

## Short Communication

# Genetic variability, heritability and genetic advance for yield and its components snake gourd (*Trichosanthes anguina* L.)

N. Deepa Devi\* and S. Mariappan

Department of Horticulture, Agricultural College and Research Institute, Tamil Nadu Agricultural University, Madurai- 625104, India.

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Genetic variability and heritability were studied in 50 genotypes of snake gourd (*Trichosanthes anguina* L.) to determine the magnitude of variability in the population and to identify genotypically diverse and economically desirable genotypes for utilization in crop improvement. The phenotypic coefficient of variation was found to be slightly higher than the genotypic coefficient of variation for all the characters under consideration, indicating that the apparent variation is not only genetic, but also due to influence of the growing environment in expression of the genotypes. The estimates of genotypic variance also showed considerable variation for majority of the characters. Higher values of phenotypic coefficient of variation and genotypic coefficient of variation were recorded for fruit length, fruit weight and number of fruits per plant while, moderate phenotypic and genotypic coefficient of variation were observed for yield, fruit girth and number of seeds per fruit indicating the extent of available genetic variability for these traits. High heritability along with high genetic advance observed for fruit length, fruit yield, fruit girth and number of fruits per plant is indicative of additive gene action in control of these traits and phenotypic selection based on these traits in the segregating population is likely to yield desired individuals.

**Key words:** Snake gourd, genotypic coefficient of variation (GCV), phenotypic coefficient of variation (PCV), heritability, genetic advance.

## INTRODUCTION

Snake gourd (*Trichosanthes anguina* L.) belonging to the family Cucurbitaceae is an important summer vegetable rich in minerals and fiber making the food wholesome and nutritious (Ahmed et al., 2000). It is also considered to be of medicinal importance and is one of the few vegetables capable of giving more yield per unit area. However the average productivity of the crop is low as large numbers of local types are in cultivation. No serious attempts have so far been made to upgrade the productivity of this development of superior high yielding genotypes depends on the improvement of yield

components in snake gourd. Yield being complex character and associated with many other contributing traits, which are simply inherited (Rao et al., 1990). The assessment of variability present in any crop species is the essential pre-requisite for formulating an effective breeding programme as the existing variability can be used to enhance the yield level of the cultivars following appropriate breeding strategies (Patil et al., 2012). The information on heritability alone may not help in identifying characters for enforcing selection and heritability estimates in conjunction with predicted genetic

\*Corresponding author. E-mail: natesandeepa@gmail.com.

**Table 1.** Estimates of genetic parameters for some economic characters in snake gourd.

Characters	GCV (%)	PCV (%)	Heritability (%)	GA (% of mean)
Vine length	15.40	15.41	99.82	31.70
Internode length	12.64	13.38	89.19	24.58
First female flower appear on node	16.47	18.87	76.18	29.62
Days to first female flower appearance	5.08	5.82	76.18	9.14
Days to first male flower appearance	6.89	10.20	45.64	9.59
Number of seeds per fruit	22.77	22.77	99.97	46.89
Fruit length	47.15	47.15	99.99	97.13
Fruit girth	24.66	24.67	99.94	50.78
Fruit weight	46.23	121.59	14.46	36.21
Number of fruits per plant	31.81	31.86	99.69	65.42
Yield	29.46	29.46	99.99	60.69

advance is more reliable (Johnson et al., 1955). Heritability gives the information on the magnitude of inheritance of characters from parent to off spring, while genetic advance will be helpful in finding the actual gain expected under selection. The present investigation thus aims at to assessing the variability by estimating phenotypic and genotypic coefficient of variation as well as heritability and genetic advance in snake gourd for future breeding programme.

## MATERIALS AND METHODS

The present investigation was carried out at the department of Horticulture, Agricultural College and Research Institute, Madurai during 2011 to 2012. Totally, 50 genotypes were assembled from different geographical location and utilized for the study. The 50 genotypes comprised of 40 genotypes from NBPGR, New Delhi, three varieties from Tamil Nadu Agricultural University viz., PKM1, MDU1 and Co 2 and seven local types from the following locations in Tamil Nadu viz., Kulithalai, Kumbakonam, Palayajeyamkondam, Nagappattinam, Jeyamkondam, Madurai and Coimbatore. The experiment was laid out in a Randomized Block Design with three replications. The seeds were sown at a spacing of 2 x 2 m. The plants were supported by trellis and other intercultural operations such as weeding, irrigation and plant protection measures were performed as and when needed. Observations on yield and ten yield contributing characters viz., vine length, inter nodal length, days to first female flower appearance, days to first male flower appearance, fruit length, fruit girth, fruit weight, number of seeds per fruit, number of fruit per plant and fruit yield were recorded. Standard statistical procedures were used for the analysis of variance, coefficient of variation (Burton and De Vane, 1952) and heritability (Lush, 1940).

