:2001

Water soluble ash. Burning in the muffle at a temperature of 550 ºC.

3. Determination of titratable acidity according to S SH ISO 750:2001.

4. Determination of fat with the Soxlet apparatus. S SH 2228/5:87

This method is based on the repeated extraction of a certain amount of material (previously dried at a temperature of 105-110ºC) with organic solvents, in our case petroleum ether, since unlike carbohydrates, fats are not soluble in water but in organic solvents.

After the extraction, the distillation process continues to remove as much solvent as possible from the fat in the pot. The solvent evaporates completely in a thermostat with a temperature below 100ºC.

The fat crystallizer, after cooling in the desiccator, is accurately weighed on an analytical balance.

5. Determination of protein by the Kieldahl method.

The method consists in breaking up and homogenizing the sample and disaggregating the material with concentrated sulfuric acid.

After burning, distillation is done, and then titration with HCl.

6. Determination of starch by acid hydrolysis.

Starch molecules are broken down by the action of HCl into glucose molecules and the latter is determined by acid hydrolysis.

For this, 4 g of material is usually taken and transferred to a 300 - 400 ml Erlenmeyer flask, washing it with 150 ml of 1% HCl. It is closed with a cork that has a coolant tube in the middle and is heated in a water bath for three consecutive hours. At the end, a test is made for the end of starch hydrolysis with KJ. After the end of the hydrolysis, the obtained solution is neutralized with 10% NaOH. In an alkaline environment, the sugar is

decomposed. By neutralizing the solution, the albumins are precipitated, therefore, lead acetate is gradually added to the flask according to the probable content in albuminous matter. After the precipitation of the lead acetate extract is finished, the solution is filtered with a double-dense filter and used for the determination of glucose according to the Bertrand or cyanide method.
7. Determination of Phosphorus-The wet material is burned in the muffle at 550 - 600 until it becomes ash and this is saturated with HCL, so the organic phosphorus goes into solution in the form of phosphoric acid with this solution phosphorus is determined by the phosphomolybdate method. The standard solution of phosphorus is prepared by constructing the scale of standards. 8. The determination of cellulose is done by taking 2-3 g of ground material, which we pass into a 400-600 ml beaker, in which we add H2SO4 1.25%, letting it boil and occasionally adding water to not increase the concentration of the acid boiling over cellulose. Then boil with 1.25% NaOH. Finally, the filter is rinsed with ethyl alcohol or ether. For the determination of pure cellulose, protein and ash are subtracted from the crude cellulose. The difference gives pure cellulose.

3. Results and their interpretation

The soil in which the experiment was set up was analyzed and the indicators are: water pH 6.95, saline pH 6.7, K.E. 0.100, Humus 2.2 %, Nitrogen 0.14 %, Phosphorus ppm 11.6, Potassium ppm 13.27, CaCO3 1.64 %, sand 36.6 %, silt 31.3 % and clay 32.1 %. They are suitable soils for the cultivation of potatoes.

Table 1. The placement of buds on the tuber

No.	Cultivars	The placement of buds on the tuber
1	O'Henry	Superficial
2	Georgia jet	Superficial
3	Covington	Superficial

So the buds are located superficially.

Chart 1 Length of the shoots / plant (m)
Cultivars have different development. Covington cultivar has longer shoot length.

