

STUDY ON BEHAVIOR OF AN EGGPLANT ASSORTMENT GROWN IN OPEN FIELD IN A CONVENTIONAL SYSTEM

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Abstract: Aubergines or eggplants contribute to the diversification of range of vegetables, they can be cultivated in all crop systems, and fruit sell well and with profit on domestic and foreign markets. World production of eggplant has increased lately, knowing a steady increase. Eggplants is consumed in different quantities in different areas. Thus, average consumption is 1.5 kg/year/inhabitant in Southeast Asia, 5 kg in Japan, 9-10 kg in the Middle East and 3 kg in Western Mediterranean countries (Apahidean, Apahidean, 2016). From eggplants, the fruit is consumed at maturity of consumption, being used for preparation of food: salad, moussaka, vegetable mash, stuffed eggplants and mixed with other vegetables are used in preparation of canned foods (Indrea et al., 2012). Eggplant cultivation is practiced in field, and cultivation in solariums is practiced in order to obtain early productions. Older varieties of varieties are no longer cultivated due to low productivity and low resistance to diseases and pests, which have led to the creation of varieties and hybrids with high productivity and resistance. Experience was carried out in 2017, in a vegetable microfarm, in Husasau de Tinca, Bihor County, a favorable area for eggplant culture due to specific pedoclimatic conditions.

Keywords: eggplant, cultivar, plant growth, production

INTRODUCTION

Eggplants (*Solanum melongena* L., var. *esculentum* Dun.) originate in Southeast Asia (India, Burma, South China) and have spread to Middle East and then to Southern Europe (Greece, Italy, Spain) around the year 1200. From here, they spread to culture in the XIV-XV century in France and other Central European countries. In Romania, they came from the Balkan peninsula, by Greek and Bulgarian gardeners, in the 19th century, being cultivated more in south of the country (Ciofu et al., 2004, Indrea et al., 2012). Eggplants are grown on an area of about 1.6-2.0 million hectares with a production of 41.8 million tons and an average production of 25.2 t/ha, China. With 28.0 million tons being first in the world, followed by India-13.0 mil.t. (FAO Yearbook, 2015). Approximately 94% of world production is produced in the subtropical Asia region. In Europe, eggplants are produced in larger quantities in Turkey (827 thousand tons), Italy (220 thousand tons), Spain (206 thousand tons) and Romania (123 thousand tons), (FAO Yearbook 2015). However, culture is also expanding to northern Europe, Ukraine-96 thousand tons, Lithuania-2 thousand tons in 2013 (Caruso et al., 2017).

In Romania, eggplant culture began to be known after First World War and became an important culture after 1950, when surfaces and productions began to grow. At present it is cultivated on about 5 000 ha, in warmer areas with a production of about 20 t/ha (Munteanu, 2003). In our country, most favorable areas for eggplant culture are in the southern and western parts of the country where they are hotter areas and favorable conditions for growth and fructification are found. On smaller surfaces are also cultivated in

the Plain and Plateau of Transylvania, in Moldova or in the sub-Colinar area of the Carpathian Mountains (Indrea et al., 2012, Lagunovschi-Luchian and Vânătoru, 2016). Poșta et al., (2012) obtained in the western area of Romania, productions over 30 t/ha at four genotypes of eggplants, obtaining a satisfactory profit.

Fruits contain 7-10% dry substance of 3.5% carbohydrate, 1% to 1.6% protides, carbohydrates 4.8g, 0.2% fat, 2.58g of fiber per 100g of fresh product, the rest of 93,3% being water. Eggplants have a relatively low energy value of 24-28 kcal/100 g (Apahidean, Apahidean, 2016). Among the mineral elements, potassium is in highest quantity (200-250 mg/100 g of fresh product). Vitamins are in small amounts, such as vitamin C 1-5 mg/100 g and complex B 0.38-0.40 mg/100 g (Beceanu and Balint, 2000, quoted by Munteanu 2003). Eggplants also contain organic acids, malic (170 mg), citric and oxalic, phenols, glycoalkaloids and anthocyanins. Eggplants, especially those with dark bark, are rich in antioxidant pigments of the anthocyanin category. Anthocyanin concentration in eggplant ranges from 8-85 mg/100g depending on the variety (Nisha et al., 2009) The high content of solanine and other bitter substances does not allow raw consumption, so they are only used in prepared state (Indrea et al., 2012). World variety of cultivars (varieties, hybrids) is quite varied and belongs to two ecological-oriental and Mediterranean (European) groups. Those in Oriental group are adapted to high temperature and humidity conditions and a short daylight regime, and those in European group are adapted to high temperature, lower humidity and long day conditions. The cultivated assortment can be grouped by variety-*esculentum* (with round or oval fruits), *var.serpentinum* (long, cylindrical fruit) and *var.depressum* (with dwarf and small fruit) (Stan et al., 2003, Munteanu, 2003).

