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Evaluation of bottle gourd (*lagenaria siceraria*) to growth and yield

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Abstract

An experiment was conducted at Horticulture farm, Sher-e-Bangla Agricultural University to evaluate the growth and yield performance of eleven (L1 to L11) bottle gourd lines during the period from November 2013 to March 2014. Maximum vine length (6.8 m), leaf area (975.4 cm^2), number of fruit (14.3), fruit length (54.9 cm), single fruit weight (1.43 kg), yield/plant (20.6 kg), yield/plot (82.0 kg) and yield/ha (50.1 ton) was found from L_{11} followed by L10. On the other hand minimum sex ratio (male to female) (0.21), days to first male flower appearance (37.3) and female flower appearance (41.0) was found from L.

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Introduction

Bottle gourd (*Lagenaria siceraria* L.) belongs to the family Cucurbitaceae, is an important and popular vegetable in Bangladesh. High genotypic coefficient of variation values for yield/plant, number of fruits/plant, fruit length and fruit breadth and wider range of variation indicate more opportunity for selection of better genotypes (Rajesh *et al.*, 1999; Ram *et al.*, 2005). In nature, bottle gourd exhibits great morphological and genetic variability and could wide environmental adaptation (Koffi, 2009). Bangladeshi farmers used different local cultivars and released (from different organization) bottle gourd variety. But their yield is not in satisfactory level. Varietal performance might be helpful to overcome this problem. Considering these circumstances the present study was undertaken with a view to evaluate the growth and yield performance of eleven bottle gourd lines.

Materials and methods

An experiment was conducted at Horticultural farm, Sher-e-Bangla Agricultural University, Dhaka, Bangladesh during period from November 2013 to March 2014 to evaluate the performance of bottle gourd lines. Eleven bottle gourd lines were used on the experiment coded from L_1- L_{11}. Seeds were sown on 50 cm × 50 cm × 45 cm sized pit. 2 m × 2 m distance was maintained. Manures and fertilizers were applied as recommended by BARI (2011). Data were collected on vine length at harvest, leaf area, chlorophyll content, sex ratio, days to appearance of first male flower, days to appearance of first female flower, number of fruit/plant, fruit length, fruit diameter, single fruit weight, yield/plant, yield/plot and yield/ha. The number of male and female flowers were visually counted and was calculated sex ratio through following formula; Sex ratio = Number of male/number of female flowers (Marie and Mohamed, 2010). Collected data were analyzed statistically using MSTAT-C computer package programme and mean were calculated. Differences between treatments were evaluated by Least Significance Difference (LSD) test at 5% level of significance (Gomez and Gomez, 1984).

Result and discussion

Vine length: Longest vine was found from L_{11} (6.8 m) followed by L_{10} (6.4 m) while minimum from L_3 (4.8 m) (Table 1). Vine length of bottle gourd lines ranged from 391.67 to 748.33 cm at 90 DAS (Harika *et al.*, 2012).

Leaf area: Maximum leaf area was found from L_{11} (975.4 cm^2) followed by L_{10} (947.2 cm^2) while minimum from L_3 (761.2 cm^2) (Table 1).

Table 1. Response of bottle gourd lines to some crop characters[x].

Bottle gourd lines	Vine length (m)		Leaf area (cm^2)		Chlorophyll content (%)		Sex ratio	
L_1	6.3	b	925.8	c	39.7	h	0.26	cde
L_2	5.2	e	856.7	g	47.7	e	0.33	bcd
L_3	4.8	f	761.2	k	55.6	a	0.43	a
L_4	5.5	d	893.9	e	45.9	f	0.35	abc
L_5	5.1	e	772.7	j	52.6	b	0.34	bc
L_6	4.8	f	800.9	i	35.6	j	0.36	ab
L_7	5.8	c	904.9	d	48.6	d	0.40	ab
L_8	5.1	e	885.3	f	42.6	g	0.33	bcd
L_9	5.1	e	822.5	h	48.5	d	0.33	bc
L_{10}	6.4	b	947.2	b	38.5	i	0.24	de
L_{11}	6.8	a	975.4	a	49.4	c	0.21	e
LSD0.05	0.2		3.2		0.3		0.09	
CV%	1.9		0.2		0.5		7.5	

[x]In a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability .

Chlorophyll content: Bottle gourd lines showed significant variation in content of chlorophyll. Maximum chlorophyll content was found from L_3 (55.6%) whereas minimum from L_6 (35.6%).

Sex ratio (Male to female): Minimum sex ratio was observed from L_{11} (0.21) which was statistically similar with L_{10} (0.24) and L_1 (0.26) while maximum from L_3 (0.43) (Table 1). Variation in sex ratio may be due to the adaptability of different genotypes was also reported by Munshi and Acharya (2005) and Samadia (2002) in bottle gourd.

Days to appearances of first female and male flowers: Early female flower was appeared from L_{11} (37.3 days) followed by L_{10} (40.3 days) whereas late from L_5 (54.3 days) (Table 2). Early male flower was appeared from L_{11} (41.0 days) followed by L_{10} (43.7 days) whereas late from L_5 (59.0 days) which was statistically similar with L_3 (58.0 days) (Table 2). Bottle gourd required maximum 60.67 days to minimum 48.17 days in different genotypic trial (Harika *et al.*, 2012). Similarly variation for the first female and male appearance in different bottle gourd genotype was also observed by Kumar *et al.* (1999) and Sirohi *et al.* (1988) in bottle gourd.