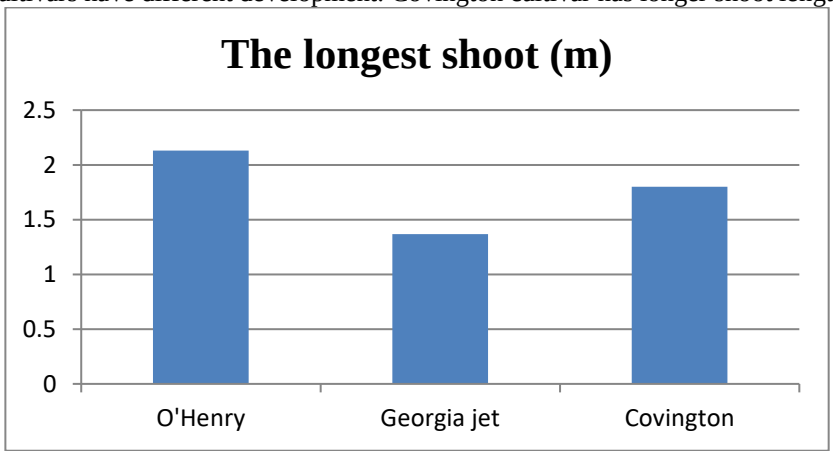


Chart 2 The longest shoot (m)
The longest shoot is in the O'Henry cultivar which has fewer shoots.

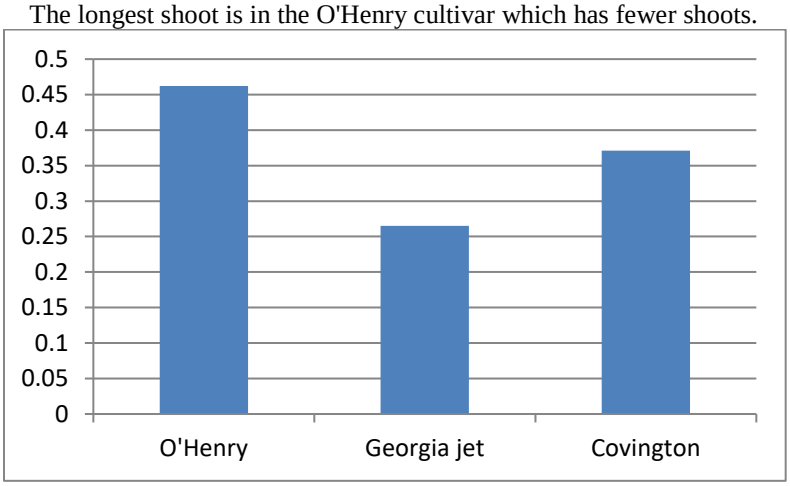
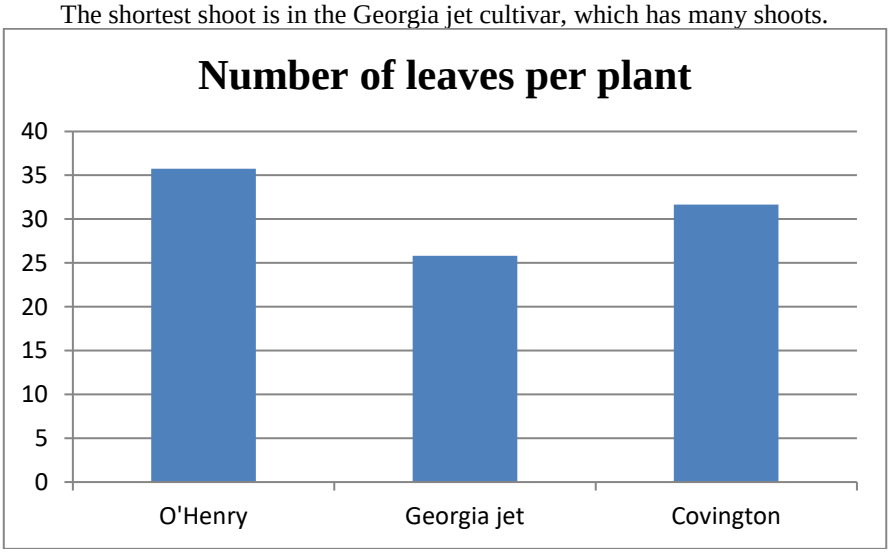
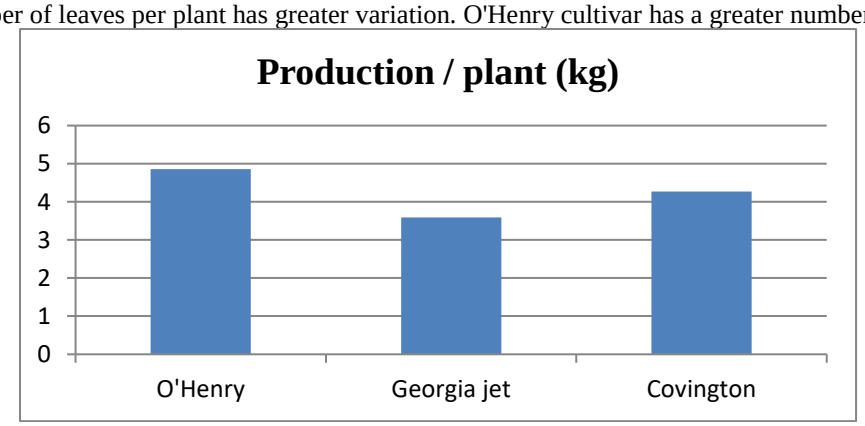


