

**PERFORMANCE OF HYBRID LINES OF POINTED GOURD
(*Trichosanthes dioica* Roxb) FOR YIELD AND YIELD ATTRIBUTES**

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Abstract

A field experiment was conducted at the Regional Agricultural Research Station, Ishurdi, Pabna during the growing season of 2013-14 with eighteen hybrid lines of pointed gourd and BARI Hybrid Patal -1 as check to observe their performances for yield, yield attributes and other morphological characters. The experiment was laid out in randomized complete block design with three replications. The maximum vine length (242.00 cm) and nodes/plant (18.30) was recorded from PG018×M₂. Shoots/plant ranged from 12.50 (PG027×M₂) to 4.66 (PG008 M₁). The maximum number of fruits/plant (160.00) was obtained from PG009×M₂ followed by PG012×M₁ (154.66). Individual fruit weight was recorded highest (50.10 g) in PG027×M₂, which was very close to PG008×M₂ (48.00) and PG018×M₂ (47.00 g). Weight of fruits/plant ranged from PG009×M₂ (6.86 kg) to PG022×M₁ (3.01 kg). The highest pulp weight was recorded in PG027×M₂ (44.20 g) which was statistically similar to PG008×M₂ (42.20 g). Three different leaf colour (light green, green and deep green), two types of leaf tip (pointed and blunt) and four types of leaf margin (slightly serrated, serrated, entire and undulated) were found among the hybrid lines. Four fruit colour (whitish, light green, green and dark green), four fruit stripes (no stripe, white, green white and light green) and three types of fruit curvature (slightly curved, curved and straight) were observed in different lines. The line PG009×M₂ showed better performance in respect of fruits/plant and weight of fruits/plant and thus gave the highest yield (45.74 t/ha). The lines PG008×M₂, PG007×M₂, PG017×M₂, PG027×M₂ and PG014×M₁ also produced better yield (39.23 - 35.58 t/ha). Therefore, the lines PG014×M₁, PG007×M₂, PG008×M₂, PG009×M₂ and PG017×M₂ should be subjected for further evaluation to release as variety.

Keywords: Hybrid lines, pointed gourd, *Trichosanthes dioica* and yield.

Introduction

Pointed gourd (*Trichosanthes dioica* Roxb.) locally known as 'Patal' is a popular cucurbitaceous vegetable in Bangladesh. The Bengal and Assam region of India

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are the primary centre of its origin (Singh *et al.*, 1992). It is cultivated almost in all districts of Bangladesh, especially in Rajshahi, Pabna, Jessore, Bogra, Rangpur and Kushtia in summer and rainy season (Rashid, 1993). It is morphologically distinct from the other cucurbitaceous species due to its well established dioecious vegetative means of propagation (Awal *et al.*, 2005). In Bangladesh, pointed gourd is cultivated in an area of around 10006.5 ha with total production of 84096 metric tons and national average yield is 8.40 t/ha during 2014-15 (Anon., 2016). It is seen that average yield of pointed gourd (8.40 t/ha) is low compared to other countries like India (FAO, 1981) due to lack of enough high yielding varieties.

Besides carbohydrates, it provides considerable amounts of minerals. 100 g edible portion of pointed gourd contains 83.0 mg Cu, 17.0 mg S, 9.0 mg Mg and 2.6 mg Na (Singh, 1989). Scarcity of vegetables prevails in the market at the end of winter and beginning of summer seasons. During the months of May to October, only a few vegetables are available in the market and the quantity is very low against the demand. Pointed gourd becomes available in the market from March to the end of October. At this juncture, pointed gourd can fulfill the demand of vegetables to some extent.

