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Research Article

Studies on genetic variability, heritability, correlation and path coefficient analysis in curry leaf (*Murraya koenigii* Spreng.) genotypes

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Abstract

A study was conducted on thirty curry leaf genotypes to analyse the variability and correlation among different qualitative traits viz., plant height, number of secondary branches, secondary branch length, secondary branch weight, length at branching, compound leaves, leaflet length, number of leaflets and inter nodal length that influences the fresh leaf yield. Analysis of variance revealed that the genotypes significantly differed for all the traits studied. The results showed that PCV was higher than the GCV for all the characters and high genotypic and phenotypic coefficient of variation was recorded for the traits viz., plant height, number of secondary branches, secondary branch length, compound leaves and fresh leaf yield per plant. High heritability was observed for plant height, secondary branches, secondary branch length, length at branching, number of leaflets and inter nodal length. Correlation studies showed that fresh leaf yield per plant was significantly and positively correlated with almost all the traits studied. The highest and direct effect on fresh leaf yield per plant was observed for compound leaves (1.195) followed by leaflet length (0.093), number of leaflets (0.306), secondary branch length (0.300) and length at branching (0.142). Hence, compound leaves, leaflet length, number of leaflet, secondary branch length and length at branching traits will be useful for selection of superior genotypes in curry leaf.

Keywords: Genotypes, variability, correlation, fresh leaf yield

INTRODUCTION

Murraya koenigii (L.) Spreng is a perennial herbal spice and is a deciduous to semi evergreen aromatic tree belongs to the family Rutaceae. It is a native of India, Sri Lanka and other South Asian countries eastward through Myanmar, Indonesia, Southern China and Hainan. It is commonly known as 'curry patta' and is popular as a spice and condiment in south India. Recently, it has gained importance as a commercial

crop. It is cultivated commercially in Tamil Nadu and Karnataka and also cultivated in West Bengal, Assam and Deccan Plateau. In Tamil Nadu mainly grown in Coimbatore, Erode, Madurai, Salem and Trichirapalli districts and the Karamadai block of Coimbatore district known as the curry leaf hub of Tamil Nadu as it is famous for the unique flavoured red petiole curry leaf.

Curry leaves are used mainly to improve the taste and flavour of foods. Leaves are slightly pungent and retain their flavour even after drying. Ground curry leaf with mature coconut kernel and spices forms an excellent preserve. The specific aromatic odour is due to the presence of essential oil, mainly concentrated in leaf which contains pinene, sabinene, caryophyllene, cadinol and cadinene and is used for various purposes in food and pharmaceutical industry. Besides that, it was also used for medicinal purposes. In India, curry leaves are considered to be good cure against dysentery and bite of the poisonous animal. The many use of this indigenous plant also seen as a potential method to ward off insects (Deepti and Nupur, 2013). Studies have shown that these leaves possess anti-diabetic, antioxidant, hepato protective properties. They are also good for hair. Curry leaves take care of indigestion, stomach ulcers due to excessive acid secretion in stomach, diarrhoea and other similar problems.

Literature survey showed that there are very few varieties viz., DWD-1, DWD-2 and Senkaampu (a local type found in Tamil Nadu region) that are cultivated commercially in India (Shoba *et al.*, 2020). It is found that many genotypes are valuable for one or other traits. Identification of suitable genotypes, therefore, becomes imperative for promoting its production, productivity and quality. So proper attention is needed on its collection, evaluation and conservation of genetic pool. The present investigation will help to identify considerable variations among the genotypes which are valuable for crop improvement programme and for further utilization and multiplication of quality planting material.

MATERIALS AND METHODS

Thirty accessions of three year old curry leaf along with check viz., Suvasini were evaluated for yield and attributing traits during Summer, 2021 which were maintained at Horticultural College and Research Institute, Tamil Nadu Agriculture University, Coimbatore. The experimental plot (10 x 3 m) was laid out in Randomized Block Design with three replications and 100 cm x 100 cm spacing was followed. The package of practices recommended by TNAU for curry leaf cultivation

was followed. The observations on various growth and yield parameters viz., plant height, number of secondary branches, secondary branch length, secondary branch weight, length at branching, compound leaves, leaflet length, number of leaflets, inter nodal length and fresh leaf yield per plant were recorded in randomly selected three plants per replication. Phenotypic coefficient of variation (PCV), genotypic coefficient of variation (GCV) and genetic advance as per cent of mean were estimated by the method suggested by Johnson *et al.* (1955) and heritability was estimated according to Lush (1940). Correlation coefficient was worked out as per Panse and Sukhatme (1961).

