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CORRELATION STUDIES IN CHENCH (*CORCHORUS ACUTANGULUS* LAM.) GENOTYPES COLLECTED FROM CHHATTISGARH

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ABSTRACT

The nature and magnitude of association among twenty characters and their contribution towards leaf yield was carried with twenty five genotypes of Chench (*Corchorus acutangulus* Lam.) collected from various agro climatic zones of Chhattisgarh and were evaluated during Rabi 2014-15 in randomized complete block design with three replications to quantify the association between leaf yield and its components. Results revealed that leaf yield (kg/plot) showed positive and significant correlation with leaf width, petiole length and leaf size at both genotypic and phenotypic level whereas, leaf size had positive and significant correlation with plant height, leaf width, petiole length and stem thickness at both genotypic and phenotypic level. Therefore, direct selection for any of the character would be effective for yield improvement in Chench with simultaneous improvement of rest of the character.

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INTRODUCTION

Chench (*Corchorus acutangulus* Lam.) is one of the unexploited and underutilized leafy vegetable and also known as vegetable jute in India. In Chhattisgarh, it is popularly known as *Chench Bhaji* and belongs to the family Tiliaceae. It is valued for its good nutritive value and fast growth with high yield potential. It is a regularleafy vegetable of the poor farmers of the Chhattisgarh and is commonly consumed along with *roti* and rice. Hence, it has the potential to become an important leafy vegetable of this region. The plant is said to possess anticancer, antipyretic, anticonvulsant, stomachic and digitalis glycoside like action whereas, leaves andarial parts of *Corchorus acutangulus* Lam. possess antibacterial potential (Patel, 2011). Moreover, *Corchorus* is known to contain high levels of iron and folate which are useful for the prevention of anaemia (Steyn *et al*., 2001). 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). Chench is very well recognized at local level but unfortunately less or no systematic work yet to be initialized under Chhattisgarh region. Looking to the higher yield potential, higher nutritional content with local adaptability, the systematic work will be initialized to exploit immense potential of leafy vegetables. Information on the association of different characters among themselves and their relationship with leaf size and yield is of paramount importance for making the selection. As reported by Shinde *et al*., 2013, the nature and degree of genetic divergence would help the plant breeder in choosing the right type of parents for breeding programme, more emphasis should be given on the study of genetic diversity among the genotypes of sorghum with respect to yield related growth characters. Leaf yield of chench 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*., 2013b). Association analysis is an important approach in a breeding programme. It gives an idea about relationship among the various characters and determines the component characters, on which selection can be used for genetic improvement in the fruit yield. The degree of association also affects the effectiveness of selection process. The degree of association between independent and dependent variables was first suggested by Galton (1888) its theory was developed by Pearson (1904) and their mathematical utilization at phenotypic, genotypic and environmental levels was described by Searle (1961). The association of commercially important quantitative characters that are statistically determined by correlation coefficient has been quite helpful as a basis of selection. Selection pressure can be more easily exerted on any of the characters which reflect close association with yield. The yield by itself may not be the best criterion for selection (Yasin *et al*., 1973). Correlation studies measure only mutual association between two traits This study, therefore, was undertaken with the objective to quantify the association between leaf yield and leaf yield traits in chench genotypes.

MATERIALS AND METHODS

The experimental material for the study comprised of 25 genotypes collected from three agroclimatic zones of Chhattisgarh and laid in randomized complete block design (RCBD) with three replications at the Horticultural Instructional and ResearchFarm, Department of Vegetable Science, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) lies between 21°16′ N latitude and 81°36′ E longitude with an altitude of 289.56 meters above the mean sea level. The experiment was conducted during Rabi season 2014-15. The soil properties like organic carbon (%) 0.60, AvailableN (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 (n mh cm^{-1}) 0.19 was observedin the site of experiment. The seeds were sown in 20cm apart between rows and15cm within the row. Standard agronomic practices and plant protection measureswere taken as per schedule. Test weight was recorded before sowing of crop. Observations were recorded on five randomly selected plants per replication for plant height, number of leaves per plant, leaf length, leaf width, petiole length, stem girth, number of branch per plant, root weight, root length, fresh weight of plant, dry weight of plant, internodal length, dry matter percentage of plant, leaf yield kg per plot, harvest index, leaf stem ratio, fibre content, were recorded at 60 and mean values for each observation were used for statistical analysis. Genotypic and phenotypic correlations were partitioned using the technique outlined by Dewey and Lu (1959).