There are three released pointed gourd varieties, two open pollinated and one hybrid in Bangladesh, which are not enough for the farmers. Farmers need more number of high yielding varieties including hybrid for cultivation. Pointed gourd is dioecious in nature and propagated vegetatively through root suckers and vines. Therefore, development and maintenance of hybrid is easier than other crops. Some hybrid lines have been developed at the Regional Agricultural Research Station, Ishurdi, Pabna. Among those lines, one line (PG027×M₂) has been released as BARI Hybrid Patal-1 after evaluation and other lines need to be evaluated. The study was, therefore, undertaken to evaluate different hybrid lines for selection of superior hybrid varieties of pointed gourd.

Materials and Method

The experiment was conducted at the Regional Agricultural Research Station of Bangladesh Agricultural Research Institute (BARI), Ishurdi, Pabna, during the growing period of October 2013 to October 2014. The experimental site was at 24.03° N Latitude and 89.05° E Longitude with an elevation of 16 m above from the sea level. The soil of the experimental field was clay loam with pH value of 8.5 belonging to the High Ganges River Floodplain under AEZ -11 (BARC, 2005). The crop received 1175 mm annual rainfall during the whole growing season. The treatment consisted of 18 hybrid lines of pointed gourd viz., PG002×M₁, PG003×M₁, PG004×M₁, PG005×M₁, PG006×M₁, PG008×M₁, PG012×M₁, PG014×M₁, PG022×M₁, PG002×M₂, PG005×M₂, PG006×M₂, PG007×M₂, PG008×M₂, PG009×M₂, PG017×M₂, PG018×M₂ and PG025×M₂

with BARI Hybrid Patal-1 as check. The fresh vines of male lines were planted on 10 October 2013 in some plots where female plants were not planted. The male and female population was maintained at 1:10 ratio. The hybrid lines of pointed gourd were evaluated in randomized complete block design with three replications. The land was ploughed well with the help of tractor followed by harrowing. Unit plot size was 4.5 m × 1.0 m. The fresh vines of different female lines were planted on 10 October 2013 maintaining the spacing of 1.5 m × 1.0 m. Watering was done in the morning for establishment of the vines. Manure and fertilizers were applied @ 10 tons of cowdung, 500 kg of Urea, 360 kg of Triple Super Phosphate, 330 kg of Muriate of Potash and 200 kg of Gypsum per hectare (Khan *et al.*, 2007). Full doses of cowdung, Triple Super Phosphate and gypsum were applied as basal during pit preparation. Urea and Muriate of Potash were top dressed in three equal installments at 20, 60 and 90 days after emergence (Khan *et al.*, 2007). Irrigation and other intercultural operations were done as and when necessary. Bamboo branches were used to support the plants and the plants were allowed to trail on the trellises made of bamboo slices. Vines emerged out from the plants near the soil level were pruned during the growing period. Fruits were harvested regularly when attained maturity or immediately before hardness of seeds (about 12 days after anthesis). Harvesting of fruit was started on 23 March 2014 and continued upto 28 October 2014 in different lines. Data on various morphological and yield characters were recorded from three plants of each plot following Plant Genetic Resources Descriptor (IBPGR, 1983). Fresh fruits were harvested from the field treatment wise in the month of July 2014 and brought them to the laboratory. Then ten fruits were randomly selected and kept treatment wise in white polybag (25 cm × 20 cm) having some holes in ambient condition. Days counted from first day (on harvest day) to the day at which fruits became shriveled, pale in colour and unsuitable for consumption were considered for shelf life.

Collected data were subjected to statistical analysis through MSTAT C Software and means were compared by DMRT at 5% level of probability.

