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**A Study on the Floristic Compositions of Hudguru Reserve Forest, Kodagu District, Karnataka, India**

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**A B S T R A C T**

Hudguru Reserve Forest is a moist deciduous forest located in Somvarpet Range of Madikeri Forest Division, Kodagu district, Karnataka. Phytodiversity study of the reserve forest was conducted through Point Centered Quarter method (PCQ). The aim was to provide basic information about floristic composition of the reserve forest. Plant species composition, Basal area, height, density, frequency, Dominance, IVI and FIV were determined. A total of 24 plant species belonging to 13 families were encountered. Fabaceae and Lythraceae were the dominant families in the Reserve forest.

**Introduction**

Kodagu district is situated on the southwest tip of Karnataka state and the tract lies between 11°55' and 12°50' north latitude and 75°20' and 76°15' east longitude. The tract has mountainous configuration presenting a grand panorama of valleys, ravines, peaks and spurs. The forest which is situated in different slopes and aspects, plays an important role in distribution of the species. The average rainfall of the district is 2725mm. Rainfall decreases from west to east due to hilly terrain. The nature of vegetation greatly varies from Bhagamandala receiving 6000mm of rainfall to till Kushalnagar, which receives 1100mm of rainfall annually.

The forest of kodagu belongs to Western Ghats is confined to the hilly region. Depending upon the Phenological condition and other ecological factors, the forest is divided into moist and dry type. The moist forest can be further subdivided into wet evergreen, semi evergreen and moist deciduous. The dry type can be subdivided into dry deciduous and thorn forest. In moist deciduous forest species remain deciduous only for a short time were number of evergreen dominates are present in the under storey. The general nature of the forest is deciduous and there are semi deciduous species in the upper canopy. The under growth has bamboo in open and canes on

wet ground. In moist deciduous forest, trees become leafless during March to April and before the monsoon sets in most of trees get back the foliage. Fire is serious problem in the deciduous belt of the Kodagu where there is substantial accumulation of leaf litter on the forest floor (Ajay Misra, 2008). As there were no reports on the floristic analysis of Hudguru reserve forest, the present study attempts to reveal the structure of the moist deciduous forest.

### **Materials and Methods**

Dabbadka forest is the reserve forest which covers an area of 2977.46 hectares. It is located 12<sup>o</sup>29'-North and 075<sup>o</sup>54'-East of Somvarpet range with an altitude of 885 meter above sea level. It has annual rain fall of 1245.55 mm and a mean temperature of 20<sup>o</sup> C during winter and 33<sup>o</sup>C during summer.

A 1000 meter transect (Line) was established through the habitat. At regular intervals of 100meter along the transect, points were demarcated. At each point, an imaginary line was drawn perpendicular to the transect thereby creating four quadrates. In each of the quadrates, the closest single living plant with a GBH $\geq$ 5cm was identified taxonomically (Keshavamurty and Yoganarasimhan, 1990), distance from the point to each of four trees was measured, GBH and total height were taken (Cottam and Curtis, 1956; Gibbs *et al.*, 1980; Cavassan *et al.*, 1984; Krebs, 1989; Dias *et al.*, 1992; Sparks *et al.*, 2002).

The phytosociological data viz. basal area, Relative densities, Relative frequency Relative dominance, IVI and FIV, the index of diversity viz. Simpson index, Shannon index and Equitability were determined. (Krebs, 1989; Shivaprasad *et al.*, 2002; Vasanthraj and Chandrashekar, 2006).

### **Data analysis**

GBH and Height Classes of number of individuals of different species were calculated. The density, basal area, dominance, frequency, Importance value index (IVI) and Family Importance Value (FIV) were calculated (Pascal, 1988).

The density (ni) of each species was recorded by counting the total number of individuals. The Dominance (d) was determined by the basal area (at 1.3m height) of individuals of the same species.

