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Evaluation of Curry leaf (*Murraya koenigii* L. Spreng) Accessions for Biochemical Traits

Dharini Chittaragi[1*], M. Ananthan[2], K. Venkatesan[3], P. Jeyakumar[4] and L. Mahalingam[5]
[1]Research Scholar, Department of Spices and Plantation Crops,
Horticultural College and Research Institute, TNAU, Coimbatore, (Tamil Nadu), India.
[2]Director, Directorate of Open Distance Learning, TNAU, Coimbatore, (Tamil Nadu), India.
[3]Professor and Head, Department of Spices and Plantation Crops,
Horticultural College and Research Institute, TNAU, Coimbatore, (Tamil Nadu), India.
[4]Professor, Department of Crop Physiology, TNAU, Coimbatore, (Tamil Nadu), India.
[5]Professor, Department of Cotton, TNAU, Coimbatore, (Tamil Nadu), India.

(Corresponding author: Dharini Chittaragi)*
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ABSTRACT: Curry leaf is an important herbal spice mainly grown in South India. There exists a wide variability among different local types. Farmers are experiencing the challenges of identifying the cultivars as they are unfamiliar with the characteristics of the existing genotypes. Selection and exploitation of the promising genotype would be of immense value for commercialization. Hence the present study was conducted to explore the variation based on biochemical attributes among thirty Curry leaf accessions. Results revealed that the highest ascorbic acid (4.44 mg/100g) and protein (6.07/100g) content was recorded by accession number 13. Among the genotypes, accession number 11 showed the maximum content of total phenols (5.97%) chlorophyll-a (1.47 mg/100g) and total chlorophyll (1.80 mg/100g) whereas chlorophyll-b was highest (0.34 mg/100g) in accession number 13 respectively. The variations in biochemical traits observed among the accessions may be due to their genetic makeup. Hence accession no. 13 and accession no. 11 can be recommended for quality breeding programmes.

Keywords: Genotypes, Chlorophyll content, Quality, Crop improvement.

INTRODUCTION

Curry leaf is commonly known as 'curry patta' and is popular as a spice and condiment in South India. It is a perennial herbal spice and is deciduous to a semi-evergreen aromatic tree that belongs to the family Rutaceae. Curry leaves are best grown in all parts of India but major production and export of Curry leaf is from Tamil Nadu state especially Coimbatore district may be due to the favorable climatic conditions. It is also cultivated in West Bengal, Assam and Deccan Plateau.

Leaves are slightly pungent and retain their flavor even after drying. The specific aromatic odour is due to the presence of essential oil. Many uses of this indigenous plant are also seen as a potential method to ward off insects (Deepti and Nupur, 2013). Studies have shown these leaves to possess anti-diabetic, antioxidant and anti-cancerous properties (Igara *et al*., 2016). They are also good for hair and used for various purposes in the food and pharmaceutical industry (Aswathi *et al*., 2014).

Western Ghats of India is rich in biodiversity. In Tamil Nadu region there exists different local types of curry leaves and a local type (Senkaampu) is very popular mainly for its good aroma and high oil content. Being a native crop, the nutritive and medicinal properties particular to any cultivar/variety have not been completely identified (Raghu, 2020). Considering National and International economic importance, this spice tree is gaining importance. It is necessary to exploit the variation in flavour characteristics of curry leaves of different regions.

Curry leaves are rich source of vitamins and minerals. About 100 gm of fresh leaves contains 8.7g carbohydrate, 6g protein, 1g fat, 7560 µg ß-carotene, 830mg Calcium and 0.93mg Iron and dehydrated leaves are rich source of carbohydrate (64.31g), protein (12g), fat (5.4g) etc. (Khatoon *et al*., 2011). Earlier studies have shown a high degree of variation for various biochemical traits mainly ascorbic acid, phenols, proteins and chlorophyll content. Significant workers have also researched on these traits notably

among them are Jagdeeshkanth and Shankarnarayan (2017); Salikutty *et al.*, (2012); Singh *et al.*, (2014); Lal and Kaur, (2019); Reetu *et al*., (2019) and recently by Peter (2019); Raghu (2020) in Curry leaf. The present study entitled "Evaluation of Curry leaf (*Murraya koenigii* L. Spreng) accessions for biochemical traits **"**aims to identify and screen superior accessions of Curry leaf and gather information on variability in bio-chemical characters.

