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MORPHOLOGICAL CHARACTERIZATION AND EVALUATION OF SNAKE GOURD GENOTYPES FOR FRUIT YIELD, YIELD ATTRIBUTES AND OTHER CHARACTERS*

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Abstract

The experiment was conducted at the research field of Horticulture Department of Bangabandhu Sheikh Mujibur Raman Agricultural University (BSMRAU) during the period from March to June 2017 to characterize and evaluate the snake gourd genotypes morphologically. In the study, 55 snake gourd genotypes collected from Plant Genetic Resources Centre (PGRC) of Bangladesh Agricultural Research Institute (BARI), Genetics and Plant Breeding Department of BSMRAU, different seed companies and various parts of Bangladesh. The genotypes exhibited 67.3% cylindrical, 21.8% elliptical, 1.8% fusiform, 9.1% ovate shape fruit along with 56.4% green, 18.2% light green, 16.4% dark green and 9.0% white fruit. Seed colour with 38.2% was brown and 83.6% seed shape was elliptical. The fruit length varied from 12 to 54 cm while fruit diameter varied from 3.5 to 5.5 cm. Days to 1st female flower opening ranged between 44 and 62 days and nodes number on female flower initiation was between 12 and 26. Days to 1st fruit harvest varied from 54 to 72 days. The number of fruits/plants ranged from 8.33 to 27, whereas individual fruit weight varied from 90 to 325g. Fruit yield/plant ranged from 1.29 to 7.74 kg. Genotypes were TC01, TC03, TC04, TC05, TC07, TC08 and TC19 identified as early maturity. The genotypes differed significantly in most of the parameters and offer a good scope for selection of parent for crop improvement programme.

Keywords: Snake gourd, characterization, genotypes, yield components, plant breeding.

Introduction

Snake gourd (*Trichosanthes cucumerina* var. *anguina* L.) popularly known as 'chichinga' is a summer vegetable grown throughout Bangladesh. It is diploid (2n=2x = 22) and belongs to the family Cucurbitaceae. It is an annual creeper and day neutral type vegetable. It is highly cross-pollinated due to monoecism. Its immature fruit is consumed after cooking in tropical Asia including Bangladesh. It is rich in minerals and fiber. It is mainly grown in summer. Due to its day neutral habit it can be grown throughout the year except extreme cold months. Scarcity of vegetable prevails in the market during mid-March to mid-June and

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mid-September to mid-November. During these lean period only a few vegetables are available in the market and the quantity is very low in against the demand. The crop has the potential to fulfill the scarcity of vegetables during lean period. In the meantime, it has occupied prime place among the vegetables due to year round character, export potential and high nutritive value (Podder, 2010). Total production of snake gourd is 37,613 metric tons from an area of 7,496 hectares with an average yield of 5.02 tons per hectare (BBS, 2020) which is very low. There are many reasons for this low yield. Lack of high yielding variety i.e. non-availability of HYVs to the farmers/producers is one of the main reasons for this low yield. There are a good number of cultivars with wide range of variability in size, shape and colour of fruits available in different parts of the country (Rashid, 1993). Several open pollinated varieties of snake gourd have been released by different institutions, universities and seed companies namely 'Jhum long', 'BARI Chichinga-1, 'BU Chichinga -1', 'Porag 35', 'Taposi', 'Aunika 7', 'Radder' and 'Surma'. One hybrid variety called 'Padma' has been released by Lal Teer seed company. Hybrid varieties are also being imported from China by some seed companies, but these hybrids are not superior in quality. Besides, the snake gourd varieties released so far are inadequate in number to meet up the demand of the farmers. Therefore, to boost up the production of this vegetable there is no alternative way to developing high yielding open pollinated as well as good hybrid varieties. Morphological characterization is still used in crop improvement programme. It is relatively inexpensive and easy to carry out. Morphological characterization is a highly recommended preliminary step that should be made more in-depth biochemical or molecular studies are attempted. Genetic variability is a key component of successful breeding program for any crop species and a critical survey of genetic variability is extremely important before triggering an improvement program aimed at developing high yielding varieties (Rao *et al*., 1997; Haussmann *et al.*, 2004). There is a bright opportunity to research germplasm characterization, which is the prerequisite for the production of a high yielding snake gourd open pollinated or hybrid variety in Bangladesh (Ahmed *et al*., 2000). In relation, there is little knowledge available to delineate standardization for the horticultural and morphological characteristics. The research was therefore undertaken to characterize and to evaluate the germplasm in respect to yield and other morphological traits as well as to select the diverged germplasm for future plant breeding program.

Materials and Methods

The research work was conducted at the research field of Horticulture Department of Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), Gazipur during the period from March to June, 2017. Fifty-five genotypes of snake gourd were collected from the Plant Genetic Resources

Centre, BARI, Genetics and Plant Breeding Department of BSMRAU, different seed companies and various parts of Bangladesh (Table 1). The experimental field soil was silty clay loam in texture with pH 6.20. It belongs to Madhupur tract to the Salna Series "Shallow Red Brown Terrace" soil (FAO, 1988 and Haider *et al.,* 1991). The soil sample from the experimental plot was collected from the depth of 15 cm and analyzed in the laboratory before initiation of the experiment. The nutrients contained in the experimental field were N (0.09 %), P (10.22 µg/g), K (0.07 meq/100 g soil), S (13.50 µg/g), Zn (0.90 µg/g) and B (0.28 µg/g). Minimum and maximum temperature during experimental period were 26.37^0C and 29.31^0C, respectively. The crop received 9.96 mm rainfall. Seeds were soaked in water for 24 hours to facilitate germination. Then, the seeds were sown in poly bags (10 cm × 12 cm). The growth medium of poly bags was prepared by mixing compost and soil at a ratio of 1 : 1. Seeds were sown on poly bags on 17 March, 2017. Seven days were required to germinate seeds. Seventeen days old seedlings were transplanted on 10 April, 2017, in the well prepared pit in an experimental plot and the pit size was 40 cm × 40 cm × 40 cm. The experiment was conducted in a Randomized Complete Block Design (RCBD) with three replications. A total of 165 (55 × 3) unit plots were prepared, each measuring 7.5 m × 1.5 m. Row and plant spacing were 1.5 m and 1.5 m, respectively. Fertilizers were applied @ 5000-100-24.5-84.0 -15.0-1.0-0.80 kg/ha of cowdung-N-P-K-S-Zn-B according to FRG (2012). The sources of N, P, K, S, Zn and B were urea, triple super phosphate (TSP), muriate of potash (MOP), gypsum, zinc sulphate (monohydrate), boric acid (laboratory grade). The entire amount of cowdung, P, S, Zn, B and one-third of K were applied in the pit. The whole N and rest of K were applied into four equal installments at 7, 21, 35, 49 days after transplanting. Vertical trellises were made by using pieces of bamboo, GI wire and nylon net for supporting whole bearing plants. Necessary intercultural operations were done during the crop period for proper growth and development. Leaf miners, fruit flies and mites affected the crop plants. Insecticide of imidacloprid group (imitaf) @ 0.5 ml / l of water was sprayed to combat leaf miner and Vartimac @ 1.5 ml / l of water was applied against mites at a 7 day interval. To manage pesticide infestation, the liquid pesticide solutions were sprayed over the plants once per week for three to four times. Sex pheromone trap was set up at the fruiting stage in a densely 5 square meter / each trap to prevent fruit fly attack. Thirty three observations on qualitative (13) and quantitative (20) characters were recorded from each plot and genotype as per descriptor (AVRDC, 2015). Collected data were analyzed through STATISTIX 10 software and mean separation was done through Tukey's Honesty Significant Different Test at 1% probability level.

