

# Floristic Investigation and Soil Analysis of Thirtharapura Reserve Forest, Chikkanayakanahalli, Karnataka, India

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## ABSTRACT

The present study is on floristic investigation and soil analysis of Thirtharapura reserve forest, Tumkur district, Karnataka, India. It is the dry deciduous type of forest contains a rich diversity of angiosperms, here we found a total of 126 taxa of 99 genera under the 41 families from this forest. Fabaceae (15 genera and 24 species) was the dominant family followed by the Rubiaceae (8 genera, 9 species), Asteraceae (7 genera, 7 species), Rutaceae (5 genera, 5 species), Malvaceae (4 genera, 5 species) and Moraceae (2 genera, 6 species) with the medicinal, timber yielding, ornamental and wild edible plant species. The forest is majorly covered by tree species with 60% come after shrubs (21%), herbs (10%), and climbers (9%). Some important medicinal plant species like *Erythroxylummonogynum*, *Hemidesmus indicus*, *Rhinacanthusnasutus*, *Azadirachta indica*, *croton bonplandianus*, *Diosporusmontana*, *Echinopsechinatus*, *Embllica Officinalis*, were often these medicinal plants used for the treatment of pain, wounds, cuts, and fractures, etc. by the native peoples. The forest soil contains low content of nitrogen along with sulphur and copper but it has high content of Iron and Manganese nutrients. The forest was disturbed by firing, mining activities, and human activities. Only the tree species were withstanding against the firing activity, herbaceous species were lost along with new sprouting species due to firing activity in the forest. The Fabaceae species were more survive in this forest, because of nitrogen-fixing capacity in their root system.

**KEYWORDS:** Floristic, Angiosperms, Habits, Fabaceae, Soil analysis, Nitrogen

## INTRODUCTION

Thirtharapura reserve forest [TRF] is famous in the name called Madalingana Kanive, and it is a long chain row of hills. The dry deciduous type of forest is sheltered to some of medicinal, timber-yielding, wild edible, ornamental plant species in terms of herbs, shrubs, climbers, and trees. Every biogeographic region of India contains 50% of ethno medicinal plants used by the local peoples and a few of them are used by doctors, scientists, and practitioners [1]. Few, important medicinal plant species like *Erythroxylummonogynum*, *Hemidesmus indicus*, *Azadirachta indica*, *Bauhinia purpuria*, *Pongamia pinnata*, *Tamarandus indica*, *Embllica Officinalis*, *Aegle marmelos*, *Santalum album*, *Solanum xanthocarpum*, *Tylophora indica*, *Mimosa pudica*, *Euphorbia hirta*, *Achyranthes aspera*, etc. [2] were found in this ecosystem. This floristic study helps to know the plant species and to create awareness among medicinal plants and its conservation strategy of the study area [3]. Due to human activities, urbanization, industrialization, construction activity, forest fire, grazing were reasons for the destruction of the forests [4]. Additionally, climate change, global warming, and biodiversity losses were also causing a serious impact on the environment [5].

Soil is one of the important factors for the availability of nutrients, especially the nitrogen, Phosphorus, Potassium,

and Sulphur elements for plant growing and fertility [6] The availability of nitrogen and phosphorus was low in the Tumkur region along with the deficiency of boron and zinc but sufficient content of Fe, Cu, and Mn micronutrients [7].

The Geological survey reported the Iron and Manganese ores were abundant along with the limestone including bauxite and Gneiss ores were present in the land of Thirtharapura reserve forest, so the region is called as mineral wasp [8]. The mining activities have altered the structure and function of forest flora, which leads to being the destruction of the forest. For the last decades, the forest was protected under the government. Till now, the Thirtharapura forest suffered from forest firing, which will affect the introduction of a new species and loss the herbaceous plants.

This forest has abundant plant biodiversity and vegetation but it remains unknown to the peoples. Due to some forest firing, human activities, and mining activities of Thirtharapura reserve forest lost its plant resource. There were no much earlier research works of this area, therefore, the present study assesses the floristic composition, diversity of vegetation, and soil analysis of the Thirtharapura reserve forest.

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**Methodology:****Study area:**

The present study was conducted in the regions (Forest nursery, Madalinga hill, and Gini vajra) of TRF. The forest was reserved around 3447.35 hectares, and located at 13° 18' latitude and 76° 47' longitude, with 2596 feet height above the sea level. The highest temperature is recorded as 28.4 °C in April, and the lowest temperature occurs in December at 21.6 °C. The average annual rainfall is 581mm / 22.9 inches [9, 11] has been reported.

