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Research Note

Genetic variability and character association studies in curry leaf (*Murraya koenigii*)

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Abstract

Studies on variability and association of characters in curry leaf genotypes were carried out with eight genotypes collected around Coimbatore district at HC&RI, Coimbatore during 2017-2019. Significant variability was observed for all the characters recorded in the curry leaf genotypes. Among the characters studied length of the matured shoot (118.90 and 114.95), plant height (66.27 and 51.41) and the number of compound leaf per matured shoot (18.97 and 17.24) recorded the highest phenotypic and genotypic variances respectively. Highest Phenotypic coefficient of variation and genotypic coefficient of variation was recorded for weight of the matured shoot (18.80 and 18.74), the number of matured shoot (15.13 and 14.98), the number of compound leaf per matured shoot (10.74 and 10.49) and fresh leaf yield /plant (10.63 and 10.40). Less variation was noticed between Phenotypic co-efficient of variation and Genotypic co-efficient of variation, which indicates environmental influence was low for all the characters. Number of matured shoots (98.09 and 30.57), Length of matured shoots (96.68 and 19.61), weight of matured shoots (99.27 and 38.46), the number of compound leaves per matured shoot (95.32 and 21.10) and fresh leaf yield per plant (95.86 and 21.01) showed high heritability with high genetic advance. High heritability with high genetic advance as per cent of mean for the character represents selection is effective and this is due to additive gene action. The magnitude of genotypic correlation was higher than the phenotypic correlation for all the traits that indicated inherent association between various characters.

Key words

Curry leaf, Variability, Heritability, Correlation coefficient

Curry leaves is a popular leaf spice used in very small quantities for their distinct aroma due to the presence of volatile oil and their ability to improve digestion. It is also an important leafy vegetable. Their use in South Indian cuisine is inevitable. The leaves have a slightly pungent, bitter and feebly acidic taste and they retain their flavour and other qualities even after drying. It is also used in many of the Indian ayurvedic and unani medicines. The curry leaf tree is native to India, Srilanka, Bangladesh and the Andaman Islands. It was spread to other areas of the world by Indian migrants where they settled (Singh *et al.*, 2014). Mature leaves contain 63.2% moisture, 1.15% total nitrogen, 6.15% fat, 18.92% total sugars, 14.6% starch and 6.8% crude fibre. There are only two named varieties released from Dharwad - DWD-1 & DWD-2. In Tamil Nadu it is cultivated on commercial scale in few districts.

One among them is in Coimbatore where it is cultivated in an area of 100 acres. The farmers are cultivating a local type *viz.*, Senkaampu which has a distinct red petiole and good aroma. Genetic variability is a prerequisite for any improvement in a crop. The success of any crop improvement programme depends on the magnitude of genetic variability and extent to which the desirable characters are heritable. There is need to conserve the variability in the plant to prevent extinction of desirable types. Furthermore, characters associated with yield are to be determined by correlation and path coefficient analysis to assist selection in the yield improvement work. Though correlation analysis indicates the association pattern of component traits with yield, it also represents the overall influence of a particular trait on yield rather than providing cause and effect relationship.. Hence

the study was taken with eight genotypes collected from different areas.

The curry leaf germplasms collected from Terampalayam, Annur and Karamadai (**Table 1**) and maintained at Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore were evaluated for growth and yield parameters during 2017-18 and 2018-19. The experiment was laid out in randomized block design with three replications with eight genotypes. Observations were taken from five randomly selected and labeled curry leaf plants per genotype. Morphological and yield parameters observed were plant height (cm), inter nodal length (cm), the number of matured shoots, length of matured shoots, weight of matured shoots (g), the number of compound leaves per matured shoot, the number of leaflets per compound leaf, and fresh leaf yield per plant (g). Variability for different characters was estimated as suggested by Burton and de Vane (1953). Expected genetic advance (Ga) was estimated by the method suggested by Johnson *et al.*, (1955), heritability according to Allard (1960). Correlation coefficient was worked out as per Panse and Sukhatme (1961).

