© 2016 IJSRSET | Volume 2 | Issue 4 | Print ISSN: 2395-1990 | Online ISSN : 2394-4099
Themed Section: Engineering and Technology

Floristic Diversity with Reference to Rare and Threatened Plants from the Forest of Yadgir District, Karnataka-India

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ABSTRACT

Tropical forests are major reservoir of the plant diversity. These forests inhabit a large number of trees, shrubs, herbs, climbers also a wealth of non-timber forest products, medicinal and wild edible plants. Knowledge of forest structure and floristics are necessary for the study of forest dynamics. The dry deciduous forest of Yadgir district has rich vegetation and the area has many plant species which are migrated, introduced, isolated and explored ones. The present survey is based on the results obtained from both the intensive and extensive floristic studies of the vegetation area for 4 years during 2011-2015. The study revealed 570 species of Angiosperms under 392 genera, which includes 18 monocot genera belonging to 101 families among them 38, enumerated as rare, endangered and threatened plants which illustrated with their botanical names, local names, red data categories and present status in the study area. Study also highlights that some rare or endangered plants abundantly found in the forest, are need more attention towards protection.

Keywords: Floristic Diversity, Endangered, Rare and Extinct pants, Forest, Yadgir

I. INTRODUCTION

Biodiversity in general is a complex and balanced network of different species which mutually dependent on each other. Floral and faunal diversities are two facts components of biodiversities, which covers the variety, and variability of species. Tropical forests are major reservoir of plant diversity. Those forests inhabit a large number of trees, shrubs, herbs, climbers, faunal, wealth and a wealth of non-timber forest products including medicinal and wild edible plants. India's forest cover is about 19.44 of its total geographical area (Mulchand M *et al.,* 2013). The Government of India has already mandate up with a Biodiversity Acts, 2002 and National Environment policy, 2005. To achieve the effective implementation of the above acts one must have a comprehensive update list of plants and animals of the region concentrating local biodiversity with particular interest to rare and threatened taxa.

The floristic diversity of Karnataka has documented by Saldhana *et al* (Vol. I (1984) and Vol II (1996) in details. A Comprehensive study conducted on Flora of North of Eastern Karnataka by N.P. Sing (1988) published in two volumes.

According to IUCN an endangered species is a population of organism which is at risk of becoming extinct because it is either few in numbers. "Threatened species" is a related term, referring to a species likely to become endangered within the near future. The species Survival Commission of the International Union for Conservation of Nature and Natural Resources (IUCN) published information online about approximately 41,500 endangered species worldwide as the Red List of Threatened species. In India, the Botanical Survey of India (BSI) first published the work on threatened plants in 1980. Jain and Sastry, 1980 published a small booklet entitled "Threatened plants of India and reported 135 species as being rare and threatened in Indian flora. Later on comprehensive work on rare and threatened plants of India was also published by BSI in the form of a book in three volumes entitled "RED DATA BOOK OF INDIAN PLANTS" (Nayar and Sastry, 1987, 1988,

1990). In this regard FRLHT has created computerized databases on the, and threat status of Southern Indian Medicinal plants. Thus, in this paper an attempt has been made to document floral components and rare or threatened plants, of the Yadgir forest and further suggested for further needful action.

The Study Area

Yadgir is a district of North eastern part of Karnataka lies between Latitude 16^0.79 N Longitude 77^0.14 E. **(Figure-1)** comprising of 5234 Sq kms of geographical area. Topographically consists of about 27,749.19 hectares of Tropical dry deciduous scrub forest which is under the ownership of forest department and is distributed in three different taluks such as Yadgir, Shorapur and Shahapur. Among the total forest area covered 9471.28 hectares is Reserve forest and 6525.39 hectares is unclassified forest and no forest area has been declared as protected. The highest point altitude recorded in the forest is 560M and lowest point in the stream level 445M and mean 500M. The average Annual Rainfall recorded during 2011-15 is 636mm. Yadgir district has been blessed by the incessant flowing of two main rivers Krishna and Bhima in addition to these two, a few tributaries flow in this region.

II. METHODS AND MATERIAL

Extensive field surveys were conducted in the district during 2011-15 during different seasons through regular field visits in order to get maximum representations. The survey tours had been planned in such a way that it was possible to cover all the seasons of the year and so almost all the months of the year. Thus it was made possible to have a comprehensive and exhaustive study of the vegetation of the entire area which resulted in the representative collection of medicinal plants at monsoon and post monsoon period. It also covered different habitats in the area like aquatic, semi aquatic or marshy, open grassland, weeds of cultivated fields, fallow land, waste places and along the roadsides, hill slopes and tops etc. Rare and endangered plants were recorded by measuring IUCN categorization also by literature.

