



Research article

## Diversity and distribution of *Litsea* in Chikkamagaluru, Karnataka

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**Abstract:** The study gives a report on the diversity of *Litsea* (Lauraceae) occur in Chikkamagaluru district of Karnataka, India. Study was conducted in two habitats of Kemmannugundi and Mullayyanagiri regions. Extensive field surveys were conducted for survey of the species by laying six belt transects of 250×4 m size. The data indicated that four species of *Litsea* occurred in the study sites; namely, *Litsea floribunda*, *Litsea stocksii*, *Litsea glabrata* and *Litsea mysorensis*. *L. floribunda* showed higher density when compared with other species, all the four species distributed frequently in Kemmannugundi whereas; in Mullayyanagiri only *L. floribunda* species is present. These trees commonly associated with other tree species are *Cinnamomum verum*, *Neolitsea cassia*, *Maesa indica*, *Memecylon malabaricum* and *Syzizium cumini*.

**Keywords:** Associated species - Kemmannugundi - Lauraceae - Mullayyanagiri - Western Ghats.

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### INTRODUCTION

The genus *Litsea* consists of about 400 species which is largest genus in the family Lauraceae distributed in tropical and subtropical Asia, Australia, New Zealand, North America and subtropical South America (Chaing *et al.* 2012). In India about 45 species are distributed in evergreen and semi evergreen forests of the Western Ghats (Bhuniya *et al.* 2010), 12 species are also found in Meghalaya, Manipur, Assam and Sikkim. Among 45 species 40 of which are endemic to peninsular India, 11 species are found in Karnataka (Saldanha 1996).

The *Litsea* trees are evergreen dioecious with alternate or whorled leaves, inflorescence is pedunculate axillary umbellate or corymbose racemes. Bracts are present, 4–6 in numbers perianth tube campanulate, anthers four celled. Ovary free or covered by perianth, style curved, stigma dilated, fruit ovoid or globose (Gamble & Fischer 1998).

Leaves and barks of *Litsea stocksii* and *L. glutinosa* are used as medicines. Essential oils like citral, lauric acid and oleic acid extracted are used commercially for the preparation of insecticides, perfumes, flavours and colognes. Oil extracted from *Litsea cubeba* is a good competitor of Chinese lemon oil due to its low cost of production and easy method of cultivation of the species. Decoction of different parts of the plant used to cure burns, sprains, cough, bronchitis and paralysis (Bhuniya *et al.* 2009).

