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CORRELATION COEFFICIENT ANALYSIS BETWEEN FRUIT YIELD AND QUALITATIVE TRAITS OF POINTED GOURD (*TRICHOSANTHES DIOICA* ROXB.) IN CHHATTISGARH REGION

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ABSTRACT

An experiment was carried out on locally collected genotypes of pointed gourd (*Trichosanthes dioica* Roxb.) in Chhattisgarh region conducted at Research cum Instructional Farm, Department of Horticulture, Indira Gandhi Krishi Vishwav idyalaya, Raipur, (C.G.) during the summer-*Kharif* seasons of 2014-15. Genotype correlation coefficient analysis was greater than phenotypic correlation coefficient for most of the characters indicating potential inherent association between the various qualitative traits. The correlation coefficient of yield was found to be positive and significant with length of vine (0.687 and 0.588 cm), number of fruits plant^{-1} (0.713 and 0.935), and fruit volume (0.643 and 0.808 cc) at both phenotypic and genotypic levels. Average fruit weight (0.718g), Number of vine (0.679) and first flower appearance after node (-0.537) at genotypic and fruit diameter (0.583 cm) phenotypic level exhibited significant positive correlation with fruit yield plant^{-1}.

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INTRODUCTION

Pointed gourd (*Trichosanthes dioica* Roxb.) is one of the versatile cucurbitaceous vegetable grown in India which is locally known as "Parwal". It is grown in both rainy and summer season and its fruits are available around 7-8 months in a year. Pointed gourd is constituted an important component of balance diet for man. They are cheaper sources of vitamins, pro-vitamins and minerals. Pointed gourd is referred as 'King of gourds' because of its higher nutrient content. Fruits are rich in vitamin 'A' and vitamin C (299 mg 100 g^{-1} of edible portion), which is higher than many other cucurbits (Singh *et al.,* 1989). Pointed gourd is native crop of India, particularly Northern and Eastern parts of India, it is cultivated in West-Bengal, Assam, Bihar and Eastern parts of Uttar Pradesh, Madhya Pradesh, Orissa and in some regions of Maharashtra, Gujarat, hilly tracts of Andhra Pradesh and Tamil Nadu. In Chhattisgarh state area under pointed gourd cultivation in Raigarh Jashpur, Raipur, Durg etc.

The knowledge of patterns of genetic variation of a crop species in any given region or country is very important for planning future germplasm collection missions and for efficient utilization of collected germplasm in crop improvement programmes (Nagi *et al*., 2013). To initiate breeding programme in any crop, study on genetic variability and transmissibility of characters into the progeny is essential for making effective selection (Sharma *et al.,* 2005). Yield being a complex character is a function of several component characters and their interaction with environment. Probing of structure of yield involves assessment of mutual relationship among various characters contributing to the yield. In this regard genotypic and phenotypic correlation reveals the degree of association between different characters and thus aid in selection to improve the yield and yield attributing characters simultaneously.

Fruit yield of pointed gourd is a polygenic trait, which is governed by numbers of gene action; direct selection for yield alone is usually not very effective. Hence, selection based on its contributing traits could be more efficient and reliable (Kumar *et al*., 2013a; Kumar *et al*., 2013b). For planning and execution of a successful breeding program, the most essential pre-requite is the availability of substantial desirable genetic variability for important characters in the germplasm and the extent to which the desirable characters are heritable. Knowledge of correlation between different quality characters are basic and for most endeavor to find out guidelines for selection of quality genotypes In this regard a good number of works has been reported by Dhanwani *et al*. (2013). The achievement of any breeding program mainly depends on genetic diversity, trait interrelationship and direct and indirect effects on yield and its attributing traits. Association of plant characters which is determined by correlation coefficient is although useful in determining the relative influence of the various characters on fruit yield.

The objective of this study was to identify suitable local genotypes for Chhattisgarh region since no study has been reported. Large numbers of unexploited local genotypes are available in Chhattisgarh and genetic diversity has been considered as an important factor which is also essential for hybridization programme to obtain high yielding progenies and hybrids on a commercial scale and giving remunerative returns to farmers. Therefore, evaluation of the local gremplasm material is very important and source of smart genotypes. Correlation studies measure only mutual association between two traits this study, therefore, was undertaken with the objective to quantify the association between fruit yield and fruit yield traits in pointed gourd genotypes.