Table 1. Source of collection and local names of 55 snake gourd genotypes

Acc. No.	Identity	Source
TC 01	BD-1607*	PGRC, BARI
TC 02	BD-1608	PGRC, BARI
TC 03	BD-1610	PGRC, BARI
TC 04	BD-1611	PGRC, BARI
TC 05	BD-1613	PGRC, BARI
TC 06	BD-1616	PGRC, BARI
TC 07	BD-1618	PGRC, BARI
TC 08	BD-1629	PGRC, BARI
TC 09	BD-1635	PGRC, BARI
TC 10	BD-1640	PGRC, BARI
TC 11	BD-1648	PGRC, BARI
TC 12	BD-1649	PGRC, BARI
TC 13	BD-1650	PGRC, BARI
TC 14	BD-1652	PGRC, BARI
TC 15	BD-1654	PGRC, BARI
TC 16	BD-1655	PGRC, BARI
TC 17	BD-1657	PGRC, BARI
TC 18	BD-1658	PGRC, BARI
TC 19	BD-1661	PGRC, BARI
TC 20	BD-1664	PGRC, BARI
TC 21	BD-1673	PGRC, BARI
TC 22	BD-4433	PGRC, BARI
TC 23	BD-4442	PGRC, BARI
TC 24	BARI Chicinga-1	HRC, BARI
TC 25	Pakunda (Local)	Kishorganj
TC 26	Julmon (Local)	Kishorganj
TC 27	China seed (Local)	Kishorganj
TC 28	China seed (Local)	Munshiganj
TC 029	Local seed	Manikganj
TC 30	Local seed	Manikganj
TC 31	Nayeem seed	Gazipur
TC 32	Metal seed (Porag 35)	Gazipur
TC 33	Banashree agro seed (Jumlong)	Siddique Bazar

Acc. No.	Identity	Source
TC 34	ACI seed (Taposi)	Siddique Bazar
TC 35	Sobuj seed	Siddique Bazar
TC 36	Local seed	Kustia
TC 37	Alamgir seed (Aunika 7)	Siddique Bazar
TC 38	Lalteer seed (Surma)	Siddique Bazar
TC 39	Local seed	Bikrampur
TC 40	Alauddin seed	Siddique Bazar
TC 41	Masud seed (Raddar)	Siddique Bazar
TC 42	650	Thailand
TC 43	SG001	BSMRAU
TC 44	SG004	BSMRAU
TC 45	SG006	BSMRAU
TC 46	SG010	BSMRAU
TC 47	SG018	BSMRAU
TC 48	SG025	BSMRAU
TC 49	SG026	BSMRAU
TC 50	Jhum snake gourd, mix	Gomoti, Matiranga
TC 51	Jhum snake gourd, small	Aladhon para, Khagrachori Sadar
TC 52	Jhum snake gourd, Ponkoj Tripura	Boropara, Khagrachori
TC 53	Jhum snake gourd, Oamra Marma	Boropara, Khagrachori
TC54	Jhum snake gourd, Johorlal Tripura	Thoiangopara, Khagrachori
TC 55	Jhum snake gourd, Kanonibala Tripura	Dighinala, Khagrachori

*Identities carrying ‘BD’ from 1 to 23were accessions number given by PGRC, BARI

Results and Discussion

A. Qualitative characters

A wide range of variation was observed among the genotypes for several qualitative characters (Tables 2, 3 & 7). All the genotypes had green cotyledon colour. Based on cotyledon size, the genotypes could be grouped into three distinct classes, namely small (7.3 %), medium (87.2 %) and large (5.5 %). Leaf blade shape was found round in all the genotypes (Table 2). Ara *et al*. (2013) classified leaf blade (lamina) type as blunt, pointed and medium pointed. Leaf blade lobbing was weak (43.6 %), intermediate (25.5 %) and strong (30.9 %). Repand type leaf blade margin (70.9%) was found dominant one followed by margin between serrate to dentate (29.1%). Leaf blade tip was

obtuse (52.7%) and acute (47.3 %) (Table 2). Ekeke and Agogbua (2018) obtained similar type leaf blade margin and tip. Majority of the genotypes showed elongated ovary (40.0 %) followed by bottle shaped (34.5 %) and elliptic ovary (25.5%) (Table 2). Fruit colour at commercial stage was green (56.4 %) followed by light green (18.2 %), dark green (16.45% and white (9.0 %) (Tables 2 & 3). Similar findings with respect to fruit colour at commercial stage were also reported by Ara *et al*. (2013). Ranjit Chatterjee and Maitra (2014) reported that fruit skin colour varied from light green, green and dark green white stripes. Based on fruit shape, the genotypes could be grouped into four distinct morphological classes, namely cylindrical (67.3 %), elliptical (21.8 %), ovate (9.1 %) and fusiform (1.8 %%) (Tables 2 & 3). Ara *et al*. (2013) reported that majority of the genotypes had cylindrical fruit while evaluating 34 snake gourd genotypes. Ranjit Chatterjee and Maitra (2014) noted that fruit shape in snake gourd ranged from long spindle, elongated or cylindrical and tapering edge. All the genotypes had streaks on fruit (Tables 2 & 3). Six distinct types of seed colour were found viz., light brown (27.3%), light brown and brown at middle (1.8%), light brown and black (27.2%), light yellow and brown at middle (3.6%), brown (38.2%) and black and cream (1.8%) (Tables 2 & 7). Ekeke and Agobua (2018) obtained ash colour seed on an average in snake gourd. Based on seed shape, the genotypes could be grouped into three distinct classes, namely elliptical (83.6 %), round (1.8 %) and ovate (14.6 %), which indicated that most of the genotypes had elliptical seed. Cucurbit seeds vary in shape and structure that are used in family classification (Chakravarty and Hore, 1979). Skin of seed coat was fine (16.4%), intermediate (63.6%) and rough (20.0%).

