

MORPHOLOGICAL CHARACTERIZATION OF SNAKE GOURD

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Abstract

An experiment was conducted with 11 accessions of Snake gourd (*Trichosanthes anguria* L.) at PGR, BARI, Ganges. The seeds of accessions were collected from different district of Bangladesh. The experiment was laid out in RCBD design with three replications. Among the morphological parameters studied, significant variations were found in growth habit, leaf size, leaf lobes, leaf colour, stem colour, fruit strip colour and seed colour. All the accessions showed uniform leaf pubescence and riped stem, branched seed, white flower and smooth fruit surface. Maximum variations were found in days to 1st male flowering, fruit length, fruit weight and 100 seed weight.

Key words: Snake Gourd, *Trichosanthes anguria*, Germplasm, Characterization

Introduction

Snake gourd (*Trichosanthes anguria* L.) is one of the important and common vegetables in Bangladesh. It is a monoecious and perennial climbing herb with male and female flowers axillary, slender tapering fruits with a waxy surface. Its fruits is orange in color when ripe and pulpy red at maturity. It has hairy, angular or 5 to 7 lobed leaves which emit a foetid odor when bruised. It is mainly grown in season but also available in winter season. Many local varieties are being grown all over the country. Specific colour, size and taste are important local consumer (Rasid & Shing, 2007). It grows well in the tropics of Asia. Hot and humid weather is suitable for the plant. High temperature and day length is responsible for seed germination and growth. The immature fruit is used as a vegetable. Snake gourd consists of substantial amount of moisture and little protein, fiber, fat and carbohydrate. Its mineral and vitamin contents are calcium, iron, and phosphorus, sodium, potassium of carotene, lutein, thiamin, biotin and ascorbic acid (<http://www.bangladesh-herbs.com/herbs/snake-gourd.htm>). For the yield improvement and future utilization of local germplasm, genetic diversity of bitter melon (Kundu, 2009) and snake gourd (Ahmed *et al.*, 2000 and Palan, 2004) was estimated at Bangladesh Sheikh Mujibur Rahman Agril. University (BSMARU) Bangladesh. According to Ahmed *et al.* (2000) there has been a great scope for genetic improvement of snake gourd as a wide range of variability exists in Bangladesh (Bhui, 2003).

However, it exhibits tremendous variability in fruit shape, size, skin characters, flesh color, and reaction towards pest and disease incidence. But systematic work to characterize the variability of snake gourd is scarce. Information on genetic parameters being basic to any crop improvement program, an attempt was

made to estimate the genetic variability, heritability and genetic advance in the germplasm of snake gourd. Available information regarding its genetic study is meager and so far, no in depth studies on these regards have been made in Bangladesh. Therefore, the present research have been planned and designed to characterize the snake gourd morphology locally which would help in the plant breeding and growers for utilization and future research study.

Materials and Method

Twenty one accessions of snake gourd were collected from different districts of Bangladesh (Table 1). The seeds were sown in poly bags at Plant Genetic Resources Centre, BARI, Ganges. The experiment was laid out in RCBD design with three replications. Eighteen days seedlings were transplanted in the prepared pit. Pit top distance were 4m and two seedlings were transplanted in each pit. Ten kg of cow dung (approx. 100 g T S P and 30 g 3D) were applied mesh pit at basal dose. Eighty gram urea was used in each pit after seedling establishment in two equal installment of 15 days interval (BARC, 2005). Normal agronomic practices were followed to grow the crop.

Table 1. Source of snake gourd accessions

Sl.No	Accessions	Source of collection
1	MRA-41	Chittagong
2	MRA-38	Chittagong
3	MR-36	Pabna
4	MR-108	Pabna
5	M-42	Sirajgonj
6	MMB-76	Talukhat
7	M-25	Sirajgonj
8	M-29	Sirajgonj
9	M-161	Sirajgonj
10	M-254	Sirajgonj

11	MH-8	Barnali
12	M-94	Sirajgong
13	M-269	Sirajgong
14	M-214	Sirajgong
15	M-204	Sirajgong
16	M-272	Sirajgong
17	M-282	Sirajgong
18	MRA-66	Chittagong
19	SM-82	Rajshahi
20	M-67	Sirajgong
21	MRA-162	Chittagong

Necessary pest and insect management practices were followed for controlling different insects & pest. The plants were grown on 1m height bamboo trellis. Observations were recorded on 13 qualitative and 10 quantitative parameters as per snake gourd descriptor (descriptor for vegetables and condiments by PGRC Sri Lanka, 1995). Minimum 3 replications were used for statistical analysis.