The ultimate goal of breeding programme aims to improve the characteristic of plants so that they become more desirable. Phenotypic variability changes under different environmental conditions while the genetic variability remains unchanged and more useful to a plant breeder for exploitation in selection. Studies on genetic variability with the help of suitable biometrical

tools such as variability, heritability, genetic advance gives us an idea about the extent of genetic variability present in the population. In the present study significant variability was observed for all the characters recorded in the curry leaf genotypes. Among the characters studied length of the matured shoot (118.90 and 114.95), plant height (66.27 and 51.41) and the number of compound leaf per matured shoot (18.97 and 17.24) recorded the highest phenotypic and genotypic variances respectively. This indicates that these characters were more viable for selection than the other characters. Hence the selection based on these characters will be efficient. The genotypic coefficient of variation is a measure of genetic variability and provides means to compare with other characters facilitating successful isolation of desirable types. Highest Phenotypic coefficient of variation and genotypic coefficient of variation was recorded for weight of the matured shoot (18.80 and 18.74), the number of matured shoot (15.13 and 14.98), the number of compound leaf per matured shoot (10.74 and 10.49) and fresh leaf yield /plant (10.63 and 10.40). Similar results were reported by Naik *et al.*, (2012), Verma and Ali, (2012), Selvakumari (2013) and Sheetal and Maurya (2015). Less variation was noticed between Phenotypic co-efficient of variation and Genotypic co-efficient of variation, this indicates the environmental influence was low for all the characters (Karunakar *et al.*, 2018). It expresses the true genetic potential which indicated the presence of high amount of genetic variability for these characters thus, selection may be more effective for these characters because the response to selection is directly proportional to the component of variability (Jain *et al.*, 2013) (Table 1).

Table 1. List of Genotypes used in the study

Sl.No.	Accession number	Place of collection
1.	TPMK 1	Terampalayam
2.	TPMK 2	Terampalayam
3.	ANMK 3	Annur
4.	KMMK 4	Karamadai
5.	KMMK 5	Karamadai
6.	KMMK 6	Karamadai
7.	KMMK 7	Karamadai
8.	KMMK 8	Karamadai

Heritability in conjunction with genetic advance would give a more reliable index of selection value (Panse, 1957). Number of matured shoots (98.09 and 30.57), Length of matured shoots (96.68 and 19.61), weight of matured shoots (99.27 and 38.46), the number of compound leaves per matured shoot (95.32 and 21.10) and fresh leaf yield per plant (95.86 and 21.01) showed a high heritability with high genetic advance. The genetic advance is more useful than heritability alone in predicting the resultant effect on selecting best individuals (Gurjar *et al.*, 2016). High heritability with high genetic advance as per cent of mean represents selection is effective and this is due to additive gene action (**Table 2**).

Correlation coefficient analysis measures the mutual relationship between plant characters and determines the component character on which selection can be made for genetic improvement of yield. Investigation regarding the presence of component and nature of association among themselves is essential and pre-requisite for improvement in yield. Correlation coefficient provides a clear picture of the extent of association between a pair of traits and indicates whether simultaneous improvement of the correlated traits may be possible or not. The knowledge of genetic association between yield and its component characters help in improving the efficiency of selection for yield by making proper choice and balancing one

Table 2. Estimation of variability parameters of different characters of curry leaf genotypes

Genetic Parameters	Plant ht. (cm)	Internodal Length (cm)	No. of Matured Shoots	Length of Matured Shoots (cm)	Wt. of Matured Shoots (g)	No. of Compound Leaf/MS	No. of Leaflets/CL	Fresh Leaf Yield/Plt. (kg)
GM	145.45	2.62	4.81	110.76	0.32	39.59	21.11	0.7588
Min.	135.46	2.453	3.917	99.932	0.213	33.555	20.253	0.661
Max.	159.23	2.808	6.113	126.30	0.394	46.238	23.325	0.876
F ratio	11.38	26.26	154.87	88.45	411.25	62.08	11.52	70.38
PV	66.27	0.0241	0.5291	118.90	0.0036	18.09	1.06	0.0065
GV	51.41	0.0216	0.5190	114.95	0.0036	17.24	0.8234	0.0062
EV	14.86	0.0025	0.0101	3.95	0.00	0.85	0.2366	0.0003
PCV (%)	5.60	5.94	15.13	9.84	18.80	10.74	4.87	10.63
GCV (%)	4.93	5.61	14.98	9.68	18.74	10.49	4.30	10.40
ECV (%)	0.67	0.33	0.15	0.16	0.06	0.25	0.57	0.23
Heritability (%)	77.57	89.38	98.09	96.68	99.27	95.32	77.81	95.86
GA (%)	13.01	0.2861	1.47	21.72	0.1227	8.35	1.65	0.16
GAM (%)	8.94	10.93	30.57	19.61	38.46	21.10	7.81	21.01
SEd	2.23	0.0292	0.0581	1.15	0.0030	0.5313	0.2798	0.0095
CD (5 %)	6.7682**	0.09**	0.1766**	3.486**	0.009**	1.6156**	0.8508**	0.0288**