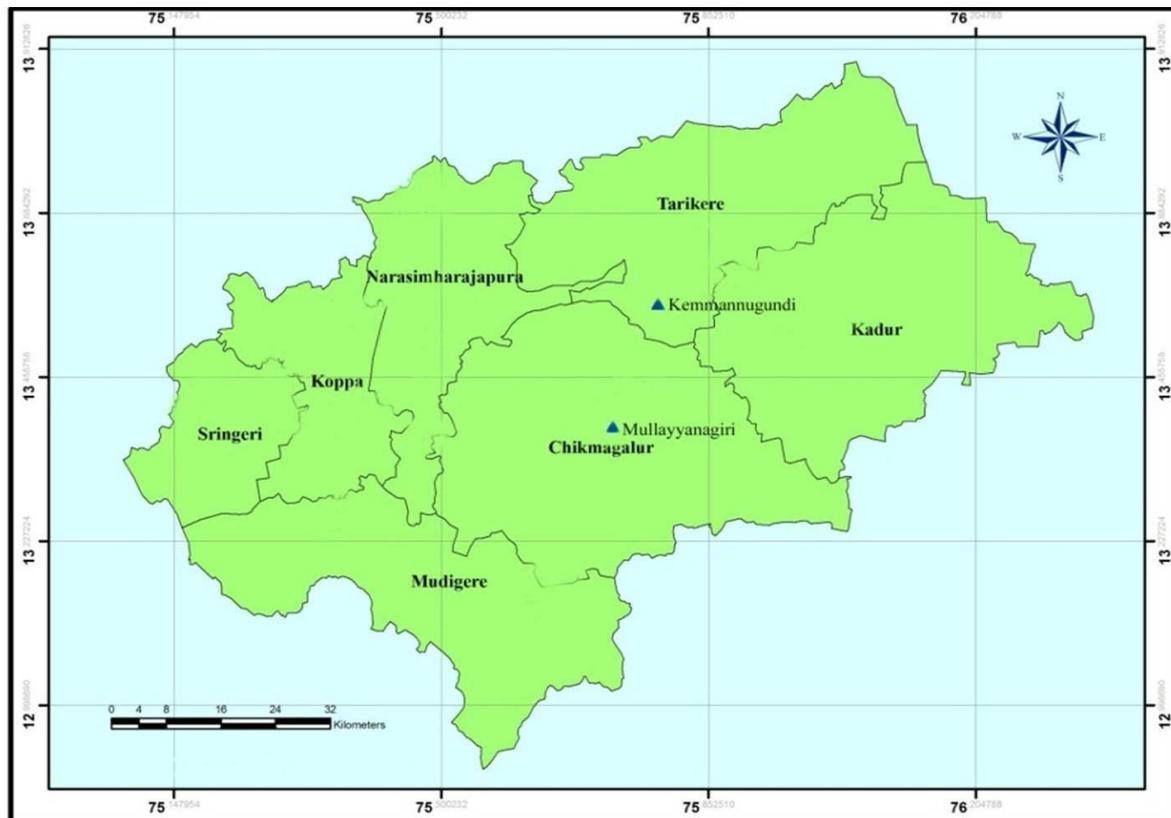
The taxonomy of the family Lauraceae is still not settled compare to other families. It is poorly understood due to its great diversity, inadequate morphological characters and lack of investment in taxonomic work. *Litsea* is a very interesting tree species in Western Ghats of India occur in evergreen and semi evergreen forests, information on its diversity, distribution and genetic relatedness within populations are not fully explored. Hence in this present study we focussed to study the diversity and distribution of *Litsea* species in Chikkamagaluru district, Karnataka.

### MATERIALS AND METHODS

#### Study area

The study area covers Kemmannugundi, Mullayyanagiri in Chikkamagaluru district situated between 12°54' to 13°53' N and 75°04' to 76°21' E in the Western Ghats regions of Karnataka (Fig. 1). The sampling sites have

rich forest vegetation such as evergreen and semi evergreen forests, the wide range of ecological conditions and altitudinal variation resulted in diverse vegetation in study area. Mullayyanagiri is the highest elevated region in Karnataka. In Kemmannugundi, Mullayyanagiri region the temperature varies between 10° to 32° C across the different months of the year.