The plant species identification was carried out using the "*Flora of Gulbarga District*" by Seetharam *et al* (2000), The *"Flora of the Presidency of Madras*" Vol I to III, by Gamble (1957) and Flora of North of Eastern Karnataka by N.P. Sing (1988) and detailed study of *Flora of Karnataka* Vol. I (1984) and Vol II (1996) by Saldanha *et al.* The Photograph and voucher specimens were deposited at the Herbarium Department of Botany, Government College, Gulbarga and Gulbarga University, Gulbarga (HGUG).

III. RESULTS AND DISCUSSIONS

Floristic and taxonomical surveys were conducted in forests of different taluks of yadgir district. During the course of investigation documented 570 angiosperms taxa for floristics analysis and are belonging 392 genera which include 18 monocot genera belonging to 101 families.

Tropical Mixed Moist/Dry Deciduous Forest

This type of forest are found in humid hilly area of the forest which is dominated with trees like *Anogeissus latifolia, Butea monosperma, Diospyros melanoxylon, Mitragyna parviflora, Terminalia spp. Wrightia tinctoria Tamarindus indica, Sterculia, Boswellia, Ficus Wrightia tinctoria, .Soymida febrifuga* etc.

Scrub Forest

The typical vegetation of the scrub forest is very sparse and constitutes of *Acacia senegal, A. leucophloea, A. chundra, Capparis spp. Dichrostachys cineraria, Mimosa hamata, Albizzia amara, Canthium sps, Zizypus spp Balanites roxburghii* etc.

Further it is revealed 38 taxa belonging 23 families and two sub families among them 16 are trees, 3 are shrub/small tree 9 herbs 10 climbers/twiners/creepers have been illustrated as threatened or rare and are belong to 29 families. All the 38 plant species are enumerated with their botanical names, local names, habit, red data categories and present status in the study area. Many of endangered plant species have immediate and more attention for their conservation. The present study also mainly highlights that some rare or endangered plants abundantly found in the forest are need more attention towards protection.

Similar floristic study was carried out by Mulchand and et al (2013) and reported 432 floristic elements in the Patnadevi Forest of Maharasthra also stated that 4

are endemic plant species like wise Pratima and Rajasamarsen (2015) reported 209 angiosperm species spreads under 169 genera belonging to 57 families among those 54 species are investigated medicinally important and 14 are Red listed one from the Gavisiddalingeshwara sacred grove of Yadgir district of Karnataka

Barethlott *et. al*., (2000) stated that in the Encyclopedia of Earth, over 8,000 plant species worldwide are officially threatened or endangered and observed that in general more than 25% taxa are under various degrees of continuous threat globally. The present findings revealed that 38 plant species have been documented as rare and threatened. Hence, these taxa have been categorized in to risk. The present study revealed that herbs like *Indigofera tinctoria*, *Glorisa supaerba* **(Plate-2**) were analysed as critically endangered, *Bacopa monniera* and *Balanites roxburghii* **(Plate-2**) treated as endangered in the study area and these species of the study area essentially needed protection. *Boswellia serrata*, *Soymida fabrifuga*, *Limonia acidissima* **(Plate-2)** were reported as rare species were also mentioned as rare in Red data book of India. Sulekha and Shringi (2014) documented 37 species as rare and threatened plants at Jawahar Sagar Sanctury of Rajasthan also enumerated present status. Albert *et al*.,(2008) studied traditional knowledge of the some 34 rare and threatened plants of North Cachar Hills District of Assam and of opinion that 13 species documented in the present paper have not been reported about its threat status earlier, but are now threatened in the district. So, it is an alarming situation where threatened taxon requires more and more attention for preserving their genetic diversity. A few rare and threatened plant species such as *Terminalia alata* and *T. arjuna* was mentioned as rare in the Red data list of IUCN (1994-2007), but found abundantly in the present study. *Acacia catechu*, and *Wrightia tinctoria* (Plate-II) these taxa were considered as threatened in Red data categories but the present study has shown their common distribution in the study area. Mishra and Agarwal (2006) have suggested that excluding such plant species of from Red data book wherever they have become common in their distribution. Most of the species enumerated are vulnerable that is high risk of endangered in the wild. Common distribution of rare and endangered species in the study area articulated that Yadgir forest of Karnataka state harbors a large number of endangered and rare plants.