** - Significant at 1% probability level, * - Significant at 5% probability level

component with another. A positive correlation between desirable character is helpful to the plant breeder because it helps in simultaneous improvement of both characters. It helps in simultaneous improvement of both characters. Regarding the character association study, plant height recorded positive and significant genotypic and phenotypic correlation with the number of matured shoot (0.5204 and 0.4906), the number of compound leaf

per matured shoot (0.5679 and 0.5625) and the number of leaflets per compound leaf (0.7751 and 0.6608). Internodal length exhibited positive and significant genotypic and phenotypic correlation with fresh leaf yield /plant (0.4258 and 0.4284). Number of matured shoot exhibited positive genotypic and phenotypic correlation with fresh leaf yield /plant (0.2840 and 0.2487). (Table 3). Length of the matured shoot showed positive and significant

Table 3. Estimation of genotypic correlation co-efficient of different characters of curry leaf genotypes

		X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	X ₈
X ₁	G	1	-0.005	0.520*	0.296	-0.048	0.567**	0.775**	0.010
	P	1	-0.043	0.490*	0.263	-0.033	0.562**	0.660**	-0.009
X ₂	G		1	0.040	-0.415*	-0.317	-0.389*	-0.446*	0.425*
	P		1	0.058	-0.365	-0.296	-0.372*	-0.412*	0.428*
X ₃	G			1	-0.072	-0.595**	-0.248	0.228	0.284
	P			1	-0.078	-0.565**	-0.250	0.173	0.248
X ₄	G				1	0.109	0.719**	0.773**	-0.225
	P				1	0.105	0.698**	0.665**	-0.203
X ₅	G					1	0.398*	0.079	0.002
	P					1	0.389*	0.072	-0.016
X ₆	G						1	0.821**	-0.364
	P						1	0.730**	-0.337
X ₇	G							1	-0.520*
	P							1	-0.465*
X ₈	G								1
	P								1

** - 0.01 Level of significance, * - 0.05 Level of significance

X₁ - Plant height. (cm), X₂- Internodal Length (cm), X₃- No. of Matured Shoots, X₄- Length of Matured Shoots (cm), X₅- Weight of Matured Shoots (g), X₆- No. of Compound Leaves/Matured Shoot, X₇- No. of Leaflets/Compound Leaf, X₈- Fresh Leaf Yield/Plant (kg)

genotypic and phenotypic correlation coefficient with the number of compound leaf/matured shoot (0.7192 and 0.6986), the number of leaflets per compound leaf (0.7730 and 0.6654). Weight of matured shoot exhibited positive and significant correlation with the number of compound leaf per matured shoot (0.3982 and 0.3894). Number of compound leaf per matured shoot recorded positive and significant correlation with the number of leaflets per compound leaf (0.8210 and 0.7309). The magnitude of genotypic correlation was higher than the phenotypic correlation for all the traits that indicated inherent association between various characters. Genotypic correlation coefficient is a measure of genetic variability. The improvement through selection of characters can be effective, provided there is considerable extent of genetic variability available and the characters are also highly heritable (Meena *et al.*, 2014 and Ram *et al.*, 2017)

It is concluded that genetic variation exist among the genotypes evaluated in the study. Influence of the environment is low and it offers scope for selection of the characters. High heritability with high genetic advance as percent of mean represents selection is effective and this is due to additive gene action and there exist an inherent association between various characters.

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