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CHARACTER ASSOCIATION AMONG THE YIELD AND YIELD ATTRIBUTES IN BOTTLE GOURD [*LAGENARIA SICERARIA* (MOLINA) STANDL] GENOTYPES

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Abstract

The present investigation was carried out during March 2013 to August 2013 at Main Experiment Station, Department of Vegetable Science, NDUA & T, Kumarganj, Faizabad (U.P.), India. Experimental material for the study consisted of 40 genotypes with two checks (Narendra Rashmi, Narendra Dharidar). Observation were recorded on 12 economic traits *viz*., node number to first staminate flower anthesis, node number to first pistillate flower anthesis, days to first staminate flower anthesis, days to first pistillate flower anthesis, days to first harvest, fruits length/polar length (cm), fruit circumference (cm), fruit weight (kg), number of fruits per plant, vine length at the time of last harvest (m), number of primary branches per vine at the time of last harvest and fruit yield (kg/plant). The character Studied were Moderate to high coefficients of variations were recorded for yield of marketable fruits (kg/plant) (36.87%), Estimate of heritability in broad sense ranged from low (58%) for days to first staminate flower anthesis to very high (99%) for fruit length/polar length. Moderately high genetic advance as per cent of mean were recorded for number of primary branches per vine at the time of last harvest (30.79%). Fruit yield (kg/ plant) had significant and positively correlated with number of fruits per plant, vine length at last harvest and primary branches per vine at last harvest.

Key words : Bottle gourd, GCV, PCV, heritability, genetic advance.

Introduction

Bottle gourd [*Lagenaria siceraria* (Molina) Standl, 2n =22] also called as birdhouse gourd, trumpet gourd, white flowered gourd and calabash gourd, is one of the most ancient crops with its man's association since 12000 B.C., as indicated by archeological remains in Peru (Esquinas-Al Cazae and Gulick, 1983). It is a popular cucurbitaceous crop in India and cultivated in other tropical and sub-tropical regions of the world. The tender fruits are also used to prepare sweets, rayata and pickles. The dried shells of mature fruits are extremely hard and are used as containers, utensils, musical instruments, floats of fishnets or ornamental items. The leaves are also used to prepare vegetable and they have higher nutritive value than fruits, in respect of protein, fat, minerals, fibre, carbohydrate, energy, calcium and phosphorus contents (Gopalan *et al*., 1982). Different plant parts of bottle gourd have several putative medicinal properties (Chopra, 1986; Moreman, 1998; Chaudhary, 2001; Manandhar, 2002).

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As per FAO, estimates the world acreage under gourd and squashes is about 1.462 million hectares with a total annual production of 18.98 million tonnes with the productivity of 12.97 tonnes per hectare (Anonymous, 2013). Bottle gourd occupies a prominent position among various cucurbit crops grown in India. It is cultivated in an area of 1.17 lakh hectares with a production of 1.42 million tonnes leading to a productivity of 12.12 tonnes per hectare (Sidhu, 2002). Like other cucurbits bottle gourd is a summer season vegetable under the north Indian climatic conditions. It is mainly cultivated both in spring-summer (February to June) and rainy (July to November) seasons.

Materials and Methods

The experimental material comprised of forty genotypes of bottle gourd with two checks was evaluated at Main Experiment Station of Department of Vegetable Science at Narendra Deva University of Agriculture & Technology, Narendra Nagar (Kumarganj), Faizabad

(U.P.), India. Geographically the experimental site falls under humid sub-tropical climate and is located in between 24.47º and 26.56º N latitude, and 82.12º and 83.58º E longitude at an altitude of 113 m above the mean sea level in the Gangetic Alluvial Plains of eastern Uttar Pradesh.

The experiment was conducted in Randomized Block Design with three replications to evaluate forty bottle gourd genotypes. Individual plot dimension was 3m × 3m with a row to row spacing of 3 m and plant to plant spacing of 50 cm. Thus, six plants were maintained in individual plots. Recommended doses of F.Y.M. and fertilizers were applied. The required pesticides and fungicides were used, as and when required to save the crop from pests and diseases, respectively. The observations were recorded from five randomly selected plants from each treatment in each replication. Observations on the following parameters were recorded using the standard procedure: node number to first staminate flower anthesis, node number to first pistillate flower anthesis, days to first staminate flower anthesis, days to first pistillate flower anthesis, days to first harvest, fruit length/polar length (cm), fruit circumference (cm), fruit weight (kg), number of fruits/plant, vine length at the time of last harvest (m), number of primary branches/vine at the time of last harvest, and fruit yield (kg/plant). The replicated mean data recorded will be analyzed according to Panse and Sukhatme (1989). Coefficient of variability according to Burton and de Vane (1953). Heritability as suggested by Hanson *et al*. (1956). Genetic advanced (Ga) was calculated by the method suggested by Johnson *et al*. (1955) and Correlation coefficient as suggested by Al-Jibouri *et al.* (1958). The Experimental was laid out in an RBD design and data were calculated with analysis of variance (ANOVA).