1. The Relative frequency (RFi) was determined by using the formula

$$RFi = AFi / TF \times 100$$

Where AFi=Absolute frequency of species and TF = Total Frequency (Sum of AFi)

2. Relative density (RD<sub>i</sub>) was determined by using the formula

$$RD_i = AD_i / AD \times 100$$

Where AD<sub>i</sub> = Absolute density of species and AD = Absolute density

3. Relative Dominance or Cover (RC<sub>i</sub>) was determined by using the formula

$$RC_i = BA_i / TBA \times 100$$

Where BA<sub>i</sub> = Basal area of species and TBA = Total basal area

4. Importance Value Index of a species were calculated by adding The Relative frequency (RF<sub>i</sub>), Relative density (RD<sub>i</sub>) and Relative dominance(RC<sub>i</sub>). The Family Importance Value Index (FIV) for botanical families were calculated by adding the IVI for different species of the same family. The

floristic diversity was measured by using Simpson's index

$$D=1-\sum_{i=1}^S (n_i/N)^2$$

Where  $n_i$  = number of individuals of species  
 $N$ = total number of individuals in the plot  
 and  
 $S$ =number of species in the plot

Shannon-Wieners index

$$1) H' = 3.3219(\log_{10}N - 1/N \sum_{i=1}^S n_i \log_{10} n_i)$$

Where  $n_i$ ,  $N$  and  $S$  are the same as in Simpson's index and  
 3.3219 is the conversion factor from  $\log_2$  to  $\log_{10}$

$$2) H_{max} = 3.3219 \log_{10} S$$

$$3) \text{Equitability (E)} = H' / H_{max}$$

## Results and Discussion

### Floristic composition

A total of 24 species belonged to 13 families, among the families Fabaceae (6 species), Combrataceae (4 species), Moraceae (2 species), Ebenaceae (2 species), Sapindaceae (2 species), Bignoniaceae, Lythraceae, Verbanaceae, Euphorbiaceae, Rubiaceae, Malvaceae, Myrtaceae and Boraginaceae were represented by monospecific (Table 1).

*Fabaceae* was represented by maximum number of 6 species belonging to different 5 genera. But *combrataceae* was represented by 4 species belonging to 2 genera. The top storey was represented by all species, undergrowth was represented by Canes, Reeds, creepers and Climbers such as *Cyclea peltata*, *Acacias inuate*, *Jasminum*

*malaba ricum*, and *Bambusa bamboo*, *Calamus pseudotenuis*, *Calamus rheedii*, *Lantana camera* and *Eupatorium sp.*

### Importance Value Index (IVI)

The IVI of the *Lagerstroemia lanceolata* (55.40) highest in this forest and followed by *Dalbergia latifolia* (39.41), *Syzygium cumini* (22.40) *Tectona grandis* (17.89) and *Adina cordifolia* (17.53). Four other species showed IVI range of 16.41–10.16 while 15 species showed IVI less than 10 (Table 2). The FIV of Fabaceae was very high (90.52) followed by Lythraceae (55.40) Combrataceae (48.32) and Myrtaceae (22.40) (Table 3). *Lagerstroemia lanceolata* showed high IVI indicates that it occupies most of the sampled area hence it is important plant species in forest. The FIV of Fabaceae was very high (90.52) where 30% of the individuals in forest were represented by Fabaceae only hence the fabaceae member frequently found along the transect.

**Table.1 Floristic composition**

Name of the Family	Number of species
Fabaceae	6
Combrataceae	4
Moraceae	2
Ebenaceae	2
Sapindaceae	2
Bignoniaceae	1
Lythraceae	1
Verbanaceae	1
Euphorbiaceae	1
Rubiaceae	1
Malvaceae	1
Myrtaceae	1
Boraginaceae	1

**Table.2** ni=number of individuals, ADi=absolute density, RDi=relative density, Ji=number of quadrates in which species is present, AFi=absolute frequency, RFi=relative frequency, BAi=basal area, MBAi=Mean basal area, ACi=absolute cover/dominance, RCi=relative cover/dominance, IVI=importance value index of Hudguru forest