MATERIALS AND METHODS

An experiment was conducted during the year 2020-21 to evaluate the 30 genotypes of Curry leaf for various biochemical parameters. Analysis was carried out at the Department of Spices and Plantation crops, Horticultural College and Research Institute, TNAU, Coimbatore, Tamil Nadu. Various biochemical parameters were estimated according to the standard procedure (Table 1).

Table 1: Different procedures followed for the analysis of biochemical parameters.

Biochemical parameter	Calculation	Reference
Ascorbic acid content (mg per 100g of fresh sample)	Amount of ascorbic acid (mg/100g sample) $\frac{0.5 \text{ mg}}{V_1} \times \frac{V_2}{15 \text{ ml}} \times \frac{100 \text{ ml}}{\text{Sample wt.}} \times 100$ V_1= Volume of dye for sample, V_2= Volume of dye for standard	Harris and Ray (1935)
Protein (%)	Graphical method	Lowry *et al.*, (1957)
Total phenols (%)	Graphical method	Bray and Thorpe, (1954)
Chlorophyll-a mg per 100g of fresh sample	Chlorophyll -a= 12.7 (O.D. value at 663) – 2.69 (O.D. value at 645) $\times \frac{V}{1000 \times W}$ V=Volume of acetone used, W= Weight of the sample	A.O.A.C. (1975)
Chlorophyll-b mg per 100g of fresh sample	Chlorophyll -b= 22.9 (O.D. value at 645) – 2.69 (O.D. value at 663) $\times \frac{V}{1000 \times W}$ V=Volume of acetone extract, W= Weight of the sample	
Total chlorophyll mg per 100g of fresh sample	Total Chlorophyll = Chl-a + Chl-b	

Statistical analysis. The observations recorded on various biochemical parameters were subjected to statistical analysis (SPSS). The mean difference was calculated by using the 'F' test at 5 per cent level of significance. Critical difference (CD) at a 5 per cent level of probability was used for comparison among the treatments. Data were subjected to analysis of variance as per the method given by Panse and Sukhatme (1961).

RESULTS AND DISCUSSION

Thirty accessions of Curry leaf were evaluated for different biochemical characters. Biochemical traits *viz.*, Ascorbic acid (mg/100g), protein (mg/100g), total phenols mg/100g), chlorophyll-a (mg/100g), chlorophyll- b (mg/100g) and total chlorophyll (mg/100g) were recorded. Different accessions of curry leaf showed significant variation for all the parameters studied. Analysis of various traits showed the positive mean square values for all the parameters studied.

The Ascorbic acid content is an essential compound required for every adult for their daily biological activity, a minimum of 60 mg of ascorbic acid is required for the human body as per the US standards. Among the various genotypes, accession no. 13 recorded the maximum ascorbic acid content (4.44mg/100g) followed by accession no. 11 (4.21mg/100g) and the minimum was recorded by accession no. 19 (2.59 mg/100g) with an average of 3.45 and range of 1.81 respectively (Fig. 1).

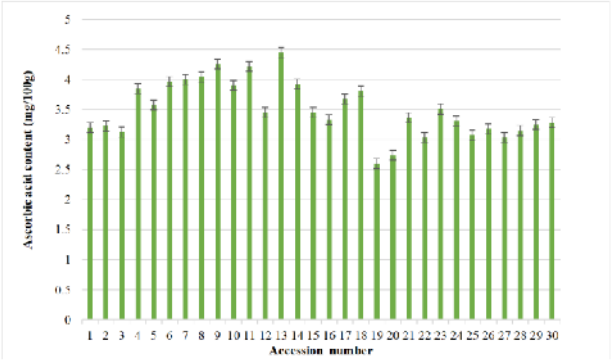

Fig. 1. Variation in ascorbic acid (mg/100g) among different curry leaf genotypes.