Results and Discussion

A) Days to 1st female flowering, vine length, number of node and shoot

The pointed gourd lines showed wide variation in days to first female flowering (Table 1). Appearance of first female flower ranged from 151 (PG005×M₂) to 170 (PG008×M₂) days. Variation in flowering period in pointed gourd was also observed by Shanmugavelu (1989). The line PG018×M₂ produced the highest vine length (242.00 cm) which was statistically similar to PG025×M₂ (234.00 cm) and PG027×M₂ (233.00 cm). The line PG007×M₂ produced the lowest vine length (90.00 cm). Significant variation in vine length of pointed gourd was also reported by Kumar *et al.* (1995) and Kabir (2007). Kumar *et al.* (1995) found the vine length ranging from 180.00 cm to 267 cm; whereas, Kabir (2007) found

vine length with a range of 95 cm to 470 cm. The maximum number of nodes/plant was found in PG018×M₂ (18.30) followed by PG006×M₁ (17.30), PG025×M₂ (16.60), PG027×M₂ (16.33), PG017×M₂ (16.00), PG002×M₁ (15.00), PG012×M₁ (15.00), PG008×M₂ (14.30), PG002×M₂ (14.00) and PG007×M₂ (14.00). Number of nodes/vine increased with the increasing vine length. Singh and Prasad (1989) also observed a wide range of variation for number of nodes/vine in pointed gourd. Number of shoots/plant ranged from 4.66 to 12.50 (Table 1). BARI Hybrid Patal 1 produced the maximum shoots/plant (12.50) which was identical to PG006×M₁ (12.00), PG012×M₁ (11.00), PG003×M₁ (10.66), PG002×M₁ (10.33) and PG014×M₁ (10.33), while the minimum in PG008×M₁ (4.66).

Table 1. Days to first female flowering, vine length, number of nodes per plant and shoots per plant of nineteen hybrid pointed gourd lines

Hybrid lines	Days to 1 st female flowering	Length of vine (cm)	Nodes/plant (no.)	Shoots/plant (no.)
PG002×M ₁	164def	172.00c	15.00a-f	10.33ab
PG003×M ₁	164def	114.00f-h	10.00g-i	10.66ab
PG004×M ₁	168abc	183.00j	8.30h-i	8.00d
PG005×M ₁	161f	109.00gh	15.30a-e	9.66bc
PG006×M ₁	164def	218.00b	17.30ab	12.00a
PG008×M ₁	153gh	113.00f-h	11.33d-i	4.66f
PG012×M ₁	156g	214.00b	15.00a-f	11.00ab
PG014×M ₁	166bcd	101.00hi	10.33f-i	10.33ab
PG022×M ₁	166bcd	139.00d	11.00e-i	6.33d-f
PG002×M ₂	162ef	143.06d	14.00a-g	7.30de
PG005×M ₂	151h	121.00fg	12.60b-h	8.00cd
PG006×M ₂	163ef	92.00ij	7.30i	5.66ef
PG007×M ₂	166bcd	90.00ij	14.00a-g	5.60ef
PG008×M ₂	170a	136.00e	14.30a-g	7.33de
PG009×M ₂	166bcd	125.00ef	11.6c-i	8.00cd
PG017×M ₂	169ab	219.00b	16.00a-d	7.00de
PG018×M ₂	163ef	242.00a	18.30a	8.00cd
PG025×M ₂	165cde	234.30a	16.60ab	7.33de
BARI Hybrid Patal -1	157g	233.00a	16.33a-c	12.50a
CV (%) ₋	6.70	4.95	18.17	11.45

Means with uncommon letter(s) in a column are significantly different at 5% level by DMRT.

Table 2. Number of fruits per plant, fruit size, individual fruit weight, weight of fruits per plant of nineteen hybrid pointed gourd lines