Table 2. Frequency distribution (%) of qualitative characters of snake gourd genotypes

Characters	Class	Number of accession	Frequency (%)
1. Cotyledon color	Green	55	100.0
2. Cotyledon size	Small	4	7.3
	Medium	48	87.2
	Large	3	5.5
3. Leaf blade shape	Round	55	100.0
4. Leaf blade lobbing	Weak	24	43.6
	Intermediate	14	25.5
	Strong	17	30.9

Characters	Class	Number of accession	Frequency (%)
5. Leaf blade margin	Repand	39	70.9
	Between serate to dentate	16	29.1
6. Leaf blade tip	Obtuse	29	52.7
	Acute	26	47.3
7. Ovary shape	Elliptic	14	25.5
	Elongated	22	40.0
	Bottle shape	19	34.5
8. Fruit color at commercial	Green	31	56.4
	Light green	10	18.2
	Dark green	9	16.4
	White	5	9.0
9. Fruit shape	Cylindrical	37	67.3
	Elliptical	12	21.8
	Fusiform	1	1.8
	Ovate	5	9.1
10. Fruit streaks	Present	55	100.0
11. Seed color	Light brown	15	27.3
	Light brown and brown at middle	1	1.8
	Light brown and black	15	27.3
	Light yellow and brown at middle	2	3.6
	Brown	21	38.2
	Black and cream	1	1.8
12. Seed shape	Elliptical	46	83.6
	Round	1	1.8
	Ovate	8	14.6
13. Skin of seed coat	Fine	9	16.4
	Intermediate	35	63.6
	Rough	11	20.0

Table 3. Fruit qualitative characters of 55 snake gourd genotypes

Genotypes	Fruit color	Fruit shape	Fruit streaks
TC 01	Green	Cylindrical	Present (prominent)
TC 02	Light green	Cylindrical	Present (prominent)
TC 03	Green	Cylindrical	Present (prominent)
TC 04	Light green	Cylindrical	Present (prominent)
TC 05	Green	Cylindrical	Present (prominent)
TC 06	Green	Elliptical	Present (prominent)
TC 07	Green	Elliptical	Present (prominent)
TC 08	Green	Cylindrical	Present (prominent)
TC 09	Green	Elliptical	Present (prominent)
TC 10	Green	Cylindrical	Present (prominent)
TC 11	Light green	Cylindrical	Present (moderate)
TC 12	Light green	Cylindrical	Present (prominent)
TC 13	Green	Cylindrical	Present (prominent)
TC 14	Green	Cylindrical	Present (moderate)
TC 15	Green	Cylindrical	Present (prominent)
TC 16	Dark green	Elliptical	Present (moderate)
TC 17	Green	Cylindrical	Present (prominent)
TC 18	Green	Cylindrical	Present (prominent)
TC 19	Light green	Cylindrical	Present (moderate)
TC 20	Light green	Cylindrical	Present (moderate)
TC 21	Dark green	Elliptical	Present (prominent)
TC 22	Green	Cylindrical	Present (prominent)
TC 23	Green	Cylindrical	Present (prominent)
TC 24	Green	Cylindrical	Present (prominent)
TC 25	Light green	Cylindrical	Present (moderate)
TC 26	Green	Cylindrical	Present (prominent)
TC 27	Dark green	Elliptical	Present (prominent)
TC 28	Green	Cylindrical	Present (prominent)
TC 29	Dark green	Elliptical	Present (prominent)
TC 30	Dark green	Elliptical	Present (prominent)
TC 31	Dark green	Fusiform	Present (prominent)
TC 32	Dark green	Elliptical	Present (prominent)
TC 33	Green	Elliptical	Present (prominent)

Genotypes	Fruit color	Fruit shape	Fruit streaks
TC 34	Green	Cylindrical	Present (prominent)
TC 35	Light green	Cylindrical	Present (prominent)
TC 36	Green	Cylindrical	Present (prominent)
TC 37	Green	Cylindrical	Present (prominent)
TC 38	Green	Cylindrical	Present (prominent)
TC 39	Green	Cylindrical	Present (prominent)
TC 40	Dark green	Elliptical	Present (prominent)
TC 41	Light green	Ovate	Present (prominent)
TC 42	Light green	Cylindrical	Present (prominent)
TC 43	White	Cylindrical	Present (obscure)
TC 44	White	Cylindrical	Present (obscure)
TC 45	White	Cylindrical	Present (obscure)
TC 46	White	Cylindrical	Present (obscure)
TC 47	Green	Cylindrical	Present (prominent)
TC 48	Green	Cylindrical	Present (prominent)
TC 49	White	Cylindrical	Present (obscure)
TC 50	Green	Cylindrical	Present (prominent)
TC 51	Green	Elliptical	Present (moderate)
TC 52	Green	Ovate	Present (prominent)
TC 53	Dark green	Ovate	Present (prominent)
TC 54	Green	Ovate	Present (prominent)
TC 55	Green	Ovate	Present (prominent)

B. Quantitative characters

Plant characteristics

A wide range of variation was recorded for vine length with a mean of 4.6 m (Table 4). It ranged from 3.0 to 7.0 m. The longest vine was observed in TC 1 (7.0 m) followed by TC 3 (5.95 m), TC 5 (5.95 m), while the shortest vine was observed in TC 55 (3.0 m) followed by TC 48 (3.25 m). Significant variation in vine length of snake gourd was also reported by Ara *et al*. (2013), Ahsan *et al*. (2014) and Rahman and Ahmed (2014). Ara *et al*. (2013) found the vine length of snake gourd ranging from 1.08 to 1.80 m. Ahsan *et al*. (2014) noted the vine length of snake gourd in the range of 4.64 to 6.17 m whereas Rahman and Ahmed (2014) recorded the vine length with a ranged from 3.30 to 6.75 m in the same crop. The findings of the present study were close to those of Ahsan *et al*. (2014) and Rahman and Ahmed (2014) in terms of vine

length. The results obtained by Ara *et al*. (2013) was lower than that of the present study because of the fact that Ara *et al*. (2013) recorded the vine length at first female flowering. Nodes on main vine varied from 24 to 39 with a mean of 32.62 (Table 4). The genotype TC 29 (39) had the highest number of nodes on the main vine followed by TC 41 (38), TC 01 (36), TC 07 (36), TC 16 (36), TC 27 (36), TC 42 (36) and TC 47 (36), whereas the genotype TC 44 (24) produced the lowest number of nodes/vine closely followed by TC 28 (29). Ara *et al*. (2013) reported that the highest variation range was observed in snake gourd as number of nodes /plant. Primary branch number/plant ranged from 3.5 to 8.0 with a mean of 5.5 (Table 4). The genotype TC 04 (8) produced maximum number of branches closely followed by TC 13 (7.5), TC 15 (7.5), TC 20 (7.5), whereas the genotype TC 35 (3.5), TC 39 (3.5), TC 50 (3.5) produced the least number of branches. Ahsan *et al.* (2014) reported the significant variation in the number of primary branches/plant with a range of 8.33 to 11.66 from the 7 parental lines of snake gourd genotypes.

