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Performance of Eggplant in Relation of Yield, Insect and Diseases during Summer of Bangladesh

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ABSTRACT

The study was conducted with 13 eggplant lines/variety at the farm of Olericulture Division, HRC, Bangladesh Agricultural Research Institute, Gazipur during the summer season of 2017 to develop new high yielding OP variety having tolerance to high temperature, high humidity, eggplant fruit and shoot borer, bacterial wilt and phomopsis blight. The lines varied significantly for their response to all characters ($P<0.05$). The line SM286A required minimum 90.67 days to first harvest. Maximum marketable fruit number was obtained by SM323 (41.56). Heavy sized fruit was harvested by SM328 (111.84 g), which was statistically similar with SM275 (107.33 g), SM236A (97.00 g). The range of fruit infection by BFSB was 12.56-23.33%, while lowest in SM236A (12.56%). In case of bacterial wilt (BW) infestation at field level performance, zero percent incidences was observed in SM232, SM236A, SM286A, SM328. The yield range of eggplant lines was 12.47-39.72 t/ha. The highest fruit yield was recorded from the line SM236A (39.72 t/ha), which was followed by SM323 (34.50 t/ha), SM232 (34.28 t/ha), SM328 (32.49 t/ha), BARI Begun-10 (31.45 t/ha), SM286A (29.88 t/ha), SM275 (29.49 c t/ha) and lower yield were recorded from SM313 (12.47 t/ha). Considering earliness, tolerance to fruit infection by BFSB, bacterial wilt infestation, phomopsis blight infestation, attractive fruit shape and fruit color, last of all fruit yield, the lines SM232, SM275, SM288, SM323, SM328 were found promising. So these five lines can be selected for further confirmation.

Keywords: Eggplant, Yield, Insect and diseases, Summer, Bangladesh

INTRODUCTION

Brinjal or eggplant (*Solanum melongena* L.) is an important Solanaceous crop of sub tropics and tropics. The name brinjal is popular in Indo-Bangla subcontinents and is derived from Arabic and Sanskrit whereas the name eggplant has been derived from the shape of the fruit of some varieties, which are white and resemble in shape to chicken eggs. It is also called Aubergine (French word) in Europe. The eggplant is of much importance in the warm areas of Far East, being grown extensively in India, Bangladesh, Pakistan, China and the Philippines. It is also popular in Egypt, France, Italy and United States. In Bangladesh, India it is one of the most common, popular and principal vegetable crops grown throughout the country. It is a versatile crop adapted to different agro-climatic regions and can be grown throughout the year.

Eggplant is rich in calories, protein, carbohydrate, fiber, vitamins, minerals, antioxidants, flavonoids, etc. One cup of cooked eggplant, weighing around 99 grams (g) contains: 35 calories, 0.82 g of protein, 8.64 g of carbohydrate, of which 3.17 g is sugars, 0.23 g of fat, 2.5 g of dietary fiber, 188 mg of potassium, 6 mg of calcium, 1 mg of sodium, 0.12 mg of zinc, 1.3 mg of vitamin C, 0.25 mg of iron, 11 mg of magnesium, 15 mg of phosphorus, 14 micrograms (mcg) of folate, 85 mcg of vitamin B6, 2.9 mcg of vitamin K. Eggplants also contain flavonoids, such as anthocyanins. Anthocyanins are water-soluble pigments that have many health benefits. The skin of the eggplant is rich in antioxidants, fiber, potassium and magnesium. The fiber, potassium, vitamin C, vitamin B6 and phytonutrient content in eggplants all support heart health. Certain flavonoids, including anthocyanins, may be associated with a lower risk of mortality from heart disease [1]. Anthocyanins and chlorogenic acid has been shown to decrease low-density lipid (LDL) levels as well also acts as an antimicrobial, antiviral and anti-carcinogenic agent and anti-cancer effects. Anthocyanin in the eggplant skin is a powerful antioxidant

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that protects brain cell membranes from free radical damage, neuro-inflammation and facilitate blood flow to the brain. This could help improve memory and prevent age-related mental disorders.

Eggplant is the most popular vegetable crop in respect of total acreage (50,415 ha) and production (5,04,817 t) in Bangladesh with an average yield of 10.0 t/ha [2], which is very low as compared to that in other tropical countries. This low yield may be due to lack of high yielding varieties with pest resistance. High yielding variety is an important factor for maximizing the yield of eggplant.

A number of cultivars are grown in Bangladesh, consumer preference being dependent upon fruit color, size and shape. We are accustomed to purple eggplant, but in addition to purple eggplant, there is also green eggplant. There is a great chance to get higher yield by collecting new germplasm of eggplant. With this information in mind, Olericulture division collected a lot of eggplant germplasm and evaluated last year and selected 12 eggplant lines. This study was undertaken to study the performance of these lines regarding yield having tolerance to high temperature, high humidity, eggplant fruit and shoot borer, bacterial wilt and phomopsis blight [3].