According to Salikutty *et al.*, (2012); Singh *et al.*, (2014) the ascorbic acid content in Curry leaf is 4.00 mg/100g on fresh weight basis. Variation in the ascorbic acid content of Curry leaf was reported by, Peter (2019); Lal and Kaur (2019); Reetu *et al.*, (2019) respectively.

The proteins are the major compounds for maintaining the diet as they are responsible for enzymatic activity. It showed significant differences among the various genotypes. The results of this estimation is presented in Table 2. The highest protein content (6.07%) was recorded in the accession no. 13 followed by accession no. 11 (5.88%) whereas the lowest protein content (3.46 %) was recorded by genotype 20 with a mean of 4.74 and a range of 2.61 (Fig. 2). A similar effect of genotype on protein content (4.96-6%) of Curry leaf was also reported by Peter (2019). Gopalan *et al.*, (2011) reported about 6.1 per cent of protein content in fresh leaves. Earlier studies have also revealed the almost same range of protein content (Salikutty *et al.*, 2012; Nishan and Subramanian 2015; Jain *et al.*, 2017; Lal and Kaur 2019; Balakrishnan *et al.*, 2020) in Curry leaf.

Table 2: Variation in Ascorbic acid, protein and total phenols among different Curry leaf genotypes.

Genotype	Ascorbic acid (mg/100g)	Protein (%)	Total phenols (%)
Accession no. 1	3.20	4.41	4.85
Accession no. 2	3.22	4.32	5.02
Accession no. 3	3.12	3.84	4.01
Accession no. 4	3.84	5.25	5.57
Accession no. 5	3.57	4.54	5.11
Accession no. 6	3.96	5.49	5.73
Accession no. 7	4.00	5.54	5.58
Accession no. 8	4.04	5.69	5.76
Accession no. 9	4.25	5.64	5.73
Accession no. 10	3.89	5.30	5.67
Accession no. 11	4.21	5.88	5.97
Accession no. 12	3.44	4.84	5.41
Accession no. 13	4.44	6.07	5.89
Accession no. 14	3.92	5.44	5.80
Accession no. 15	3.44	4.64	5.11
Accession no. 16	3.33	4.41	4.98
Accession no. 17	3.66	5.21	5.32
Accession no. 18	3.80	5.29	5.45
Accession no. 19	2.59	3.66	3.52
Accession no. 20	2.73	3.46	3.81
Accession no. 21	3.36	4.49	5.28
Accession no. 22	3.03	4.41	4.67
Accession no. 23	3.50	5.18	5.15
Accession no. 24	3.30	4.60	4.89
Accession no. 25	3.07	4.04	4.24
Accession no. 26	3.17	3.93	4.20
Accession no. 27	3.03	3.67	3.91
Accession no. 28	3.14	3.85	4.01
Accession no. 29	3.25	4.71	5.06
Accession no. 30	3.27	4.39	4.93
S. Ed.	**0.06**	**0.11**	**0.10**
C. D. (0.05%)	**0.13**	**0.22**	**0.19**

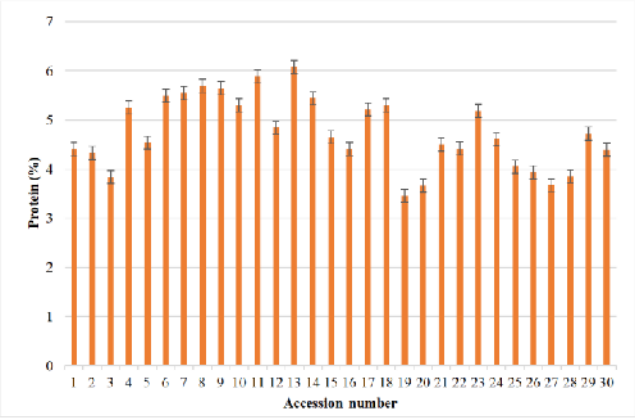

Fig. 2. Variation in protein (%) among different curry leaf genotypes.