Table 4. Plant growth characters of 55 snake gourd genotypes

Genotypes	Vine length (m)	Nodes on main vine	Primary branches/plant
TC 01	7.00a	36a-c	6.0de
TC 02	5.75b-d	31d-g	6.5cd
TC 03	5.95b	31d-g	5.0fg
TC 04	5.35b-h	31d-g	8.0a
TC 05	5.95b	35a-d	6.5cd
TC 06	5.30c-h	31d-g	7.0bc
TC 07	5.65b-d	36a-c	6.0de
TC 08	4.75h-m	34b-e	6.5cd
TC 09	4.90f-k	35a-d	6.0de
TC 10	4.00o-s	26hi	6.5cd
TC 11	5.00e-j	31d-g	6.0de
TC 12	5.75b-d	33c-f	7.0bc
TC 13	5.60b-e	35a-d	7.5ab
TC 14	5.50b-f	30e-h	6.5cd
TC 15	5.90bc	34b-e	7.5ab
TC 16	5.40b-g	36a-c	6.5cd
TC 17	5.20d-i	34b-e	7.0bc
TC 18	5.50b-f	32c-g	7.0bc
TC 19	4.90f-k	35a-d	6.5cd
TC 20	4.15m-s	30e-h	7.5ab
TC 21	4.10n-s	31d-g	6.5cd
TC 22	4.30k-q	32c-g	6.0de
TC 23	4.65i-n	35a-d	6.0de

Genotypes	Vine length (m)	Nodes on main vine	Primary branches/plant
TC 24	4.50j-o	34b-e	6.0de
TC 25	4.75h-m	32c-g	6.0de
TC 26	4.65i-n	36a-c	5.5ef
TC 27	4.85g-k	36a-c	7.0bc
TC 28	4.30k-q	29f-h	6.0de
TC 29	5.50b-f	39a	6.5cd
TC 30	4.25l-r	34b-e	5.5ef
TC 31	4.50j-o	34b-e	5.0fg
TC 32	4.25l-r	32c-g	4.5gh
TC 33	3.70q-t	31d-g	4.5gh
TC 34	4.50j-o	32c-g	4.5gh
TC 35	3.85p-t	31d-g	3.5i
TC 36	4.50j-o	33c-f	4.5gh
TC 37	3.62st	32c-g	4.0hi
TC 38	4.50j-o	32c-g	4.5gh
TC 39	3.90o-s	32c-g	3.5i
TC 40	4.00o-s	30e-h	4.0hi
TC 41	5.25d-i	38ab	4.0hi
TC 42	4.00o-s	35a-d	5.0fg
TC 43	4.75h-m	34b-e	5.0fg
TC 44	3.60s-u	24i	4.0hi
TC 45	4.25l-r	32c-g	6.0de
TC 46	3.90o-s	34b-e	4.5gh
TC 47	4.35k-p	36a-c	4.0hi
TC 48	3.25tu	28g-i	4.5gh
TC 49	3.75p-t	31d-g	4.5gh
TC 50	4.25l-r	32c-g	3.5i
TC 51	3.75p-t	31d-g	5.5ef
TC 52	4.00o-s	32c-g	5.0fg
TC 53	3.65r-t	31d-g	5.0fg
TC 54	4.50j-o	31d-g	4.0hi
TC 55	3.00u	32c-g	4.0hi
Mean	4.6	32.62	5.5
Range	3.0-7.0	24.0-39.0	3.5-8.0
CV (%)	3.87	3.83	3.91

NB: Figures in a column showing similar letters are not significantly different at 1% level of probability by Tukey's Honestly Significance Difference Test

Flowering characteristics

Days to 1st male flower opening ranged from 39 to 59 days (Table 5). The earliest male flower opening was recorded in TC 05 (39 days) followed by TC 14 (41 days), TC 16 (41 days), TC 13 (42 days) and TC 15 (42 days). Ahsan *et al.* (2014) obtained days to 1st male flower opening in the range of 74.66 to 81.33 days among the 7 parental lines. Ara *et al*. (2013) reported that days to 1st male flowering ranged from 60 to 72 days among 34 snake gourd genotypes. Rajkumar *et al*. (2016) got days to 1st male flowering ranging from 18.38 to 46.50 days among 44 genotypes of snake gourd in India. A wide range of variation was observed in terms of days to 1st female flower opening which ranged from 44 to 62 days (Table 5). The earliest female flower opening was manifested in TC 03, TC 08 and TC 52 (44 days for each genotype) followed by TC 11 and TC 13 (45 days for each genotype). On the other hand, maximum days for female flower opening was recorded in TC 51 (62 days) followed by TC 06 (60 days). In snake gourd, the range of 1st female flower opening was 81.66 to 84.33 days that was reported by Ahsan *et al*. (2014). Ara *et al*. (2013) obtained days to 1st female flowering in the range of 65.0 to 75.0 days among 34 snake gourd genotypes. Significant variation was obtained in respect of node number at 1st male flower which ranged from 7 to 19 (Table 5). The lowest node number was obtained for node order for 1st male flower opening in TC 16 (7) followed by TC 5 (8), TC 11 (8) and TC 12 (8). Ahsan *et al.* (2014) reported that node number of 1st male flower opening ranged from 4.33 to 16.00 in 7 parental genotypes of snake gourd. Haque *et al*. (2014) noted node order of 1st male flowering ranging from 9.00 to 14.00 while evaluating of snake gourd genotypes. Node number of 1st female flower opening ranged from 12 to 26 and statistically significant variation was observed in snake gourd genotypes (Table 5). The lowest node number to 1st female flower initiation was recorded in TC 03 (12) followed by TC 16 (14), TC 07 (15), TC 08 (15), TC 11 (15), TC 12 (15), TC 13 (15), TC 21 (15), TC 22 (15), TC 53 (15), TC 55 (15). Ahsan *et al.* (2014) recorded the node number of 1st female flower anthesis in the range of 18.33 to 22.66 among 7 parental lines of snake gourd. Joseph (1978) obtained nodes for initiation of female flower in snake gourd in the range of 15.00 to 23.44. Deepa Devi *et al*. (2016) reported that node number at 1st female flowering ranged from 15.61 to 24.87 in 13 parental lines of snake gourd in India. Substantial variation among the snake gourd genotypes was observed for ovary length (Table 5). Maximum ovary length was found in the TC 04 (3.5 cm) followed by TC 22 (3.0 cm) and TC 47 (3 cm). Significant variability among the snake gourd genotypes was also observed for ovary diameter (Table 5). Ovary diameter was noticed maximum in the TC 22 (0.8 cm) followed by TC 04 (0.75 cm).