MATERIALS AND METHODS

The experiment was conducted at the experimental farm of Joydebpur during the summer of 2017. The experimental field was at 23.9917°N Latitude and 90.4124°E Longitudes having an elevation of 8.2 m from sea level. Thirteen eggplant lines/varieties viz., SM232, SM236C, SM236A, SM267, SM275, SM286A, SM288, SM289, SM313, SM323, SM328, SM335, BARI Begun-10 included in the study. The seeds were sown on the seedbed on 15 March 2017. Thirty two days old seedlings were transplanted in the main field on 16 April, 2017. The experiment was laid out in a RCB design with three replications. The unit plot size was 7.5 × 0.70 m and 10 plants were accommodated in a plot with a plant spacing of 75 cm apart in single row maintaining a row to row distance of 1 m with 50 cm drain. The land was fertilized with cow dung, N, P, K, S, Zn and B @ 10,000 100, 30, 75, 13, 1.5 and 0.8 kg/ha, respectively. One third of the cow dung and half of P and full of S, Zn and B were applied during final land preparation. Rest of cow-dung and P and 1/3 of K were applied as basal in pit. Entire amount of N and rest of K were applied in four equal installment starting from 20 days after transplanting. Rest three installments were applied at vegetative, flowering and initial fruiting stage. Irrigation, weeding, crop protection measures and other intercultural operations were done following standard practice. Data on days to 1st harvest, marketable fruit number/plant, average fruit weight (g), fruit weight/plant (kg), fruit length (cm), fruit diameter (cm), plant height at 1st harvest (cm), plant height at last harvest (cm), fruit infection by BFSB (%), bacterial wilt infestation (%), little leaf infestation (%), phomopsis blight infestation (%), fruit yield (t/ha), fruit shape and fruit color were recorded from five randomly selected plants per entry per replication. The information on different characters was statistically analyzed.

RESULTS AND DISCUSSION

Mean performances of eggplant lines/varieties are presented in **Tables 1 and 2** and **Figure 1**. The lines varied significantly for their response to days to 1st harvest, marketable fruit number/plant, average fruit weight, fruit weight/plant, fruit length, fruit diameter, plant height at 1st harvest, plant height at last harvest, fruit infection by BFSB, bacterial wilt infestation, fruit yield ($P<0.05$). In respect of days to first harvest, the earliest line was SM286A (90.67 days) which was statistically similar with SM323 (91.59 days), SM236A 91.67 days), SM232 (92.00 days) and SM313were the most delayed (109.67 days). The range of marketable fruit number was (15.67-41.56). The highest marketable fruit number per plant was counted in SM323 (41.56) which was statistically similar with SM236A (37.67), SM286A (36.67), while lowest fruit number was counted in SM313 (15.67). Average fruit weight is an important criterion to select a high yielder line. The heaviest fruit was produced in SM328 (111.84 g), which was statistically similar with SM275 (107.33 g), SM236A (97.00 g), while lightest fruit was in SM313 (73.33 g). Fruit weight/plant was maximum in SM236A (3.61 kg) which was followed bySM323 (3.14 kg), SM232 (3.12 kg), SM328 (2.95 kg), while minimum was in SM313 (1.13 kg). The longest identical fruit was produced by BARI Begun-10 (25.12 cm) which was followed by SM288 (20.33 cm) and SM328 produced the shortest fruit (9.45 cm). The higher diameter fruit was produced by the line SM335 (9.23 cm) followed by SM328 (8.93 cm) and minimum was by SM323 (3.40 cm). The range of plant height at first and last harvest was 55.00-80.67 days and 91.00-126.58 days, respectively. The range of fruit infection by BFSB was 12.56-23.33%, while lowest in SM236A (12.56 %), which was statistically similar with SM328 (12.67%), SM286A (14.00%), SM323 (14.56%), SM232 (15.00%) and highest was in SM288 (23.33%). In case of bacterial wilt (BW) infestation at field level performance, zero percent incidence was observed in SM232, SM236A, SM286A, SM328, while maximum was observed in SM335 (15.59%). Zero percent phomopsis blight diseases incidence was observed in SM232, SM236A, SM288 while maximum was observed in SM335 (10.00 %). Morphological characteristics of the lines are presented in **Table 2.**

Table 1. The yield and yield contributing characters of 13 eggplant lines/variety.

