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Research Paper

Characterizations and Correlation coefficient analysis of snake gourd (*Trichasanthes anguina* L)

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ABSTRACT:- Eight cultivars of snake gourd (*Trichasanthes anguina* L) collected from test F1 genotype and different seed company were evaluated under Randomized Block Design with three replications at Research & Development (Vegetable) Farm, Supreme Seed Company Limited, Bhaluka, Mymensingh in kharif-1 season of 2013 for correlation coefficient analysis between yield and its attributing characters. days to female flowering, days to male flowering, node number of 1st female flowering, number of node at 1st male flowering, days to 1st harvest, number of fruits per plant, Total number of fruit, total weight of fruit per plant and yield (gm), Individual fruit weight (gm), fruit length (cm) and fruit diameter (cm) were major contributing factors towards yield and selection based on these characters can be effective for developing high yielding varieties.

Keywords:- Snake gourd *(Trichosanthes cucumerina)*, Correlation, coefficient analysis, and weight.

I. INTRODUCTION

Snake gourd (*Trichasanthes anguina* L) belonging to the family cucurbitaceae having chromosome number, 2n=22 (Chakrabarti, 1982), sub-family Cucurbitoideae, tribe Trichosantheae. It is originated in Indo-Malayan region. It is an annual, day neutral herbaceous and climbing type vegetable crops. In Bangladesh it is usually grown well during March to October both in field and homestead garden. As a result, it can meet up the vegetable demand during early kharif season (mid March to mid June) when there exists an acute shortage of vegetable in Bangladesh. It plays a vital role in mitigating vegetable demand during the lean period of vegetable supply in Bangladesh. Snake gourd is one of the leading summer vegetables. In addition, it has got tremendous export potentiality because of its excellent keeping quality (Podder *et al*., 2010).

Snake gourd is important food items for solving nutritional problems in Bangladesh. From nutritional point of view, snake gourd can be considered as nutrition rich fruit vegetable. It contains considerable amount of protein (0.5%), fat (0.3%), minerals (0.5%), fiber (0.5%) and carbohydrates (3.3%) (Gopalan *et al*.,1982). Ripe fruits are rich in vitamin A. There are number of cultivars with wide range of variability in size, shape and color of fruits available in this country (Rashid 1993). Snake gourd is a monoecious crop and highly cross pollinated crop. The total production of snake gourd during 2009 to 2010 was 30339 MT on the area of 15741 acres of land (BBS 2009 to 2010). The figure indicates the low yield potentiality of our cultivars. Among many reasons, the lack of high yielding variety is one of the reasons for low yield of this crop in Bangladesh. The yield is very low in Bangladesh compared to other snake gourd production country like India and Thailand. Several factors are considered responsible for this low yield of snake gourd in Bangladesh. Lack of high yielding variety is one of the main reasons for low yield of snake gourd and there are no recommended varieties in the country.

Moreover, no information pertaining to the agronomical and morphological characteristics are available for delineating standardization and no systematic research of this kind has yet been carried out in the country. Therefore, the study was undertaken to delineate the characterization and evaluation of snake gourd test hybrids for selecting the best one(s).

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II. MATERIALS AND METHODS

The experiment was conducted at the Research & Development (Vegetable) Farm, Supreme Seed Company Limited, Bhaluka, Mymensingh in kharif-1 season of 2013. The seeds were sown in the field on 20 March, 2013. Four test hybrid was made using seven inbreed lines of snake gourd, three popular checks were collected from market and one variety collected from BADC of Bangladesh.

The experiment was laid out in RCBD design with three replications. The genotypes were randomly distributed within the replication. The unit plot size was 7.0 m × 1.2 m. The spacing maintained was 1.2×1.75 m^2. One genotype represented one treatment and four plants of a genotype represented one replication. After final land preparation, 3.5 m × 28.0 m raised beds were prepared and each bed was used as a block. There were four pits per replication and three seeds were sown in each pit. After germination rest seedlings were removed leaving one healthy plant. The net area of the experimental plot was 200 m^2. Seeds of the eight genotypes were first allowed to soak in water for 24 hours. The soaked seeds were then sown directly to the pit.