A. Qualitative characters

Data were recorded at fruiting stage.

Growth habit	Vine-V	Bushy-B	
Stem pubescence	Pubescent-P		
Stem colour	Light green-LG	Dark green-DG	Green-G
Stem shape	Ridged-R		
Tendrill type	Branches-B		
Leaf colour	Light green-LG	Dark green-DG	Green-G
Leaf lobes	Shallow-S	Intermediate-I	Deep-D
Leaf shape	Pinnate-P		
Leaf size	Small (< 9 X 12 cm)	Medium (> 9 X 12 cm)-M	Large (> 12 X 18 cm)-L
Flower colour	White-W		
Fruit strip colour	Yellow-orange-YO	White-W	
Fruit surface	Smooth-S		
Seed colour	Grayed-orange-GO	Grayed-white-GW	Yellow-Y

B. Quantitative characters

1. Days to 1st male flowering: Days required from planting to first opening of male flower.
2. Days to 1st female flowering: Days required from planting to 1st opening of female flower.
3. Number of male flower: Number of male flowers per plant.
4. Number of female flower: Number of female flowers per plant.
5. Fruit length (cm): Mean length of five randomly selected green fruit.

6. Fruit width (cm): Mean width of five randomly selected green fruit.

7. Fruit weight: Mean weight of five randomly selected green fruit.

8. Seed length (cm): Mean length of 3 randomly selected matured seed.

9. Seed width (cm): Mean length of 3 randomly selected matured dried seed.

10. 100 seed weight (gm): Mean weight of 100 randomly selected seed after sun drying.

Result and Discussion

Characterization is one of the important tools to identify genetic diversity. The PGRC Snake gourd collection is a pool of genetic diversity and its long term preservation has been ensured. The characterization data documents the diversity, allows storing the diversity and facilitates access to useful traits for crop improvement.

A. Qualitative characters

Qualitative variations of different characters are shown in Table 2. Highest variation was found in seed color, leaf color, leaf lobes, leaf size, fruit strip color and stem color. Some variations were observed in leaf

Table 2. Number of snake gourd accessions under different qualitative classes

Qualitative Parameters	Sub Type	No. Accession
Growth habit	Bushy	17
	Vine	4
Leaf shape	Pinnate	21
	Small	2
Leaf size	Medium	11
	Large	8
	Shallow	4
Leaf lobes	Intermediate	7
	Deep	18
	Light green	14
Leaf color	Dark green	3
	Green	4
Stem pubescence	Pubescent	21
	Light green	11
Stem color	Dark green	10
	Ridged	21
Tendrill type	Branches	21
	White	21
Fruit surface	Smooth	21
	White	7
Fruit strip color	Yellow-orange	14
	Grayed orange	19
	Grayed white	1
Seed color	Grayed white	1
	Yellow	1

shape, fruit surface, stem shape, seed type, flower color, stem pubescence. Grayish orange color seed found in 19 accessions. In accession M-214 & MSH-76 showed grayish white and yellow seed color.