Number of fruit/plant: Number of fruit/plant varied significantly among the bottle gourd lines. Maximum number of fruit/plant was found from L_{11} (14.3) which was statistically identical with L_{10} (13.7) and L_1 (13.3) followed by L_2, L_4 and L_8 (12.3) but minimum from L_3 (9.3) (Table 2).

Table 2. Response of bottle gourd lines to flower and fruit attributes[x].

Bottle gourd lines	Days to appearances of first male flower		Days to appearances of first female flower		Fruit Number/plant		Fruit length (cm)		Fruit diameter (cm)	
L_1	42.3	h	46.7	e	13.3	ab	38.5	c	17.5	ab
L_2	46.7	e	50.3	d	12.3	bc	26.6	f	12.2	c
L_3	53.3	b	58.0	a	9.3	f	18.1	k	17.5	b
L_4	45.3	f	49.3	d	12.3	bc	27.0	e	18.3	a
L_5	54.3	a	59.0	a	11.0	de	23.2	h	18.4	a
L_6	51.3	c	55.7	b	11.0	de	19.0	j	18.4	a
L_7	43.3	g	47.7	e	10.0	ef	33.0	d	18.0	ab
L_8	51.3	c	56.3	b	12.3	bc	21.3	i	17.9	ab
L_9	49.7	d	53.7	c	11.7	cd	24.5	g	18.5	a
L_{10}	40.3	i	43.7	f	13.7	a	53.1	b	9.7	d
L_{11}	37.3	j	41.0	g	14.3	a	54.9	a	9.8	d
LSD0.05	0.7		1.6		1.1		0.2		0.7	
CV%	0.9		1.9		5.7		0.5		2.7	

[x]In a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability.

Fruit length: Fruit length was varied significantly among the bottle gourd lines. Longest fruit was found from L11 (54.9 cm) followed by L10 (53.1 cm) while minimum from L3 (18.1 cm) (Table 2). Harika *et al.* (2012) found that maximum fruit length 58.92 cm and minimum 9.18 cm among twenty five genotypes.

Fruit diameter: Bottle gourd lines showed significant variation in terms of fruit diameter. Maximum fruit diameter was found from L_9 (18.5 cm) which was statistically similar with L_5 (18.4 cm), L_6 (18.4 cm), L_4 (18.3 cm), L_7 (18.0 cm), L_8 (17.9 cm) and L_1 (17.5 cm) while minimum from L_{10} (9.7 cm) which was statistically similar with L_{11} (9.8 cm) (Table 2). Fruit diameter ranges was observed from 16.3 cm to 6.47

cm and this range was found from different genotype of bottle gourds (Harika *et al.*, 2012).

Single fruit weight: Single fruit weight was varied significantly among the bottle gourd lines. Maximum single fruit weight was found from L_{11} (1.43 kg) followed by L_{10} (1.35 kg) and L_1 (1.32 kg) whereas minimum from L_3 (0.89 kg) (Table 3). The results obtained are in agreement with Samadia (2002) and Sharma and Dhankar (1999).

Yield/plant: Bottle gourd lines showed significant variation for yield/plant. However, maximum yield/plant was found from L_{11} (20.6 kg) followed by L_{10} (18.4 kg) and L_1 (17.6 kg) whereas minimum from L_3 (8.3 kg) (Table 3).

Table 3. Response of bottle gourd to yield related attributes[x].

Bottle gourd lines	Single fruit weight (kg)		Yield/plant (kg)		Yield/plot		Yield (ton)/ha	
L_1	1.32	b	17.6	b	70.1	b	42.6	b
L_2	0.99	de	12.3	c	48.8	c	29.3	c
L_3	0.89	g	8.3	f	33.1	f	19.5	f
L_4	1.01	d	12.4	c	49.5	c	29.8	c
L_5	0.92	fg	10.1	e	40.2	e	23.9	e
L_6	0.96	def	10.5	de	41.9	de	25.0	de
L_7	1.13	c	11.3	cde	45.0	cde	27.0	cde
L_8	0.94	efg	11.7	cd	46.4	cd	27.8	cd
L_9	0.97	de	11.4	cde	45.2	cde	27.1	cde
L_{10}	1.35	b	18.4	b	73.4	b	44.7	b
L_{11}	1.43	a	20.6	a	82.0	a	50.1	a
LSD0.05	0.05		1.4		5.6		3.5	
CV%	2.1		6.2		6.3		6.5	

[x]In a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability.

Yield/plot: Maximum yield/plot was found from L_{11} (82.0 kg) followed by L_{10} (73.4 kg) and L_1 (70.1 kg) while minimum from L_3 (33.1 kg) (Table 3).

Yield/ha: Maximum yield/ha was found from L_{11} (50.1 ton) followed by L_{10} (44.7 ton) and L_1 (42.6 ton) while minimum from L_3 (19.5 ton) (Table 3).

Conclusion

Lastly, it can be concluded that L_{11} was the best bottle gourd lines among the lines used on the experiment which was followed by L_{10}. L_{11} might be used as the used in the farmer's levels after repeated trial.

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