The experimental block is situated at 24.20^0 N latitude and 90.30^0 E longitudes at an elevation of 15.5 m above the sea level. The mean annual rainfall is 1775 mm. The soil of the experiment plot was clay loam in texture belonging to the Madhupur Tract under Agro Ecological Zone-28 (FAO, 1971). The warmest and coldest months were June (24^0 C maximum.) and January (minimum 12.6^0C) respectively. The crop received 1657 mm annual rainfall during the whole growing season. The selected plot was well drained having pH value at 6.7. The soaked seeds were sown on 20 march, 2013. The experimental plot was prepared with tractor ploughing followed by harrowing and laddering to bring the desired tilts. Manures and fertilizers were applied at the rate of Cowdung 10 ton, Urea 100 kg, TSP 40 kg, MP 75 kg, Gypsum 40 kg, $MgSo_4$ 15 Kg, Zinc oxide 2 kg, Borax 2 kg, and Reagent 5 Kg/acre respectively. The total quantity of Cowdung, TSP, Gypsum, MgSO4, Zinc oxide, Borax, Regent and one fifth of Urea & MP were applied during final land preparation. The rest Urea & MP were applied in four splits. Intercultural operations such as irrigation, weeding, mulching, stacking etc were done according to schedules and as a necessary.

Observations were recorded on each plant for days to female flowering, days to male flowering, node number of 1st female flowering, number of node at 1st male flowering, days to 1st harvest, number of fruits per plant, Total number of fruit, total weight of fruit per plant and yield (gm), Individual fruit weight (gm), fruit length (cm) and fruit diameter (cm).

Number of days was counted from the date of germination to date of first male and female flower opened. Number of nodes and shoots was counted from the first node at which the first female flower opened. The vine length was measured from the base to tip of the main vine. Days to first harvest was counted from the time taken from flowering to edible maturity of fruits. The number of fruits in each plant was harvested at edible stage and counted together. Weight of all the harvested fruits from each plant was recorded and averaged. The length of ten fruits was recorded and averaged. The diameter of ten fruits at the middle of the fruit was recorded and averaged. The total weight of all the harvested from each plant was recorded and fruit yield per plant as well as fruit yield per hectare was calculated. Collected data was subjected to statistical analysis and means were compared by Correlation coefficient analysis.