Hybrid lines	Days to 1 st fruit harvest	Fruits/plant (no.)	Individual fruit weight (g)	Length of fruit (cm)	Width of fruit (cm)	Weight of fruits/plant (kg)
PG002×M ₁	176bc	107.33ij	40.24d-f	10.00c	3.30ef	4.32d
PG003×M ₁	175c	98.00k	45.61a-d	11.56b	3.53d-f	4.47cd
PG004×M ₁	179abc	115.66e	44.49a-d	11.50b	3.50d-f	5.14c
PG005×M ₁	175c	114.00g-i	38.00e-h	10.06c	3.60c-f	4.38d
PG006×M ₁	175c	121.66d-f	37.00e-h	8.36fg	3.53d-f	5.25c
PG008×M ₁	176c	117.66e-g	43.66b-e	9.83cd	3.20f	4.38d
PG012×M ₁	165c	154.66a	34.14gh	9.40c-e	3.63c-e	5.26c
PG014×M ₁	168c	117.33e-g	45.62a-d	11.33b	3.70b-e	5.33c
PG022×M ₁	178abc	135.00b	22.92i	7.83g	3.60c-f	3.01f
PG002×M ₂	178abc	107.35ij	32.40h	9.50c-e	3.30ef	3.46e
PG005×M ₂	176bc	115.00f-h	44.40a-d	9.53c-e	3.46d-f	5.10c
PG006×M ₂	167d	125.66cd	39.60d-g	9.16de	3.53d-f	4.95c
PG007×M ₂	177bc	129.00bc	41.27c-f	8.90ef	3.66c-e	5.32c
PG008×M ₂	178abc	120.00d-g	48.00ab	12.67a	3.96a-c	5.88b
PG009×M ₂	182a	160.00a	43.00b-f	10.16c	3.76a-d	6.86a
PG017×M ₂	178abc	129.00bc	42.00b-f	9.56c-e	4.10ab	5.43c
PG018×M ₂	181ab	109.66h-j	47.00a-c	9.93cd	4.16a	5.15c
PG025×M ₂	175c	123.00c-e	41.24c-f	9.13de	3.56c-f	5.07c
BARI Hybrid Patal -1	178abc	104.00ij	50.10a	13.23a	4.10ab	5.39c
CV (%)	5.29	3.24	7.76	4.19	6.03	5.06

Means with uncommon letter (s) in a column are significantly different at 5% level by DMRT.

B) Days to 1st fruit harvest, number of fruits/plant, individual fruit weight, fruit length and width and weight of fruits/plant

Days to 1st fruit harvest, fruits/plant, fruit length, fruit width, individual fruit weight and weight of fruits/plant showed significant variation in hybrid pointed gourd lines (Table 2). Days to 1st fruit harvest ranged from 165 to 182 days. Maximum days were required to 1st fruit harvest of PG009×M₂ (182 days) followed by PG018×M₂ (181 days), PG004×M₁ (179 days), PG002×M₂ (178

days), PG017×M₂ (178 days), BARI Hybrid Patal 1 (178 days) and PG022 × M₁ (178 days), and the minimum time required for PG012×M₁(165 days). The number of fruits/plant ranged from 98.00 to 160.00. Maximum number of fruits /plant was recorded from PG009×M₂ (160.00) followed by PG012×M₁ (154.66) and the minimum from PG003×M₁ (98.00). The variation in number of fruits/plant among the pointed gourd genotypes was also reported by Prasad and Singh (1990) and Alam *et al.* (2008). Alam *et al.* (2008) found the fruit number/plant with a range of 13.67 to 180.67. Individual fruit weight varied significantly among the lines and it ranged from 22.92 g to 50.10 g. The largest fruit was obtained from BARI Hybrid Patal-1 (50.10 g) followed by PG008×M₂ (48.00 g), PG018×M₂ (47.00 g), PG003×M₁ (45.61 g), PG014×M₁ (45.62 g), PG004×M₁ (44.49 g) and PG005 × M₂ (44.40g); whereas, the smallest fruit was produced by PG022×M₁ (22.92 g). The fruit length ranged from 7.83 to 13.23 cm. The highest fruit length was in BARI Hybrid Patal-1 (13.23 cm) which was closely followed by PG008 × M₂ (12.67 cm) and the smallest from PG022×M₁ (7.83 cm). These results are almost similar to Khan *et al.* (2007) and Alam *et al.* (2008). The widest fruit was produced by PG018×M₂ (4.16 cm) followed by PG017×M₂ and Bari hybrid Patal 1 (4.10 cm) but the narrowest in PG008 × M₁ (3.20 cm). Weight of fruits/plant varied significantly among the lines (Table 2). The maximum weight of fruits/plant was recorded in PG009×M₂ (6.86 kg) which differed significantly from others but the minimum was found in PG022×M₁ (3.01kg). The better fruit weight/plant was also recorded in PG008×M₂ (5.88 kg), PG027×M₂ (5.39 kg) and PG014×M₁ (5.33kg). Similar results were also reported by Singh *et al.* (1985), Alam *et al.* (2008) and Khan *et al.* (2007).