Total phenols are mainly responsible for anti-oxidant activity. The maximum content of total phenols was recorded by accession no. 11 (5.97%) followed by accession no. 13 (5.89%) and the minimum was found in accession no. 19 (3.52%) with a mean of 5.02 and range 2.45 respectively (Fig. 3). The difference in the total phenols may be due to variation in the inherent synthesizing ability of individual accession. These results are in confirmation with the previous study in Curry leaf (Jagadeeshkanth and Shankarnarayan, 2017).

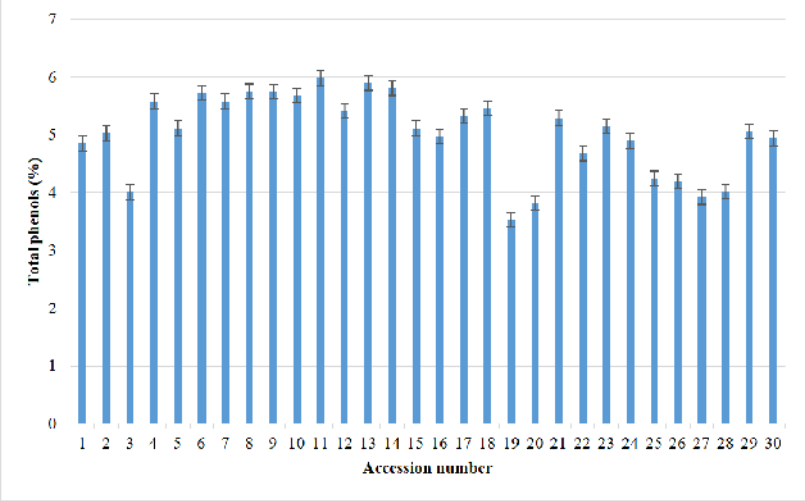

Fig. 3. Variation in total phenols (%) among different curry leaf genotypes.

The highest chlorophyll-a was recorded in accession no. 11 (1.47 mg/100g) followed by accession no. 13 (1.17 mg/100g) whereas the lowest was recorded in accession no.19 (0.47 mg/100g) with a mean of 0.84 and range 1. Accession 13 (0.34 mg/100g) recorded maximum chlorophyll- b value followed by accession no. 11 (0.32 mg/100g) and the minimum value was shown by accession no. 19 and 20 (0.10 mg/100g) with a mean of 0.21 and range of 0.24 respectively (Table 3). Significant variations in chlorophyll-a, chlorophyll-b were reported by Lalitha *et al.,* (1997); Peter (2019); Jagadeeshkanth and Shankarnarayan (2017) in curry leaf. Total chlorophyll is the sum of the chl-a and chl-b content present in the leaves. Among the various genotypes highest total chlorophyll content was found in accession no. 11 (1.80 mg/100g) followed by accession no. 13 (1.51/100g) and was found lowest in accession no. 19 (0. 58mg/100g) with a mean of 1.06 and range of 1.22 respectively (Fig. 4). The total chlorophyll content values are in confirmation with the studies of Reetu *et al.,* (2019); Garg *et al.,* (2012).