Chart 3 The shortest shoot (m)
The shortest shoot is in the Georgia jet cultivar, which has many shoots.

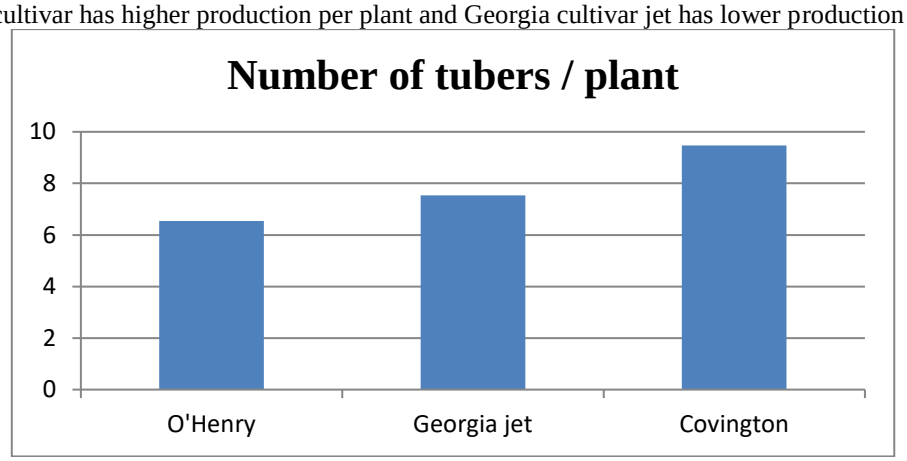


Graph 4 Number of leaves per plant
The number of leaves per plant has greater variation. O'Henry cultivar has a greater number of leaves.

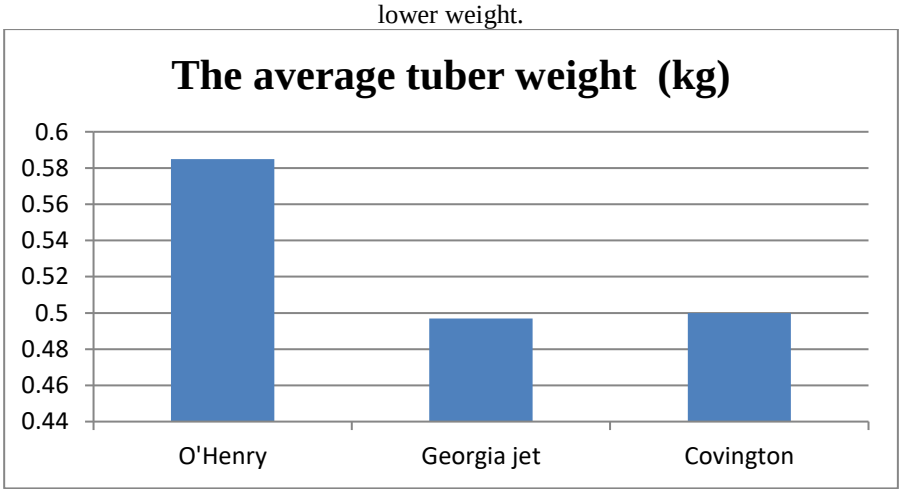


Production indicators

Graph 5 Production per plant (kg)
O'Henry cultivar has higher production per plant and Georgia cultivar jet has lower production per plant.