MATERIALS AND METHODS

The field experiment was conducted using fourteen pointed gourd genotypes, available at Department of Horticulture, COA, IGKV, Raipur, (C.G.). The collected genotypes were previously planted in Randomized Block Design (RBD) with three replications at spacing of 2 m × 1m (Row to Plant). The soil properties like organic carbon (%) 0.60, Available N (kg ha^{-1}) 275.00, Available P (kg ha^{-1}) 16.75 and Available K (kg ha-1) 303.00, Soil Reaction pH 7.09 and Electrical conductivity (0.19 dS m^{-1}) was observed in the site of experiment. The data were recorded during the summer-*Kharif* seasons of 2014-15. Standard cultural practices were adopted during the investigation to raise crop successfully. The data were recorded on sixteen characters from five randomly selected plants from each genotype over replication *viz.,* number of vines $plant^{-1}$, first female flower appear after nodes, length of vine (cm), internodal length of vines (cm), petiole length of leaves (cm), leaf length (cm), leaf width (cm), number of fruits $plant^{-1}$, fruit length (cm), fruit diameter (cm), fruit volume (cc), fruit weight (g), number of seeds $fruit^{-1}$, seed pulp ratio, fruit yield $plant^{-1}$ (kg), fruit yield ha^{-1} (kg) and total soluble solids (^{0}Brix), were recorded and mean values for each observation were used for statistical analysis (Ram D., 2001). Genotypic and phenotypic correlations were partitioned using the technique outlined by Dewey and Lu (1959).

RESULTS AND DISCUSSION

The genotypic and phenotypic correlation coefficient between for fruit yield and its component in pointed gourd are presented in Table 1. The degree of association between independent and dependent variables was first suggested by Galton (1888) and its theory was developed by Pearson (1904).

Correlation coefficient analysis revealed that fruit yield $plant^{-1}$ expressed a highly significant positive correlation with length of vine, fruit diameter, and average fruit weight, number of fruits $plant^{-1}$ and fruit volume at both phenotypic and genotypic levels. Length of vine showed significance positive correlation with fruit diameter, average fruit weight and fruit volume at genotypic level only. Internodal length showed positive correlation with petiole length, leaf length, and leaf width at both genotypic and phenotypic levels. Petiole length positively correlated with leaf length, leaf width, fruit diameter, average fruit weight, first flower appears after node and vines $plant^{-1}$. Leaf length positively correlated with leaf width at both phenotypic and genotypic levels. Leaf width positively correlated with fruit length genotypic level only. Fruit diameter positively correlated with average fruit weight fruit volume and fruits yield $plant^{-1}$ at both genotypic and phenotypic levels. Average fruit weight positively correlated with fruit volume at phenotypic level only. Number of fruits $plant^{-1}$ positively correlated with fruit yield $plant^{-1}$ (kg) at phenotypic level only. Fruit volume positively correlated with specific gravity at genotypic level and fruit yield $plant^{-1}$ at both phenotypic and genotypic levels of the genotypes. Fruit length negatively correlated with fruit diameter and TSS at genotypic level only.

Length of vine (0.687 and 0.588 cm), number of fruits $plant^{-1}$ (0.713 and 0.935), fruit volume (0.643 and 0.808 cc), number of seeds $fruit^{-1}$ (0.552 and 0.691) exhibited significant positive correlation with fruit yield $plant^{-1}$ at both phenotypic and genotypic levels and fruit weight (0.719 g), fruit diameter (0.583 cm) showed significant positive correlation with fruit yield $plant^{-1}$ at both genotypic and phenotypic levels respectively leaf length (0.569 and 0.736 cm), leaf width (0.534 and 0.883 cm), fruit weight (0.655 and 0.968), fruit volume (0.594 and 0.734 cc), number of seeds $fruit^{-1}$ (0.635 and 0.819), yield $plant^{-1}$ (0.687 and 0.588 kg), and numbers of vines $plant^{-1}$(0.743 and 0.956) showed significant positive correlation with length of vine at both phenotypic and genotypic levels. Numbers of fruits $plant^{-1}$ (0.616), length of fruit (0.558 cm) showed significant positive correlation with length of vine at both genotypic and phenotypic levels respectively, whereas first flower after node exhibited significant negative correlation with length of vine at genotypic level only, Similar results were also reported by Shabarish *et al.*, 2014 and Sheela *et al.,* 2014 in cluster bean.

Leaf length (0.661 and 0.902 cm), leaf width (0.536 and 0.677 cm), fruit length (0.667 and 0.835) exhibited high positive significant correlation with internodal length at both phenotypic and genotypic levels whereas petiole length (0.659) showed significant and positive correlation with internodal length at genotypic level only, Malek *et al.* (2007).

