Biological Forum – An International Journal **14(2a): 137-140(2022)**

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

Comparison of Grafted Plants and Seedlings of Curry Leaf (*Murraya koenigii* (L.) Spreng) for Yield and Performance

Jones Ponraj A.[1*], Velmurugan S.[1], Irene Vethamoni P.[2], Subramanian A.[3] and Pugalendhi L.[4]
[1]*Department of Plantation Spices Medicinal and Aromatic Crops,*
HC & RI Tamil Nadu Agricultural University, Coimbatore (Tamil Nadu), India.
[2]*Dean Horticulture, HC & RI Tamil Nadu Agriculture University, Coimbatore (Tamil Nadu), India.*
[3]*Department of Genetics and Plant Breeding Tamil Nadu Agricultural University, Coimbatore (Tamil Nadu), India.*
[4]*Department of Vegetable Science, HC & RI Tamil Nadu Agricultural University, Coimbatore (Tamil Nadu), India.*

(Corresponding author: Jones Ponraj A.)*
(Received 27 April 2022, Accepted 18 June, 2022)
(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: This study mainly focuses on comparing the grafted plants with the seedling plants of curry leaf for better morphological growth and yield. It is important to study the variation between grafted and seedlings as there are several constraints in breeding programmes of curry leaf through seeds, it is important to know the performance of grafted plants so as to implement for further crop improvement programmes. To study the variability parameters, genotypic and phenotypic coefficient of variation, heritability and genetic advance which will aid in finding traits responsible for the variation between grafted and seedling plants. Different parameters were recorded in which all the traits showed greater PCV % than that of GCV % with a minimum variation which can be considered as the result of environment. Three characters fresh weight of leaf, dry weight of leaf alone and fresh leaf yield had higher GCV and PCV %. All the characters used in this study had higher heritability coupled with genetic advance except for average number of leaflets per compound leaf. From the mean data observed it is found that grafted (GSK) plants performed better for growth and yield.

Keywords: Grafted plants, curry leaf, variability studies, analysis of variance, mean performance.

INTRODUCTION

Murraya koenigii (L.) Spreng has been placed in the family of Rutaceae. Its habit is a perennial shrub that can grow up to a height of 2.5 meters. It is said to be originated from Tarai a low land region in Uttar Pradesh. Cultivation is practiced in other countries also like Burma, Sri Lanka, China, Australia, and some of the Pacific countries. It is grown mostly throughout India, mainly cultivated in Assam, Bengal, Western Ghats, cochin and skim to Garhwal, and India leads as one of the largest importers, consumers and producers among the Asian countries. Curry leaves are traditionally used in the preparation of food primarily in Indian cuisine they have a very pungent and acidic flavor. They are also used for treating malaise of gastrointestinal problems as it can be used as an alternative to modern expensive drugs (Batool *et al.*, 2020). Some of their beneficial utilizations are, can be used as a blood purifier, for treating stomach aches, and for adding flavors to most dishes made in India. The unique flavor and aroma of the leaves are due to the presence of pinene, sabinene, caryophyllene, cadinol and cadinene (Jain *et al.*, 2012). The use of *Murraya koenigii* (L.) Sprengan attributable spice to culinary and pharmacology is due to the chemical constituents like quercetin, catechin, epicatechin, naringin and myricetin present in their essential oils (Lal and Kaur 2019). Leaves of curry leaf plant have 66% water, 6% protein, 19% fiber and other mineral matter (Joseph and Peter 1985). They are rich in calcium, phosphorous, iron and carotene. They also contain oxalates and phytate phosphorous. It grows well with temperatures ranging from 270 - 470 C, soil with a slightly acidic nature having a pH range of 5 to 7 is ideal for cultivation. Curry leaf is mainly propagated through seeds which are found to be poly embryonic in nature (Sivasubramaniam and Selvarani 2012). Variability arises from genotype to genotype both morphologically and chemo-typically as reported by Chittaragi *et al.* (2021) the cause of such variation may be due to their genetic nature. They are also propagated by root suckers which shows a low success percentage compared to that of the seed propagation method. Seeds are also considered as a recalcitrant type; they lose viability due to excessive drying and temperature below 100 C. With several knowledge in grafting done previously in curry leaf which showed a better compatibility when wild type rootstock was used (Sandhya *et al.*, 2020). It is found that wedge grafting method showed the highest compatibility among the different methods of grafting with the treatment of IBA solution (Aswin Sakthivel *et al.*, 2021). Now it is