Table 3. Range, Mean, Standard deviation and Co-efficient of variation (%) of Snake gourd

Character	Range	Mean	SD	CV(%)
Days to male flowering	53-107	71.33	13.30	18.81
Days to female flowering	68-88	78.00	5.14	6.59
No. of male flower	12-358	131.05	91.01	69.45
No. of female flower	14-303	108.19	79.21	73.21
Fruit length (cm)	16.6-44.4	24.34	7.47	30.70
Fruit width (cm)	3.23-4.66	3.99	0.38	9.46
Fruit weight (gm)	48-267.2	146.68	50.16	34.19
Seed length (cm)	1.07-1.63	1.38	0.14	9.91
Seed width (cm)	0.6-1.23	0.82	0.13	15.82
100 seed weight (gm)	24.72-51.2	32.95	4.00	18.20

Quantitative traits:

Range, mean, standard deviation (SD) and co-efficient of variation (CV%) are shown in Table-3. Early male and female flowering was found in M-272 (53 days) and M-27 (68 days) respectively for male (64 days) and female (80 days) flower were appeared in 16 days earlier in collection number (M-25). The male flower appeared 15 days earlier than the female ones among the collections (M-67).

The minimum and maximum number of male and female flower was 12 and 14 and 358 and 302 (MSH-76) respectively but number of male and female flower was same in SM-82 (18). The CV% indicates the highest variability in the no. of male (69.45%) and female (73.21%) flower. Days to female flowering (6.59%) showed the lowest variability among the parameter this is followed by fruit weight (9.46) and seed length (9.91%).

100% stacked column with 3D visual effect of mean, SD & CV% are shown Fig. 1. It reveals the graphical proportion among mean, SD and CV% & converting them into 100% stacked column.

The length, width and weight of fruit gourd are shown in fig. 2 showing length and width in column and fruit weight in line graphically. The highest fruit length (44.4 cm) and width (4.66 cm) were observed in MSH-6 which is followed by SM-82, MRA-162 and MR-108. The lowest length and width was found in M-214 (16.6 cm). The average length and width was 24.34 cm and 3.99 cm respectively (Fig. 2). Green fruit weight varied from 48 g (M-204) to 267.2 g (MSH-6) among the accession where the mean weight was 146.68.

The length, width and weight of 100 seeds of snake gourd are shown in fig. 3. Showing length and width in column and 100 seed weight in line graphically.

Seed length varied from 1.07 cm to 1.63 cm. The highest seed length was observed in M-214 and lowest was in MRA-62. Similarly seed width varied from 0.6 cm to 1.23 cm. The highest seed width was found in MSH-76 and the lowest was in MRA-66. The mean length and width was 1.38 cm and 0.82 cm respectively. 100 seed weight was ranged from 24.72 gm (MRA-62) to 51.2 g (MRA-66) and their average weight was 32.95 g among the accessions.

