

Phenotypic diversity analysis in pointed gourd (*Trichosanthes dioica* Roxb.)

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Introduction

Pointed gourd (*Trichosanthes dioica* Roxb.) is one of the most nutritive cucurbit vegetables and is native to Indian subcontinent. It is one of the important vegetables of India and Bangladesh. Pointed gourd is rich in vitamin and contains 9.0 mg Mg, 2.6 mg Na, 83.0 mg K, 1.1 mg Cu, and 17.0 mg S per 100 g edible part. It is reported to have the medicinal property of lowering blood sugar and total cholesterol (1, 2 & 3) and also known to have antiulcerous effects (5). Knowledge on magnitude and nature of genetic variation helps in formulating breeding programme for improvement of a crop. The objective of the present study was to use a diverse set of pointed gourd germplasm to estimate the extent of genetic diversity with respect to yield and yield components.

Materials and Methods

A total of 22 varieties/land races of pointed gourd were collected from different states of India (Uttar Pradesh, Bihar and Orissa) and were planted at a spacing of 2 × 1m in a randomized block design with three replications during 2008-2010. The plant population in the experimental field had female and male plants at the ratio of 10:1 to ensure effective pollination. The accessions were evaluated for seven morphological characters. Mean, ANOVA, and coefficient of variation were analyzed by using the AgRes statistical software (version 7.1) and mean data was further subjected to correlation analysis by using GenRes statistical software (version 7.01).

Results and Discussion

The analysis of variance revealed significant differences among the accessions studied for all the characters. A wide range of variation (Table 1) was observed for internode length (5.50-13.67 cm), node number bearing first flower (6.00- 16.83), number of fruits per plant (79.86-502.00), fruit weight (14.31-37.98 g), fruit length (4.17-8.73 cm) and yield per plant (2.48-10.21 kg). Among the accessions studied, the earliest flowering was observed in CHPG 11 (51 d), which is a favourable trait to

take advantage of early harvest and profitable market avenue owing to its high demand. The variety Swarna Alaukik recorded the highest yield (10.21 kg/plant) followed by CHPG 11 (9.57 kg/plant).

The accessions showed a considerable level of variability for qualitative traits such as fruit colour (Fig. 1; light green to dark green), fruit striping (Fig.1; striped to without striped), fruit shape (round to oblong), leaf surface (smooth to rough). The high level of phenotypic diversity observed among the accessions in this study is in agreement with the earlier findings (4) for different characters in other sets of germplasm. The diversity found in fruit colour and shape would be helpful for the selection of genotypes with desired quality. In addition, the accessions displaying contrast characters can be used to study the genetics of trait expression.

Based on D² values the accessions were grouped into five clusters (Table 2). The pattern of group constellations indicated that genetic diversity was not directly correlated to the geographic diversity. Cluster I was largest comprising 12 accessions, whereas cluster V was smallest with a single accession. The intra-cluster distance (Table 3) ranged from 0.00 (cluster V) to 26.67 (cluster I) and inter-cluster distances varied from 17.60 (cluster III Vs cluster V) to 47.76 (cluster IV Vs cluster V). Cluster IV could be characterized (Table 4) with genotypes early in flowering (<55 days), higher values for fruit characters (fruit weight-32.78 g; fruit length-8.72 cm) and yield per plant (9.59 kg). Though maximum number of fruits per plant (466.01) was recorded in cluster II it stood second in terms of yield per plant which may be due to less fruit weight recorded by this group. The results presented here on diversity existing in this species will provide the foundation for designing an efficient pointed gourd breeding programme.