III. RESULT AND DISCUSSION

Flowering characteristics

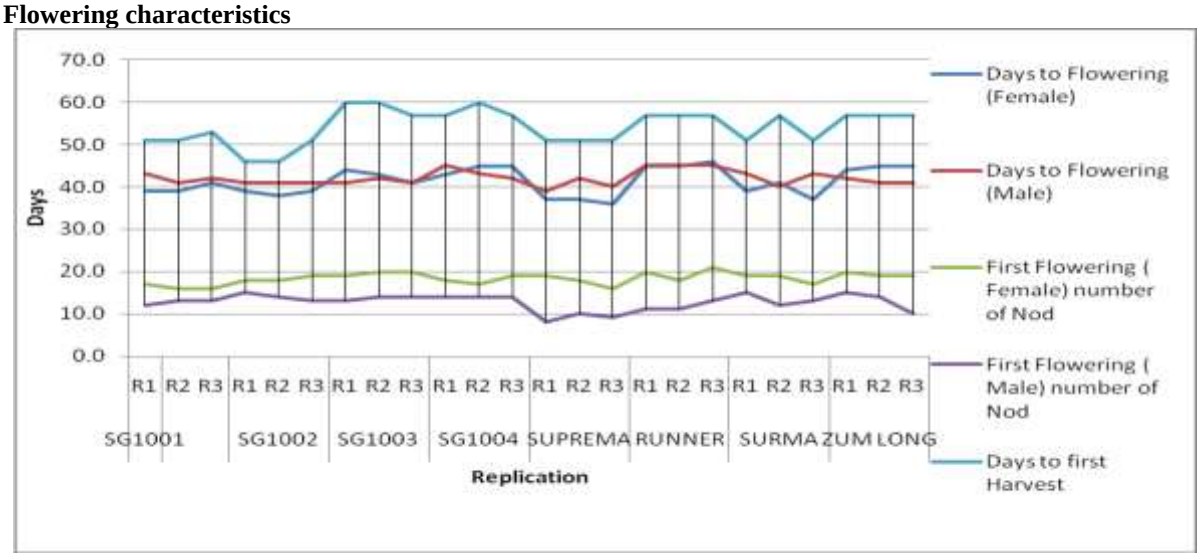

Figure 1.Flowering characteristics of snake gourd genotypes

Significant variations were recorded among the genotypes studied under present trial on flowering characteristics pertaining to days to female flowering, days to male flowering, node number of 1st female flowering and node number of 1st male flowering were significant among them (Figure 1). The genotype RUNNER required maximum days to first female flowering (46.0 days) and ZUM LONG required maximum days to first male flowering (45.0 days). These results are almost similar to the findings of Uddin et al. (2007-2008). In snake gourd, Joseph (1978) recorded considerable variation among 25 lines for days to 1st female flower anthesis (72.0 days). First Flowering (Female) number of Nods from 16 to 21 and male 9 to 15. The genotype SUPREMA required the minimum time (37.0 days) for female flowering and SG1002 required the minimum time (38 days) for male flowering. Variation in flowering in ridge gourd, bitter gourd, bottle gourd and sweet gourd was also observed by Rahman *et al.* (1990). The genotype RUNNER bearing maximum node number (21.0) for first female flowering and SG1001 bearing maximum node number (16.0).On the other hand, the genotype SUPREMA bearing minimum node number (9.0) for first male flowering. The genotypes differed significantly in respect of 1st harvest. The days of first harvesting ranged from 46.0-60.0 days. SG1002 genotypes required short days for early harvesting (46.0 days). Saha et al. (1986) reported 4.6 to 8.8 nodes for male flower bearing among the pumpkin genotypes. Prasad and Singh (1989) found low genotypic and phenotypic variance for node order of first male flower open (2.68-7.42) in ribbed gourd.