Graph 6 Number of tubers per plant
The number of tubers per plant is again different where the Covington cultivar has the highest number but with a lower weight.



Graph 7 Average tuber weight (kg)
The O'Henry cultivar has the largest tuber weight and the Georgia jet and Covington cultivars have the lowest weight, which are almost equal.

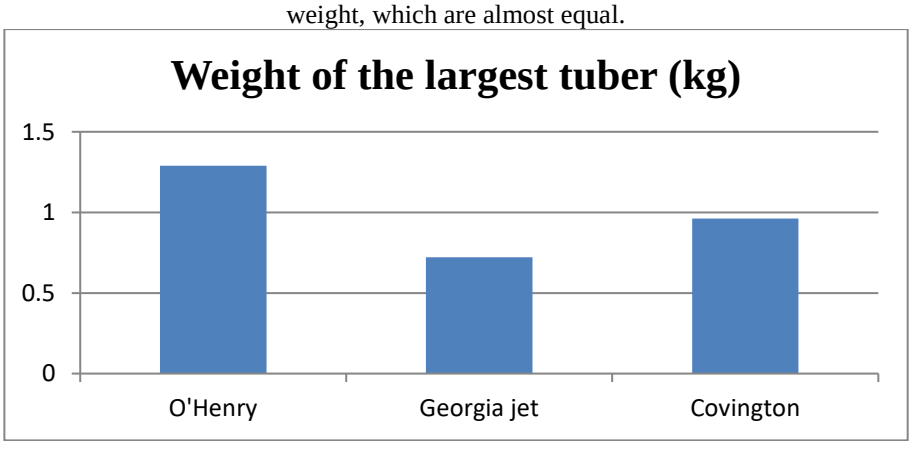
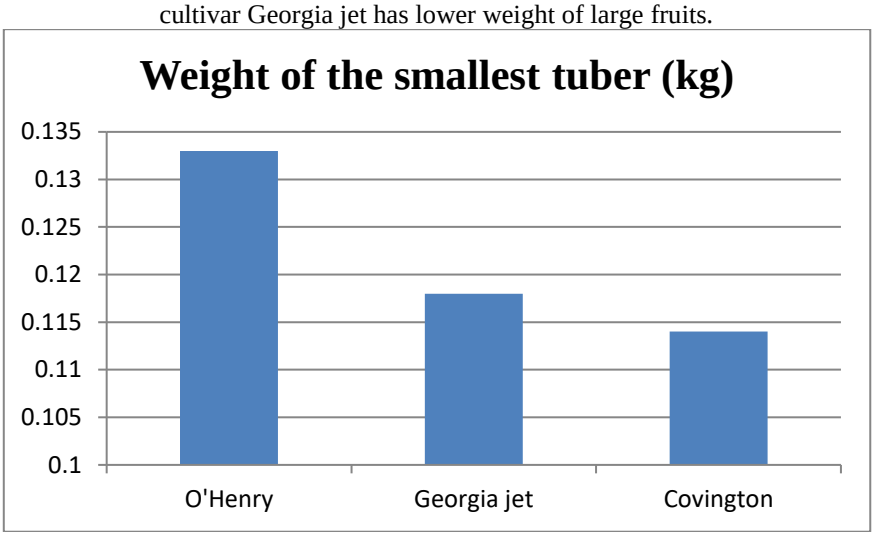