**Floristic investigation:**

The floristic study was conducted during 2020-21 in the 3 different sites of TRF (Forest nursery, Madalinga hill, and Gini vajra). During the survey, the identified species were recorded, photographed, and collected. The identified species were dried with pressed and after pasted on the herbarium sheets. The field data concerned with a local name, habit, morphological characters, colour, floral parts were recorded during the field study. The plant species were

identified by a taxonomist, cross-check with flora and with digital JCB Herbarium [12, 13, 14, 15]. The Prepared herbarium was preserved in the Department of studies and research in Botany, Tumkur University for future reference.

**Soil analysis:**

The soil sample was collected by the central and foot part of the forest hills. The surface was cleaned and drive the auger at 15cm depth into the soil, the 10-15 samples were collected in a zig-zag manner. All the samples were mixed well and removed the unwanted materials like stones, roots, pebbles, and gravels. The mixed sample should be reduced in using the quartering method. The quartering should be made by 4 equal parts and removed from the opposite quarters. This procedure was repeated for obtaining desired sample size. Finally, got the pure and fine powdered form soil carried through the clean polythene bag [16]. The soil analysis was done by the agriculture research centre of ICAR-Krishi Vignana Kendra (KVK), Hirehalli, Tumkur.

**Result:****Floristic study:**

The study explored a total of 126 plant species belonging to 99 genera and 41 families grouped under the Angiosperm of Thirtharapura reserve forest. The enlisted floristic data along with their botanical name, habit, common name, vernacular name, and family.

**Table 1: The representation of enlisted plants data as Botanical name, Habit, Common name, Vernacular name and family.**

SL NO	BOTONICALNAME	HABIT	COMMONNAME	VERNACULAR NAME	FAMILY
1	<i>Acacia concinna</i> (Willd.) DC.	T	Soap pod	Seegekayi	Fabaceae
2	<i>Acacia catechu</i> (L. f.) Willd.	T	Senegalia catechu	Kaggali	Fabaceae
3	<i>Acaciachundra</i> (Rottler) Willd.	T	Red cutch	Taredu	Fabaceae
4	<i>Acacia leucophloea</i> L.	T	Vachellialeucophloea	Bilijaali	Fabaceae
5	<i>Acacia melanoxylon</i> R. Br.	T	Australian black wood	Jaali	Fabaceae
6	<i>Acacia nilotica</i> (L.) DELILE	T	Gum arabic tree	Kari jali	Fabaceae
7	<i>Acacia planifrons</i> Wright & Arn.	T	Umbrella thrn	Odejali	Fabaceae
8	<i>Achyranthus aspera</i> L.	H	Chaff- flower	uttarani	Amaranthaceae
9	<i>Aegle marmelos</i> (L.) Correa	T	Beli fruit	Bilvapatre	Rutaceae
10	<i>Agave americana</i> (L.)	S	Century plant	anekattale	Asparagaceae
11	<i>Ailanthus excelsa</i> Roxb.	T	Heaven tree	Hebbevu	Simaroubaceae
12	<i>Albizia amara</i> (Roxb.) Boiv.	T	Oil cake tree	Chigare	Mimosaceae
13	<i>Albizia lebbeck</i> (L.) Benth.	T	Women's tongue	Baage	Mimosaceae
14	<i>Anacardium occidentale</i> L.	T	Cashew	Godanbi, geru	Anacardiaceae
15	<i>Andrographis serpyllifolia</i> (Rottler ex vahl) Weight	H	Creeping creat	Kasinasaradagida	Acanthaceae
16	<i>Anogeissus latifolia</i> (Roxb. Ex DC.) Wall.	T	Ayle wood tree	Dindiga	Combretaceae
17	<i>Aristida congesta</i> Roem. & Schult.	H	Broom grass	Porkehullu	Poaceae
18	<i>Artocarpus heterophyllus</i> Lam.	T	Jack fruit	Halasu	Moraceae
19	<i>Azadirachta indica</i> A. Juss.	T	Neem	Bevu	Meliaceae
20	<i>Baswellia serrata</i> Triana & Planch	T	Indian oli-banum	Guggula mara	Burseraceae
21	<i>Bauhinia purpurea</i> L.	T	Purple bauhinia	Devakanchan	Fabaceae
22	<i>Borreria articularis</i> L. f	H	Madanaganthi	Madanagante	Rubiaceae
23	<i>Buchanania axillaris</i> (Desr.) TP Ramamoorthy	T	Cuddapahalmand	Maradi	Anacardaceae
24	<i>Butea monosperma</i> (Lam.) Taub	T	Flame of forest tree	Muttuga	Fabaceae
25	<i>Cajanus scarabaeoides</i> (L.) Houars	H	Showy pigeon pea	Bankulli	Fabaceae
26	<i>Calatropis gigantia</i> (L.) Dryand	S	Crown flower	Ekkadagida	Apocyanaceae
27	<i>Calophyllum inophyllum</i> L.	T	Indian lourel	Honne	Clusiaceae
28	<i>Canthium coromandelicum</i> (Burma f.)	H	coromondelcanthium	Kaaremullu	Rubiaceae
29	<i>Capparis grandiflora</i> Hook & Thomson	S	Large-petal caper	Dudupi	Capparaceae

