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*ORIGINAL ARTICLE*

# The evaluation of the collection samples of the eggplant according to some physiological indicators

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The article is devoted to the evaluation according to the physiological indicators-total wet and dry biomasses, photosynthetic potential (PP), the absolute surface density of the leaves (ASDL) and productivity of 25 collection samples of the eggplant plant, and the selection of the initial material for future selection based on these indicators. It was determined that the total wet content varies between 80.4-212.6 s/ha, dry biomass 17.4-33.7 s/ha, PP 808.3-2511.3 thousand $m^2$ day/ha, ASDL 4.67-15.88 mg/$cm^2$, and productivity 280-600 s/ha in the eggplant collection samples. Such a wide change interval was allowed to select samples differed with the separate physiological indicators and recommend them for different directions selection carried out in the future.

**Keywords:** Eggplant, Collection samples, Physiological indicators, Photosynthetic potential, The absolute surface density of the leaves, Total biomass.

## Introduction

The eggplant *(Solanum spp.)* belonging to the family Nightshades *(Solanaceae pers.)* occupies an important place among the vegetable plants. In the small farmer farms and backyard areas the increasing of the areas of the eggplant plant every year is explained with its high nutritional value, dietary and taste qualities, as well as the multi-purpose use of its fruits (Allahverdiyev, Aghayev, 2020; Pivovarova, 2015).

There are 7.1-11.0% dry substance, 2.5-4% sugar, 4.0-5.5% extractive substances, 0.6-1.4% protein, 0.1-0.4% oil, calcium, phosphorus, potassium, magnesium and iron salts in the eggplant fruits (Allahverdiyev, Aghayev, 2020; Meshkov et al., 2017; Pivovarova, 2015; Bunin et al., 2013). It is known that the potassium macronutrient normalizes the activity of the heart, water-salt metabolism of the organism, helps the creating the alkaline balance in the organism (Allahverdiyev, Aghayev, 2020; Pivovarova, 2015).

The eggplant is used widely in the kitchens of all the world countries (including India, China, Italy, Russia, Georgia, Central Asia countries, Turkey and others). The various Azerbaijani dishes is prepared from the eggplant fruits: the frying, stewed eggplant in water, sirdag, puree, chop, eggplant caviar, eggplant dolma, etc. The eggplant is pickled, dried and used in the canning industry (Allahverdiyev, Aghayev, 2020; Pivovarova, 2015; Bunin et al., 2013).

Taking into account the valuable characteristics of the eggplant fruits, the increasion of its sort ranges, the creation of the new quality sort and hybrids is one of the actual problems in vegetable-growing today. Taking into account the above-mentioned, the purpose of the current research was to evaluate the collection samples according to the various physiological indicators, to select the initial materials for selection according to sustainability to the productivity, quality and abiotic factors.

## Materials and Methods

In 2016-2017, the studying of the collection samples was carried out in the competitive test nursery in the sections with an area of 3.2 $m^2$ (4 × 0.8 m) in three repetitions.

In the experimentation area the studying of the collection samples was carried out in the same agrophone. The manure (at the rate of 20 t/ha) was used as organic fertilizer, and NPK (16:16:16) as mineral fertilizer. The manure is given under the plough carried out in autumn, and NPK in the form of additional feeding in 5-6 leaves phase and budding-flowering period.

The placement of the nurseries, phenological observations and morphological reports there, harvesting, the report of the product were carried out in accordance with the methodical instructions (Litvinov, 2011).

The total wet biomass was determined by the weight method, the total dry biomass with the drying in a thermostat at 105°C measuring the mass, the photosynthetic potential by measuring the leaf surface area during the vegetation and multiplying it to the number of the vegetation days (PP=Lor × Tv), the absolute surface density of the leaves with the amount of the dry substance per unit leaf surface area (Eyvazov et al., 2018).

In the collection nursery, the regionalized as a standard Ganja and Zahra sorts were used and 25 sort samples were tested in the nursery.

## Results and Discussion

In the Table 1, the evaluation indicators of the collection samples are shown according to the physiological indicators-total wet biomass, total dry biomass, photosynthetic potential (PP), absolute surface density of the leaves (ASDL) and productivity. It can be seen from the data in the Table 1 that the studying physiological indicators are a wide change interval on the collection samples. So the change interval of the wet mass was 80.4-212.6 s/ha, dry biomass-17.4-33.7 s/ha, PP-808.3-2511.3 thousand $m^2$ day/ha, ASDL-4.67-15.88 and the change interval of the productivity-280-600 s/ha. Just so the wide change interval was allowed to select the best initial materials on the separate indicators, as well as the samples differed with the wide spectrum physiological indicators.

The samples which differed with the high values of the total wet and dry biomasses compared on both standards were 160 (200 and 26.9 s/ha, respectively), 170 (202.0 and 29.3), 167 (212.6 and 30.1), 207 (204.8 and 33.7 s/ha). 144 (1383.5), 167 (1649.3), 160 (1615.8), 170 (1900.6), 180 (1428.9), 181 (1344.0), 213 (1787.5), 215 (1544.4), 222 (25143), 223 (1700.4) and 226 (1832.8 thousand $m^2$ day/ha) samples were differed according to the value of the PP expressed the productivity potency of the plant, allowed to create an idea of the plant growing in the area that they could be used as valuable donors in the future selection carried out according to the productivity.