Table 5. Flowering characteristics of 55 snake gourd genotypes

Genotypes	Days to 1st flower open		Nodes on 1st flower initiation		Ovary of female flowers	
	Male	Female	Male	Female	Length (cm)	Diameter (cm)
TC 01	46d-h	47f-h	10ij	18g-i	2.00gh	0.50d
TC 02	44f-i	46gh	14ef	19f-h	2.00gh	0.50d
TC 03	43f-i	44h	11hi	12l	2.75b-d	0.50d
TC 04	46d-h	47f-h	13fg	16i-k	3.50a	0.75ab
TC 05	39i	46gh	8jk	22c-e	2.50de	0.50d
TC 06	58ab	60ab	12gh	24a-c	2.00gh	0.40e
TC 07	52b-d	47f-h	10ij	15jk	2.00gh	0.50d
TC 08	43f-i	44h	9jk	15jk	2.50de	0.50d
TC 09	51c-e	47f-h	13fg	17h-j	2.50de	0.50d
TC 10	43f-i	45h	9jk	19f-h	2.75b-d	0.50d
TC 11	44f-i	45h	8jk	15jk	2.50de	0.50d
TC 12	43f-i	45h	8jk	15jk	2.75b-d	0.50d
TC 13	42g-i	45h	10ij	15jk	2.00gh	0.50d
TC 14	41hi	55b-e	17bc	20e-g	2.00gh	0.50d
TC 15	42g-i	49e-h	10ij	16i-k	2.00gh	0.50d
TC 16	41hi	47f-h	7l	14kl	2.50de	0.60c
TC 17	46d-h	48f-h	15de	16i-k	2.00gh	0.50d
TC 18	46d-h	52d-g	15de	19f-h	2.50de	0.50d
TC 19	45e-i	46gh	17bc	22c-e	2.00gh	0.50d
TC 20	47c-h	53c-f	16cd	19f-h	2.20fg	0.60c
TC 21	46d-h	48f-h	12gh	15jk	2.50de	0.70b
TC 22	46d-h	55b-e	10ij	15jk	3.00b	0.80a
TC 23	48c-g	48f-h	12gh	16i-k	2.50de	0.50d
TC 24	46d-h	47f-h	13fg	19f-h	2.00gh	0.50d
TC 25	44f-i	49e-h	9jk	16i-k	2.00gh	0.50d
TC 26	51c-e	55b-e	14ef	21d-f	2.00gh	0.50d
TC 27	46d-h	49e-h	18ab	20e-g	2.00gh	0.50d
TC 28	47c-h	48f-h	13fg	18g-i	2.00gh	0.50d
TC 29	48c-g	49e-h	15de	21d-f	2.00gh	0.50d

Genotypes	Days to 1st flower open		Nodes on 1st flower initiation		Ovary of female flowers	
	Male	Female	Male	Female	Length (cm)	Diameter (cm)
TC 30	51c-e	59a-c	16cd	20e-g	2.00gh	0.50d
TC 31	48c-g	48f-h	17bc	16i-k	1.50j	0.50d
TC 32	48c-g	56a-d	12gh	21d-f	1.50j	0.50d
TC 33	48c-g	49e-h	19a	18g-i	2.50de	0.50d
TC 34	46d-h	55b-e	15de	26a	2.80bc	0.60c
TC 35	46d-h	46gh	17bc	22c-e	2.00gh	0.50d
TC 36	46d-h	47f-h	15de	22c-e	2.00gh	0.50d
TC 37	47c-h	47f-h	14ef	17h-j	2.50de	0.60c
TC 38	49c-f	50d-h	15de	20e-g	1.60j	0.40e
TC 39	49c-f	49e-h	15de	20e-g	2.00gh	0.50d
TC 40	47c-h	48f-h	16cd	19f-h	2.30ef	0.50d
TC 41	53a-c	59a-c	15de	18g-i	1.90hi	0.50d
TC 42	48c-g	49e-h	17bc	20e-g	2.70cd	0.70b
TC 43	47c-h	50d-h	13fg	23b-d	2.00gh	0.60c
TC 44	46d-h	49e-h	11hi	17h-j	2.50de	0.50d
TC 45	46d-h	50d-h	14ef	25ab	1.70ij	0.50d
TC 46	45e-i	50d-h	11hi	18g-i	3.00b	0.50d
TC 47	47c-h	48f-h	13fg	21d-f	3.00b	0.70b
TC 48	47c-h	52d-g	13fg	24a-c	2.00gh	0.50d
TC 49	45e-i	48f-h	11hi	21d-f	2.20fg	0.60c
TC 50	46d-h	47f-h	14ef	16i-k	1.50j	0.50d
TC 51	59a	62a	18ab	23b-d	1.50j	0.50d
TC 52	45e-i	44h	16cd	19f-h	1.50j	0.50d
TC 53	48c-g	47f-h	12gh	15jk	1.75h-j	0.50d
TC 54	48c-g	49e-h	13fg	17h-j	2.00gh	0.50d
TC 55	48c-g	49e-h	10ij	15jk	1.70ij	0.50d
Mean	46.67	49.33	13.10	18.58	2.19	0.53
Range	39.0-59.0	44.0-62.0	7.0-19.0	12.0-26.0	1.5-3.5	0.40-0.80
CV (%)	3.84	3.84	3.91	3.87	3.90	3.88

NB: Figures in a column showing similar letters are not significantly different at 1% level of probability by Tukey's Honestly Significance Difference Test