C) Pulp weight, number of seeds/fruit, weight of seeds/fruit, duration of fruit harvest, fruit yield and shelf life

Pulp weight/fruit, number of seeds/fruit, weight of seeds/fruit, duration of fruit harvest, fruit yield and shelf life are presented in Table 3. Pulp weight in the lines ranged from 17.20 g to 44.20 g. The maximum pulp weight was obtained from the fruit of BARI Hybrid Patal 1 (44.20 g) followed by PG008×M₂ (42.20 g). On the other hand, the minimum pulp weight was produced by PG022×M₁ (17.20 g). These results are in conformity with the findings of Kabir (2007), Khan *et al.* (2007) and Alam *et al.* (2008). Number of seeds/fruit ranged from 16.66 to 27.33. The maximum number of seeds/fruit was recorded in PG014×M₁ (27.33) closely followed by PG018×M₂, PG007×M₂, PG025×M₂, PG008×M₂, and PG012 × M₁, while the minimum in PG005×M₁ (16.66). This corroborates the findings of other investigators (Khan *et al.*, 2007; Alam *et al.*, 2008; Prasad and Singh, 1990). The maximum weight of seeds/fruits was found in PG018 × M₂ (7.20 g) which was closely followed by PG006×M₂ (7.10 g) while the lowest in PG005×M₁ (4.13 g). Significant variation was also found in the lines with regard to duration of fruit harvest which ranged from 212 days to 223 days. The maximum harvest duration

was found in PG017×M₂ (223 days) followed by PG009×M₂ (222 days) and the minimum duration was recorded in PG002×M₂ (212 days) and PG005×M₂ (212 days). Yield of pointed gourd significantly varied among the lines (Table 3). The maximum yield was obtained from PG009×M₂ (45.74 t/ha) followed by PG008×M₂ (39.23 t/ha), BARI Hybrid Patal-1 (36.85 t/ha), PG017×M₂ (36.19 t/ha) and PG027×M₂ (35.94 t/ha) and the minimum was recorded in PG0022×M₁ (20.10 t/ha). These results are almost similar with the findings of Khan *et al.* (2007) and Alam *et al.* (2008). Maximum shelf life was found in BARI Hybrid Patal-1 (15.0 days) followed by PG014×M₁ (14.33 days), PG007×M₂ (14 days) and PG017×M₂ (12.50 days) while the lowest shelf life was found in PG005×M₁ (6.23 days).

Table 3. Pulp weight, number of seeds per fruit, weight of seeds per fruit, duration of fruit harvest, fruit yield and shelf life of nineteen hybrid pointed gourd lines