## RESULT AND DISCUSSION

### Genetic variability

The estimates on genotypic coefficient of variation, phenotypic coefficient of variation, heritability and genetic advance as percent of mean for the traits under study are

furnished in Table 1. The phenotypic coefficient of variation was found higher than the genotypic coefficient of variation for most traits studied. The genotypic coefficients of variation obtained for various yield, yield attributing ranged from 5.08 to 47.15. The highest genotypic coefficient of variation was observed for fruit length (47.15) followed by fruit weight (46.23) and number of fruits per plant (31.81), while the genotypic coefficients of variation observed for yield (29.46), fruit girth (24.66) and number of seeds per fruit (22.77) were moderate. The genotypic coefficient of variation was low for days to first male flower appearance (6.89) and days to first female flower appearance (5.08). The phenotypic coefficient of variation observed was high for fruit weight (121.59) followed by fruit length (47.15) and number of fruits per plant (31.86), and moderate phenotypic coefficients of variation was observed for yield (29.46), fruit girth (24.66) and number of seeds per fruit (22.77). The phenotypic coefficient of variation was low for days to first male flower appearance (10.20) and days to first female flower appearance (5.82).

Study of genotypic and phenotypic coefficient of variation indicated the extent of variability for different traits in snake gourd and those results are in conformity to the findings of Rahman et al. (2002). Higher phenotypic and genotypic coefficient of variation recorded for fruit length, fruit weight and number of fruits per plant indicates that, these genotypes exhibit much variation among themselves with respect to these characters offering more scope for selection. Phenotypic coefficient of variation (PCV) and genotypic coefficient of variation (GCV) recorded for days to first male flower appearance and days to first female flower appearance were low and was in agreement with the findings of Miah et al. (2000) and Rahman et al. (2002).

### Heritability and genetic advance

High heritability coupled with low genetic advance, low

heritability with high genetic advance or low heritability and low genetic advance offers less scope for selection, as they indicate the role of non-additive genetic effects. High heritability coupled with high genetic advance is indicative of greater proportion of additive genetic variance and consequently a high genetic gain expected from selection (Singh and Rai, 1981). The characters having heritability with low genetic advances as percent of mean appeared to be controlled by non-additive gene action and selection for such characters may not be effective (Singh and Singh, 2007).

The genotypes recorded high heritability values for all the characters under study. Fruit length (99.99%), fruit yield (99.99%), fruit girth (99.94%), number of fruits per plant (99.69%) and vine length (99.82%) had recorded high heritability value. Genetic advance as percent of mean ranged from 9.13% for days to first female flower appearance to 97.14% for fruit length. High genetic advance was also recorded for number of fruits per plant (65.42%), fruit yield (60.69%), fruit girth (50.78%) and number of seeds per fruit (46.89%). While moderate genetic advance was recorded for vine length (31.69%), fruit weight (29.61%) and internodal length (24.58%). High genetic advance indicated that additive genes govern these characters and selection will be rewarding for improvement of these traits. The above finding supports the results of Rahman et al. (2002). The genetic advance recorded was low for days to first female flower appearance (9.13%) and days to first male flower appearance (9.59%).

## Conclusion

The genetic improvement in snake gourd is possible through selection exercised for fruit length, fruit weight, number of fruits per plant, fruit yield and number of seeds per fruit which, showed high values of phenotypic coefficient of variation (PCV) and genotypic coefficient of

variation (GCV) coupled with high heritability and genetic advance. This will provide an opportunity to select better recombinants for various characters and thereby creating large variability for these characters in the future generations. However, characters predominantly controlled by additive gene action would be amenable for to conventional breeding methods.

## REFERENCES

- Ahmed MS, Rasul MG, Bashar MK, Mian ASM (2000). Variability and heterosis in snake gourd (*Trichosanthes anguina* L.). Bangladesh J. Plant Breed. Genet. 13:27-32.
- Burton GW, De Vane (1952). Quantitative inheritance in grasses. Proc. 6<sup>th</sup> Int. Grassland Congress 1:277-283.
- Johnson HW, Robinson HF, Comstock RE (1955). Estimation of Genetic variability and environmental variability in soybean. J. Agron. 47:314-318.
- Lush JL (1940). Intra – sire correlation and regression of offspring on dams as a methods of estimating heritability of characters. Proc. Am. Soc. Anim. Produces 33:293-301.
- Miah MA, Rahman MM, Uddin MS, Rahman AKMM, Ullah MH (2000). Genetic association in bitter melon (*Momordica charantia* L.). Bangla. J. Sci. Technol. 2:21-25.
- Patil PR, Surve VH, Mehta HD (2012). Line x Tester analysis in Rice (*Oryza sativa* L.). Madras Agric. J. 99:210-213.
- Rahman MA, Hossain MD, Islam MS, Biswas DK, Ahiduzzaman M, (2002). Genetic variability, heritability and path analysis in snake gourd (*Trichosanthes anguina* L.). Pak. J. Biol. Sci. 5(3):284-286.
- Rao DSRM, Singh H, Singh B, Khola OPS, Faroda AS (1990). Correlation and path coefficient analysis of seed yield and its components in sesame (*Sesamum indicum* L.). Haryana Agric. Univ. J. Res. 20:25-30.
- Singh AK, Singh N (2007). Studies on genetic variability and heritability in balsam (*Impatiens balsamina*). J. Ornamental Hort. 10:128-130.
- Singh RP, Rai JN (1981). Note on the heritability and genetic advance in chilli. (*Capsicum annum* L.). Prog. Hortic. 13(1):89-92.