necessary to study the comparative performance of grafted plants with the seedlings of curry leaf. This study concentrates on identification for better establishment, faster growth with better quality of curry leaf among the grafts as well as the seedlings.

MATERIALS AND METHODS

The experiment was carried out in Department of spices and plantation crops, Horticultural College and Research Institute, Coimbatore in the year 2021. The experimental design followed for evaluation of grafts along with seedlings was Randomized Block design having 11 accessions (SK-1 to SK-11) collected from different localities, one wild type curry leaf plant collected from forest area of yercaud (WSK) and grafted plants (GSK) (Table 1). The accessions and grafts were replicated three times in the field. Different morphological parameters were recorded from the plants and statistical analysis were carried out for finding the mean differences among them which can be calculated using F test, Critical difference for comparison among the seedlings and the grafted plants. The observed data were also subjected to analysis of variance for the following parameters plant height, plant spread (N-S), plant spread (E-W), number of compound leaves per shoot, average length of shoots per plant, average number of leaflets per leaf of a plant, fresh weight of whole shoot, fresh weight of leaves alone, leaf length, fresh weight of leaflets per compound leaf, dry weight of leaves alone, fresh leaf yield/plant. Additionally genotypic and phenotypic coefficient of variation were also analysed using the formula given by (Al-Jibouri *et al.,* 1958). All the Statistical analysis were performed by using the statistical package 'TNAU STAT'.

RESULTS AND DISCUSSION

The genetic variability parameters were estimated through analysis of variance (Table 2). The range of variation in the mean performance of different traits among the seedling and the grafted plants are plant height 32.29 cm – 57.25 cm, plant spread (N-S) 27.08 cm – 50.96 cm, plant spread (E-W) 25.63 cm – 47.33 cm, number of compound leaves per shoot 20.01 – 35.91, average length of shoots per plant 25.43 – 45.36 cm, average number of leaflets per leaf of a plant 12.77 cm – 16.37 cm, fresh weight of whole shoot 47.38 g – 72.72 g, fresh weight of leaves alone 24.05 g – 57.90 g, leaf length 10.52 – 18.70 cm, fresh weight of leaflets per compound leaf 1.30 cm – 2.24 cm, dry weight of leaves alone 20.31 – 44.45 g, fresh leaf yield/plant 79.54 g – 300.79 g.

All the characters included in the study showed significant difference among the seedlings and the grafted curry leaf plants. From the analysed statistical parameters for the observed characters (Table 3), it is found that GSK showing highest mean performance for six characters among the 12 characters studied and considered to be superior to that of the seedling plants based on the analysed mean data, the highest mean performance for fresh leaf yield per plant were observed for GSK (300.790 g) followed by SK-1, SK-7 and SK-10. Plant height was maximum in GSK (57.25 cm) followed by SK-1 and SK-11. The extent of spread in north – south direction was maximum for GSK with a length of 50.96 cm but the spread of plant in east – west direction was maximum in SK-6 (47.33 cm). The number of compound leaves per shoot varied with different plants and was found to be maximum (35.91) and the number of leaflets were also maximum (16.37) for the grafted plants, which may contribute for the fresh weight of leaves alone and was found to be maximum for GSK (57.94 g). The mean performance of GSK was the highest for dry weight of leaves alone with 44.45 g. From the statistically analysed data for all the traits studied it would be concluded that analysis of variance showing significant differences with largest mean and variability contributing for the variation occurring between different plants (Lalitha *et al.,* 1997). It can be stated that difference between phenotypic and genotypic variance observed would be due to the environmental factors (Ram and Singh 1993).