**Figure 1.** Map showing sampling sites in Chikkamagaluru District, Karnataka.

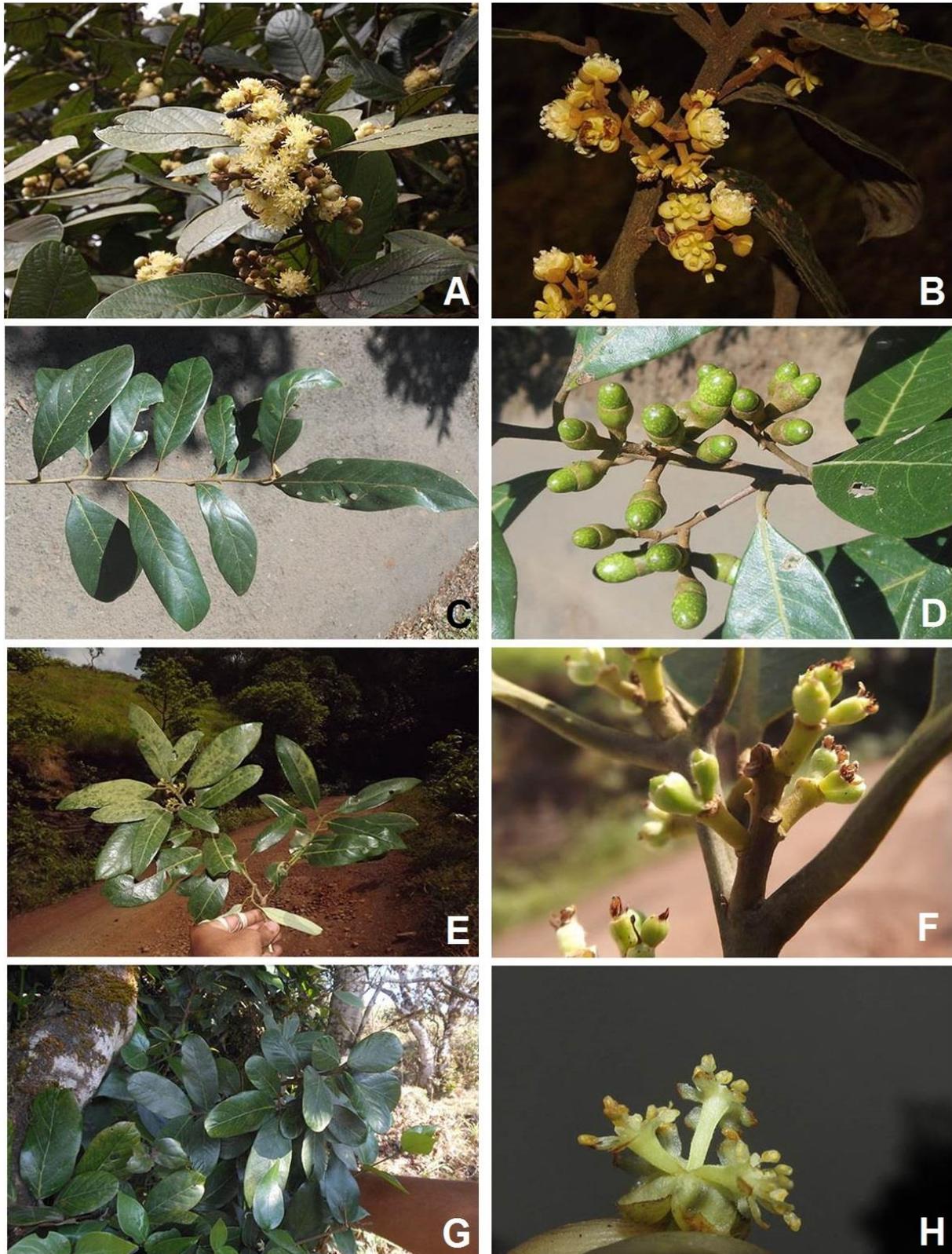
#### *Tree sampling and Data analysis*

Extensive field surveys carried out throughout the year to know the diversity, distribution and phenology of the *Litsea* species. Stratified random sampling method is used to collect the tree data, three belt transects of 250×4 m was laid in each study sites and girth was measured at breast height using a girth tape. Species density, frequency, abundance, importance value index and basal area of plant were calculated by following Mishra (1968), Mueller-Dambois & Ellenberg (1974). The importance value index was calculated by summing of relative density, frequency and relative dominance. Species diversity index was calculated by Shannon Wiener index (1963); the species dominance index was calculated by using Simpson (1949).

#### **RESULTS AND DISCUSSION**

The four species of *Litsea* occurred in the two study sites; namely, *Litsea floribunda*, *Litsea stocksii*, *Litsea glabrata* and *Litsea mysorensis* (Fig. 2). These four species collected from the study sites, identified through some morphological characters using standard floras and herbarium samples were prepared. *L. floribunda* is present in Kemmannugundi and Mullayyanagiri, but the *L. stocksii*, *L. glabrata*, *L. mysorensis* only present in Kemmannugundi region absent in Mullayyanagiri (Table 1).