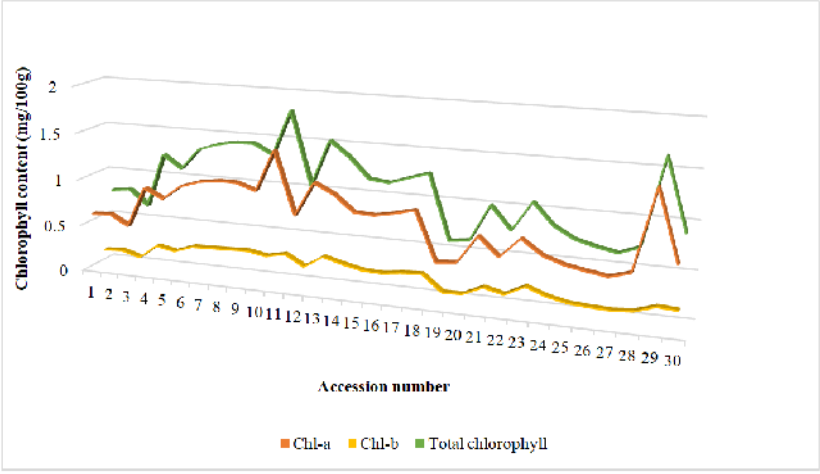

Fig. 4. Variation in Chlorophyll-a, chlorophyll-b and total chlorophyll (mg/100g) among different Curry leaf genotypes.

Table 3: Variation in Chlorophyll-a, Chlorophyll-b and Total chlorophyll (mg/100g) among different Curry leaf genotypes.

Genotype	Chlorophyll-a(mg/100g)	Chlorophyll-b(mg/100g)	Total chlorophyll (mg/100g)
Accession no. 1	0.61	0.16	0.78
Accession no. 2	0.63	0.17	0.80
Accession no. 3	0.52	0.11	0.63
Accession no. 4	0.95	0.26	1.22
Accession no. 5	0.85	0.22	1.08
Accession no. 6	1.01	0.29	1.31
Accession no. 7	1.07	0.30	1.38
Accession no. 8	1.10	0.31	1.41
Accession no. 9	1.10	0.31	1.42
Accession no. 10	1.03	0.28	1.31
Accession no. 11	1.47	0.32	1.80
Accession no. 12	0.81	0.21	1.02
Accession no. 13	1.17	0.34	1.51
Accession no. 14	1.07	0.28	1.36
Accession no. 15	0.90	0.24	1.15
Accession no. 16	0.89	0.23	1.12
Accession no. 17	0.93	0.26	1.19
Accession no. 18	0.98	0.27	1.26
Accession no. 19	0.47	0.10	0.58
Accession no. 20	0.49	0.10	0.60
Accession no. 21	0.78	0.20	0.99
Accession no. 22	0.59	0.15	0.74
Accession no. 23	0.80	0.25	1.06
Accession no. 24	0.65	0.18	0.83
Accession no. 25	0.58	0.13	0.72
Accession no. 26	0.54	0.12	0.66
Accession no. 27	0.51	0.11	0.62
Accession no. 28	0.57	0.12	0.70
Accession no. 29	1.43	0.19	1.62
Accession no. 30	0.69	0.18	0.88
S. Ed.	**0.02**	**0.03**	**0.11**
C. D. (.0.05%)	**0.05**	**0.05**	**0.22**

CONCLUSION

The biochemical parameters of the thirty curry leaf accessions were analyzed. Accession no. 13 recorded comparatively higher values of biochemical constituents like ascorbic acid (4.44 mg/100g), protein (6.07/100g) and chlorophyll-b (0.34 mg/100g) respectively. Similarly, accession no. 11 also recorded the higher values for other biochemical parameters. Since all the accessions were grown in the same agro-climatic, the variations in biochemical traits observed among the accessions may be due to their genetic makeup. In recent past cultivation of Curry leaf is gaining its importance in the export of Spices. Given above, accession no. 13 and accession no. 11 can be recommended for a quality breeding programme as it is having a considerable value of biochemical constituents that can be utilized in the processing and pharmaceutical industry. This indicates the exploiting this variation for future quality improvement programmes in curry leaf.

FUTURE SCOPE

Evaluation of high yielding genotypes enriched with higher quality is required.

Selection and exploitation of the promising genotype would be of immense value for commercialization in Curry leaf. The evaluation of available genotypes will help to sort out suitable biotypes for further crop improvement programmes for commercial cultivation.

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Conflict of Interest. None.

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