30	<i>Cassia auriculata L.</i>	S	Matura tea tree	Tangadi	Fabaceae
31	<i>Cassia fistula L.</i>	T	golden shower tree	Kakke	Fabaceae
32	<i>Cassinegluca (Rottb). Kuntze</i>	T	Ceylanteak	Mookarki	Celastraceae
33	<i>Chloris virgata SW.</i>	H	Feather finger grass	Gudihullu	Poaceae
34	<i>Chloroxylon swietenia DC.</i>	T	East indian satin wood	Bittula	Rutaceae
35	<i>Chromolaena odorata (L.) R. M. King&amp;H. Rob</i>	S	Siam weed	Kamyunistsasya	Asteraceae
36	<i>Cocculus hirsutus (L.) W. Theob.</i>	C	Broom creeper	Daagadiballi	Menispermaceae
37	<i>Crotalaria pallida</i>	H	American crotalaria	Gijigijigida	Fabaceae
38	<i>Croton bonplandianus L.</i>	S	Ban tulsi	Alpha bedisoppu	Euphorbiaceae
39	<i>Cymbopogon coloratus Stapf</i>	H	Lemmon grass	bade hullu	Poaceae
40	<i>Dalbergia latifolia Roxb.</i>	T	East indian rose wood	Beete mara	Fabaceae
41	<i>Dalbergia paniculata Roxb.</i>	T	Dhobin, Phansi	Pachali	Fabaceae
42	<i>Dalbergia sisso DC.</i>	T	Indian rose wood	Beete	Fabaceae
43	<i>Delonix regia (Hok.) Raf</i>	T	Royal poinciana	Gantigehoovu	Fabaceae
44	<i>Dendrocalamus strictus (Roxb.) Nees</i>		Male bamboo	Gandubidiru	Poaceae
45	<i>Diospyros melanoxylon Roxb.</i>	T	Black ebony	Abanasi	Abinaceae
46	<i>Diospyros montana Roxb.</i>	T	Bombay ebony	Jagalaganti	Abinaceae
47	<i>Dodonaea viscosa (L.) Jacq</i>	S	Hop bush	Bandariki	Sapindaceae
48	<i>Echinopsechinatus Roxb.</i>	H	Indian globe thistle	Brahmadanda	Asteraceae
49	<i>Emblica officinalis L.</i>	T	Indian gooseberry	Amla	Phyllanthaceae
50	<i>Endostemon viscosus (Roth) M. R. Ashby</i>	S	Sticky wild Basil	Kaadutulasi	Lamiaceae
51	<i>Erigeron canadensis L.</i>	H	Canadian horse weed	Jarayupriya	Asteraceae
52	<i>Erythroxylum monogynum Roxb.</i>	T	Bastard sandal	Natkadeodar	Erythroxylaceae
53	<i>Eucalyptus obliqua L. Her</i>	T	Messmate stringy bark	Neelagiri	Myrtaceae
54	<i>Euphorbia antiquorum L.</i>	S	Malayan spurge tree	Mandukalli	Euphorbiaceae
55	<i>Euphorbia hirta L.</i>	H	Asthama plant	Akkigida	Euphorbiaceae