The results showed that *L. floribunda* frequently present in all transects, the frequency of *L. glabrata* is 0.67, *L. mysorensis* 0.33, *L. stocksii* 1.0. The *L. floribunda* showed highest density 46.67 and 33.67 it covers a basal area of 1904.79 m<sup>2</sup>.ha<sup>-1</sup> and 885.27 m<sup>2</sup>.ha<sup>-1</sup> (Table 1) in Mullayyanagiri and Kemmannugundi respectively, *L. mysorensis* showed lesser density and basal area compare to all the species. Abundance and frequency (A/F) ratio of all the *Litsea* species in the study sites is >0.05, it showed a clumped or contagious pattern of distribution this is because it is a dioecious tree, clumping of individuals of the same species is often clearly related to gap formation and dispersal, pollination mechanism of the species. Upadhaya *et al.* (2003) investigated on the same family members *Cinnamomum* and *Neolitsea* it also showed clumped pattern of distribution.



**Figure 2.** *Litsea* species in Chikkamagaluru district, Karnataka: A–B, *Litsea floribunda*; C–D, *Litsea stocksii*; E–F, *Litsea mysorensis*; G–H, *Litsea glabrata*.

A total of 15 associated species belongs to 10 families were recorded in both Kemmannugundi and Mullayyanagiri study sites (Table 2). Five species belongs to family Lauraceae, this is because of preference of same environmental factors from the genera. *Callicarpa*, *Cinnamomum*, *Cryptocarya*, *Neolitsea* and *Syzygium* species are frequently distributed in all the transects of Kemmannugundi. *Cinnamomum* showed high density (21.33) per transect in Mullayyanagiri whereas *Memecylon*, *Ochlandra*, *Psychotria* showed low density (0.33)

in both the study sites (Table 2). *Actinodaphne*, *Cryptocarya*, *Macaranga* and *Neolitsea cassia* only present in Kemmannugundi absent in Mullayyanagiri region.

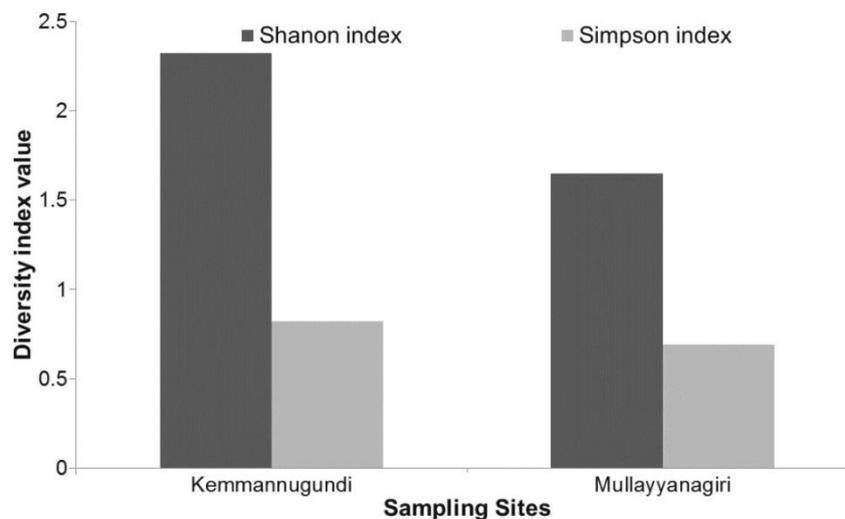
**Table 1.** Frequency (Fre), density per transect (Den), abundance (Abun), IVI, A/F ratio of *Litsea* spp.

Species	Fre	Den	Abun	RF	RD	RA	IVI	A/F	Basal area m <sup>2</sup> /ha
<b>Kemmannugundi</b>									
<i>Litsea floribunda</i>	1	33.67	33.67	7.32	37.14	29.93	74.39	4.6	885.27
<i>Litsea glabrata</i>	0.67	2	3	4.88	2.21	2.67	9.76	0.61	1.77
<i>Litsea mysorensis</i>	0.33	1	3	2.44	1.1	2.67	6.21	1.23	0.48
<i>Litsea stocksii</i>	1	7	7	7.32	7.72	6.22	21.26	0.96	39.48
<b>Mullayyanagiri</b>									
<i>Litsea floribunda</i>	1	47.67	47.67	10	50	44.9	104.9	4.77	1904.79

**Table 2.** Frequency (Fre), density per transect (Den), abundance (Abun), IVI, A/F ratio of the major associated species.