The leaf width (0.794 and 0.868 cm), fruit length (0.684 and 0.977 cm), number of vines $plant^{1}$ (0.551 and 0.585) exhibited high positive significant correlation with leaf length at both phenotypic and genotypic levels while, petiole length (0.702), fruit volume (0.725 cc), number of seeds $fruit^{-1}$ (0.622) and TSS (0.607 °Brix) at genotypic level only, fruit weight (0.594 g) exhibited significant positive correlation with leaf length at phenotypic level only, Khan *et al.* (2009).

The number of vines $plant^{-1}$ (0.582 and 0.692) showed high positive significant correlation with leaf width at both phenotypic and genotypic levels and petiole length (0.750 cm), fruit weight (0.574 g), fruit length (0.636 cm), number of seeds $fruit^{-1}$ (0.602) showed significant positive correlation with leaf width at genotypic level only.

Number of fruits $plant^{-1}$ (0.638) and fruit volume (0.598 cc) exhibited positive significant correlation with petiole length at genotypic level only. Fruit yield $plant^{-1}$ (0.713 and 0.935 kg) and 1st flower after node (0.541 and -0.711) exhibited significant negative correlation with number of fruits $plant^{-1}$ at phenotypic and genotypic levels respectively, whereas fruit weight (0.697 kg), fruit diameter (0.795 cm), fruit volume (0.768 cc) and number of vines $pant^{-1}$ (0.642) showed positive correlation with number of fruits $plant^{-1}$ at genotypic level only.

Number of vines $plant^{-1}$ (0.690 and 0.916) showed high

Table1: Correlation coefficient between fruit yield and its component characters in pointed gourd (*Trichosanthes dioica* Roxb.)

S. No.	Characters		01 Length of vine (cm)	02 Internodal length (cm)	03 Leaf length (cm)	04 Leaf width (cm)	05 Petiole length (cm)	06 No. of Fruits Plant⁻¹	07 Fruit weight (g)	08 Fruit diameter (cm)	09 Seed pulp ratio	10 Fruit volume (cc)	11 Fruit length (cm)	12 No. of seeds fruit⁻¹	13 Yield plant⁻¹ (kg)	14 °SS (°Brix)	15 1ST female flower appearance after node	16 No. of vines plant⁻¹
1	Vine of length (cm)	P	1.000	0.033	0.569*	0.534*	0.470	0.495	0.655*	0.339	-0.270	0.594*	0.558*	0.635*	0.687**	0.263	-0.393	0.743**
		G	1.000	0.275	0.736**	0.883**	0.299	0.616*	0.968**	0.022	-0.518*	0.734**	0.449	0.819**	0.588*	0.286	-0.667**	0.956**
2	Internodal length (cm)	P		1.000	0.661**	0.536*	0.464	-0.073	0.415	0.210	0.088	0.398	0.667**	0.180	0.122	0.131	0.180	0.251
		G		1.000	0.902**	0.677**	0.659*	-0.070	0.389	-0.277	0.005	0.036	0.835**	0.238	-0.080	0.171	0.243	0.345
3	Leaf length (cm)	P			1.000	0.794**	0.314	0.159	0.594*	0.245	-0.319	0.517	0.684**	0.434	0.192	0.215	-0.059	0.551*
		G			1.000	0.868**	0.702**	0.160	0.276	0.396	-0.507	0.725**	0.977**	0.622*	0.287	0.607*	-0.055	0.585*
4	Leaf width (cm)	P				1.000	0.296	0.156	0.518	0.039	-0.298	0.351	0.371	0.439	0.208	0.006	-0.127	0.582*
		G				1.000	0.750*	0.235	0.574*	0.025	-0348	0.494	0.636*	0.602*	0.405	0.493	-0.216	0.692**
5	Petiole length (cm)	P					1.000	0.333	0.291	0.491	0.016	0.411	0.456	-0.021	0.485	0.156	-0.052	0.268
		G					1.000	0.638*	0.518	0.173	0.065	0.598*	0.236	-0.121	0.230	-0.212	0.036	0.434
6	Number of Fruits plant⁻¹	P						1.000	0.498	0.400	-0.118	0.515	0.025	0.296	0.713	0.208	-0.541*	0.435
		G						1.000	0.697**	0.795**	-0.339	0.768**	0.045	0.474	0.935**	0.265	-0.711**	0.642*
7	Fruit weight (g)	P							1.000	0.281	-0.316	0.511	0.496	0.630*	0.513	0.010	-0.179	0.690**
		G							1.000	0.615*	-0.515	0.972**	0.816**	0.913**	0.718**	0.262	-0.577*	0.916**
8	Fruit diameter (cm)	P								1.000	-0.180	0.629*	0.693**	0.463	0.583*	0.332	-0.473	0.623*
		G								1.000	-0.558*	0.986**	0.739**	0.837**	0.507	0.253	-0.393	0.865**
9	Seed pulp ratio	P									1.000	-0.185	-0.184	-0.485	-0.196	-0.175	0.003	-0.247
		G									1.000	-0.311	-0.321	-0.682**	-0.422	-0817	0.094	-0.409
10	Fruit volume (cc)	P										1.000	0.497	0.449	0.643*	0.282	-0.386	0.477
		G										1.000	0.616*	0.642*	0.808**	0.795**	-0.464	0.712**
11	Fruit length (cm)	P											1.000	0.376	0.255	0.105	-0.028	0.365
		G											1.000	0.531	-0.071	0.118	0.255	0.484
12	Number of seeds fruits⁻¹	P												1.000	0.552*	0.046	-0.203	0.594*
		G												1.000	0.691**	0.520	-0.422	0.798**
13	Fruit yield plant⁻¹ (kg)	P													1.000	0.220	-0.337	0.529
		G													1.000	0.268	-0.537*	0.679**
14	TSS (⁰Brix)	P														1.000	-0.307	0.044
		G														1.000	-0.604*	0.177
15	1st Female flower app. after node	P															1.000	-0.413
		G															1.000	-0.701
16	Number of vines plant⁻¹	P																1.000
		G																1.000