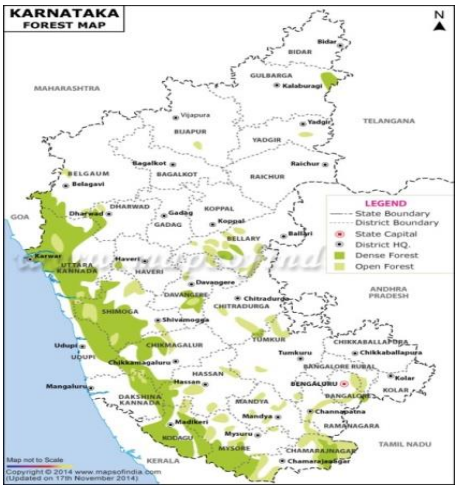
Table 1. IUCN Red List Plants distributed in Yadgir district

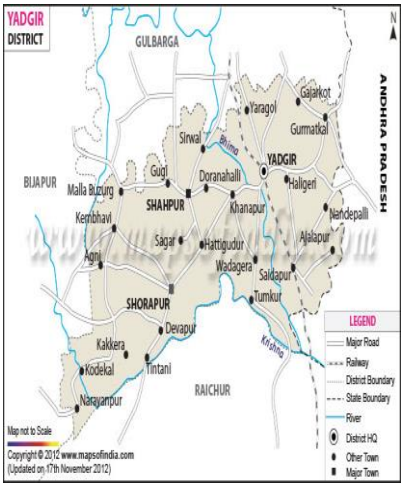
Sl. No	Name of the Plant	Name of the Family/subfamily	Habit	Vernacular/Kannada Name	IUCN Red list status
1	*Abrus precatorius* L.	Leguminosae Sub family: Papilionaceae	Climber	Gulaganji	Vulnerable
2	*Acacia catechu* (Roxb.) Willd.	Leguminosae Sub family: Mimosae	Tree	Kachu/ Khadira	Vulnerable
3	*Aegle marmelos* (L.) Corr.	Rutaceae	Tree	Bilva patre/Belada Hannu	Vulnerable
4	*Aristolochia bracteolata* Lam.	Aristolochiaceae	Twiner	Kurigida	Vulnerable
5	*Aristolochia indica* L.	Aristolochiaceae	Climber	Eshwari balli	Vulnerable
6	**Bacopa monniera* (L.) Wett.	Scrophulariaceae	Herb	Neeru Brahmi	Endangered
7	*Balanites roxburghii* Planch.	Simarubaceae	Tree	Ingula	Endangered in wild
8	**Biophytum sensitivum* (L.) DC	Geraniaceae	Herb	Horamucchuga/horam uni	Vulnerable
9	*Boerhaavia chinensis* (L.) Aschers & Schweinf.	Nyctaginaceae	Herb	Bekkina hejje balli	Vulnerable
10	***Boswellia serrata* Roxb.	Burseraceae	Tree	Dhoopada mara	Rare
11	**Caesalpinia bonduc* (L.) Roxb.	Leguminosae Sub family: Caesalpiniaceae	Shrub	Gajagada kayi	Vulnerable
12	**Catunaregam spinosa*	Rubiaceae	Tree	Kaarigida	Vulnerable