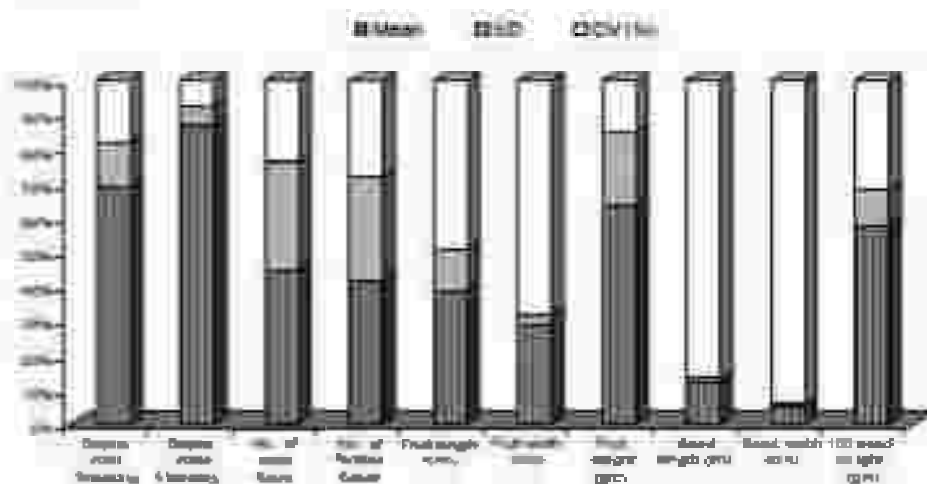


Fig. 1. 3D Visual effect of Mean, SD & CV% of quantitative parameters

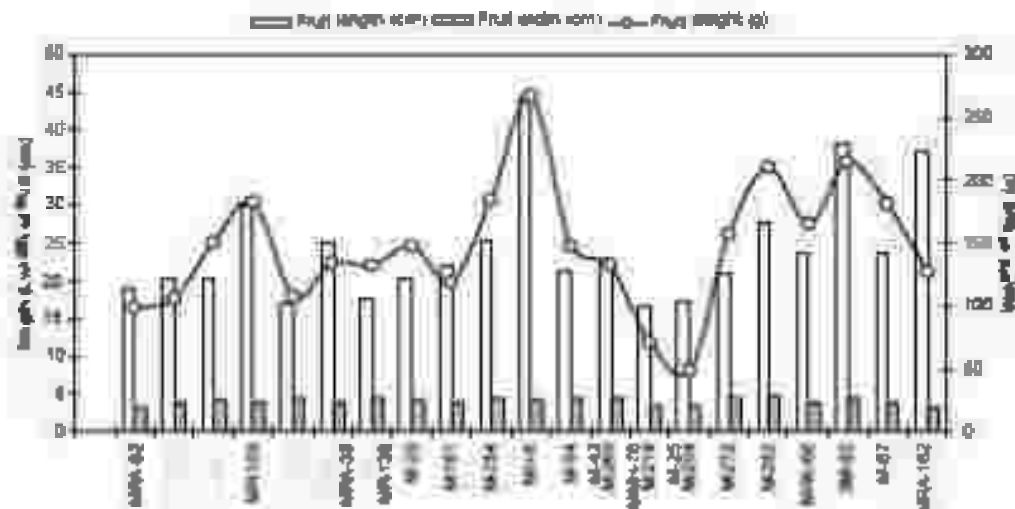


Fig.2. Length, width & weight of fruits different accession

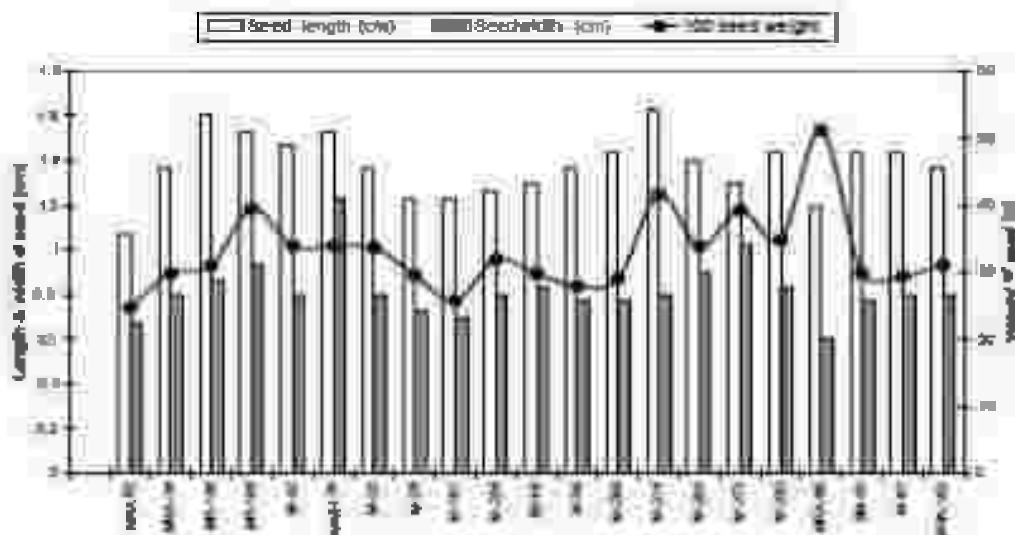


Fig.3. Length, width & weight of seed of different accessions

Conclusion

According to days to male and female flowering the early varieties were M - 29 and M-38 and late varieties were MH - 5. Considering fruit length, width and weight the best variety MH - 5 among the accessions. The Snake gourd germplasm at PGRC is might be a reliable source for horticulturist and plant breeders for crop improvement with desirable traits on morphological parameters.

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