R value based on 12 df **: level of significance at 1 % (0.661) and *: level of significance at 5 % (0.532) positive significant correlation with fruit weight, whereas fruit diameter (0.615 cm), fruit volume (0.972 cc), fruit length (0.816 cm), number of seeds fruit^{-1} (0.913) yield plant^{-1} (0.718 kg) showed significant positive correlation with fruit weight at genotypic level only, whereas first female flower appearance after node (-0.577) was found significant and negatively correlated with fruit weight at genotypic level only.

Fruit volume (0.629 and 0.986 cc), fruit length (0.693 and 0.739 cm), number of vines plant^{-1} (0.623 and 0.865 cm) showed high positive significant correlation with fruit diameter at both phenotypic and genotypic levels. However, number of seeds fruit^{-1} (0.837) and fruit yield plant^{-1} (0.583 kg) were found significant positively correlated with fruit diameter at both genotypic and phenotypic levels respectively. Seed pulp ratio (-0.558) was found significant and negatively correlated with fruit diameter.

All the characters did not exhibited any significant positive correlation with seed pulp ratio while, number of seeds fruit^{-1} (-0.682), TSS (-0.817 °Brix) were exhibiting significant negative correlation with seed pulp ratio at genotypic level only. Fruit yield plant^{-1} (0.643 and 0.808 kg) showed high positive significant correlation with fruit volume at both phenotypic and genotypic levels whereas fruit length (0.616 cm), number of seeds fruit^{-1} (0.642), TSS (0.795 °Brix), number of vines plant^{-1} (0.712) was found to be highly significant and positively correlated with fruit volume at genotypic level only. Number of seeds fruit^{-1} (0.531) showed significant positive correlation with fruit length at genotypic level only while, number of seeds fruit^{-1}, number of vines plant^{-1} (0.594 and 0.794) exhibited significant positive correlation with number of seeds fruit^{-1} at both phenotypic and genotypic levels. Number of vines plant^{-1} (0.679) showed significant positive correlation and showed significant negative correlation with fruit yield plant^{-1} at genotypic level only. First female flower appears after nodes (-0.604) exhibited significant negative correlation with TSS at genotypic level only.

The findings clearly indicated that genotypic correlations were of higher magnitude to the corresponding phenotypic ones, thereby establishing strong inherent relationship among the characters studied. The low phenotypic value might be due to appreciable interaction of the genotypes with the environment.

An overall observation of correlation coefficient analysis revealed that length of vine, number of fruits plant^{-1}, fruit volume, number of seeds fruit^{-1} fruit weight, fruit diameter exhibited the significant positive correlation with yield plot^{-1}. Hence, direct selection for these traits may lead to the development of high yielding pointed gourd genotypes also reported by Sarkar *et al*. (1999).

The present results findings are in conformity with Umamaheswarappa *et al*. (2004) who reported that fruit yield ha^{-1} had strong positive association with number of fruits vine^{-1}, fruit weight, fruit length and fruit girth. Similar results were also reported by Ahmed *et al*. (2005), Kumar *et al*. (2007), Ram *et al*. (2001), Wani *et al*. (2008) and Srivastava *et al*. (2007) in pointed gourd.

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