RESULTS AND DISCUSSION

The analysis of variance of all the characters under study is presented in Table 1. This analysis of variance revealed that mean sum of squares due to genotypes was highly significant for all the studied characters. This is an indication of existence of sufficient variability among the genotypes for leaf yield and its component traits. Significant mean sum of squares due to leaf yield and attributing characters revealed existence of considerable variability in material studied for improvement of various traits. These findings are in general agreement with the findings of Varalakshmi *et al*. (2004), Shukla *et al*. (2005 a) and Joshi *et al*. (2011). This indicated that the genotypes were possessing inherent genetic variances among themselves with respect to the characters studied.

Estimates of phenotypic and genotypic correlation coefficients between each pair of characters are given in Table 2. The results showed that the magnitude of genotypic correlation is higher than the phenotypic correlation indicating that elimination of environmental effects led to strengthen genetic association. The difference between genotypic and phenotypic correlation was in general low indicating the environmental effect, did not have much influence on these characters. Results of genotypic and phenotypic correlation coefficient of yield and its contributing characters of different genotypes of Chench (*Corchorus acutangulus* Lam.) have been discussed, Plant height showed positive and significantly correlation with leaf width and number of branches per plant at both genotypic and phenotypic level while, it is significantly positively correlated with stem girth, dry weight of plant and dry matter percentage at genotypic level only. The above findings were in agreement with Rahman *et al*. (2000) and Varalakshmi and Reddy (1997). Number of leaves per plant showed positive and significantly correlation with root length at both genotypic and phenotypic level and also positive and significantly correlation with number of branches per plant at genotypic level only.Leaf length showed positive and significantly correlation with leaf width. Mohideen and Muthukrishnan (1979) reported that leaf width showed highly significant positive relationship with yield of greens which was in agreement with the present findings.

Table 1: Analysis of variance for 20 characters among 25 genotypes of Chench

	Character(df)	Mean sums of square Replication 2	 Treatment 24	 Error 48
01	Plant height (cm)	0.14201	135.018**	0.59594
02	Number of leaves per plant	93.4464	48.3619**	7.88751
03	Leaf length (cm)	0.30916	1.61626**	0.33695
04	Leaf width (cm)	0.07522	0.64353**	0.04717
05	Petiole length cm	0.00979	0.33259**	0.04052
06	Stem girth (mm)	0.43573	0.56763**	0.26198
07	Number of branches per plant	0.19524	40.5324**	0.414
08	Root weight (g)	0.00507	0.03388**	0.00537
09	Root length (g)	0.08977	7.40845**	0.19893
10	Fresh weight of plant (g)	0.14814	18.8249**	0.25079
11	Dry weight of plant (g)	0.00338	0.60642**	0.01302
12	Internodal length (cm)	0.065	0.632**	0.033
13	Dry matter %	39.4304	53.8417**	21.234
14	Days to 50 % flowering	13.72	114.83**	0.92833
15	Yield kg per plot	0.01305	0.80532**	0.02352
16	Harvest index (%)	0.00281	0.07631**	0.00326
17	Leaf stem ratio	0.01623	0.85593**	0.02605
18	Fibre content %	0.07007	14.2984**	0.02908
19	Test weight (g)	0.00174	0.72844**	0.00026
20	Duration of the crop	43.5733	82.7811**	0.47611

Table 2: Genotypic and phenotypic correlation coefficient between leaf yield and its component characters in chench