Eggplant cultivation in the field is done exclusively through seedlings from May to September, with the aim of obtaining some production from end of June, at a lower cost price than greenhouse or solarium crops. Economically profitable productions can be obtained in zones I and II of favorability, since eggplants need at least four months, with average temperatures above 18°C, which is why the favorable culture basins are located in the south, southeast, southwest as well as a limited area of the Transylvanian Plain (Indrea et al., 2012). Field crops ensure consumption from end of July until end of September, during which peak consumption is recorded due to the high demand for canned eggplants (Beceanu et al., 2008).

MATERIALS AND METHODS

Experience was carried out in 2017, being located in a vegetable microfarm, in Husasau de Tinca, Bihor county, in the western part of Romania. Average monthly multiannual temperature in experimental area has positive values since February (0.3°C), then reaches in March to 5.0°C, in April to 10.5°C, in May 15.8°C. In summer months, average monthly temperatures are high, being 19.1°C in June, 20.8°C in July and 21.5°C in August. Since September, average monthly temperatures drop but remain positive until December. In 2017, precipitation value was 604.7 mm. Soil on which the experience was placed is alluvial. Within the microfarm, soil underwent profound changes as it passed into vegetable sector. Soil has a total average porosity over the entire depth of the arable bed, water field capacity has a mean value ranging from 23.8 to 24.7%, and wilting coefficient is between 9.3-11.2%. Minimum is between 18.9% and 19.9%.

Purpose of experience was to determine how some eggplant cultivars behave, when cultivated in the field, in the conventional crop system. Objectives were to determine vegetative growth of plants and production. Cultivars Zaraza, Violeta di Firenze, Carina,

Black Beauty, Japanese Pickling, Dourga, Orange of Turquie, Monstruese of New York, Listanda de Gandia, Jilo Tinqa Verde (10 experimental variants in three rehearsals) were used in the experience.

Experience was placed on a land, fertilized in autumn with 45 t/ha of manure, after which autumn plowing was done. In spring, land was shredded by specific works and prepared for seedlings planting. In parallel with soil preparation, seedlings were grown in a biofuel heating plant, where they were sowed on March 4th. Seedlings were transplanted, in phase of 1-2 true leaves in pots, with the side of 9.5 cm. During seedlings growing period, preventive treatment with Previcur was performed. Seedlings planting was carried out in first decade of May on a mulch ground with black polyethylene foil, after drip irrigation system was previously placed. During vegetation period, specific maintenance works were applied. Treatments for the prevention of diseases (with Topsin applied to soil, for *Fusarium sp.* and *Verticillium sp.*, with Antarcol for *Alternaria solani*) and pest control (with Milbeknock, for *Tetranychus urticae* red mite, Kalipso and Actara against Colorado beetle-*Leptinotarsa decemlineata*). Phaseal fermentation was carried out in three steps using complex chemical fertilizers.

Observations have been made on plant growth, quantitative and qualitative production. Fertilization during vegetaion period was performed in three steps using complex chemical fertilizers.

RESULTS AND DISCUSSIONS

From data presented in Table 1 it is found that plant height was between 24 cm (Orange de Turquie) and 73 cm (Jilo Tinqa Verde) with 13.50-26.50 leaves/plant. Number of shoots at time of the observations was between 1.5-3.0 and number of flowers was, on average, between 2.0 and 4.5/plant. Compared to experience average, plant height was 33.45% higher for the Jilo Tinqa Verde variety, leaf/plant number, 37.87% (Japanese Pickling variety), and the number of shoots was higher by 53.84 %, at Carina variety (Table 2).

Table 1

Cultivar influence on growth and fructification of eggplant plants (24.06.2017)

Cultivar	Plant height cm	Average number/plant				
		Leaves	Shoots	Flowers	Buds	Fruits
Zaraza	72	22.75	1.50	4.25	2.00	1.75
Violeta di Firenze	62	26.25	2.00	4.50	1.00	0.50
Carina	61	22.00	3.00	4.00	0.75	0.50
Black Beauty	59	22.75	2.25	3.25	1.75	0.25
Japanese Pickling	60	26.50	1.75	4.00	1.25	1.25
Dourga	52	26.25	2.00	2.75	2.50	0.50
Orange de Turquie	24	13.50	1.75	3.00	0.50	0.00
Monstruese de New York	43	20.75	1.75	5.00	1.50	1.25
Listada de Gandia	41	17.25	1.50	2.00	0.75	0.00
Jilo Tinqa Verde	73	20.50	2.00	5.25	1.75	0.00