56	<i>Euphorbia nivulia Buch. Ham</i>	S	Holy milk hedge	Dubbakalli	Euphorbiaceae
57	<i>Evolvulus sinoides Linn.</i>	H	Dwarf morning glory	Vishnykranthi	Convolvulaceae
58	<i>Ficus bengalensis L.</i>	T	Banyan tree	Alada mara	Moraceae
59	<i>Ficus drupacea Thunb.</i>	T	Mysore fig	Gooni mara	Moraceae
60	<i>Ficus racemosa L.</i>	T	Cluster fig	Rumadi	Moraceae
61	<i>Ficus religiosa L.</i>	T	Peepal tree	Aralimara	Moraceae
62	<i>Ficus virens Aiton</i>	T	White fig	Basari mara	Moraceae
63	<i>Gardenia gummifera L. f</i>	T	Gardenia gummy	KaaduBikke	Rubiaceae
64	<i>Gardenia latifolia Ait.</i>	T	Indian box wood	Kalkambi	Rubiaceae
65	<i>Gliricidia sepium (Jacq). Kunth ex Walp</i>	T	Mother of Cocoa	Gobbarada mara	Fabaceae
66	<i>Grewia asiatica L.</i>	S /T	Phalsa	Phalsa	Malvaceae
67	<i>Gymnema sylvestre R. Br</i>	C	Sugar killer vine	Madhunashini	Apocyanaceae
68	<i>Gymnosporia emarginata (Wild.) Thw.</i>	T	Thorny stoff tree	Thandrasa	Celastraceae
69	<i>Hardwickia binnata Roxb.</i>	T	Anjan	Kamara	Fabaceae
70	<i>Hemidesmus indicus (L.) R. Br</i>	H	Indian sarsaparilla	Sogade	Apocyanaceae
71	<i>Holoptelea integrifolia (Roxb.) Planch</i>	T	Jungle cork tree	Tapsi	Ulmaceae
72	<i>Hyptis suaveolens (L.) Kuntze</i>	H	American mint	Natitulasi	Lamiaceae
73	<i>Ipomea obscura (L.) Ker Gwal</i>	H	Small white morning glory	Mugutiballi	Convolvulaceae
74	<i>Ixora pavetta Andr.</i>	T	Torch wood tree	Goravi	Rubiaceae
75	<i>Jasminum auriculatum Vahl.</i>	C	Needle flower jasmine	Kaadumallige	Oleaceae
76	<i>Jasminum rottlerianum Wall.</i>	H	White bracted jasmine	vaaramallige	Oleaceae
77	<i>Lantana camara L.</i>	S	West indianlantana	Kakke	Verbinaceae
78	<i>Lepidagathis cristata Willd</i>	H	Crested lepidagathis	Surya kantha	Acanthaceae
79	<i>Leucas aspera Willd.</i>	H	Leucas	Tumbegida	Lamiaceae
80	<i>Limonia acidissima L.</i>	T	Wood-apple	Belvatte mara	Rutaceae
81	<i>Mangifera indica L</i>	T	Mango tree	Mavu	Anacardaceae