Estimates of the genotypic and phenotypic coefficients of variation (GCV and PCV), showed that all the plants under study had a substantial degree of variance. All of the characters in the current study had somewhat greater PCVs than GCVs, but the differences were extremely small, indicating that the environment had less impact for most of the traits, considering superiority based on phenotype is therefore effective. Similar results have been reported by (Chittaragi *et al.,* 2022). High phenotypic and genotypic coefficient of variation was observed for characters *viz.,* fresh weight of leaf (22.29 % and 21.6%), dry weight of leaf alone (24.363 % and 22.421%) and fresh leaf yield (39.62% and 39.41%). Selection with these characters would be rewarding however genotypic and phenotypic coefficient of variation doesn't provide vital information regarding heritable variation estimate.

Heritability is the proportion of total variability that is due to genetic cause or can be defined as the ratio of genotypic variance to the total variance. It is a way to assess the heritable characters from the parents to offspring (Falconer, 1960). Among the 12 different traits studied, all the characters showed high heritability (Table 4). Genetic advance is the genetic gain under selection. Assessment of heritability when coupled with genetic advance are more useful in estimating the superiority and assisting in selection of elite types (Johnson *et al.,* 1955). Expect for the character average number of leaflets per compound leaf (heritability-69.13 % and genetic advance in percent of mean – 11.36 %) showed high heritability coupled with low genetic advance this result corresponds to the previous evaluation study carried out in curry leaf Shoba *et al.,* (2020), which may result in non-additive gene action and selection for such traits may not be rewarding (Panse and Sukhatme 1954). All the other characters had high heritability along with high genetic advance, indicating the action of additive genes.

Table 1: Treatment details.

Accession name	Location collected
GSK (Grafted)	-
WSK (Wild type)	Yercaud (Tamil Nadu)
SK-1 (Local Accession)	Karamadai (Tamil Nadu)
SK-2 (Local Accession)	Karamadai (Tamil Nadu)
SK-3 (Local Accession)	Rajahmundry (Andhra Pradesh)
SK-4 (Local Accession)	Rajahmundry (Andhra Pradesh)
SK-5 (Local Accession)	Rajahmundry (Andhra Pradesh)
SK-6 (Local Accession)	Kolli hills (Tamil Nadu)
SK-7 (Local Accession)	Kolli hills (Tamil Nadu)
SK-8 (Local Accession)	Suvasini (Karnataka)
SK-9 (Local Accession)	Kerala local (Kerala)
SK-10 (Local Accession)	Bhavanisagar (Tamil Nadu)
SK-11 (Local Accession)	Batlagundu (Tamil Nadu)

Table 2: Analysis of variance for 12 characters in curry leaf plants.

Source	df	PH	PS (N-S)	PS (E-W)	NCL	ALS	ANLT	FWS	FWL	LL	FWLT	DWL	FLY
Replication	2	0.69	2.48	4.26	6.24	4.10	0.27	5.51	1.01	0.14	0.01	1.72	39.95
Genotype	12	178.77**	176.91**	125.22**	60.32**	134.92**	3.01**	180.56**	238.39**	17.95**	0.30**	188.88**	15379.60**
Error	24	3.24	3.69	6.31	2.06	8.54	0.39	14.43	7.64	0.50	0.02	10.74	55.66

** Significant at 5 % level

ABBREVIATIONS

PH-plant height, PS(N-S)-plant spread (North-South), PS(E-W)-plant spread (E-W), NCL-number of compound leaves per shoot, ALS-average length of shoots per plant, ANLT-average number of leaflets per leaf of a plant, FWS-fresh weight of whole shoot, FWL-fresh weight of leaves alone, LL-leaf length, FWLT-fresh weight of leaflets per compound leaf, DWL-dry weight of leaves alone, FLY-fresh leaf yield/plant

Table 3: Mean data for grafted and seedling plants of curry leaf.

