

THE PHYSIOLOGICAL RESEARCH OF THE COLLECTION SAMPLES OF THE POTATO IN THE ABSHERON DRY SUBTROPICAL ZONE

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Abstract. The article is devoted to the physiological research of the collection samples of the potato in the dry subtropical Absheron zone. It was determined that in the collection samples the amount of the total dry biomass varies in the range of 12.7-40.0 s/ha, including 4.8-13.5 s/ha in leaves, 1.9-8.7 s/ha in trunks and stems, 3.4-29.2 s/ha in tubers and 1.6-6.3 s/ha in roots. Elfe (38.0 s/ha), Colomba (38.4 s/ha) and Amiri-600 (40.0 s/ha) are differed in comparison to the other sorts according to the amount of the total dry biomass, so they can be used as good donors for the future selection of the potato productivity. It was detected that Amiri-600 (23.2 s/ha), Concordiya (18.5 s/ha), Sevinj (18.2 s/ha) and Julinka (16.0 s/ha) are especially different according to the highest amount of the dry biomass in the tubers.

Keywords: the collection samples, potato, the total dry biomass, the surface and underground parts, the physiological research.

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1. Introduction

One of the most important tasks in front of the modern potato growing is the selection the high-yielding, disease-resistant and abiotic-resistant, suitable for local conditions sorts, programming their productivity cultivating with the intensive technology (Allahverdiyev & Aghayev, 2020; Eyvazov *et al.*, 2017). In different soil and climatic conditions of the republic, especially in the Absheron economic zone having a dry subtropical climate, the selection of the potato sorts and the creation of the new ones are important economically in order to grow high quality potato product for satisfy the needs of the population. During the selection the suitable for local conditions sorts, need to pay special attention to their genetic basis, the sustainability to high temperature and drought, because the sorts have different adaptability depending on the condition (Turko, 2007; Starovoytova *et al.*, 2018).

As it is known, the potato is one of the most important agricultural plant in Azerbaijan, as all over the world. It is an indispensable food product, used widely as feed for animals, very good raw materials for different potato products, starch and alcohol. Potato contains 75-80% water on average, 20-25% dry substance, including 15-20% starch, 0.3-0.7% sugar (during kept, its quantity can increase to 3-5%), 1-2% protein, up to 1% mineral salts, vitamins C, B1, B2, B6, PP, K and carotenoids (Allahverdiyev & Aghayev, 2020).

Taking into account the above, the purpose of the current work is researches physiologically the collection samples of the potato in the Absheron dry subtropical

zone, selects the samples appropriate to the local condition on the bases of the obtained results and gives recommendations for regionalize the best of them in the republic.

2. Materials and methods

17 sorts of Germany and Holland origins are compared with 3 local sorts (the sorts Telman, Sevinj, Amiri-600). The sort Telman is taken as the standard. During the experiment in Absheron condition, the predecessor plant of the potato was clover. The areas are plowed since autumn, 60% of the intended norm of the manure, phosphorus and potassium fertilizers at the rate of 40 tons per hectare, and the rest part is given in the form of NPK (16:16:16) the formation of 5-6 leaves and in the form of the feeding during the budding-flowering period. The plowing have been carried out again in early spring, the potato planting have been carried out by the hand opening the furrows.

The potato planting was carried out on February 17, 2016, February 24, 2017, and February 26, 2018, and the appropriate phenological, biometric and physiological researches were carried out after the obtained sprouts (Litvinov, 2011). The dry biomass of the surface and underground parts of the potato is determined by 8-12 hours drying and then weight method until a stable obtained weight at 105⁰ C temperature (Ermakov, 1987).

3. Results and discussions

As it is known, one of the main indicators of the photosynthetic activity of the plants is the accumulation of the total dry biomass in it, and this indicator characterizes the total productivity of the plantings (Eyvazov *et al.*, 2017; Yusifov, 2004). The vegetative organs (leaves, trunks and stems) make up a part of the total dry biomass, and the tuber, root, etc., i.e., an agricultural important part make up the another part. Naturally, the consumption to the formation, growth and development of the agricultural significant part of the most part of the organic compounds formed in the photosynthesis process is important that, it is achieved by using the different methods and techniques.

In the collection samples of the potato plant the information about the amount of the dry biomass of the surface and underground parts is shown in Table 1 (Table 1). In the collection samples the amount of the total dry biomass has varied between 17.7-40.0 s/ha, including 4.8-13.5 s/ha in leaves, 1.9-8.7 s/ha in trunks and stems, 3.4-23.2 s/ha in tubers, 1.1-6.3 s/ha in roots. According to the average results of the three-year researches, in the amount of the total dry biomass, Elfe (38.0), Colomba (38.4) and Amiri-600 (40.0 s /ha) have prevailed to the other sorts in comparison. The average level of this indicator (28.2-35.1 s/ha) is noted in the sort samples Captiva (28.2 s/ha), Sevinj (29.3 s/ha), Julinka (28.7 s/ha), Panomera (29, 4 s/ha), Concordiya (33.4 s/ha) and Telman (35.1 s/ha). In the rest samples, the amount of the total dry biomass has varied in the range of 11.3-24.9 s/ha and the least dry biomass has observed in the sort Fabula.