Hybrid lines	Pulp weight (g)	Number of seeds/fruit	Weight of seeds/fruit (g)	Duration of fruit harvest (days)	Fruit yield (t/ha)	Shelf life (days)
PG002×M ₁	34.00d-h	22.33b-d	5.20c	218c-f	28.84h	6.25j
PG003×M ₁	38.00c	22.66b-d	5.56bc	219b-e	29.80h	7.25ij
PG004×M ₁	38.10c	22.67b-d	5.40bc	214gh	34.30e-g	11.23c-e
PG005×M ₁	33.00e-i	16.66f	4.13d	216d-g	29.23h	6.23j
PG006×M ₁	31.00g-j	23.00b-d	5.30bc	215fgh	35.04d-f	10.50d-f
PG008×M ₁	37.00c-e	22.23b-d	5.43bc	214gh	29.20h	12.00c
PG012×M ₁	29.00ij	24.00a-d	4.16d	216d-g	35.06b-f	9.66fg
PG014×M ₁	39.10b-d	27.33a	5.33bc	215fgh	35.58c-e	14.33b
PG022×M ₁	17.20k	23.00bc	5.20c	213gh	20.10j	9.00gh
PG002×M ₂	26.50j	21.66cd	5.40bc	212h	23.10i	8.00hi
PG005×M ₂	38.50b-d	21.00de	5.41bc	212h	34.03e-g	11.3c-e
PG006×M ₂	32.00f-i	18.00ef	7.10a	218c-f	33.01g	9.03gh
PG007×M ₂	35.60c-g	25.33ab	5.30bc	220bc	36.85c	14.00b
PG008×M ₂	42.20ab	24.66a-c	5.20c	219bd	39.23b	8.66gh
PG009×M ₂	37.40c-e	20.66de	5.56bc	222ab	45.74a	11.50cd
PG017×M ₂	36.20c-f	23.00b-d	5.40bc	223a	36.19cd	12.50c
PG018×M ₂	39.50bc	25.66ab	7.20a	216efg	34.35e-g	9.36h
PG025×M ₂	35.00c-g	25.00a-c	5.73b	218c-f	33.81fg	10.00e-g
BARI Hybrid Patal -1	44.20a	23.00b-d	5.40bc	218c-f	35.94cd	15.00a
CV (%)	7.32	8.14	4.94	4.58	2.50	7.32

Means with uncommon letter (s) are significantly different at 5% level by DMRT.

D) Leaf colour, leaf tip and leaf margin

The leaves of pointed gourd lines showed wide variation in different leaf characteristics (Table 4). The colour of leaves was light green, green and deep green. The leaves of the lines, PG017×M₂, PG018×M₂, and PG025×M₂ were deep green while PG003×M₁, PG004×M₁, PG005×M₁, PG006×M₁, PG008×M₁, PG014×M₁, PG005×M₂ and PG006×M₂ were green. The rest of the lines had light green leaves. The two lines PG005×M₁ and PG018×M₂, and the variety BARI Hybrid Patal 1 produced blunt leaves, while the rest of the lines produced pointed leaves. The leaf margin of PG002×M₁ and PG009×M₂ were slightly serrated, while PG003×M₁, PG004×M₁, PG012×M₁, PG005×M₂ and PG017×M₂ and PG004×M₁ were serrated. The leaf margin of the lines PG005×M₁, PG008×M₁, PG014×M₁, PG022×M₁, PG002×M₂, PG006×M₂, PG007×M₂, PG008×M₂ were entire and the remaining had undulated margin. These results are in agreement with the findings of Khan *et al.* (2007) who reported to have variation in type of margin of pointed gourd.

Table 4. Leaf characteristics of nineteen hybrid pointed gourd lines

Hybrid lines	Leaf colour	Leaf tip	Leaf margin
PG002×M ₁	Light green	Pointed	Slightly serrated
PG003×M ₁	Green	Pointed	Serrated
PG004×M ₁	Green	Pointed	Serrated
PG005×M ₁	Green	Blunt	Entire
PG006×M ₁	Green	Pointed	Undulated
PG008×M ₁	Green	Pointed	Entire
PG012×M ₁	Light Green	Pointed	Serrated
PG014×M ₁	Green	Pointed	Entire
PG022×M ₁	Light green	Pointed	Entire
PG002×M ₂	Light green	Pointed	Entire
PG005×M ₂	Green	Pointed	Serrated
PG006×M ₂	Green	Pointed	Entire
PG007×M ₂	Light green	Pointed	Entire
PG008×M ₂	Light green	Pointed	Entire
PG009×M ₂	Light green	Pointed	Slightly serrated
PG017×M ₂	Deep Green	Pointed	Serrated
PG018×M ₂	Deep Green	Blunt	Undulated
PG025×M ₂	Deep Green	Pointed	Undulated
BARI Hybrid Patal-1	Light green	Blunt	Undulated