Yield characteristics

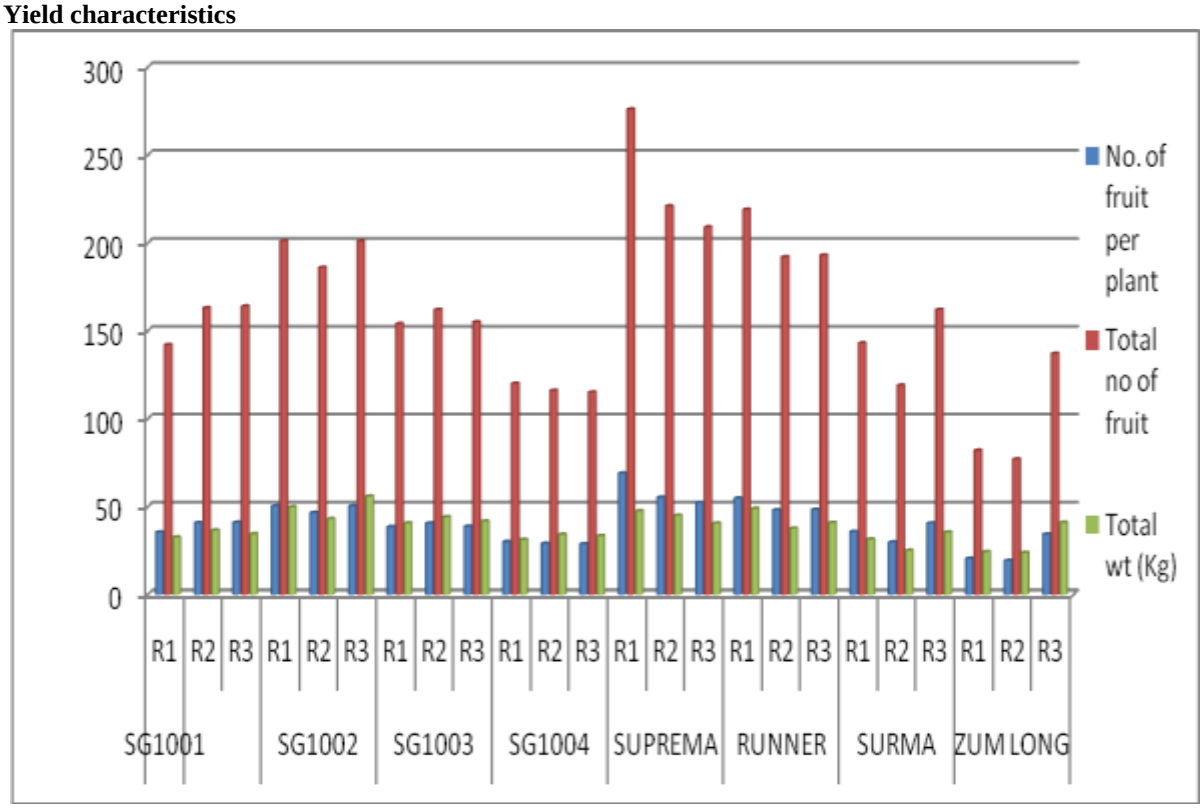

Figure 2. Yield and yield contributing characteristics of snake gourd genotypes

Number of fruits per plant, Total number of fruit and total weight of fruit per replication (Kg) showed significant variation among the genotypes (Figure 2). Wide range of variability was found in case of number of fruit per plant. The number of fruits per plant ranged from 20.5 to 55.25. The genotype SUPREMA produced the highest number of fruits per plant (55.25) which was statistically identical to RUNNER (54.75) whereas, the check had the lowest number of fruits per plant ZUM LONG (20.5). The total number of fruits ranged from 77.00 to 276.00. The genotype SUPREMA produced the highest total number of fruits (276.00) which was statistically identical to RUNNER (219.00) whereas, the check had the lowest total number of fruits per plant ZUM LONG (77.00). The maximum yield was obtained from the genotype from SG1002 (55.90 Kg) which was statistically differed from the other genotypes. However, the minimum yield was recorded in ZUM LONG (23.80 Kg).

Fruit characteristics

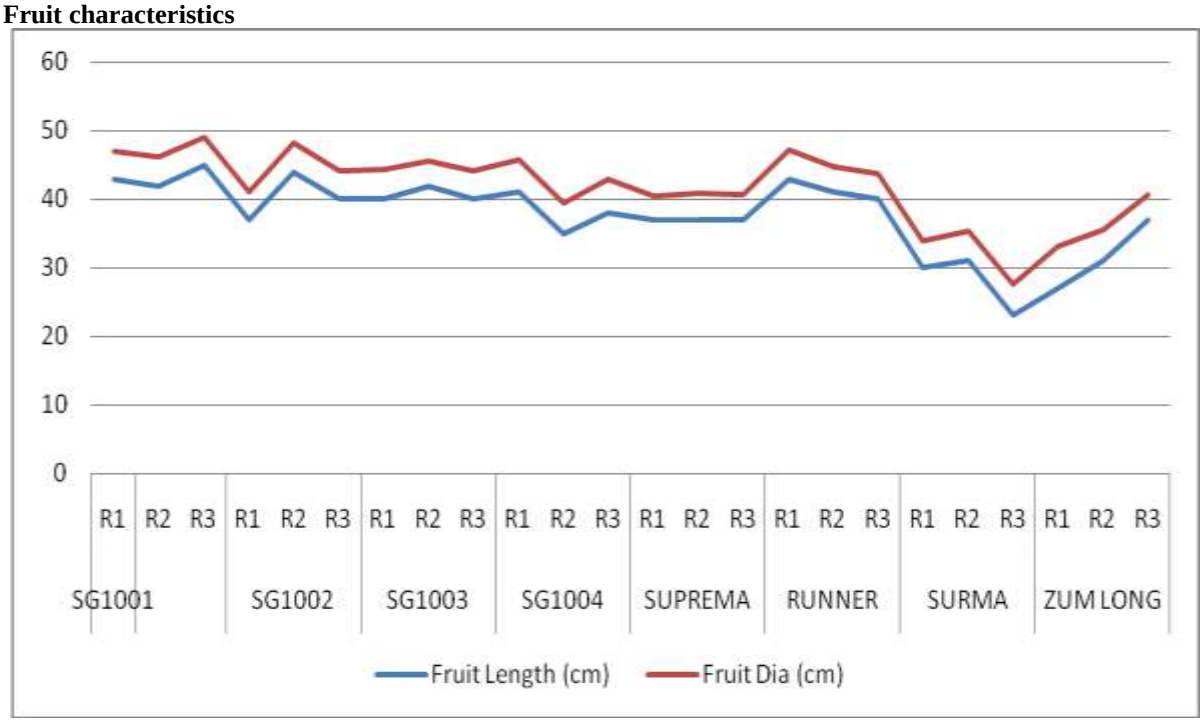

Figure 3. Fruit contributing characteristics of snake gourd genotypes

Fruit length (cm) and fruit diameter (cm) showed significant variation among the genotypes (Figure 3). The longest fruit was obtained from the genotype SG1001 (45.00 cm) which was statistically similar to SG1002 (44.00 cm) while the smallest fruit was obtained from ZUM LONG (27.00 cm). The large diameter fruit was obtained from the genotype ZUM LONG (6.10 cm) which was statistically similar to SG1004 (4.80 cm) while the smallest fruit was obtained from SUPREMA and SG1003 (3.50cm). These results are in accordance with the findings obtained by Varghese (1991). Variations for yield per plant was also recorded in water melon (Chezhiyan, 1984), bottle gourd (Rahman *et al*., 1991) musk melon (Swamy *et al*., 1984) and pumpkin (Rana *et al*., 1986; shah *et al*., 1992). Yield of snake gourd significantly varied among the snake gourd genotype (Table 2).