Character		1 Plant height (cm)	2 No.of leaves per plant	3 leaf length (cm)	4 leaf width (cm)	5 Petiole length (cm)	6 Stem thickness (mm)	7 No. of branches per plant	8 Root Weight (g)	9 Root length (cm)	10 fresh weight of plant (g)
1	P	1.000	0.21	0.34	0.538**	0.335	0.231	0.451**	-0.14	0.074	0.162
	G	1.000	0.265	0.37	0.617**	0.378	0.457*	0.458**	-0.179	0.079	0.166
2	P		1.000	0.081	0.189	0.054	0.073	0.337	-0.044	0.543**	0.161
	G		1.000	0.085	0.189	0.155	0.017	0.430*	-0.011	0.652**	0.204
3	P			1.000	0.709**	0.376	0.399*	0.129	-0.091	-0.24	0.105
	G			1.000	0.809** **	0.406*	0.815**	0.145	-0.111	-0.272	0.086
4	P				1.000	0.440**	0.368	0.226	-0.299	-0.124	0.099
	G				1.000	0.592**	0.733*	0.274	-0.401*	-0.145	0.113
5	P					1.000	0.352	0.049	-0.182	-0.144	0.136
	G					1.000	0.787*	0.043	-0.286	-0.152	0.354
6	P						1.000	-0.037	-0.051	-0.111	0.118
	G						1.000	-0.057	-0.303	-0.32	0.143
7	P							1.000	0.05	0.15	-134
	G							1.000	0.062	0.165	-0.142
8	P								1.000	0.295	-0.017
	G								1.000	0.378*	-0.027
9	P									1.000	0.152
	G									1.000	0.174
10	P										1.000
	G										1.000
11	P										
	G										
12	P										
	G										
13	P										
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Leaf yield kg per plot, duration of the crop and stem girth at both genotypic and phenotypic level and also positive and significantly correlation with petiole length at genotypic level only.Leaf width showed positive and significantly correlation with petiole length, yield kg per plot and also positive and significantly correlation with stem girth at genotypic level only while it is significant negative correlation with root weight at genotypic level only.Petiole length showed positive and significantly correlation with dry weight of plant at both genotypic and phenotypic level while, it is significantly positively correlated with stem girth at genotypic level only.Stem girth showed positive and significantly correlation with internodal length and yield kg per plot and also significant negative correlation with harvest index at genotypic level only.Root weight showed positive and significantly correlation with root length at genotypic level only. Root length showed significant negative correlation with days to 50 % flowering, fibre content and duration of the crop at both genotypic and phenotypic level.Fresh weight of plant showed positive and significantly correlation with dry weight of plant and internodal length at both genotypic and phenotypic level. Dry weight of plant showed positive and significantly correlation with internodal length at both genotypic and phenotypic level and also positive and significantly correlation with dry matter % at genotypic level only.Days to 50 % flowering showed significant negative correlation with yield kg per plot at genotypic level only.Duration of the crop showed positive and significantly correlation with harvest index at both genotypic and phenotypic level.Leaf stem ratio showed positive and significantly correlation with fibre content at genotypic level only and also significant negative correlation with yield kg per plot at genotypic level only. Varalaksmi and Reddy (1997) and Campbell and Abbott (1982) reported that yield was negatively correlated with leaf: stem ratio indicating

Table 2: Cont.....