82	<i>Mimosa pudica L.</i>	H	Touch me not	Muttidare muni	Fabaceae
83	<i>Mitracarpushirtus (L.)</i>	H	Tropical girdlepod	Channagundi	Rubiaceae
84	<i>Morinda tinctoria Roxb.</i>	T	Indian malberry	Tagate mara	Rubiaceae
85	<i>Muntingiacalabura L</i>	T	Jam tree	gasagase	Muntingiaceae
86	<i>NaringicrenulataRoxb.</i>	T	Elephant nettle	Kadu bilvapatre	Rutaceae
87	<i>Oldenlandiaumbellata L.</i>	H/C	Chay root	Chaya беру	Rubiaceae
88	<i>Opuntia dillenii Haw.</i>	H	Australian pest pear	papaskalli	Cactaceae
89	<i>Parthenium hysterophorus L.</i>	H	Carrot grass	Congress gida	Asteraceae
90	<i>Pavonia odorata Willd.</i>	H	Fragrant swamp mallow	Balarakshigida	Malvaceae
91	<i>Pavoniazeylanica L.</i>	S	Ceylan swamp mallow	Anntutogari	Malvaceae
92	<i>Phoenix sylvestris (L.) Roxb.</i>	T	Dolo sugar palm	Echalu	Arecaeae
93	<i>Phyllanthus reticulatus Poir.</i>	S	Black honey shrub	Kari huli	Phyllanthaceae
94	<i>Phyllanthus virgatus G. Forst</i>	H	Seed under leaf	Kaadunelli	Phyllanthaceae
95	<i>Pongamia pinnata (L.) Panigrahi</i>	T	Indian beech	Honge mara	Fabaceae
96	<i>Prosopis juliflora (SW.) DC</i>	T	Mesquite	Ballarijali	Mimosaceae
97	<i>Pterocarpus marsupium Roxbergh</i>	T	Indian kino tree	Sura honne	Fabaceae
98	<i>Rhinocanthusnasutus (L.) Kurz</i>	S	Snake jasmine	Naga mallige	Acanthaceae
99	<i>Santalum album L.</i>	T	Indian sandal wood	Chandana	Santalaceae
100	<i>SapindusemarginatusVahl.</i>	T	Notched leaf soap nut	Kudalekaye	Sapindaceae
101	<i>Scutiamyrtina (Burm. f.) Kurz</i>	S	Cot thorn droog	Kurudi	Rhamnaceae
102	<i>Shroea roxburghiiG. Don</i>	T	Talura lac tree	Jaalari	Dipterocarpaceae
103	<i>Sida acuta Burm. f.</i>	H	Wire weed	Vishakaddi	Malvaceae
104	<i>solanum incanum L.</i>	H	Thorn apple	Gullabadane	Solanaceae
105	<i>Solanum nigrum L.</i>	H	Black night shade	Kaki hannusoppu	Solanaceae
106	<i>Solanum xanthocarpumSchrad. &amp;H. Wendl.</i>	H	Febrifuge plant	Kantakaari	Solanaceae
107	<i>Stachytarpetta indica (L.) Vahl</i>	H	Indian snake weed	Kariyuttrani	Verbinaceae
108	<i>Strychnospotatorum (L.)</i>	T	Clearing nut tree	Kathaka	Loganiaceae
109	<i>Syzygium cumini (L.) Skeels</i>	T	Malabar palm	Neerale	Myrtaceae
110	<i>Tamarindus indicus L.</i>	T	Tamarind	Hunuse	Fabaceae
111	<i>Tarenna asiatica (L.)</i>	S	Asiatic tarenna	Kumngida	Rubiaceae
112	<i>Tectona grandis L. f.</i>	T	Teak	Teega	Verbinaceae
113	<i>Tephrosia purpurea L.</i>	T	Wild indigo	Kaggili	Fabaceae
114	<i>Terminalia arjuna (Roxb.) Wight &amp;Arn.</i>	T	Arjun tree	Toorematti	Combretaceae
115	<i>Terminalia alata Heyne ex Roth</i>	T	Terminalia ellipta	Matti	Combretaceae
116	<i>Terminalia bellarica (Gaertn. )Roxb.</i>	T	Bellaricmyrobalan	Taare	Combretaceae
117	<i>Terminalia catappa L.</i>	T	Indian almand	Kaadubadami	Combretaceae
118	<i>Terminalia chebula Retz.</i>	T	Chebolic myrobalan	Alale	Combretaceae
119	<i>Thespesia populnea (L.) Sol. Ex Correa</i>	T	Portia tree, pacific rose wood	Buguri mara	Malvaceae
120	<i>Toddalia asiatica (L.) Lam.</i>	C	Forest peppar	Doddakaadumenasu	Rutaceae
121	<i>Trichodesmazeylanicum (Burm. f.) R. Br.</i>	H/S	Camel bush	Ethinanaaligegida	Boraginaceae
122	<i>Tridax procumbens L.</i>	H	Coat buttons	Javanthi	Asteraceae
123	<i>Tylophora indica (Burm. f.) Merr.</i>	C	Vomiting swallow wort	Adumuttadagida	Apocyanaceae
124	<i>Vernonia cinerea (L.) Less.</i>	H	Dandotapala	Kaaduhogesoppu	Asteraceae
125	<i>Vicoa indica (L.) DC.</i>	H	Golden daisy	Moogatisoppu	Asteraceae
126	<i>Viscum articulatumBurm. f.</i>	C	Leafless mistletoe	Badanike	Santalaceae