Fruit characteristics

A substantial variation was found among the genotypes in days to 1st fruit harvest at marketable stage and it ranged from 54 to 75 days (Table 6). Minimum time was required for 1st fruit harvest of the genotype TC 05 (54 days) followed by TC 01, TC 03, TC 04, TC 07, TC 08, TC 19, TC 23, TC 35, TC 37, TC 42 and TC 46 (57 days for each genotype). Maximum time was required for 1st fruit harvesting of the genotypes TC 30, TC 34, TC 41 and TC 45 (75 days for each genotype) closely followed by TC 15, TC 20, TC 22, TC 25, TC 26, TC 27, TC 32, TC 33, TC 36, TC 38, TC 40, TC 43, Tc 47, TC 48 and TC 49 (72 days for each genotype). Ara *et al.* (2013) reported that snake gourd genotypes differed significantly with respect to 1st harvest ranging from 77.0-90.0 days. The result of the present study was lower than the result reported by Ara *et al*. (2013) in respect of days to 1st fruit harvest. Fruit length ranged from 12 to 54 cm (Table 6). Maximum fruit length was observed in TC 47 (54 cm) followed by TC 42 (50 cm) and TC 01 (48 cm) whereas the lowest fruit length was registered in TC 55 (12 cm) followed by TC 53 (17 cm), TC 54 (18 cm) and TC 21 (19 cm). In snake gourd, Ara *et al*. (2013) obtained fruit length in the range of 25.33 to 45.33 cm. Fruit diameter varied from 3.5 to 5.5 cm (Table 6). In addition, the highest diameter of the fruit was recorded in TC 51 (5.5 cm) followed by TC 13, TC 16, TC 31 and TC 53 (4.8 cm for each genotype), while the lowest in TC 35 (3.5 cm) closely followed by TC 06 (3.6 cm), TC 15 (3.6 cm), TC 34 (3.6 cm) and TC 20 (3.7 cm). Ahsan *et al.* (2014) recorded fruit diameter in the range of 2.62 to 5.09 cm. Rahman and Ahmed (2014) reported the range of fruit diameter from 2.60 to 6.14 cm. Number of fruits /plant ranged from 8.33 to 27.0 (Table 6). Number of fruits /plant was noted maximum in TC 05 (27.0) followed by TC 07 (25.0) and then followed by TC 01 (24.33), TC 02 (24.33), TC 46 (24) and TC 53 (24.67) while its value was found minimum in TC 48 (9.0), TC 06 (9.33) and TC 43 (9.33). Ahsan *et al.* (2014) reported significant variations for the number of fruits /plant among the parents ranging from13.00 to 32.33 fruits/ plant. Rajkumar *et al*. (2016) obtained the number of fruits /plant in the range of 7.00 to 27.50 fruits /plant, while Rahman and Ahmed (2014) obtained from 4.50 to 23.50. Ara *et al*. (2013) obtained 16.00 to 45.60 number of fruits /plant in 34 snake gourd genotypes. The results of the present study are very close to the results of most of the reports. However, the findings about number of fruits /plant reported by Ara *et al*. (2013) were higher than the findings of the present study. Individual fruit weight varied from 90 to 325 g (Table 6). The genotype TC 18 recorded maximum individual fruit weight 325 g which was identical to those of TC 01 (310 g), TC 04 (318 g) and TC12 (300 g) and the lowest single fruit weight was found in TC 55 (90 g) followed by TC 54 (100 g), TC 53 (110 g), TC 50 (148 g) and TC 34 (148 g). Ahsan *et al.* (2014) obtained individual fruit weight in the range of 101.89 to 159.45 g from 7 parental lines. Rahman and Ahmed (2014) reported that marked variation was observed in terms of individual fruit which ranged from 81.34 to 441.81 g. Maximum yield /plant

was recorded in the genotype TC 04 (7.74 kg) closely followed by TC 01 (7.54 kg), TC 02 (7.06 kg) and TC 05 (7.28 kg) (Table 6) and the lowest yield /plant was derived from the genotype TC 55 (1.29 kg) followed by TC 54 (1.50 kg), TC 06 (1.68 kg), TC 43 (1.62 kg), TC 48 (1.80 kg), TC 50 (1.73 kg) and TC 51 (1.79 kg). In snake gourd, Ara *et al.* (2013) reported that weight of fruits /plant differed significantly among the 34 genotypes and this character ranged from 3.27 to 9.15 kg/plant. Rahman and Ahmed (2014) also got wide variation in fruit yield /plant ranging from 0.30 to 6.01 kg among the 32 snake gourd genotypes, while Rajkumar *et al.* (2016) obtained fruit yield /plant in the range of 3.06 to 10.49 kg from the 44 snake gourd genotypes in India. Ahsan *et al.* (2014) reported the range of yield /plant was 1.60 to 4.76 kg. The findings of the present study corroborated the result of Rahman and Ahmed (2014) and Ara *et al.* (2013).

Table 6. Fruit characteristics of 55 snake gourd genotypes

Genotypes	Days to harvest	Fruit length (cm)	Fruit diameter (cm)	Fruits/plant	Individual fruit weight (g)	Fruit yield/ plant (kg)
TC 01	57cd	48b	4.4b-e	24.33b-d	310ab	7.54ab
TC 02	68ab	40c-e	4.2c-f	24.33b-d	290b-e	7.06ab
TC 03	57cd	25l-o	4.5b-e	17.00j-n	187s-x	3.18o-t
TC 04	57cd	40c-e	4.5b-e	24.33b-d	318ab	7.74a
TC 05	54d	40c-e	4.4b-e	27.00a	270d-h	7.28ab
TC 06	68ab	27k-m	3.6gh	9.33vw	180u-y	1.68z
TC 07	57cd	27k-m	4.3b-e	25.00ab	240i-n	6.01cd
TC 08	57cd	28j-m	4.3b-e	19.67g-i	208u-o	4.09h-n
TC 09	68ab	29i-l	4.1d-g	15.33m-r	197r-w	3.02o-v
TC 10	68ab	29i-l	4.3b-e	20.42e-h	210o-t	4.28g-l
TC 11	68ab	41cd	4.4b-e	22.33c-f	298a-d	6.66bc
TC 12	72ab	40c-e	4.0f-h	20.33e-h	201p-v	4.09h-n
TC 13	68ab	35fg	4.8b	18.00h-l	300a-c	5.40de
TC 14	68ab	28j-m	4.4b-e	20.00f-i	151y-a	3.02o-v
TC 15	72ab	29i-l	3.6gh	22.00d-g	170w-z	3.74j-o
TC 16	68ab	27k-m	4.8b	22.67b-e	231j-o	5.24d-f
TC 17	68ab	30h-k	4.2c-f	17.00j-n	217l-r	3.69k-p
TC 18	68ab	43c	4.5b-e	15.67l-r	325a	5.09e-g
TC 19	57cd	29i-l	4.5b-e	15.33m-r	277c-f	4.25g-l
TC 20	72ab	40c-e	3.7f-h	15.33m-r	210o-t	3.22n-t
TC 21	68ab	19q-r	4.2c-f	16.00k-q	132z	2.11w-b
TC 22	72ab	40c-e	4.0f-h	12.33s-u	230k-p	2.83p-w
TC 23	57cd	42c	4.2c-f	11.67t-u	260f-j	3.04o-v
TC 24	72ab	43c	4.4b-e	19.00h-j	250f-k	4.75e-i