Character		11 Dry weight of plant (g)	12 Internodal length (cm)	13 Dry matter %	14 Days to 50% Flowering	15 Duration of the crop	16 Harvest index (%)	17 leaf stem ratio	18 Fibre content %	19 Test weight (g)	20 Yield kg per plot
1	P	0.396	0.327	0.246	-0.236	-0.133	-0.056	-0.231	0.056	0.08	0.192
	G	0.416*	0.36	0.401*	-0.242	-0.136	-0.057	-0.235	0.057	0.079	0.200
2	P	0.117	0.212	-0.058	-0.513**	-0.161	-0.111	-0.304	-0.32	-0.101	0.221
	G	0.151	0.235	-0.175	-0.657**	-0.193	-0.099	-0.379	-0.404*	-0.151	0.332
3	P	-0.09	0.167	0.021	-0.182	0.440**	0.068	-0.158	-0.309	0.242	0.493**
	G	-0.141	0.164	-0.029	-0.107	0.493**	0.095	-0.157	-0.343	0.265	0.440**
4	P	0.139	0.155	-0.025	-0.116	-0.049	-0.089	-0.137	0.199	-0.02	0.420**
	G	0.14	0.255	-0.145	-0.133	-0.008	-0.086	-0.157	0.221	-0.034	0.484**
5	P	0.434**	0.201	0.099	0.088	0.104	-0.048	-0.002	0.011	-0.054	0.029
	G	0.491**	0.255	0.25	0.125	0.144	-0.046	-0.013	0.014	-0.072	0.047
6	P	0.164	-0.056	-0.04	-0.04	0.045	-0.231	-0.041	0.05	0.105	0.217
	G	0.309	0.639**	-0.031	-0.052	0.073	-0.494*	-0.104	0.1	0.191	0.472*
7	P	0.015	-0.189	0.031	0.1	-0.217	0.124	-0.031	0.174	-0.043	-0.228
	G	0.007	-0.202	0.014	0.097	-0.235	0.146	-0.035	0.175	-0.046	-0.24
8	P	-0.121	-0.001	-0.019	-0.039	-0.322	-0.35	-0.319	-0.112	0.05	-0.159
	G	-0.143	-0.007	-0.032	-0.043	-0.355	-0.412*	-0.394	-0.146	0.045	-0.231
9	P	0.28	0.338	0.011	-0.526**	-0.381**	-0.287	-0.297	-0.398**	-0.086	0.269
	G	0.306	0.36	0.011	-0.563**	-0.436**	-0.317	-0.307	-0.413**	-0.083	0.291
10	P	0.703**	0.537**	0.093	-0.272	0.081	0.151	-0.548**	-0.593**	-0.032	0.343
	G	0.728**	0.587**	0.136	-0.273	0.086	0.171	-0.559**	-0.606**	-0.035	0.364
11	P	1.000	0.615**	0.315	-0.052	-0.153	-0.429*	0.134	-0.113	0.069	-0.078
	G	1.000	0.681**	0.483**	-0.192	-0.162	-0.036	-0.213	-0.532*	-0.218	0.235
12	P		1.000	0.211	-0.077	-0.178	-0.209	0.12	-0.018	0.204	0.016
	G		1.000	0.412**	-0.206	0.049	-0.168	-0.294	0.189	0.134	0.551**
13	P			1.000	0.025	-0.248	-0.368	0.047	-0.003	0.092	0.073
	G			1.000	-0.102	0.124	-0.071	-0.052	-0.093	-0.181	-0.03
4	P				1.000	0.146	-0.247	-0.146	0.003	0.271	0.113
	G				1.000	0.123	0.156	0.452	0.618	0.021	-0.563**
15	P					1.000	0.465**	-0.133	-0.113	-0.221	0.106
	G					1.000	0.655**	0.013	-0.001	0.098	-0.029
16	P						1.000	-0.075	-0.157	-0.182	-0.142
	G						1.000	0.095	0.043	0.025	-0.287
17	P							1.000	0.127	0.021	0.021
	G							1.000	0.490*	-0.065	-0.478*
18	P								1.000	0.279	-0.057
	G								1.000	0.005	-0.219
19	P									1.000	-0.228
	G									1.000	-0.226
20	P										1.000
	G										1.000

that a higher yielder should always have a low leaf: stem ratio which was in agreement with the present findings.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 environments. An overall observation of correlation coefficient analysis revealed that leaf width and stem thickness exhibited the significant positive correlation with yield kg per plot. Hence, direct selection for these traits may lead to the development of high yielding genotypes of chench.

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