Table 1: Correlation of eleven yield contributing characters on yield of eight snake gourd genotypes

Correlations											
Contributing Characters	Days to Flowering (Female)	Days to Flowering (Male)	First Flowering (Female) number of Nod	First Flowering (Male) number of Nod	Days to first Harvest	No. of fruit per plant	Total no of fruit	Total wt (Kg)	Individual fruit wt (g)	Fruit Length (cm)	Fruit Dia (cm)
Days to Flowering (Female)	**1.000**										
Days to Flowering (Male)	.480*	**1.000**									
First Flowering (Female) number of Nod	.504*	.142	**1.000**								
First Flowering (Male) number of Nod	.276	.219	.169	**1.000**							

Days to first Harvest	.821**	.303	.448*	.094	**1.000**						
No. of fruit per plant	-.495*	-.103	-.056	-.620**	-.476*	**1.000**					
Total no of fruit	-.495*	-.103	-.056	-.620**	-.476*	1.000**	**1.000**				
Total wt (Kg)	-.285	-.110	.118	-.327	-.336	.816**	.816**	**1.000**			
Individual fruit wt (g)	.475*	.450*	.143	.255	.292	-.329	-.329	-.321	**1.000**		
Fruit Length (cm)	.096	.141	-.093	-.152	-.026	.376	.376	.471*	.161	**1.000**	
Fruit Dia (cm)	.277	.126	.094	.526**	.210	-.635**	-.635**	-.540**	.665**	-.434*	**1.000**

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

IV. CORRELATION COEFFICIENTS

The experimental materials comprised of eight indigenous genotypes of snake gourd including some of the commercially released varieties from different institutes of Bangladesh and four promising gynoecious lines. The observations were recorded by selecting twelve random plants for 11 quantitative characters along with two important quality traits. The phenotypic and genotypic correlation co-efficient was calculated as per formulae suggested by Al-Jibouri *et al.* (1958) and Miller *et al.* (1958). Path coefficient analysis was carried out to partition the total correlation into direct and indirect effects as suggested by Dewey and Lu (1959).

In the present study, Table 1 revealed that the genotypic values were higher than the phenotypic values Singh *et al.*, (1977). This could be interpreted on the basis that there was a strong inherent genotypic relationship between the characters studied, but their phenotypic expression was impeded by the influences of environmental factors. It is evident from Table 1 that the number of fruit per plant had the highest positive correlation (1.000**) with fruit weight followed by Total no of fruit (.816**) and Days to Flowering (Female) (0.480*). Increase in fruit length and diameter (fruit index) resulted in increase in fruit weight which ultimately increased the total yield per plant. Fruit weight and fruits per plant also having very high positive direct effect upon yield, which is also evident from path co-efficient analysis. Hence, direct selection for traits like fruit weight and number of fruits per plant could be effective for improvement of the yield. Traits like number of male flowers per plant, ascorbic acid and total carotenoids content, days to first male flower, days to first female flower and node number of first female flower appearance exhibited negative correlation co-efficient with yield. (Bhave *et al.* 2003). The above findings indicated that the lower the node at which first male or female flower appeared the higher and earlier would be the yield. Joshi *et al.* (1981) observed similar findings in cucumber and stated that the number of nodes to the first pistilate flower is reasonably a good measure of earliness. A strong negative correlation of ascorbic acid and total carotenoids with fruit weight indicated that small fruited genotypes are rich in ascorbic acid and total carotenoids and are more nutritions (Tendulkar, 1990).

V. CONCLUSION

Correlation studies in eight genotypes of snake gourd revealed that marketable fruit yield per plant exhibit significant positive correlation with number of fruit per plant and fruit length. In general, genotypic correlation coefficients were higher than the corresponding phenotypic correlation coefficients suggesting that the environmental influence reduces the relationship between yield and yield contributing characters of snake gourd. Coefficient analysis showed that number of fruit per plant, Total no of fruit, Days to Flowering (Female), First Flowering (Female) number of Nod, Individual fruit wt (g), Individual fruit wt (g) and Days to Flowering (Male) had direct positive effects on marketable fruit yield per plant. This indicates that this character was the major contributor to fruit yield. Therefore, maximum weight age should be given to this character for improvement of yield in snake gourd.

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