	Species i	ni	ADi %	RDi	Ji	AFi	Rfi %	BAi	MBAi	ACi	Rci	IVI
1	<i>Dalbergialatofolia</i>	12	78.9972	15	8	40	12.6984127	26.560475	2.213372917	0.017485026	11.7181	39.417
2	<i>Bombaxceiba</i>	1	6.5831	1.25	1	5	1.587301587	1.5386	1.5386	0.001012876	0.67881	3.5161
3	<i>Anogeisuslatifolia</i>	4	26.3324	5	4	20	6.349206349	11.48455	2.8711375	0.007560394	5.06682	16.416
4	<i>Diospyrosmontana</i>	2	13.1662	2.5	2	10	3.174603175	3.77585	1.887925	0.00248568	1.66585	7.3405
5	<i>Legerstomialanceolata</i>	17	111.9127	21.25	12	60	19.04761905	34.237775	2.013986765	0.02253907	15.1052	55.403
6	<i>Syzygiumcumini</i>	5	32.9155	6.25	4	20	6.349206349	22.22335	4.44467	0.014629854	9.80462	22.404
7	<i>Erythrinastricta</i>	1	6.5831	1.25	1	5	1.587301587	12.56	12.56	0.008268374	5.54129	8.3786
8	<i>Terminaliatomontosa</i>	4	26.3324	5	3	15	4.761904762	8.04625	2.0115625	0.005296927	3.54989	13.312
9	<i>Emblicaoofficinalis</i>	1	6.5831	1.25	1	5	1.587301587	2.26865	2.26865	0.001493475	1.0009	3.8382
10	<i>Diosporamelanoxylon</i>	1	6.5831	1.25	1	5	1.587301587	1.2265625	1.2265625	0.000807458	0.54114	3.3784
11	<i>Buteamonosperma</i>	2	13.1662	2.5	2	10	3.174603175	1.6328	0.8164	0.001074889	0.72037	6.395
12	<i>Pterocarpusmarsupium</i>	2	13.1662	2.5	2	10	3.174603175	6.06805	3.034025	0.003994658	2.67714	8.3517
13	<i>Dalbergiapaniculata</i>	3	19.7493	3.75	2	10	3.174603175	10.0951	3.365033333	0.006645705	4.45381	11.378
14	<i>Pongamiapinnata</i>	4	26.3324	5	2	10	3.174603175	5.5735	1.393375	0.003669091	2.45895	10.634
15	<i>Radermacheraxylocarpa</i>	1	6.5831	1.25	1	5	1.587301587	4.15265	4.15265	0.002733731	1.83209	4.6694
16	<i>Sapindusemerginatus</i>	1	6.5831	1.25	1	5	1.587301587	1.32665	1.32665	0.000873347	0.5853	3.4226
17	<i>Adina cordifolia</i>	4	26.3324	5	2	10	3.174603175	21.2107	5.302675	0.013963216	9.35785	17.532
18	<i>Tectonagrandis</i>	4	26.3324	5	4	20	6.349206349	14.84435	3.7110875	0.009772184	6.54911	17.898
19	<i>Ficusreliegiosa</i>	2	13.1662	2.5	2	10	3.174603175	7.92065	3.960325	0.005214243	3.49448	9.1691
20	<i>Schleicheraoleosa</i>	2	13.1662	2.5	1	5	1.587301587	2.3236	1.1618	0.001529649	1.02514	5.1124
21	<i>Terminaliabellerica</i>	4	26.3324	5	4	20	6.349206349	8.0227	2.005675	0.005281424	3.5395	14.889
22	<i>Ficusinfectoria</i>	1	6.5831	1.25	1	5	1.587301587	16.6106	16.6106	0.010934924	7.32836	10.166
23	<i>Cordiamixa</i>	1	6.5831	1.25	1	5	1.587301587	0.94985	0.94985	0.000625296	0.41906	3.2564
24	<i>Terminaliapaniculata</i>	1	6.5831	1.25	1	5	1.587301587	2.0096	2.0096	0.00132294	0.88661	3.7239
	<b>Total</b>	<b>80</b>	AD=526.648	<b>100</b>		TF=315	<b>100</b>	TBA=226.662		0.149214429	100	<b>300</b>

**Table -3**

<b>Family</b>	<b>FIV</b>
Fabaceae	90.52
Lythraceae	55.40
Combrataceae	48.32
Myrtaceae	22.40
Moraceae	19.32
Verbanaceae	17.89
Rubiaceae	17.53
Euphorbiaceae	13.31
Ebenaceae	10.71
Sapindaceae	8.53
Bignonaceae	4.66
Malvaceae	3.51
Boraginaceae	3.25