\*Habit: H= herb, S= shrub, T= tree and C= climber

**Soil analysis:**

The forest soil was containing a 6.6 PH with 0.21 electrical conductivity, and with low organic carbon content. The micro and macronutrients of nitrogen, phosphorus, potassium, calcium, magnesium, Sulphur, iron, manganese, zinc, and copper were found in the TRF soil.

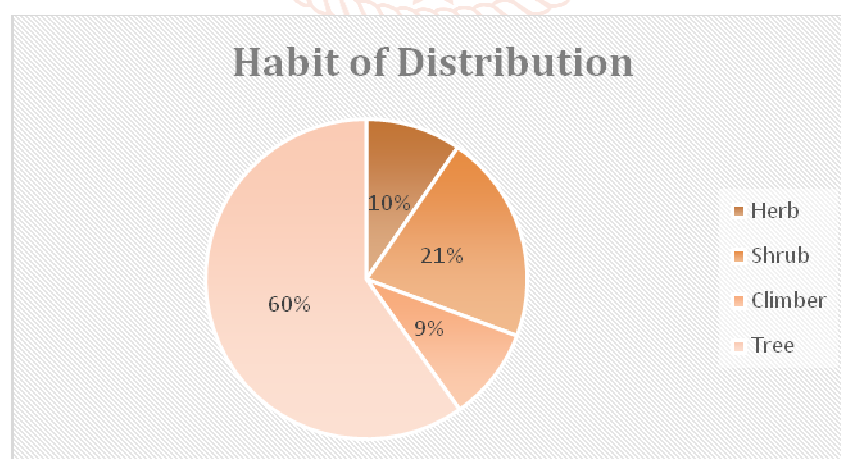
**Table 13: - Soil analysis of the forest.**

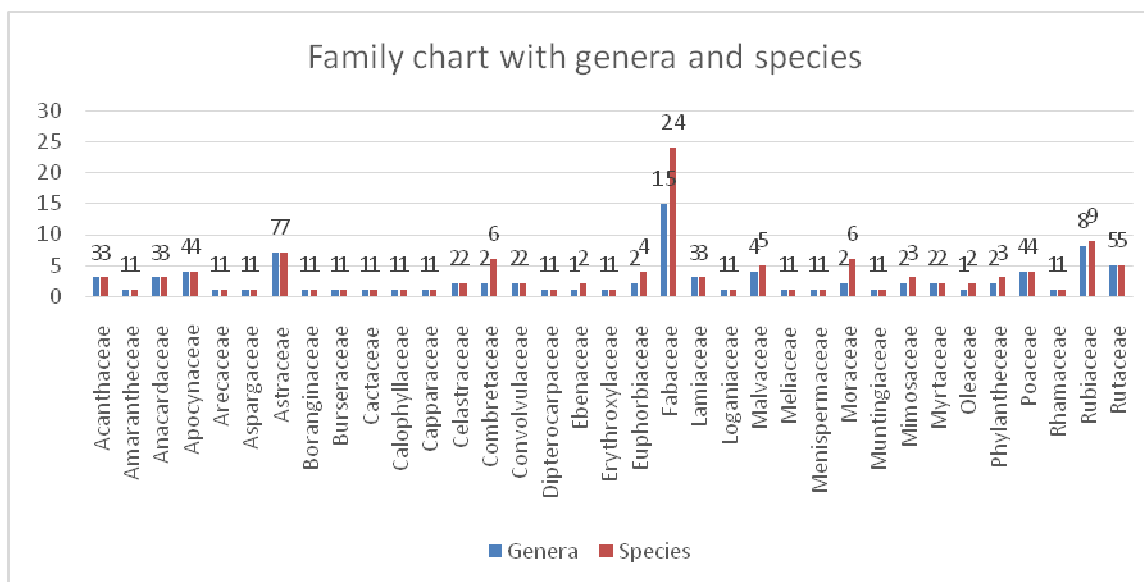
Soil health information	Units	Observed	Critical limit	Remarks
1. Soil pH	(1:2)	6.6	6.50-7.50	safe
2. Electrical conductivity	(dSm-1)	0.21	<1.00	Safe
3. Organic carbon	(%)	0.7	0.75-1.00	Low
Major nutrients				
4. Available nitrogen	Kg/Ha	253.1	230-560	Low
5. Available phosphorus	Kg/Ha	25.7	22.5-55	Safe
6. Available potassium	Kg/Ha	224	125-336	Safe
Secondary nutrients				
7. Available calcium	(ppm)	1210	800-1500	Safe
8. Available magnesium	(ppm)	215	150-250	Safe
9. Available sulphur	(ppm)	5	10–15	Low
Trace nutrients				
10. Available iron	(ppm)	13.5	5–10	High
11. Available manganese	(ppm)	9	3–8	High
12. Available zinc	(ppm)	0.9	0.75-1.00	Safe
13. Available copper	(ppm)	0.2	0.50-1.00	Low