Sr. No.	PH	PS (N-S)	PS (E-W)	NCL	ALS	ANLT	FWS	FWL	LL	FWLT	DWL	FLY
SK-1	54.120	46.780	42.030	24.810	43.567	14.620	72.720	34.390	18.770	1.410	28.950	269.210
SK-2	34.960	27.080	28.330	20.590	29.167	12.770	47.530	24.050	10.520	1.300	20.310	82.290
SK-3	41.460	40.790	43.270	23.100	34.600	15.270	66.910	43.910	14.840	1.430	35.750	149.260
SK-4	45.600	42.600	42.370	20.900	31.500	13.810	64.330	44.330	13.017	2.040	31.070	173.890
SK-5	47.730	41.450	43.630	28.520	33.633	14.960	59.420	41.420	14.793	2.240	42.110	216.210
SK-6	50.430	46.060	47.330	24.540	40.600	14.060	67.830	47.830	13.100	1.510	36.660	200.160
SK-7	50.430	48.270	46.400	28.470	39.000	13.640	64.490	44.490	13.130	1.780	44.670	235.980
SK-8	45.600	30.950	37.270	20.010	27.833	13.310	66.230	39.570	12.830	2.020	26.750	99.000
SK-9	32.290	35.160	40.670	21.240	33.260	13.120	57.930	37.930	11.880	1.580	32.670	115.890
SK-10	38.830	44.250	41.000	22.060	45.367	13.440	64.740	45.740	12.433	2.230	37.710	221.820
SK-11	51.470	44.250	43.900	27.880	42.457	14.220	67.200	47.200	14.800	1.920	41.980	213.210
GSK	57.250	50.960	42.730	35.910	43.933	16.370	68.750	57.940	18.450	1.650	44.450	300.790
WSK	37.230	28.900	25.630	23.310	25.433	13.460	47.380	27.380	11.880	1.930	23.740	79.540

Table 4: Variability parameters for grafted and seedling plants of curry leaf.

CHARACTERS	MEAN	MAXIMUM	MINIMUM	PCV %	GCV %	Heritability %	GAM (%)
PH	45.185	57.250	32.290	17.390	16.928	94.76	33.946
PS(N-S)	40.577	50.960	27.080	19.315	18.726	94.00	37.401
PS(E-W)	40.351	47.330	25.630	16.799	15.603	86.27	29.853
NCL	24.718	35.910	20.010	18.753	17.828	90.38	34.913
ALS	36.181	45.367	25.433	19.675	17.939	83.13	33.693
ANLT	14.081	16.370	12.770	7.979	6.634	69.13	11.362
FWS	62.728	72.720	47.380	13.319	11.864	79.34	21.768
FWL	41.245	57.940	24.050	22.295	21.265	90.97	41.781
LL	13.880	18.770	10.520	18.110	17.379	92.09	34.357
FWLT	1.772	2.240	1.300	19.155	17.269	81.28	32.072
DWL	34.371	44.670	20.310	24.363	22.421	84.69	42.504
FLY	181.327	300.790	79.540	39.629	39.415	98.92	80.756

CONCLUSION

For the comparison of grafted and seedling plants, grafted plants along with a wild type and 11 other accessions collected from different localities were evaluated. Grafted plants recorded relatively high performance to that of seedling plants. Different traits were also recorded for estimating the variation occurring between grafted and seedling plants of curry leaf, in which parameters *viz.*, fresh weight of leaf, dry weight of leaf and fresh leaf yield per plant had high GCV and PCV. Heritability and genetic advance were

also estimated for all the traits showing higher heritability and genetic advance except for average number of leaflets per compound leaf which had higher heritability coupled with low genetic advance. These genetic parameters were analysed for further supporting and strengthening the comparison study of grafts and seedlings.

FUTURE SCOPE

As curry leaf plants are commercially propagated through seeds which will have high variation due to their allogamous nature. Variation from one generation to next can be minimized when plants are clonally propagated also produce true to type plants and can be further utilised in crop improvement programmes. Some of the wild genotypes possess drought tolerance naturally, they can be grafted with high yielding genotypes and can be evaluated for drought tolerant high yielding plants.