**Table 1.** The evaluation of the eggplant collection samples according to some physiological indicators (the mass flowering, during the beginning of the fruit formation, for the years 2017-2018).

| S.No | The catalog number in the SRIVG | The name of the sample | Total wet biomass, s/ha | Total dry biomass, s/ha | Photosynthetic potential, thousand $m^2$, day/ha | The absolute surface density of the leaves, $mg/sm^2$ | Productivity, s/ha |
|---|---|---|---|---|---|---|---|
| 1 | 40 | Ganja, standard | 182.6 | 26.7 | 829.4 | 7.90 | 340 |
| 2 | 42 | Zahra, standard | 131.6 | 18.3 | 1146.5 | 5.83 | 300 |
| 3 | 69/B | The selected line from 69/A | 113.7 | 20.0 | 921.7 | 5.83 | 340 |
| 4 | 137 | Pantera | 140.3 | 21.8 | 859.8 | 7.68 | 380 |
| 5 | 140/A | The selected line from F1 Terong teno | 181.8 | 31.0 | 877.3 | 15.88 | 560 |
| 6 | 141 | The selected line from F1 Terong Jelita | 133.4 | 26.0 | 1154.9 | 7.88 | 340 |
| 7 | 143 | Clear list | 154.0 | 19.5 | 968.7 | 5.27 | 300 |
| 8 | 144 | Ordubad | 161.5 | 19.6 | 1383.5 | 5.59 | 460 |
| 9 | 150 | R-627 SGR–584 Olin. Fiolet.-239 | 181.3 | 23.1 | 1145.9 | 5.23 | 360 |
| 10 | 154 | R-791 SGR-791 | 151.2 | 25.6 | 1110.2 | 6.86 | 280 |
| 11 | 160 | R-923 SGR-923 local | 200.0 | 26.9 | 1615.8 | 9.02 | 400 |
| 12 | 167 | R-923 SGR-954 Black beonity | 212.6 | 30.1 | 1649.3 | 5.99 | 480 |
| 13 | 170 | R–3099 SGR-3099 F1 Hybrid ng 29 | 202.0 | 29.3 | 1900.6 | 6.88 | 460 |
| 14 | 180 | ASRISSVP-13–12 F1 | 120,1 | 22.9 | 1428.9 | 5.47 | 500 |
| 15 | 181 | ASRISSVP- | 168.4 | 23.5 | 1344.0 | 5.31 | 540 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 16 | 206 | 13–22 F1 Solyaris | 146.7 | 18.0 | 1298.3 | 5.97 | 600 |
| 17 | 207 | Pekinskiye chernie | 204.8 | 33.7 | 1260.9 | 8.07 | 500 |
| 18 | 213 | Falina F1 | 167.5 | 24.3 | 1787.3 | 5.28 | 340 |
| 19 | 214 | Solara F1 | 80.4 | 24.0 | 784.2 | 5.99 | 320 |
| 20 | 215 | Onstruasa de NewJC | 109.7 | 26.6 | 1544.4 | 5.04 | 340 |
| 21 | 222 | V1039539 | 144.2 | 27.8 | 2511.3 | 5.35 | 420 |
| 22 | 223 | V1042687 | 164.5 | 25.7 | 1700.4 | 8.23 | 460 |
| 23 | 225 | V1042317 | 118.7 | 24.7 | 1365.9 | 6.07 | 500 |
| 24 | 226 | V1042481 | 115.3 | 29.3 | 1832.8 | 4.67 | 520 |
| 25 | 228 | V1047327 | 90.3 | 17.4 | 808.3 | 7.38 | 460 |
| Change interval | | | 80.4-212.6 | 17.4-33.7 | 808.3-2511.3 | 4.67-15.88 | 280-600 |

140/A (15.88), 160 (9.02), 207 (8.07) and 223 (8.23 mg/cm$^2$) samples were selected in comparison with the standards, according to the ASDL that they can be also recommended for the selection carried out in the direction of the creating the sustainable sorts to the abiotic factors (against the drought, heat, salinity).

According to the results of the research, it is also possible to select the samples differed with the complex of the physiological indicators that they can be recommended for direct regionalization in the country. 160 (the total wet biomass 200.0; total dry biomass 26.9 s/ha; PP-1615.8 thousand m$^2$ day/ha, ASDL-9.02 mg/cm$^2$, productivity 400 s/ha), 167 (212.6; 30.1; 1649.3; 5.99 and 480, respectively), 170 (202.0; 29.3; 1900.6; 6.88; 460), 207 (204.8; 33, 7; 1260.9; 8.07; 500) samples belong to such samples.

140/A (560 s/ha), 180 (500 s/ha), 181 (540 s/ha), 206 (600 s/ha), 207 (500 s/ha), 225 (500 s/ha) and 226 (520 s/ha) were differed especially in comparison with the standards according to the productivity indicators. In such samples, the productivity was 1.47-1.77 times higher than the standard sort Ganja (340 s/ha) and 1.67-2.0 times higher than the sort Zahra (300 s/ha) that it also allows to use them as a valuable donor in the selection which will be carried out in the future according to the productivity.

## Conclusion

The results of the research can be summarized as following:

1. 160, 167, 207 samples were selected according to the amount of the total wet and dry biomasses, 144, 160, 167, 170, 180, 181, 213, 215, 222, 223 and 226 samples according to the value of the PP, 140/A, 160, 207 and 223 samples according to the value of the ASDL that they can be used as valuable donors in the different directions selection carried out in the future.
2. 140/A, 180, 181, 206, 207, 225 and 226 sort samples were selected according to the productivity indicator that their productivity is higher 1.47-1.77 times than the regionalized standard sort Ganja and 1.67-2.0 times than the sort Zahra.
3. 160, 167, 170 and 207 samples were differed according to the total wet and dry biomasses, the values of the PP and ASDL of the physiological indicators that they can be recommended for direct regionalization in the country.

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