ASSESSMENT OF EGGPLANT (*Solanum melongena* L.) GENOTYPES AND SELECTION OF PARAMETERS FOR BETTER YIELD

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Abstract: One of the goals in eggplant breeding (*Solanum melongena* L.) is higher yield. The research included 20 different genotypes that are part of the collection of the Institute for Vegetable Crops Smederevska Palanka. 16 genotypes originated from Serbia, 2 from the Netherlands, 1 from Italy and 1 from Israel. The experiment was conducted at locations Vranovo (44°36'6,35"N, 20°59'55.47"E, altitude 87 m) using a randomized complete block design in three replications. Yield parameters (earliness, plant height/cm, number of fruits per plant, fruit weight/g, fruit length and width/cm, fruit yield per genotype/kg) were examined to study the traits relations and to effects on eggplant yield. Number of fruits per plant had positive and significant correlation with yield (r=0.685**). Also results showed positive correlation between each of: plant height to fruit length (r=0.812**), plant height to fruit weight (r=0.147), fruit width to fruit weight (r=0.523*). This characteristics had direct or indirect positive effect on yield so it can be taken as selection criteria to increase final yield of eggplant. Because there is genetic variability between tested genotypes, progress in breeding will depends on this variation. Earliness had negative correalation with yield (r=-0.044) and with all others parameters.

Keywords: eggplant, genotypes, fruit, yield, earliness

1. Introduction

Eggplant (*Solanum melongena* L.) is an agronomically and economically important member of the *Solanaceae* family. It is important as a source of various nutritional compounds, but also as a raw material for the pharmaceutical industry [1]. In 2018, world production of eggplants was 54 million tonnes on more than 1.8 million ha, led by China with 63% of the total and India with 24% [2].

The presence of good fiber and various vitamins and minerals in fruits (rich source of iron, manganese) is of great benefit to human health. Eggplant also contain high phenolic contents that act as antioxidants [3; 4]. The color of purple skin cultivars is due to the anthocyanin nasunin [5]. The browning of eggplant flesh results from the oxidation

of polyphenols, such as the most abundant phenolic compound in the fruit, chlorogenic acid [6].

Foods that contain antioxidants may help prevent a range of diseases. Various research shows that the eggplant extracts have superb healing effects on different disorders like burns, warts, inflammatory infections, gastritis, stomatitis and arthritis [7]. Chlorogenic acid shows anticarcinogenic functions by making apoptosis in many human cancer cells, such as leukemia and lung cancer cells [8].

One of the goals of the eggplant breeding has a higher yield and better quality fruits, as well as adaptation to various environmental [9]. Many of the forms are created as a form of adaptation to environmental conditions. Variability is observed even within the same form in terms of plant height, fruit size and yield depending on the climate, exposure, place and method of cultivation [10].

The aim of the research was to examine relations between yield parameters (earliness, plant height/cm, number of fruits per plant, fruit weight/g, fruit length and width/cm, fruit yield per genotype/kg) and their effects on eggplant yield.

2. Materials and methods

The research included 20 different genotypes that are part of the collection of the Institute of Vegetables, Smederevska Palanka. 16 genotypes originated from Serbia, 2 from the Netherlands (K22 and K25), one from Italy (K19) and one from Israel (K38) (Table 1). The experiment was conducted at locations Vranovo (44°36′6,35″N, 20°59′55.47″E, altitude 87 m).

Table 1. Used genotypes and their origin

Genotype	Origin	Genotype	Origin
K 1	Srbija	K 19	Italija
K 3	Srbija	K 20	Srbija
K 6	Srbija	K 21	Srbija
K 7	Srbija	K 22	Holandija
K 8/1	Srbija	K 25	Holandija
K 10	Srbija	K 34	Srbija
K 12	Srbija	K 35	Srbija
K 13	Srbija	K 36	Srbija
K 15	Srbija	K 38	Izrael
K 16	Srbija	K 39	Srbija

Sowing was carried out in individual pots of 11 cm diameter, filled with sterile substrate and kept in a protected area. The seedling were maintained in a common manner, i.e. every 15 days fertilized with NPK 20:20:20 (25g/10l of water) and treated with pesticides as needed. Planting was carried out at the beginning of June. The area of the basic plot was 56 m^2. In each replication, 10 plants were placed in a row for each genotype. The length of the rows was 4 m, the distance between the rows was 0.70 m, while the distance between the plants in the row was 0.40 m.