Results and Discussion

The analysis of variance for different characters revealed that the mean sum of square due to genotypes/ treatment were highly significant for all the characters at 5% and 1% probality level (table 1). In other words, the performances of the genotypes with respect to these characters were statistically different, suggesting that there are ample scope for selection in the available germplasm of bottle gourd. The estimate of genotypic coefficient of variation is of prime importance to breeder because genetic variance alone, does not allow a decision as to which characters were showing the highest degree of variability therefore, accurate relative comparison can be made with the help of phenotypic and genotypic coefficient of variation. In general, the phenotypic coefficient of were higher than the genotypic coefficient of variability for all the characters under study which indicated that environment played vere important role in the expression of the traits. The coefficients of genotypic and phenotypic variability, heritability and genetic advance as per cent of mean of 12 economical traits of bottle gourd studied in the present investigation are given in table 1.

Moderate to high coefficients of variations were recorded for average yield of marketable fruits (kg/plant) (36.87 %), average length/polar length of marketable fruit (36.84%), average number of marketable fruits per plant (36.45%), average circumference of marketable fruit (29.27%), number of primary branches per vine at the time of last harvest (21.25%) and node number to first pistillate flower anthesis (20.73%). The other six traits had relatively low coefficient of variation. Characters with high coefficients of variation revealed greater possibilities of improvement through selection. Except for days to first staminate flower anthesis (58%), average weight (kg) of marketable fruit (62%) and days to first pistillate flower anthesis (63%), the heritability estimates for rest of the traits were very high (ranging from 76 to 99%), thereby exhibiting high transmissibility of all these traits.

Low genetic advance as percent of mean were recorded for days to first staminate flower anthesis (5.55%), days to first pistillate flower anthesis (6.59%), days to first harvest (6.75%) and average weight of marketable fruit (8.79%). Moderately high genetic advance as per cent of mean were recorded for number of primary branches per vine at the time of last harvest (30.79%), node number to first staminate flower anthesis (29.81%), vine length at the time of last harvest (24.82%). For rest of the five economic traits, the estimated genetic advance in per cent of mean were quite high ranging from 38.69% (node number to first pistillate flower anthesis) to 75.27% (fruit length/polar length). Traits exhibiting high heritability along with high genetic advance as per cent of mean are considered to be governed by additive gene action and hence stand a brighter chance for fast improvement through selection (Johnson *et al*., 1955a). In present investigation most of the economic traits fitted well in the above criterion, particularly for node number to first staminate flower anthesis, node number to first pistillate flower anthesis, fruit length/polar length, fruit circumference, number of fruits per plant and fruit yield per plant (table 1).

It was very noticeable to record that the maturity traits *viz*., node number to first staminate flower anthesis,

Table 1 : Estimates of grand mean, range, coefficient of variation (PCV & GCV), heritability and expected genetic advance in per cent of mean (Ga) for the twelve economic characters in bottle gourd.

S. no.	Characters	Mean	Range		Coefficient of variation		Heritability (%)	Genetic advance as % of mean (Ga)
			Lowest	Highest	PCV	GCV		
1.	Node number to first staminate flower anthesis	7.38	5.30	10.37	16.55	15.49	88.00	29.81
2.	Node number to first pistillate flower anthesis	10.88	6.20	15.60	20.73	19.73	91.00	38.69
3.	Days to first staminate flower anthesis	46.97	42.67	50.70	4.61	3.52	58.00	5.55
4.	Days to first pistillate flower anthesis	49.11	44.00	52.33	5.08	4.04	63.00	6.59
5.	Days to first harvest	58.77	54.00	63.33	4.29	3.75	76.00	6.75
6.	Average fruit length/polar length (cm)	30.29	18.63	49.33	36.84	36.69	99.00	75.27
7.	Average fruit circumference (cm)	31.17	19.60	43.17	29.27	29.00	98.00	59.15
8.	Average fruit weight (kg)	0.91	0.74	1.03	7.26	5.74	62.00	8.79
9.	Average number of fruits per plant	4.72	1.60	8.50	36.45	34.70	91.00	68.00
10.	Vine length at the time of harvest (m)	5.68	3.84	7.30	16.17	14.20	72.00	24.82
11.	Number of primary branches per vine at the time of last harvest	11.95	6.66	15.33	21.25	17.81	70.00	30.79
12.	Average fruit yield (kg/plant)	4.36	1.46	7.95	36.87	35.68	94.00	71.10

node number to first pistillate flower anthesis, day to first staminate flower anthesis and days to first pistillate flower anthesis, days to first harvest had positive and highly significant phenotypic correlation coefficient among themselves except for those in between node number to first staminate flower anthesis and days to first pistillate flower anthesis as well as node number to first pistillate flower anthesis and days to first staminate flower anthesis (table 1). It was interesting to record that fruit length/ polar length had positive and significant correlation coefficients with that of node number to first staminate flower anthesis and node number to first pistillate flower anthesis whereas, fruit circumference had negative and highly correlation coefficients. Tiwari (2002) working with a set of 19 bottle gourd genotypes over four environments recorded positive and significant correlation among all the maturity traits in all the four environments as observed in the present investigation. Zaidi (2007) also reported similar results node number to first pistillate flower anthesis, days to first staminate flower anthesis, node number to first staminate flower anthesis and days to first pistillate flower anthesis were positively and significantly associated with days to first harvest as reported by Singh (2004) and Zaidi (2007) fruit length had significant negative correlations with fruit circumference. Zaidi (2007) also observed similar correlation coefficient in bottle gourd.Fruit circumference had significant negative correlations with two maturity traits node number to first staminate flower anthesis and node number to first pistillate flower anthesis.

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