Table 5. Fruit characteristics of nineteen hybrid pointed gourd lines at marketable stage

Hybrid lines	Fruit colour	Stripes of fruit	Shape of fruit	Curvature of fruit
PG002×M ₁	Dark green	Green white stripe	Spindle	Slightly curved
PG003×M ₁	Whitish	No stripe	Spindle	Curved
PG004×M ₁	Dark green	White stripe	Spindle	Curved
PG005×M ₁	Light green	No stripe	Cylindrical	Slightly curved
PG006×M ₁	light green	Light green stripe	Cylindrical	Straight
PG008×M ₁	Dark green	White stripe	Cylindrical	Slightly curved
PG012×M ₁	Green	White stripe	Oval	Straight
PG014×M ₁	Green	Green white stripe	Cylindrical	Straight
PG022×M ₁	Dark green	Green white stripe	Oval	Straight
PG002×M ₂	Light green	White stripe	Spindle	Curved
PG005×M ₂	Whitish	No stripe	Spindle	Curved
PG006×M ₂	Dark green	Green white stripe	Cylindrical	Straight
PG007×M ₂	Dark green	Green white stripe	Cylindrical	Slightly curved
PG008×M ₂	Dark green	Green white stripe	Cylindrical	Curved
PG009×M ₂	Dark green	Green white stripe	Spindle	Curved
PG017×M ₂	Dark green	Green white stripe	Oval	Straight
PG018×M ₂	Green	Green white stripe	Spindle	Slightly curved
PG025×M ₂	Light green	Green white stripe	Oval	Slightly curved
BARI Hybrid Patal -1	Dark green	Green white stripe	Cylindrical	Slightly curved

E) Colour, shape, stripe and curvature of fruit

The fruits of hybrid pointed gourd lines showed variation in colour, shape, stripes and curvature (Table 5). The colour of fruit was dark green in PG002×M₁, PG004×M₁, PG008×M₁, PG022×M₁, PG006×M₂, PG007×M₂, PG008×M₂, PG009×M₂, PG017×M₂, and BARI Hybrid Patal. The fruit colour of PG003×M₁ and PG005×M₂ was whitish; whereas, PG005×M₁, PG006×M₁, PG002×M₂ and PG025×M₂ was light green. Variation in colour of pointed gourd has also been observed by Ram (2001) and Khan *et al.* (2007). The fruits of PG004×M₁, PG008×M₁, PG012×M₁ and PG002×M₂ showed white stripes and PG006×M₁ showed light green stripes. On the other hand, the fruits of PG003×M₁, PG005×M₁ and PG005×M₂ had no stripe. The rest of the lines produced fruits with green white stripes. The lines PG005×M₁, PG006×M₁, PG008×M₁,

PG014×M₁, PG006×M₂, PG007×M₂, PG008×M₂ and PG027×M₂ produced cylindrical fruits, while PG002×M₁, PG003×M₁, PG004×M₁, PG002×M₂, PG005×M₂, PG009×M₂ and PG018×M₂ produced spindle shaped fruits, but the rest of the lines produced oval shaped fruits. Variation in shape of pointed gourd was also reported by Khan *et al.* (2007). Slightly curved fruits were found in PG002×M₁, PG005×M₁, PG008×M₁, PG007×M₂, PG018×M₂, PG025×M₂ and BARI Hybrid Patal 1. On the contrary, curved fruits were produced by PG003×M₁, PG004×M₁, PG002×M₂, PG005×M₂, PG008×M₂ and PG009×M₂ but the rest produced straight fruits. The results are in conformity with the report of Prasad and Singh (1990).