Treatment	Days to 1st harvest	Marketable fruit number/ plant	Average fruit weight (g)	Fruit weight/ plant (kg)	Fruit length (cm)	Fruit diameter (cm)	Plant height at 1st harvest (cm)	Plant height at last harvest (cm)	Fruit infection by BFSB (%)	Bacterial wilt infestation (%)	Phomopsis blight infestation (%)
SM232	92.00 b-d	33.00 b-d	94.67 b-d	3.12 b	11.67 fg	3.63 d	59.33 de	92.00 c	15.00 d-f	0.00 b	0.00 b
SM236A	91.67 cd	37.67 ab	97.00 a-c	3.61 a	14.67 c	6.23 b	70.00bc	121.00 ab	12.56 f	0.00 b	0.00 b
SM236C	107.33 a	24.00fg	82.33 c-f	1.97 d	12.00 e-g	5.03 c	71.67 bc	121.00 ab	22.67 ab	10.00 ab	6.00 ab
SM267	108.67 a	28.67 d-f	92.67 b-d	2.63 c	14.00 c-e	4.60 c	58.33 de	125.00 a	16.33 d-f	6.67 ab	6.00 ab
SM275	108.00 a	25.00 e-g	107.33ab	2.68 c	14.67 c	5.93 b	55.00 e	91.00 c	17.67 c-e	6.93 ab	10.0 ab
SM286A	90.67 d	36.67 a-c	75.67 f	2.72 c	12.33 d-f	3.57 d	59.00 de	91.67 c	14.00 ef	0.00 b	3.00 ab
SM288	108.67 a	21.67 gh	95.67 b-d	2.07 d	20.33 b	3.57 d	80.67 a	121.67 ab	23.33 a	6.67 ab	0.00 b
SM289	107.00 a	24.67 fg	77.00ef	1.88 d	10.33 f-h	6.27 b	72.67 a-c	97.67 bc	18.33 b-e	16.67 a	13.30 a
SM313	109.67 a	15.67 h	73.33 f	1.13 e	10.33 f-h	5.00 c	78.33 ab	110.67 a-c	19.00 a-d	10.00 ab	6.00 ab
SM323	91.59 cd	41.56 a	76.51 f	3.14 b	14.45 cd	3.40 d	64.97 cd	65.24 d	14.56 d-f	0.26 b	3.00 ab
SM328	95.59 b	26.56 e-g	111.84 a	2.95 bc	9.45 h	8.93 a	72.97 a-c	126.58 a	12. 67 f	0.00 b	3.00 ab
SM335	107.92 a	17.23 h	81.51 d-f	1.36 e	10.12 gh	9.23 a	76.97 ab	119.91 ab	21.89 a-c	13.59 a	10.00 ab
BARI Begun-10	94.59 bc	31.23 c-e	91.84 c-e	2.86 bc	25.12 a	3.45 d	72.31 a-c	96.91 bc	15.56 d-f	0.26 b	0.00 b
Level of significance CV (%)	*2.26	*13.18	*10.10	*8.85	*9.12	*6.52	*7.51	*13.98	*16.45	*137.04	*140.00

The yield range of eggplant lines was 12.47-39.72 t/ha. The highest fruit yield was recorded from the line SM236A (39.72 t/ha), which was followed by SM323 (34.50 t/ha), SM232 (34.28 t/ha), SM328 (32.49 t/ha), BARI Begun-10 (31.45 t/ha), SM286A (29.88 t/ha), SM275 (29.49 c t/ha) and lower yield were recorded from SM313 (12.47 t/ha).

Four types of fruit shape was observed among the lines viz., oblong (5 lines), cylindrical (3 lines/variety), elongate (3 lines), round (2 line), while in term of fruit color, all the lines were purple colored except 2 lines were green colored (SM286A, SM289).

Table 2. Qualitative characters of 13 eggplant lines/variety.

Lines/variety	Fruit shape	Fruit color
SM232	Elongate	Purple
SM236A	Oblong	Purple
SM236C	Oblong	Purple
SM267	Oblong	Purple
SM275	Oblong	Purple
SM286A	Elongate	Deep green with white stripe at bottom
SM288	Cylindrical	Purple
SM289	Round	Light green
SM313	Oblong	Purple
SM323	Elongate	Purple
SM328	Round	Purple
SM335	Cylindrical	Purple
BARI Begun-10	Cylindrical	Purple

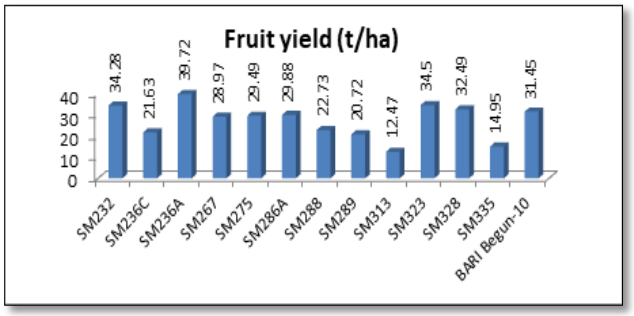

Figure 1. Fruit yield (t/ha) of 13 eggplant lines/variety.

CONCLUSION

Though the lines SM236A, SM323, SM232, SM328, SM286A were high yielder, but considering earliness, tolerance to fruit infection by BFSB, bacterial wilt infestation, phomopsis blight infestation, attractive fruit shape and fruit color, last of all fruit yield, the lines SM232, SM275, SM288, SM323, SM328 were found promising. So these five lines can be selected for further confirmation [4].

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