

Study Some of Potato Cultivars, Regarding to the Leafy Surface, Root and Stem (*Solanum tuberosum* L.)

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Abstract

The experiment was carried out in the year 2012 to evaluate dry mass partitioning and growth parameters of potato cultivars. Two types of potatoes for fresh consumption and industrial processing was evaluated. Graded seeds Class A of eleven potato cultivars: Sinora, Faluka, Ambition, Arnova, Zafira, Exelent, Mantiou, Rudolph, Marlen, Ambassador and Condor were evaluated and analyzed the performance of each cultivar during the vegetation. Imported seeds from Netherland (AGRICO) was planted in four repetitions according to the system plan completely random (PPRB) on the block, with four rows for each cultivar and repeated use. During vegetation all cultivars are treated in the same way. Samples were harvested randomly and parameters were analyzed such as: vegetation period, leaf area, root dry mass, stalks dry mass and yield. Evaluated cultivars belonged to different vegetative periods ranging from Sinora a searly cultivar that reaches maturity at 20 to July's and up to Ambition and Exelent as late cultivar, which reaches maturity at 10 September. The difference for the duration of the vegetative period was 53 days. Regarding root dry mass Ambition and Rudolph has the highest rate which Mantiou and Sinora result with lowest rate of dry mass. Generally speaking the highest yield was harvested to Ambition compared with Faluka which results with lowest one.

KEYWORDS: Potato, root, stalk, dry mass, leaf are.

Introduction

Potato (*Solanum tuberosum* L.) is annual crop – family Solanaceae, which is cultivated because of it's tuber, reach with strach and other nutritent meterias. This family includes some 170 wild varieties and some 26 other which are being cultivated, with more than thousand sub-varieties. (Šarić & Muminović, 1998). Potato originates from South Amerika (Peru), suuoundings of Titicaca lake where was cultivated even before 10.000 years (Buturac & Bolf, 2000). First written informations about potato in Europe come from Spain, Sevilla area around year 1550. Potato is one of the basic crops, which significantly impact nutritive status of the world population. Its production places it fourth, after wheat, rice and corn [Zgórska 2008]. According to many authors [Leszczyński 2000, Wroniak 2006] potato is the major vegetable throughout the world. Worldwide potato is being cultivated in over than 18 million hectares with yearly yield of 265 millions of tones, with an average production of 14. 6 t/h. (Šarić & Muminović, 1998). Highest quantitz of potatoes are being produced in China, Russia, Germany, France, UK, Poland, and USA as well in other

countries worldwide. Potato is being cultivated in almost all areas of Kosovo, in plain agrolands, but also in heights (400-2000m above sea level), where yearly are being cultivated 10.000–12.000 ha, with an average yield of 12 t/ha. Therefore, the objective of this study was to evaluate the dry mass partitioning, productivity and growth parameters of potato cultivars.

Materials and methods

The experiment was carried out in the year 2012 to evaluate dry mass partitioning and growth parameters of potato cultivars. Experiment plots were established in Peja, Researching Farm / Kosovo Institute of Agriculture in Dukagjini Plain (42°56' N and 20°30' E with altitude 490 m a.s.l.). The soil type was of Vertisol type with a pH of 6.9. Basic processing of the land has been completed in Autumn of the year 2011, whereas preparation of surfaces for planting has been done in spring 2012. Land has been fertilized with NPK composition (15:15:15), prior to planting with quantity 1000/kg/ha. Two types of potatoes for fresh consumption and industrial processing was evaluated. Graded seeds Class A of eleven potato cultivars: Sinora, Faluka, Ambition, Arnova, Zafira, Exelent, Mantiou, Rudolph, Marlen, Ambassador and Condor were evaluated and analyzed the performance of each cultivar during the vegetation. Imported seeds from Netherland (AGRICO) was planted in four repetitions according to the system plan completely random (PPRB) on the block, with four rows for each cultivar and repeated use. Planting of potato tubers took place on third week of April in length of the rows in the blocks was 4 meters, distance between rows 75cm, whereas distance between tubers was 40cm. Distance between parcels was 2m, whereas experimental surface was 12m² with density of 33.300 tubers/ha. Feeding with nitrates took place in the pre blossom phase with NAG composition (27%N), quantities 200 kg/ha. Cultivation technology was based on best agriculture practices applicable in Kosovo used to produce potato. Harvesting of tubers and plants for further analyses was successively based on ripening period. 10 plants of each experimental unit was randomly selected and harvested. After the harvest above ground, roots was carefully washed out from the soil by using a soft water jet and 2 mm sieves. Weighed photocopies of the leaves were transformed to leaf areas (LA) by means of the specific area of the copy paper. Afterwards, all leaves and shoots of harvested plants were dried at 70°C for 48 h to determine the dry weight of root (RW), leaf (LA), stem (SW) and plant (W).

Results and discussion

It was known that tested cultivars have different vegetation period. The first cultivar was harvested on 20th of July and last one on 10th of September. The range of cultivars in Kosovo climat conditions was Sinora as early up to Ambition and Exelent as late vegetation one. The differences between first harvested cultivars to last one was 53 days which we assume that cultivars were identified from very short to late one (Table 1). Based on the results shown (Table 1) evaluated cultivars was categorised in three groups: short vegetation Arnova, Ambassador and Sinora; Mid vegetation Faluka, Zafira, Mantiou, Marlen and Kondor; late vegetation, Ambition, Exelent and Rudolph. Interpretation of results and comparability was within the groups.