RESULTS AND DISCUSSION

The analysis of variance (ANOVA) showed the significant genetic variability among the curry leaf genotypes (Table 1). Genetic variability has prime importance in any crop improvement programme to understand the selection efficiency. It was used to estimate the genetic variability parameters indicating range (minimum and maximum) and mean for all the traits studied. The phenotypic coefficient of variation (PCV) was highest for all the traits studied as compared to genotypic coefficient of variation (GCV). Higher PCV and GCV were observed for the traits such as plant height, secondary branches, secondary branch length, compound leaves and fresh leaf yield per plant. Moderate values of PCV and GCV were observed for leaflet length and number of leaflets (Table 2). Genetic variability is a vital importance for development of any crop plants through selection. Similar results were reported by Lalitha *et al.* (1997), Lal *et al.* (2001), Subha (2010), Aravind (2012), Hegde (2012) and Jagdeeshkanth and Shankararayan (2014) in curry leaf.

High broad sense heritability and high genetic advance per cent of mean was observed for plant height, secondary branches, secondary branch length, length at branching, number of leaflets and inter nodal length (Gaikwad *et al.*, 2020). Hence, selection of these traits is effective due to additive gene action. Moderate broad sense heritability with high genetic advance per cent of mean was recorded in compound leaves and fresh leaf

Table 1. Analysis of variance for Curry leaf genotypes

Source	d. f.	Mean sum of square									
		PH	NSB	SBL	SBW	LAB	CL	LL	NOL	IL	FLY
Genotype	29	1419.05**	34.21**	508.21**	0.03**	56.46**	157.60**	6.82**	14.79**	0.66**	89515.72**
Replication	2	25.71	1.22	31.00	0.01	15.92	16.19	0.25	1.73	0.06	11181.46
Error	58	76.95	3.44	86.58	0.01	9.96	54.29	1.97	0.53	0.02	38882.25

**Significant at 1 % level

[PH- Plant height, NSB- Number of secondary branches, SBL-Secondary branch length , SBW-Secondary branch weight , LAB- Length at branching, CL-Compound leaves, LL-Leaflet length , NOL-Number of leaves, IL-Internodal length, FLY-Fresh leaf yield]

yield per plant and these traits can also be used for selection. Low broad sense heritability with low genetic advance as per cent of mean was observed for the trait secondary branch weight and selection of these traits would be ineffective.

Correlation coefficient is a statistical quantification which is used to discover the magnitude of association among two or more variables. Plant height and secondary branch length were significantly and positively correlated for all the traits except for number of leaflets. Secondary branches were significantly and positively correlated with secondary branch length, secondary branch weight,

length at branching, inter nodal length and fresh leaf yield per plant. Secondary branch weight was significantly and positively correlated with length at branching, compound leaves and fresh leaf yield per plant. Length at branching was significantly and positively correlated with compound leaves, inter nodal length and fresh leaf yield per plant. Compound leaves were significantly and positively correlated with leaflet length, inter nodal length and fresh leaf yield per plant. Leaflet length was significantly and positively correlated with inter nodal length and fresh leaf yield per plant. Number of leaflets and inter nodal length were significantly and positively correlated with fresh leaf yield per plant (**Table 3**).

Table 2. Genotypic and phenotypic coefficient of variation, heritability and genetic advance as per cent of mean of Curry leaf genotypes

Characters	Mean	Maximum	minimum	Phenotypic coefficient of variation (%)	Genotypic coefficient of variation (%)	Heritability (%)	Genetic advance as per cent of mean
PH	84.36	116.6	50.68	27.14	25.07	85.32	47.70
NSB	10.81	18.55	4.00	34.23	29.62	74.88	52.81
SBL	42.69	66.64	26.18	35.29	27.76	61.88	44.99
SBW	0.40	0.56	0.13	36.87	18.62	25.51	19.37
LAB	23.94	32.45	13.60	21.07	16.44	60.86	26.42
CL	29.25	46.33	19.00	32.19	20.05	38.81	25.74
LL	9.75	11.55	8.20	17.65	11.85	45.08	16.39
NOL	14.58	21.00	11.00	15.75	14.92	89.83	29.14
IL	1.67	2.40	0.85	29.42	27.61	88.06	53.37
FLY	561.70	868.26	309.39	42.74	23.51	30.27	26.65

[PH- Plant height (cm), NSB- Number of secondary branches, SBL-Secondary branch length (cm), SBW-Secondary branch weight (g), LAB-Length at branching (cm), CL-Compound leaves, LL-Leaflet length (cm), NOL-Number of leaves, IL-Internodal length (cm), FLY-Fresh leaf yield (g/p)]

Table 3. Genotypic and phenotypic correlation coefficients among different characters of Curry leaf genotypes