\*ppm- parts per million, kg- killogram, Ha-hectares

**Discussion:**

TRF is one of the reserve forests in Karnataka state with a rich repository to native and endemic species of 126 plant species belonging to 99 genera and 41 families in terms of trees (60%) followed by shrubs, (21%), herbs (10%), and climbers (9%). The tree species were major with a height of 25 feet and were not much more than that, except for some species like *Acacia chundra*, *Eucalyptus obliqua*, *Shorea roxburghii*, *Syzygium cumini*, *Albizia lebbek* were distributed throughout the forest. The TRF was dominated by the Fabaceae (15 genera and 24 species) family come after the Rubiaceae (8 genera, 9 species), Asteraceae (7 genera, 7 species) Rutaceae (5 genera, 5 species) Malvaceae (4 genera, 5 species) and Moraceae (2 genera, 6 species). The forest contains medicinal plants (*Erythroxylum monogynum*, *Hemidesmus indicus*, *Rhinacanthus nasutus*, *Azadirachta indica*, *Croton bonplandianus*, *Diospyros montana*, *Echinopsechinatus*, and *Embolia officinalis*), wild edible plants (*Solanum nigrum*, *Terminalia chebula*, *Anacardium occidentale*, *Tamarindus indica*, *Canthium coromandelicum*), timber yielding plants (*Acacia chundra*, *Acacia nilotica*, *Albizia lebbek*, *Ailanthus excels*, *Dalbergia latifolia*, *Hardwickia binata*, *Santalum album*, *Tectona grandis*, *Terminalia alata*), ornamental plants (*Shorea roxburghii*, *Jasminum auriculatum*, *Delonix regia*) were distributed throughout the forest and sheltered to fauna like the cheetah, bear, peacock, wolf, Kangaroo, etc.

**Figure 1: Showing habit of species distribution percentage in TRF**



**Figure 2: Showing families with their genera and species number in the TRF**

A few decades ago, surrounding peoples were cut down the trees like Jane, Pachali, Maradi, Tupra, Muttuga, Teak, Beete, Honne, and Jalary for timber purposes [10]. The ornamentally used plants such as *Jasminum auriculatum* and *Shroea roxburghii* were found in the foothills of the forest. Now the forest was protected by the government. According to the survey of villagers, the above-mentioned medicinal plant species were used for the treatment of pain, wounds, cuts, and fractures, etc. The forest was utmost with tree and shrub-like species because of forest facing a problem with firing during every summer. Due to this, the herbaceous species were destroyed by burning along with the new sprouting species. This study was conducted in 3 different sites of the forest, there were no different species found over the forest. A few years ago, the forest flora was disturbed by the mining activities, now it was stopped but the mining area should look barren. This forest facing so many problems to conserve itself by the human activities like grazing, cutting, mining activities, and forest firing.

Soil is the main component to the availability of nutrients and minerals for the growth of the plant. The Nitrogen, Phosphorous, Potassium is the primary component for growing and the plant absorbs nitrogen than any other nutrient [6]. The nitrogen, Sulphur, and copper contents were very low but iron and manganese were very high in this region. The forest was rich with Leguminosae (Fabaceae) species because of the nitrogen-fixing capacity in their root system with the help of rhizobia bacteria. These species were also allowed to improve the soil [17]. The rhizobia bacteria have the special ability to fixing the nitrogen from the atmosphere, converting the molecular nitrogen ( $N_2$ ) into ammonium ( $NH_4^+$ ) form usable by plants [18]. Fabaceae species were more survive compared with others in the soil.

### Conclusion:

The dry deciduous type of TRF was a rich number of angiosperms with 126 taxa with 99 genera and 41 families in terms of herbs, shrubs, climbers, and trees of medicinal, timber yielding, ornamental and wild edible species. The Fabaceae (15 genera of 24 species) was dominant family along with Rubiaceae (8 genera, 9 species), Asteraceae (7 genera, 7 species), Rutaceae (5 genera, 5 species), Malvaceae (4 genera, 5 species) and Moraceae (2 genera, 6 species). The forest soil contains less nitrogen due to this Fabaceae species were abundant in this region because of nitrogen fixation capacity in their root system. The high content iron and manganese minerals were attracting the mining activities. Therefore, this forest needs to conservation strategy from the firing, mining activities, and human activities.

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