**Table-4**

<b>Height Class(m)</b>	<b>No of individuals</b>	<b>Percentage</b>
0-4	3	3.75
4-8	16	20
8-12	20	25
12-16	20	25
16-20	15	18.75
20-24	4	5
24-28	2	2.5

**Table-5**

<b>Girth Range (cm)</b>	<b>No of individuals</b>	<b>Percentage</b>
10-40	0	0
40-80	2	2.5
80-120	14	17.5
120-160	24	30
160-200	16	21.25
200-240	13	16.25
240-280	5	6.25
280-320	2	2.5
320-360	1	1.25
360-400	1	1.25
400-440	0	0
440-480	1	1.25

Table -6					
Taxa (S)	Individuals(N)	N/S	Simpson_1-D	Shannon_H	Equitability_E
24	80	3.33	0.9075	2.763	0.869

### Density

Absolute density of the study area was 526.648 Individuals /hectare. The member of Fabaceae accounted 30% of the total individual's. Among the Fabaceae *Dalbergia latifolia* (50%), *Pongamia pinnata* (16%), *Dalbergia sissoo* (12.5%), *Pterocarpus marsupium* (8.33), *Butea monosperma* (8.33) and *Erythrina stricta* (4.1%) were predominantly represented. Other than Fabaceae *Lagerstroemia lanceolata* (21.25%) and the remaining species were showed less than 10 (Table 2). But in this forest *Lagerstroemia lanceolata* showed high density with high IVI hence it is frequently present predominantly occupies the sampled area than Fabaceae.

### Basal area

The total basal area was 226.662 m<sup>2</sup>/ hectare, of which *Lagerstroemia lanceolata* constitute 6.6 % of the total basal area i.e. 15.10 m<sup>2</sup>/ hectare.

*Dalbergia latifolia* represented 11.71m<sup>2</sup>/ hectare, where the rest of the species had less than 10 (Table 2). Along with the transect, *Lagerstroemia lanceolata* can be seen frequently and its relative dominance was high compared hence it occupied major portion of the sampled area.

### Height & GBH Classes

Nearly 23.75% of the individuals were within 1-8m height range, 50% of the individuals belonged to the class of 8–16 height and 26.25% of the individuals were exceeded 16m height among which most of the individuals (28%) are *Lagerstroemia lanceolata* (Table 4).

20% of the individuals were belonged to 10–120 cm gbh class and 67.5% of the individuals belonged to 120–240 gbh range, and 12.5% exceeded to 240cm range, among them *Syzygium cumini*, *Erythrina stricta*, *Lagerstroemia lanceolata*, *Ficus reliegiosa*, *Dalbergia latofolia*, *Adina cordifolia*, *Ficus infectoria*, *Terminalia tomentosa*, *Cordia mixa* and *Tectona grandis* (Table 5). Based on height and GBH classes, 20% of the individuals of the forest represented set of the future, 50% represented set of the present and nearly 12.5% represented set of the past. This indicates that forest is set of the present.

### Floristic richness

The high value for Simpson index (0.90) indicates that out of every 100 pairs of individuals taken randomly, 10 belong to same species that reveals high floristic richness of the forest. The lower N/S ratio of plot (3.3) suggested that the number of individuals of the species in plot was less. Shannon- Wiener's index (h'=2.763) and equitability value (E=0.869) were high which indicates moderate representation of the most of the species in the forest (Table 6). At last diversity indices revealed that the forest showed high diversity.

### Conclusion

In Hudguru RF, *Lagerstroemia lanceolata* was showed high relative frequency and high relative density which indicates that species were distributed evenly and relatively common along the transect as well as it showed very high relative dominance (15.10) hence IVI was maximum (55.40).



This indicated that it is very important species within the community. The Fabaceae were showed maximum FIV (90.52) hence the Fabaceae is an important family in the forest. So Hudgur RF is represented by different species of Fabaceae but *Lagerstroemia lanceolata* alone dominate the forest.

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