Yield parameters (earliness, plant height/cm, number of fruits per plant, fruit weight/g, fruit length and width/cm, fruit yield per genotype/kg) were examined to study the traits relations and to effects on eggplant yield. The trials was conducted in the Randomized Complete Block Design (RCBD) with 3 replications. The correlation and path coefficient was studied using StatSoft Inc. STATISTICA, version 8.0.

3. Results and Discussion

The research included 20 genotypes which differed in origin, color and shape of the fruit, yield (Table 1. and Figure 1).

Figure 1. Used genotypes different in color and shape of the fruit

The experiment was conducted at locations Vranovo in the year when the average air temperatures were higher than the ten-year average. During the period of development of vegetative organs and flowering in eggplant plants, average temperatures ranged 21.0 - 27.8 °C. The total amount of precipitation at the localities Vranovo (139.6 mm) was lower compared to the multi-year average precipitation (Table 1).

Table 2. Total precipitation (mm) (A.) and average monthly air temperature (°C) (B.) at Vranovo for June-September 2015 and ten-year average (2000-2010)

		Month			
		June	July	August	September
A.	Precipitation (mm)	43.5	9.6	41.0	45.5
	Ten-year average precipitation (mm)	79.0	53.0	39.0	43.0
B.	Average Temperature (˚C)	24.8	32.3	33.3	27.8
	Ten-year average temperature (˚C)	17.9	21.2	19.8	18.7

Number of fruits per plant had positive and significant correlation with yield (r=0.68**) (Table 3.). The same results were obtained in a similar study [11]. Also results showed positive correlation between each of: plant height to fruit length (r=0.81**), plant height to fruit weight (r=0.147), fruit width to fruit weight (r=0.52*). This characteristics had direct or indirect positive effect on yield so it can be taken as selection criteria to increase final yield of eggplant. Corerlaltaion between friut length and weight with yield were positive but not significant. this is in line with the results of other groups of researchers [11; 12; 13]. Earliness had negative correalation with yield (r=-0.044) and with all others parameters. Our results are in accordance with earlier report [14] who found negative correlation between days to flowering (earlinesss) and fruit yield.

Table 3. Correlation coefficients among traits of eggplant genotypes

Traits	FYpG	L	W	FW	NFpP	PH	E
FYpG	1.00						
L	0.29	1.00					
W	0.11	-0.12	1.00				
FW	0.40	0.03	**0.52 ***	1.00			
NFpP	**0.68 ***	0.20	-0.14	-0.32	1.00		
PH	0.39	**0.81 ***	-0.06	0.15	0.24	1.00	
E	-0.04	-0.27	-0.41	-0.21	0.11	-0.06	1.00

Marked correlations are significant at $p < 0.05$. FYpG - fruit yield per genotype/kg; L - fruit length /cm; W - fruit width/cm; FW - fruit weight/g; NFpP - number of fruits per plant; PH - plant height /cm; E – earliness.

5. Conclusion

All characteristics that had direct or indirect positive effect on yield can be taken as selection criteria to increase final yield of eggplant. Because there is genetic variability between tested genotypes, progress in breeding will depends on this variation.

Author Contributions: JD, SP and ZG was involved in the study design, data collection, results analysis and interpretation, manuscript writing and revisions. JM was involved in the study design, writing of the manuscript, drafting and review of the manuscript. VZ was involved in the study design and data analysis, MU was involved in the data analysis, TŽ was involved in review of the manuscript. All authors have read and agreed to the published version of the manuscript.

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