Genotypes	Days to harvest	Fruit length (cm)	Fruit diameter (cm)	Fruits/plant	Individual fruit weight (g)	Fruit yield/ plant (kg)
TC 25	72ab	33f-i	4.4b-e	10.00u-w	213n-t	2.13w-b
TC 26	72ab	26k-n	4.3b-e	14.00p-t	185t-x	2.59s-y
TC 27	72ab	22n-q	4.6b-d	10.00u-w	229k-q	2.29u-a
TC 28	68ab	27k-m	4.4b-e	17.67i-m	177v-z	3.13o-u
TC 29	68ab	34f-h	4.4b-e	13.67q-t	262e-i	3.58l-q
TC 30	75a	29i-l	4.2c-f	14.67n-s	243g-m	3.57l-q
TC 31	68ab	20p-r	4.8b	14.33o-s	230k-p	3.30m-t
TC 32	72ab	29i-l	4.7bc	15.33m-r	272c-g	4.17h-m
TC 33	72ab	36e-g	4.2c-f	18.33h-k	250f-k	4.59e-j
TC 34	75a	24m-p	3.6gh	14.00p-t	160x-a	2.24w-a
TC 35	57cd	29i-l	3.5h	14.33o-s	148z	2.12w-b
TC 36	72ab	28j-m	4.6b-d	17.00j-n	210o-t	3.56l-r
TC 37	57cd	32g-j	4.5b-e	16.67j-o	255f-k	4.25g-l
TC 38	72ab	30h-k	4.4b-e	17.67i-m	232j-o	4.10h-n
TC 39	68ab	40c-e	4.1d-g	18.33h-k	245g-l	4.49f-k
TC 40	72ab	26k-n	4.6b-d	16.33k-p	255f-k	4.16h-m
TC 41	75a	20p-r	4.6b-d	19.67g-i	165x-z	3.24n-t
TC 42	57cd	50ab	4.5b-e	16.67j-o	295b-d	4.92e-h
TC 43	72ab	29i-l	4.0f-h	9.33vw	175v-z	1.62z
TC 44	68ab	28j-m	4.5b-e	20.00f-i	158x-a	3.15o-u
TC 45	75a	34f-h	4.0f-h	10.00u-w	242h-n	2.42t-z
TC 46	57cd	37d-f	4.2c-f	24.00b-d	200q-v	4.79e-h
TC 47	72ab	32g-j	4.4b-e	13.67q-t	245g-l	3.35m-s
TC 48	72ab	30h-k	4.3b-e	9.00w	200q-v	1.80x-b
TC 49	72ab	54a	4.0f-h	13.33r-t	290b-e	3.87i-o
TC 50	69ab	21o-r	4.6b-d	11.67t-u	148z	1.73y-b
TC 51	69ab	25l-o	5.5a	8.33w	215m-s	1.79x-b
TC 52	69ab	21o-r	4.0f-h	16.00k-q	167x-z	2.67r-x
TC 53	69ab	17r	4.8b	24.67a-c	110z	2.77q-w
TC 54	65bc	18q-r	4.0f-h	15.00n-r	100z	1.50z
TC 55	69ab	12s	4.3b-e	14.33o-s	90z	1.29z
Mean	67.33	31.13	4.31	16.77	218.69	3.71
Range	54.0-75.0	12.0-54.0	3.5-5.5	8.3-27.0	132-325	1.68-7.74
CV (%)	3.86	3.97	3.85	4.32	3.96	7.0

NB: Figures in a column showing similar letters are not significantly different at 1% level of probability by Tukey's Honestly Significance Difference Test.

Seed characteristics

Seed length was maximum in TC 30, TC 38 and TC 46 (18.8 mm in each genotype) closely followed by TC 25 (18.0 mm), TC 40 (18.3 mm). Minimum value was recorded in TC 17 (10.3 mm). Maximum seed width was recorded in TC 06 (12.3 mm) closely followed by TC 28 and TC 41 (12.0 mm in each genotype) as well as minimum seed width in TC 43 (9.3mm). Seed length and width ranged from 10.3 to 18.8 mm and 9.3 to 12.3 mm, respectively (Table 7). Ekeke and Agogbua (2018) found an average seed length and width of 13.25 mm and 6.82 mm respectively in snake gourd. A little variation was found in seed thickness which ranged from 5.0 mm to 6.2 mm. Ekeke and Agogbua (2018) found an average seed thickness of 5.5 mm in snake gourd. Significant variations were found with respect to number of seeds /fruit and 100-seed weight (Table 7). These two seed characters ranged accordingly from 12 to 93 and from 16 to 55 g.

Table 7. Seed characteristics of 55 snake gourd genotypes

Genotypes	Seed color	Seed shape	Seed length (mm)	Seed width (mm)	Seed thickness (mm)	100-seed weight (g)	Seeds / fruit
TC 01	11	Elliptical	16.5b-f	10.0d-g	5.5a-d	30gh	64f-i
TC 02	5	Elliptical	17.3a-e	11.0a-e	6.0ab	33fg	36r-u
TC 03	9	Elliptical	17.3a-e	9.8e-g	6.0ab	28hi	52k-m
TC 04	5	Elliptical	17.5a-d	10.0d-g	6.0ab	28hi	67e-h
TC 05	1	Elliptical	17.3a-e	11.0a-e	5.3b-d	30gh	54j-l
TC 06	9	Elliptical	17.8a-d	12.3a	6.0ab	28hi	43n-r
TC 07	9	Elliptical	17.0a-f	10.3d-g	5.0d	28hi	71c-f
TC 08	9	Elliptical	17.8a-d	10.2d-g	5.3b-d	24jk	77bc
TC 09	9	Elliptical	17.2a-e	11.8a-c	6.0ab	30gh	63g-i
TC 10	1	Elliptical	17.0a-f	10.5c-g	6.0ab	32fg	68e-g
TC 11	9	Elliptical	17.3a-e	11.0a-e	5.8a-c	34f	93a
TC 12	9	Elliptical	17.0a-f	11.0a-e	6.0ab	30gh	45m-q
TC 13	9	Ovate	16.3b-f	11.0a-e	6.0ab	28hi	60h-j
TC 14	1	Elliptical	17.8a-d	11.2a-d	5.8a-c	24jk	58i-k
TC 15	1	Ovate	17.0a-f	11.8a-c	6.0ab	26ij	69d-g
TC 16	1	Elliptical	17.8a-d	11.3a-d	5.0d	30gh	63g-i
TC 17	1	Elliptical	10.3g	10.0d-g	5.0d	22kl	50l-n
TC 18	9	Elliptical	16.8a-f	11.0a-e	5.8a-c	30gh	50l-n