Acknowledgement. Sincere thanks to the Department of Spices and Plantation crops, Tamil Nadu Agricultural University, Coimbatore for providing facilities to carry out the research work.

Conflict of Interest. None.

REFERENCES

Al-Jibouri, H., Miller, P. A., & Robinson, H. F. (1958). Genotypic and environmental variances and covariances in an upland Cotton cross of interspecific origin 1. *Agronomy journal*, *50*(10), 633-636.

Aswin Sakthivel, M., Velmurugan, S., Selvi, B. S., & Senthil, A. (2021). Studies on vegetative propagation in curry leaf (*Murraya koenigii* Spreng.), *10*(10): 2610-2615.

Batool, S., Khera, R. A., Hanif, M. A., Ayub, M. A., & Memon, S. (2020). Curry leaf. In *Medicinal Plants of South Asia* (pp. 179-190). Elsevier.

Chittaragi, D., Ananthan, M., Venkatesan, K., Jeyakumar, P. and Mahalingam, L. (2021). Evaluation of Curry leaf (*Murraya koenigii* L. Spreng) Accessions for Biochemical Traits. *Biological Forum – An International Journal*, *13*(4): 946-951.

Chittaragi, D., Ananthan, M., Venkatesan, K., Mahalingam, L., & Jeyakumar, P. (2022). Studies on genetic variability, heritability, correlation and path coefficient analysis in curry leaf (*Murraya koenigii* Spreng) genotypes. *Electronic Journal of Plant Breeding*, *13*(1), 193-197.

Falconer, D. S. (1960). The genetics of litter size in mice. The genetics of litter size in mice. *56* (Suppl. 1):153-166.

Jain, Vandana, Munira Momin, and Kirti Laddha. 2012. "*Murrayakoenigii*: an updated review. *International Journal of Ayurvedic and Herbal Medicine 2*(04): 607-627.

Johnson, H. W., Robinson, H. F., & Comstock, R. E. (1955). Estimates of genetic and environmental variability in soybeans 1. *Agronomy journal*, *47*(7), 314-318.

Joseph, S., & Peter, K. V. (1985). Curry leaf (*Murraya koenigii*), perennial, nutritious, leafy vegetable. *Economic Botany*, *39*(1), 68-73.

Lal, M., and Kaur, N. (2019). Effect of processing on nutritional and antinutritional composition of curry leaves (*Murraya koenigii*)." *International Journal of Home Science 5* (3):186-190.

Lalitha, S., Thamburaj, S., Thangaraj, T., & Vijayakumar, M. (1997). Evaluation of curry leaf (Murraya *koenigii spreng*) ecotypes. *South Indian Horticulture*, *45*, 78-80.

Panse, V. G., & Sukhatme, P. V. (1954). Statistical methods for agricultural workers. *Statistical methods for agricultural workers.*

Ram, T., & Singh, S. (1993). Genetic analysis of yield and its components in urdbean (*Vigna mungo* (L.) Hepper). *Indian Journal of Pulses Research*, *6*, 194-196.

Sandhya, S., Jegadeeswari, V., & Shoba Nand Jeyakumar, P. (2020). A preliminary study to check the graft compatibility and success percentage of curry leaf (*Murraya koenigii* Spreng.). *Journal of Pharmacognosy and Phytochemistry*, *9*(4), 3479-3483.

Shoba, N., Balakrishnan, S., Paramaguru, P., & Vithya, K. (2020). Genetic variability and character association studies in curry leaf (*Murraya koenigii*). *Electronic Journal of Plant Breeding*, *11*(02), 694-697.

Sivasubramaniam, K., & Selvarani, K. (2012). Studies on curry leaf (Murraya koenigii) seeds. *Current Science*, *103*(8), 883-885.

How to cite this article: Jones Ponraj A., Velmurugan S., Irene Vethamoni P., Subramanian A. and Pugalendhi L. (2022). Comparison of Grafted Plants and Seedlings of Curry Leaf (*Murraya koenigii* (L.) Spreng) for Yield and Performance. *Biological Forum – An International Journal*, *14*(2a):137-140.