Literature cited

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Table 1. Per se performance of 20 Accessions for different traits of pointed gourd

Accession	Days to flowering	Node no bearing 1 st flower	Internodal length (cm)	Fruit weight (g)	Fruit length (cm)	No of fruits/plant	Yield/plant (kg)
CHPG 1	69.33	12.16	6.83	24.15	7.11	127.86	2.95
CHPG 2	73.50	15.17	9.33	22.69	6	131.67	3.59
CHPG 4	70.67	9.67	9.17	32.34	7.83	205.78	6.06
CHPG 7	67.72	16.77	7.50	32.85	6.7	201.42	6.07
CHPG 8	53.22	13.61	11.17	23.89	6.93	238.25	6.44
CHPG 11	70.83	12.50	10.33	35.84	7.83	296.78	9.57
CHPG 12	63.22	12.44	9.33	37.98	8.27	215.50	6.68
CHPG 14	63.33	9.83	7.67	37.68	7.87	79.86	2.48
CHPG 15	47.17	12.44	8.17	37.90	7.6	109.83	3.73
CHPG 16	60.50	12.11	11.33	24.72	6.67	95.25	2.65
NP 309	65.66	15.11	10.33	20.51	6.17	239.08	7.07
NP 702	54.67	7.33	8.17	23.26	6.67	484.53	9.73
NP 709	63.88	10.66	10.50	15.70	5	462.67	6.43
NP 751	50.83	6.00	11.00	23.47	5.23	502.00	9.43
NP 754	57.67	7.00	6.33	27.50	6.73	414.83	8.26
NP 756	62.55	10.56	10.17	29.52	7.57	244.92	6.67
NP 308	70.00	11.11	5.50	16.00	4.17	181.67	2.89
Adauri Hara	61.00	7.78	9.83	29.61	8.57	143.58	4.70
Rajendra Parwal	51.44	7.44	7.67	31.36	8.73	308.33	8.97
Swarna Alaukik	56.67	10.72	13.67	34.20	8.7	374.33	10.21
HAP 39	66.00	15.27	13.67	31.11	8.03	154.33	4.76
HAP 28	57.00	16.83	6.67	14.31	4.67	152.33	3.78
Mean ± SE	61.68±1.69	11.48±1.21	9.27±0.58	27.57±1.25	6.96±0.26	243.86±14.10	6.05±0.12
CD (P=0.05)	3.41	2.45	1.17	2.51	0.51	28.46	0.24

Table 2. Composition of clusters based on genetic divergence in pointed gourd

Cluster	No. of genotypes	Genotypes and their source
I	12	Orissa- CHPG 1, CHPG 2, CHPG 4, CHPG 7, CHPG 8, CHPG 11, CHPG 12, CHPG 14, CHPG 15, CHPG 16 Uttar Pradesh- NP 309, NP 756
II	4	Uttar Pradesh-NP 702, NP 709, NP 751, NP-754
III	3	Uttar Pradesh-NP 308, Adauri Hara Bihar-HAP-39
IV	2	Uttar Pradesh-Rajendra Parwal Bihar-Swarna Alaukik
V	1	Bihar-HAP-28

Table 3. Inter- and intra- cluster distances

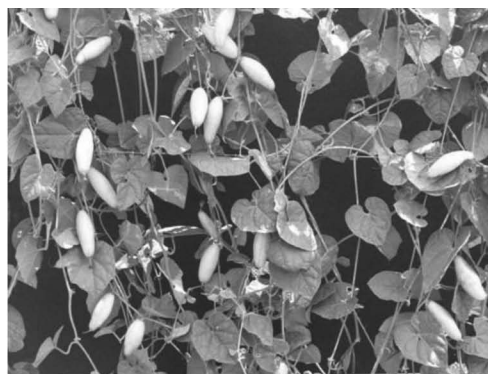
Cluster	I	II	III	IV	V
I	26.67	34.15	24.05	38.99	25.24
II		19.92	37.61	24.36	37.02
III			21.44	45.51	17.60
IV				15.05	47.76
V					0.00

Table 4: Cluster mean for different traits of pointed gourd

Cluster	Days to flowering	Node no bearing 1st flower	Internodal length (cm)	Fruit weight (g)	Fruit length (cm)	No of fruits/plant	Yield/plant (kg)
I	63.98	12.70	9.28	30.01	7.21	182.18	5.33
II	56.76	7.75	9.00	22.48	5.91	466.01	8.46
III	65.67	11.39	9.50	25.57	6.92	159.86	4.12
IV	54.06	9.08	10.67	32.78	8.72	341.33	9.59
V	57.00	16.83	6.67	14.31	4.67	152.33	3.79



Clonal Selection-NP 702



cv. Swarna Alaukik

Figure 1. Fruits of NP 702 and Swarna Alaukik