Characters	PH	NSB	SBL	SBW	LAB	CL	LL	NOL	IL	FLY
PH	1	0.671*	0.617*	0.066	0.021	0.504*	0.109	-0.351	0.354	0.472*
NSB	0.917*	1	0.393**	0.029	0.150	0.395**	-0.107	-0.116	0.401**	0.341*
SBL	0.595*	0.416**	1	0.021	0.110	0.694**	0.078	-0.124	0.170	0.650*
SBW	0.837*	0.496*	-0.383	1	0.146	0.119	-0.048	-0.047	-0.203	0.051*
LAB	0.582*	0.299	-0.121	0.219	1	0.047	-0.105	-0.165	0.055	0.041
CL	0.253	-0.432	-0.223	-0.010	0.976*	1	0.028	-0.116	0.162	0.914*
LL	0.913*	0.048	-0.015	0.225	0.716*	0.330	1	-0.171	0.156	0.091
NOL	0.209	0.317	-0.215	-0.307	0.853*	0.228	0.107	1	-0.101	-0.030
IL	0.088	0.175	-0.217	-0.005	0.456**	0.264	0.031	0.942*	1	0.172
FLY	0.004	-0.128	-0.205	0.133	0.299	0.549*	0.331	0.629*	0.737*	1

(Upper diagonal values indicate phenotypic correlation and lower diagonal values indicate genotypic correlation. *0.001 significance and ** 0.005 significance)

[PH- Plant height , NSB- Number of secondary branches, SBL-Secondary branch length , SBW-Secondary branch weight, LAB- Length at branching , CL-Compound leaves, LL-Leaflet length , NOL-Number of leaves, IL-Internodal length, FLY-Fresh leaf yield]

Table 4. Direct (bold) and indirect effect of characters on fresh leaf yield per plant of curry leaf.

Characters	PH	NSB	SBL	SBW	LAB	CL	LL	NOL	IL	Correlation coefficient of FLY
PH	-0.240	-0.027	0.283	-0.029	0.047	1.166	0.0204	-0.117	-0.186	0.472*
NSB	-0.177	-0.036	0.189	-0.008	0.032	0.855	-0.001	-0.037	-0.222	0.341*
SBL	-0.226	-0.023	0.300	-0.090	0.037	1.020	0.021	-0.068	-0.134	0.650*
SBW	-0.025	-0.001	0.099	-0.273	0.078	0.544	-0.028	-0.004	0.193	0.051*
LAB	-0.079	-0.008	0.079	-0.150	0.142	0.357	-0.005	-0.065	-0.021	0.041
CL	-0.234	-0.026	0.256	-0.124	0.042	1.195	0.012	-0.066	-0.142	0.914*
LL	-0.052	0.004	0.067	0.084	-0.007	0.158	0.093	-0.062	-0.078	0.091
NOL	0.091	0.004	-0.067	0.004	-0.030	-0.259	-0.019	0.306	0.057	-0.030
IL	-0.099	-0.018	0.090	0.118	0.006	0.378	0.016	-0.039	-0.448	0.172

Residual effect: 0.152

[PH- Plant height, NSB- Number of secondary branches, SBL-Secondary branch length, SBW-Secondary branch weight, LAB-Length at branching, CL-Compound leaves, LL-Leaflet length (cm), NOL-Number of leaves, IL-Internodal length, FLY-Fresh leaf yield]

The traits viz., plant height, secondary branches, secondary branch length, secondary branch weight, length at branching, compound leaves, leaflet length, number of leaflets and inter nodal length showed positive association with fresh leaf yield. These results are in conformation with Shoba *et al.* (2020) and Peter (2019) in curry leaf.

Path coefficients analysis measures the direct and indirect contribution of different independent characters on a dependent character (Krishnaveni *et al.*, 2021). The highest and direct effect on fresh leaf yield per plant was observed for compound leaves (1.195), followed by leaflet length (0.093), number of leaflets (0.306), secondary branch length (0.300) and length at branching (0.142), while the intermodal length (-0.448), secondary branch weight (-0.273), plant height (-0.240) and secondary branches (-0.036) had negative and direct correlation (Table 4). Hence, compound leaves, leaflet length, number of leaflets, secondary branch length and length at branching are the most important traits during genotype selection (Tirkey *et al.*, 2019).

The results of the present study showed, there exists a huge variability among all the curry leaf genotypes for all the traits studied. The genetic analysis helps for the crop improvement programme through selection. Genetic parameters in relation with genetic variability, correlation and path analysis revealed that traits such as compound leaves, leaflet length, number of leaflet, secondary branch length and length at branching will be useful for the selection of superior genotypes with high fresh leaf yield.

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