Table 1. The evaluation according to the amount of the dry biomass of the surface and underground parts of the collection samples of the potato (the mass flowering phase, for 2016-2018)

№	The names and origins of the sorts	Total dry biomass, s/ha	The total dry biomass of the leaves, s/ha	The dry biomass of the trunks and stems, s/ha	The dry biomass of the tubers, s/ha	The dry biomass of the roots, s/ha
1.	Telman, Azerbaijan Standart	35.1	13.5	8.7	7.9	5.0
2.	Sevinj, Azerbaijan	29.3	5.8	2.7	18.2	2.6
3.	Amiri-600, Azerbaijan	40.0	7.4	4.3	23.2	5.1
4.	Farida, Holland	24.1	8.1	4.7	7.7	3.6
5.	Viviana, Holland	19.8	6.0	1.9	9.7	2.2
6.	Bermina, Holland	22.5	7.5	5.6	6.2	3.2
7.	Jelli, Holland	22.6	7.8	3.0	6.8	5.0
8.	Concordiya, Holland	33.4	7.0	4.0	18.5	3.9
9.	Captiva, Holland	28.2	8.7	4.6	11.8	3.1
10.	Julinka, Holland	28.7	9.1	2.5	16.0	1.1
11.	Irina, Holland	17.7	7.2	4.7	4.1	1.7
12.	Bellarosa, Holland	21.3	7.8	3.3	8.5	1.7
13.	Sifra, Germany	18.1	6.8	3.6	5.7	2.0
14.	Panomera, Germany	29.4	12.0	4.5	9.2	3.7
15.	Mozart, Germany	20.9	6.4	2.6	7.9	4.0
16.	Fabula, Germany	11.3	4.8	2.0	3.4	1.1
17.	Silvana, Germany	18.9	6.2	2.9	7.3	2.5
18.	Redi-Skarlet, Germany	24.9	5.5	1.9	15.2	2.3
19.	Colomba, Germany	39.1	13.0	8.5	14.4	3.2
20.	Elfe, Germany	38.0	11.7	8.3	11.7	6.3
Change interval		11.3-40.0	4.8-13.5	1.9-8.7	3.4-23.2	1.1-6.3

As for the accumulation of the dry biomass in the leaves, the highest amount of the indicator noted in this organ has been noted in the standard sort Telman (13.5 s/ha). Only the Germany origin Colomba can be compared with it (13.0 s/ha). The Germany origin Elfe (11.7 s/ha) and Panomera (12.0 s/ha) are again occupied the next places. In the rest sort samples, this indicator varies between 4.8-9.1 s/ha. The same picture can be seen in the accumulation of the dry biomass in trunks and stems. According to this indicator, the sort Telman surpasses all the sort samples (8.7 s/ha), only the Germany origin Colomba (8.5 s/ha) and Elfe (8.3 s/ha) sorts can be compared with it. In the rest samples, the amount of the biomass varies in the range of 1.9-4.7 s/ha.

Due to the amount of the dry biomass in the tubers, many samples surpass the standard sort. Amiri-600 (23.2 s/ha), Concordiya (18.5 s/ha), Sevinj (18.2 s/ha), Julinka (16.0 s/ha) are particularly different, among them. Given that these sort samples are also differ with a high amount of the total dry biomass, they can be used as the best initial materials for the future selection.

According to the amount of the dry biomass accumulated in the roots, only Jelli (5.0 s/ha), Amiri-600 (5.1 s/ha) and Elfe (6.3 s/ha) can be compared with the standard. The accumulation of the dry biomass varies between 1.1-4.0 s/ha in the roots of the rest sort samples, and the least dry biomass is noted in the sort Julinka (1.1 s/ha).

As for the accumulation of the dry biomass in the individual organs, the general regularity is not observed here. The accumulation of the dry biomass in 35% of the 20

collected samples occurs with the tuber-leaf-trunk-root scheme, in 25% with the leaf-tuber-trunk-root scheme, in 20% with the tuber-leaf-root-trunk scheme, 10% of each with the leaf-trunk-tuber-root and leaf-tuber-root-trunk schemes.

The comparing the information given in the table, the equality is noted in the accumulation of the dry biomass in the surface and underground parts of the studied collection samples. That is, the dry biomass of the underground part (tubers and roots) predominates in 10 of the studied 20 collection samples. This shows once again that the special attention should be paid to the development of both the surface and underground parts in order to increase the productivity of the potatoes. It can be achieved with the help of the different agro-technical methods (with the softening of the bottom of the plants, filling, timely watering, additional feeding, etc.).

4. Conclusion

So the following generalizations can be made as a result of the conducted research:

1. In the collection samples the amount of the total dry biomass varies in the range of 12.7-40.0 s/ha, including 4.8-13.5 s/ha in leaves, 1.9-8.7 s/ha in trunks and stems, 3.4-23.2 s/ha in tubers, 1.1-6.3 s/ha in roots.
2. Elfe (38.0 s/ha), Colomba (38.4 s/ha) and Amiri-600 (40.0 s/ha) are differed in comparison to the other sorts according to the amount of the total dry biomass, so they can be used as the best donors for the future selection of the potato.
3. Amiri-600 (23.2 s/ha), Concordia (18.5 s/ha), Sevinj (18.2 s/ha), Julinka (16.0 s/ha) are especially different according to the highest amount of the dry biomass in the tubers.
4. The equality is noted in the accumulation of the dry biomass in the surface and underground parts of the studied collection samples that, it shows both parts have a special role in increasing of the potato productivity, i.e., it should be achieved the optimal ratio of the development of the surface and underground parts during the cultivation.

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