Table 1. Vegetative period of evaluated cultivars (ripening)

Nr.	Cultivar	Vegetative period	Origin
1	Arnova	Very short vegetation	Agrico - Holand
2	Ambasador	Short vegetation	Agrico - Holand
3	Sinora	Mid short vegetation	Agrico - Holand
4	Faluka	Mid vegetation	Agrico - Holand
5	Zafira	Mid vegetation	Agrico - Holand
6	Mantiou	Mid vegetation	Agrico - Holand
7	Marlen	Mid vegetation	Agrico - Holand
8	Kondor	Mid vegetation	Agrico - Holand
9	Ambition	Late vegetation	Agrico - Holand
10	Exelent	Late vegetation	Agrico - Holand
11	Rudolph	Late vegetation	Agrico - Holand

The number of stems per plant were evaluated for each experimental units. The higher number of stems was computed to Ambition 5.2 stems per plant compare to Arnova with 3.9 stems per plant (Table 2). The number of stems resulted on improving leaf area per plant which effected on increasing photosintesis asimilates and improving yield. The better performance regarding number of stems was shown to Ambasador 4.8 stem/plant from cultivars with short vegetation, Zafira 4.9 stem/plant from mid vegetation group and Ambition 5.2 stem/plant from late vegetation group. It seems that not big difference was identified between cultivars which belonge to different groups.

Table 2. Number of stem per plant (n) to different cultivars

Nr	Cultivar	Stem per plant (n)
1	Arnova	3.9
2	Ambasador	4.8
3	Sinora	4.3
4	Faluka	4.7
5	Zafira	4.9
6	Mantiou	4.2
7	Marlen	4.7
8	Kondor	4.1
9	Ambition	5.2
10	Exelent	4.6
11	Rudolph	4.6

As plant dry mass concerned the higher rate was founded to cultivars Ambition 123. 86 gr, Rudolph 121.05 gr and Ambasador 118. 05 which to other cultivars the dry mass was less than 107 gr and lowest one was Sinora 71.16 gr (Table 3). The highest value of dry mass of roots and leaf area was find to Ambasador and Ambition which the first one belonge to short vegetation grup and second one to late vegetation group. The cultivars from mid vegetation group Zafira perform beter that four other cultivars within the group.

Table 3. Dry mass of stem, root, leaf, leaf area and total plant dry mass partitioning to different potato cultivars

Cultivar	Stem dry mass gr ⁻¹	Root dry mass gr ⁻¹	Leaf dry mass gr ⁻¹	Leaf area cm ²	Leaf area m ²	Plant dry mass gr ⁻¹
Arnova	36.68	11.56	47.52	5637.87	0.56	95.76
Ambassador	32.94	20.29	65.74	8387.64	0.84	118.97
Sinora	22.01	11.65	37.49	4531.67	0.45	71.16
Faluka	35.05	14.38	42.00	5690.48	0.57	91.43
Zafira	32.39	12.74	51.57	6999.63	0.70	96.71
Mantiou	27.10	9.87	36.65	4741.42	0.47	73.63
Marlen	32.07	13.23	48.16	6373.53	0.64	93.45
Kondor	38.26	13.54	39.96	5479.93	0.55	91.76
Ambition	48.56	12.29	63.01	7895.37	0.79	123.86
Exelent	41.30	12.86	52.84	6791.89	0.68	107.00
Rudolph	52.87	14.78	53.85	6771.52	0.68	121.05

The higher percentage of root and leaf participation to plant dry mass is resulted with high yield. Root dry mass and leaf area participation to Ambassador was with higher rate compare to other cultivars within the short vegetation group. Zafira resulted with high percentage rate of root and leaf and yield compare to other cultivars within mid vegetation group. Ambition was identified within the late vegetation group as a leader on root and leaf percentage also the yield was the highest compare to other cultivars (Table 4). Participation of higher rate of root dry mass and leaf area affected on higher nutrient uptake and photosynthesis assimilate rate.

Table 4. Percentage of stem, root and leaf participation on total weight of plant and yield per plant

Cultivar	Stem participation %	Root participation %	Leaf participation %	Yield kg/plant
Arnova	37.4	12.32	50.28	1.05
Ambassador	27.82	17.11	55.07	0.90
Sinora	30.86	16.38	52.76	0.91
Faluka	37.77	16.97	45.26	0.75
Zafira	33.41	13.21	53.37	1.15
Mantiou	36.61	13.66	49.72	0.91
Marlen	33.94	14.23	51.83	0.91
Kondor	41.70	14.61	43.69	1.03
Ambition	37.36	9.98	52.66	1.21
Exelent	38.49	12.17	49.34	1.02
Rudolph	43.61	12.37	44.02	1.01

Conclusions

Eleven cultivars with different vegetative period were evaluated for their performance on dry mass partitioning, productivity and growth parameters. Evaluated cultivars have identified in three groups based on their vegetative period as early, mid and late vegetation. Cultivar Ambassador has the best performance compare to other cultivars from early vegetative group. Zafira was the best from the mid vegetative group and Ambition better yield, dry mass partitioning and growth parameters compare with other cultivars from late vegetative group. We recommended three mentioned cultivars to potato growers.

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