Conclusion

Based on the above result, it can be concluded that the hybrid pointed gourd lines PG014×M₁, PG007×M₂, PG008×M₂, PG009×M₂ and PG017×M₂ performed better in respect of yield and yield attributes. These five hybrid lines should be subjected for further evaluation to release as hybrid variety (ies).

References

- Alam, M. A., M. G. Rabbani, E. H. M. S. Rahman, M. R. Kabir and M. S. N. Mandal. 2008. Evaluation of some collected pointed gourd genotypes and their relationship. *Int. J. BioRes.* 4(1):17-23.
- Anonymous. 2016. Year Book of Agricultural Statistics-2015, Bangladesh Bureau of Statistics (BBS). Ministry of Planning, Govt. of the Peoples Republic of Bangladesh. P. 245.
- Awal, A., M. S. M. J. Alam, M. R. Al, M. N. Hasan, S. R. Basunia and S. M. M. Rahman. 2005. *In Vitro* propagation of pointed gourd (*Trichosanthes dioica* Roxb.) from shoot tips. *Biotec.* 4(3): 221-224.
- BARC. 2005. Fertilizer Recommendation Guide. Bangladesh Agril. Res. Council, Farmgate, Dhaka-1215. 191 P.
- FAO. 1981. Food and Agricultural Organization of the United Nations. Soil Survey Project of Bangladesh. Soil Res. Tech. Pep. Pp. 101-159.
- IBPGR. 1983. Descriptor for Pointed Gourd (*Trichosanthes dioica* Roxb.). International Board for Plant Genetic Resources. Rom, Italy.
- Kabir, M. E. 2007. Genetic variability, correlation and path analysis of pointed gourd (*Trichosanthes dioica* Roxb.). M. S. Thesis. Dept. of Hort. and Post Harvest Tech., Sher-e-Bangla Agril Univ. Dhaka-1207. 78 P.
- Khan, A. S. M. M. R., M. G. Rabbani, M. A. Siddique, and M. A. Islam. 2007. Characterization and evaluation of pointed gourd germplasm. *Bangladesh J. Agril. Res.* 32(1): 117-134.
- Kumar, R, V. S. Brahmachari and R. Kumar 1995. Varietal assessment of Parwal (*Trichosanthes dioica*). *Indian. J. Hort.* 8(2): 165-168.

- Prasad, V. S. R. K. and D. P. Singh. 1990. Studies of morphological component of pointed gourd (*Trichosanthes dioica*). *Indian J. Hort.* **47**(3): 537-540.
- Ram, D. 2001. Non-hierarchical Euclidean cluster analysis in pointed gourd. *Indian J. Hort.* **58**(3): 264-268.
- Rashid, M. M. 1993. Vegetable Science (in Bengali) 1st ed. Bangla Academy, Dhaka. Bangladesh. Pp. 333-336.
- Shanmugavelu, K G. 1989. Production Technology of Vegetable Crops. Oxford and IBH Pub. Co., New Delhi, India. Pp. 821-825.
- Singh, A. K., R. D. Singh and K. Singh. 1992. Genetic Variability, heritability and genetic advance for some traits in pointed gourd (*Trichosanthes dioica* Roxb.). *Haryana J. Hort. Sci.* **21**(3-4):236-240.
- Singh, D. P. and V. S. R. K. Prasad. 1989. Variability and correlation studies in pointed gourd (*Trichosanthes dioica* Roxb). *Indian J. Hort.* **46**(2): 204-209.
- Singh, K. 1989. Pointed gourd (*Trichosanthes dioica* Roxb.). *Indian Hort.* **33**: 35-38.
- Singh, R. R., G. M. Mishra and R. N. Jha. 1985. Studies on varieties and scopes for improvement in pointed gourd (*Trichosanthes dioica*). *South Indian Hort.* **33**(4): 257-260.