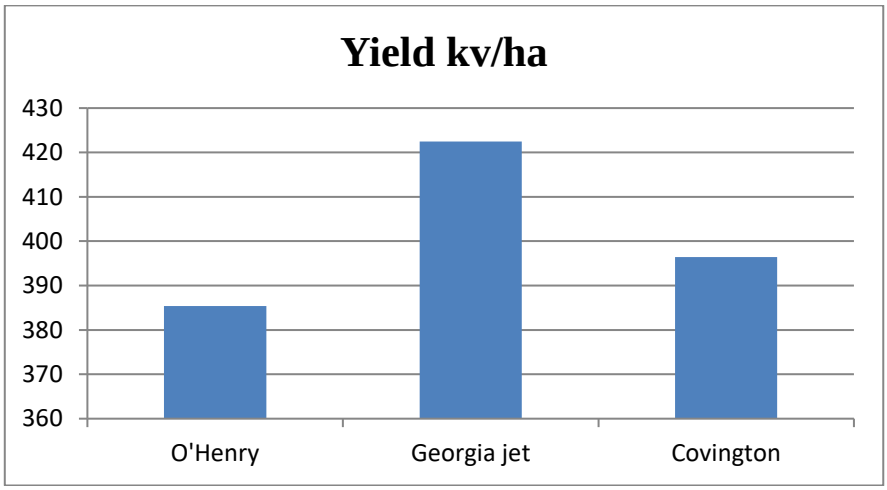
Chart 8 Weight of the largest tuber (kg)

Cultivar O'Henry has the biggest tuber, which has almost 30% of the tubers with the highest weight. While the cultivar Georgia jet has lower weight of large fruits.



Graph 9 Weight of the smallest tuber (kg)

The same law continues, where O'Henry has the highest weight of the smallest tuber and Covington has the lowest.



Graph 10 Yield kv/ha

Georgia jet has the highest yield with 420 kv/ha and O'Henry has the lowest yield, which gave a yield of 36 kv/ha less.

Chemical analyses

Chemical analyses **Table No. 2**

Nr	Name of the analysis	Method/Reference	Cultivars		
			O'Henry	Georgia jet	Covington
1	Dry matter %	In 80-100° C	23	21	27.43
2	Water %	Drying	77	79	72.67
3	Ash %	Burning in 500° C	1.23	0.86	1.82
4	Proteins %	Kjeldahl	5.86	6.91	7.17
5	Acidity %	Volumetric	0.13	0.13	0.33
6	Fats %	Soxlet	0.05	0.08	0.07
7	Crude cellulose %	Sharer	0.82	0.87	0.84
8	Starch %	By acid hydrolysis	7.2	6.7	6.8
9	Reducing sugar %	Fehling	2.0	1.2	1.1
10	Phosphorus mg	Spectrophotometers	43	47	47

Cultivars have differences in the chemical composition and specifically: in the cellulose content, where the Georgia jet cultivar has the lowest content with 21% and has better digestibility qualities.
There is variation in protein content, with Covington and Georgia jet cultivars having higher content.
There are no changes in starch and phosphorus content.
There are changes in the content of pentosans (sugars) and specifically the cultivar O'Henry has almost twice as many sugars as the other two cultivars.

Conclusions and recommendations

From the analysis of the morphological and production indicators as well as the adaptation to the climate of the soil, we can draw some conclusions, among which we will mention:

Conclusions

1. The color of the leaf varies slightly between cultivars. It is green with dark or light shades. They are cultivars of the same group.
2. The sweet potato has two leaf shapes: cloven-hoofed and fig-leaf-like. The mule-hoof shape is more resistant to rot. All three cultivars have a mule-hoof leaf shape.
3. The number of tubers per plant is again different, with the Covington cultivar having the highest number, but with a lower weight.
4. The O'Henry cultivar has the largest tuber, which has almost 30% of the heaviest tubers. While the cultivar Georgia jet has a lower weight of large fruits.
5. The same law continues, where O'Henry has the highest weight of the smallest tuber and Covington has the lowest weight.
6. Georgia jet has the highest yield with 420 kv/ha and O'Henry has the lowest yield, which gave a yield of 36 kv/ha less.
7. Cultivars have differences in chemical composition and specifically: in the cellulose content, where the Georgia jet cultivar has the lowest content with 21% and has better digestibility qualities.
8. There is variation in protein content, with Covington and Georgia jet cultivars having higher content.
9. There are no changes in starch and phosphorus content.
10. There are changes in the content of pentosans (sugars) and specifically the cultivar O'Henry has almost twice as many sugars as the other two cultivars.

Recommendations

From the analysis of all the indicators and mainly in the realized yield, we advise that, in extensive cultivation, the Georgia jet cultivar should be planted, which has a higher yield and a better combination of chemical composition.

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