Species	Kemmannugundi								Mullayyanagiri							
	Fre	Den	Abun	RF	RD	RA	IVI	A/F	Fre	Den	Abun	RF	RD	RA	IVI	A/F
<i>Actinodaphne</i> sp.	0.33	1.67	5	2.44	1.84	4.44	8.72	2.05	-	-	-	-	-	-	-	-
<i>Callicarpa tomentosa</i>	1	2.67	2.67	7.32	2.94	2.37	12.63	0.36	1	1.67	1.67	10	1.75	1.57	13.32	0.17
<i>Cinnamomum verum</i>	1	11	11	7.32	12.13	9.78	29.23	1.5	1	21.33	21.33	10	22.3	20	52.3	2.13
<i>Cryptocarya</i> sp.	1	4.67	4.67	7.32	5.15	4.15	16.62	0.64	-	-	-	-	-	-	-	-
<i>Glochidion</i> sp.	0.67	3.67	5.5	4.88	4.04	4.89	13.81	1.13	0.67	3	4.5	6.67	3.15	4.24	14.06	0.68
<i>Macaranga peltata</i>	0.67	1.67	2.5	4.88	1.84	2.22	8.94	0.51	-	-	-	-	-	-	-	-
<i>Maesa indica</i>	0.67	4.33	6.5	4.88	4.78	5.78	15.44	1.33	1	3.67	3.67	10	3.85	3.45	17.3	0.37
<i>Memecylon malabaricum</i>	0.33	0.33	1	2.44	0.37	0.89	3.7	0.41	0.33	0.33	1	3.33	0.35	0.94	4.62	0.3
<i>Neolitsea cassia</i>	1	5	5	7.32	5.52	4.44	17.28	0.68	1	4.33	4.33	10	4.55	4.08	18.63	0.43
<i>Neolitsea zeylanica</i>	0.67	2.33	3.5	4.88	2.57	3.11	10.56	0.72	-	-	-	-	-	-	-	-
<i>Nothapodytes foetida</i>	0.33	1.33	4	2.44	1.47	3.56	7.47	1.64	0.67	2.33	3.5	6.67	2.45	3.3	12.42	0.53
<i>Ochlandra travancorica</i>	0.33	0.33	1	2.44	0.37	0.89	3.7	0.41	0.33	0.33	1	3.33	0.35	0.94	4.62	0.3
<i>Psychotria nigra</i>	0.33	0.33	1	2.44	0.37	0.89	3.7	0.41	0.33	0.33	1	3.33	0.35	0.94	4.62	0.3
<i>Syzygium cumini</i>	1	4	4	7.32	4.41	3.56	15.29	0.55	0.67	4.67	7	6.67	4.9	6.59	18.16	1.05
<i>Vernonia arborea</i>	0.33	1	3	2.44	1.1	2.67	6.21	1.23	0.33	0.33	1	3.33	0.35	0.94	4.62	0.3

Shanon index is a diversity index taking into account of number of individuals as well as number of taxa. The Shanon and Simpson index of Kemmannugundi is 2.32, 0.82 respectively and 1.65, 0.69 in Mullayyanagiri respectively (Fig. 3). According to Shanon and Simpson indices Kemmannugundi has highest species richness area compare to the Mullayyanagiri region. The Shanon index of the Kemmannugundi region is lower (2.32) compare to Sulimudi forests of Western Ghats, Kerala (2.64) (Magesh & Menon 2011) and Simpson value higher (0.82) compare to Vagamon region (0.36) (Brilliant *et al.* 2012).



**Figure 3.** Shanon and Simpson diversity index in Kemmannugundi and Mullayyanagiri.

## CONCLUSION

This study revealed that the two study sites harboured four *Litsea* species and *Litsea floribunda* showed good species richness. *Litsea stocksii*, *Litsea glabrata* and *Litsea mysorensis* showed low species richness in Kemmannugundi whereas these species absent in Mullayyanagiri. A total of 15 associated species belongs to 10 families were recorded; Laural members are the dominant associated species in both the study sites.

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