Genotypes	Seed color	Seed shape	Seed length (mm)	Seed width (mm)	Seed thickness (mm)	100-seed weight (g)	Seeds / fruit
TC 19	5	Elliptical	17.0a-f	11.2a-d	6.0ab	30gh	60h-j
TC 20	5	Elliptical	18.0a-c	11.0a-e	6.0ab	35ef	40p-s
TC 21	9	Ovate	17.0a-f	11.3a-d	6.0ab	32fg	63g-i
TC 22	5	Elliptical	16.5b-f	9.5f-g	5.5a-d	26ij	74b-e
TC 23	9	Elliptical	16.3b-f	10.5c-g	6.0ab	30gh	81b
TC 24	9	Elliptical	17.0a-f	12.0ab	6.0ab	40cd	28vw
TC 25	5	Elliptical	18.0a-c	11.3a-d	5.0d	32fg	30u-w
TC 26	5	Elliptical	17.0a-f	10.0d-g	5.0d	30gh	54j-l
TC 27	1	Ovate	16.0c-f	11.2a-d	5.4b-d	26ij	70c-g
TC 28	5	Ovate	17.0a-f	12.0ab	6.0ab	30gh	63g-i
TC 29	9	Elliptical	16.0c-f	9.8e-g	5.0d	30gh	76b-d
TC 30	9	Elliptical	18.8a	11.0a-e	6.0ab	34f	60h-j
TC 31	1	Elliptical	15.3ef	10.0d-g	5.0d	22kl	60h-j
TC 32	9	Round	15.0f	11.0a-e	6.2a	20l	12x
TC 33	1	Elliptical	17.0a-f	11.0a-e	5.5a-d	30gh	48l-o
TC 34	9	Elliptical	17.0a-f	10.8b-f	5.3b-d	33fg	40p-s
TC 35	1	Elliptical	17.0a-f	10.3d-g	5.3b-d	55a	43n-r
TC 36	5	Elliptical	17.0a-f	10.0d-g	5.5a-d	42bc	64f-i
TC 37	7	Ovate	15.0f	11.0a-e	5.0d	24jk	50l-n
TC 38	9	Elliptical	18.8a	11.0a-e	6.0ab	34f	46m-p
TC 39	5	Elliptical	16.0c-f	10.0d-g	5.3b-d	38de	43n-r
TC 40	9	Elliptical	18.3ab	11.3a-d	6.0ab	44b	25w
TC 41	3	Elliptical	17.8a-d	12.0ab	5.8a-c	30gh	58i-k
TC 42	9	Elliptical	16.8a-f	10.3d-g	5.5a-d	30gh	58i-k
TC 43	1	Elliptical	16.0c-f	9.3g	4.8d	16m	34s-v
TC 44	1	Elliptical	16.3b-f	10.3d-g	5.0d	30gh	42o-r
TC 45	5	Elliptical	16.0c-f	10.0d-g	5.0d	35ef	38q-t
TC 46	5	Elliptical	18.8a	11.8a-c	6.0ab	30gh	49l-o
TC 47	7	Elliptical	15.8d-f	9.7e-g	5.2cd	24jk	42o-r

Genotypes	Seed color	Seed shape	Seed length (mm)	Seed width (mm)	Seed thickness (mm)	100-seed weight (g)	Seeds / fruit
TC 48	5	Elliptical	16.0c-f	11.0a-e	5.0d	32fg	32t-w
TC 49	5	Ovate	17.3a-e	11.0a-e	6.0ab	30gh	26w
TC 50	9	Ovate	17.3a-e	10.8b-f	5.0d	30gh	34s-v
TC 51	5	Elliptical	15.0f	10.3d-g	5.0d	24jk	32t-w
TC 52	9	Elliptical	15.3ef	9.3g	5.0d	26ij	63g-i
TC 53	1	Elliptical	16.8a-f	9.8e-g	6.0ab	26ij	64f-i
TC 54	1	Elliptical	15.0f	10.0d-g	5.0d	24jk	79b
TC 55	1	Elliptical	16.4b-f	9.8e-g	5.0d	24jk	46m-p
Mean	-	-	16.74	10.69	5.54	29.87	52.91
Range	-	-	10.3-18.8	9.3-12.3	5.0-6.2	16-55	12-93
CV (%)	-	-	3.82	3.83	3.84	3.90	4.02

NB: (-) Not analyzed; 1= Light brown, 3= Light brown and brown at middle, 5= Light brown and black, 7=Light yellow and brown at middle, 9= Brown, 11= Black and cream.

Figures in a column showing similar letters are not significantly different at 1% level of probability by Tukey's Honestly Significance Difference Test

Maximum seed number was observed in TC 11 (93) followed by TC 23 (81) and TC 54 (79) and minimum seed number was manifested in TC 32 (12) followed by TC 40 (25) and TC 49 (26). Kumar *et al.* (2013) reported that substantial variation was observed among the 20 snake gourd genotypes for 100-seed weight and it ranged from 18 to 55 g. Maximum amount of a 100-seed weight was observed in TC 35 (55 g) followed by TC 40 (44 g) and TC 36 (42 g). Minimum 100-seed weight was recorded in TC 43 (16 g) followed by TC 32 (20 g), TC 17 (22 g) and TC 31 (22 g). This trait ranged from 20.0 g to 41.0 g in snake gourd (Varghese, 1991). Rahman and Ahmed (2014) obtained 100-seed weight in the range of 24.0 to 38.0 g.

Conclusion

Based on the above results and discussion, most of the qualitative characters showed distinct variation and maximum variation was observed in fruit colour and fruit shape. Significant variation was also observed in quantitative characters and fruit yield per plant. The promising genotypes identified as TC 01, TC 02, TC 05, TC 10, TC 18, TC 22, TC 24, TC 33, TC 36, TC 40, TC 41, TC 42, TC 44, TC 46 and TC 53 have potential to be used in future breeding program for getting productive and desirable traits. Moreover, the variability observed in the present study could be used in the snake gourd improvement programme.

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