Table 2

Vegetative growth of eggplants (24.06.2017)

Cultivar	Plant height cm		Leaves/plant		Shoots/plant	
	cm	%	No.	%	No.	%
Zaraza	72	131.62	22.75	118.36	1.50	76.92
Violeta di Firenze	62	113.34	26.25	136.57	2.00	102.56
Carina	61	111.51	22.00	114.46	3.00	153.84
Black Beauty	59	107.86	22.75	118.36	2.25	115.38
Japoneese Pickling	60	109.69	26.50	137.87	1.75	89.74
Dourga	52	95.6	26.25	136.57	2.00	102.56
Orange de Turquie	24	43.87	13.50	70.23	1.75	89.74
Monstruese de New York	43	78.61	20.75	107.96	1.75	89.74
Listada de Gandia	41	74.95	17.25	97.75	1.50	76.92
Jilo Tinqa Verde	73	133.45	20.50	106.65	2.00	102.56
Averagec(control)	54.70	100.00	19.22	100.00	1.95	100.00

Eggplant production differed from one cultivar to another, ranging from 4.32 t/ha to Orange de Turquie cultivar and 47.10 t/ha at Violeta di Firenze. Compared with experience average, production was 13.45% higher at Listada de Gandia, 33.46% at Black Beauty, 54.6% at Zaraza and 88.55% at Violeta di Firenze (table 3).

Table 3

Cultivar influence on eggplants production, grown in the field

Cultivar	Production		Difference to control (t/ha)	Significance of difference
	t/ha	%		
Zaraza	38.62	154.60	13.64	***
Violeta di Firenze	47.10	188.55	22.12	***
Carina	11.54	46.19	-13.44	000
Black Beauty	33.34	133.46	8.36	***
Japoneese Pickling	18.28	73.17	-6.70	00
Dourga	22.81	91.31	-2.17	-
Orange de Turquie	4.2	17.29	-20.66	000
Monstruese de New York	25.12	100.56	0.14	-
Listada de Gandia	28.34	113.45	3.36	-
Jilo Tinqa Verde	20.40	81.66	-4.58	0
Average (control)	24.98	100.00	-	-

LSD P 5% 3.64

LSD P 1% 6.15

LSD P 0.1% 8.02

Compared to Black Beauty, considered to be control, Zaraza and Violeta di Firenze varieties achieved higher yields of 15.83% and 41.27% respectively, with the difference in production being distinctly significant. Turquie and Carina Orange crops achieved the lowest yields, being only 12.95%, respectively 34.61% compared to control variant.

Table 4

Eggplant production obtained in the field

Cultivar	Production		Difference to control (t/ha)	Significance of difference
	t/ha	%		
Zaraza	38.62	115.83	5.28	**
Violeta di Firenze	47.10	141.27	13.76	***
Carina	11.54	34.61	-21.80	000
Black Beauty (control)	33.34	100.00	-	-
Japoneze Pickling	18.28	54.82	-15.06	000
Dourga	22.81	58.42	-10.53	000
Orange de Turquie	4.32	12.95	-29.02	000
Monstruese de New York	25.12	75.34	-8.22	00
Listada de Gandia	28.34	95.00	-5.00	0
Jilo Tinqa Verde	20.40	50.58	-13.14	000
LSD P 5%	3.42			
LSD P 1%	5.17			
LSD P 0.1%	8.34			

CONCLUSIONS

On the basis of obtained results from the research carried out on eggplant culture in the field, in specific conditions of Western area of Romania, using Zaraza cultivars, Violeta di Firenze, Carina, Black Beauty, Japonese Pickling, Dourga, Orange de Turquie, New Monstruese York, Listanda de Gandia, Jilo Tinqa Verde, the following conclusions were drawn:

- plant height was between 24 cm (Orange de Turquie) and 73 cm (Jilo Tinqa Verde) with 13,50-26,50 leaves/plant;
- number of shoots, at time of the observations was between 1.5-3.0 and number of flowers was, on average, between 2.0 and 4.5/plant;
- eggplant production was different from one cultivar to another, ranging from 4.32 t/ha at Orange de Turquie cultivar and 47.10 t/ha at Violeta di Firenze;
- compared with experience average, production was 13.45% higher at Listada de Gandia, 33.46% at Black Beauty, 54.6% at Zaraza and 88.55% at Violeta di Firenze cultivar.

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