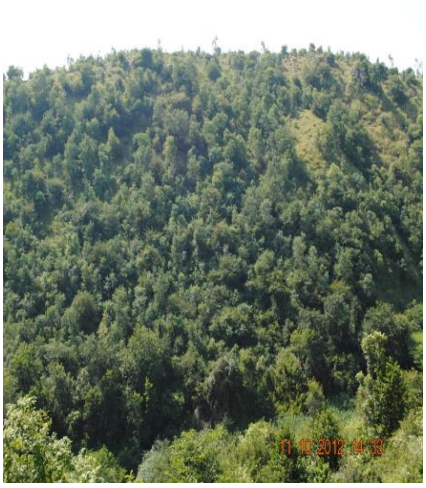
	(Thunb) *Randia demotorum* (Retz.)Lam.				
13	***Celastrus paniculatus* Willd.	Celastraceae	Climber	Jyothishmathi	Vulnerable
14	*Combretum albidum* G.Don *Syn. Combretum ovalifolium* Roxb.	Combretaceae	Climber	Edatiga	Endangered
15	*Cordia dichotoma* Forst.	Boraginaceae	Tree	Challehannu	Vulnerable
16	*Dalbergia latifolia* Roxb.	Leguminosae Sub family: Papilionaceae	Tree	Beete	Vulnerable
17	*Diospyros chloroxylon* Roxb.	Ebenaceae	Small Tree	Ninai, Nensi	Endangered
18	**Diospyros melanoxylon* Roxb.	Ebenaceae	Small tree	Beedi yele, Tumari	Endangered
19	*Gloriosa superba* L.	Liliaceae	Climber	Agnishikhe	Critically Endangered
20	*Holoptelea integrifolia* (Roxb.)	Ulmaceae	Herb	Tapsi mara	Endangered
21	**Indigofera tinctoria* L.	Leguminosae Sub family: Papilionaceae	Herb	Neeli gida	Critically endangered
22	*Limonia acidissima* L. *Syn. Feronia elephantum*	Rutaceae	Tree	Belavala, Belada gida	Rare
23	*Merremia gangetica* (L.) Cufod.	Convolvulaceae	Creeper	Ilikivie	Rare
24	*Momordica cymbalaria* Fenzl.ex Naudin	Cucurbitaceae	Creeper	Karchi kayi	Endangered
25	*Phyllanthus emblica* L. *Syn. Emblica officinalis* L	Euphorbiaceae	Tree	Bettada nelli	Endangered
26	**Plumbago zeylanica* L.	Plumbaginaceae	Herb	Chitramoola	Vulnerable
27	***Pterocarpus marsupium* Roxb.	Leguminosae Sub family: Papilionaceae	Tree	Rakta chandana	Vulnerable
28	*Santalum album* L.	Santalaceae	Tree	Srigandha	Endangered in wild
29	**Sida cordifolia* L.	Malvaceae	Herb	Bala	Endangered
30	**Soymida febrifuga* (Roxb.) Juss.	Meliaceae	Tree	Some mara	Rare
31	*Taverniera cuneifolia* (Roth.)Arn.	Leguminosae Sub family: Papilionaceae	Herb	Majeth/Jetimadaha	Vulnerable
32	*Terminali bellirica* (Gaertn.)Roxb.	Combretaceae	Tree	Taare mara	Vulnerable
33	**Terminalia alata* Heyne ex Roth	Combretaceae	Tree	Karimatti	Vulnerable
34	**Terminalia arjuna* (Roxb. *ex* DC.) Wight & Arn	Combretaceae	Tree	Hole matti	Low Risk
35	*Terminalia chebula* Retz.	Combretaceae	Tree	Alalekayi mara/Haritaki	Endangered
36	**Tinospora cordifolia* (Wild.)J Hook & Thoms	Menispermaceae	Climber	Amruta balli	Endangered
37	**Withania somnifera* (L.) Dunal in DC	Solanceae	Herb	Ashwagandha	Endangered
38	**Wrigtia tinctoria* R.Br.	Apocyanceae	Tree	Hale	Vulnerable

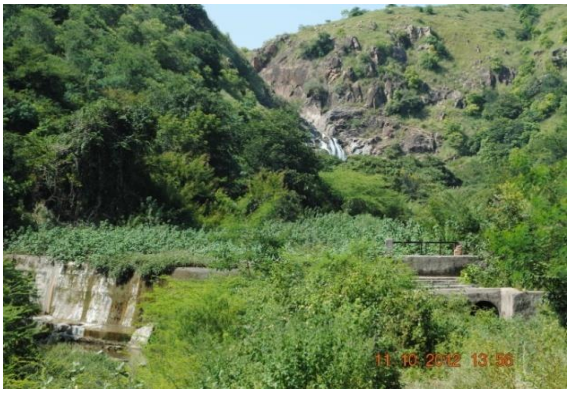
*** Abundantly found the study area, ** Extremely high risk of extinction in the wild condition**

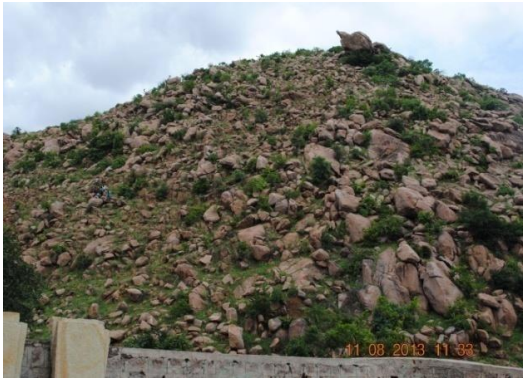
- **EW** Extinct in Wild, **CR**- Critically endangered-Extremely high risk in the wild, **EN** Endangered-High risk of extinction in the wild, **VU**- Vulnerable-High risk of endangered in the wild, **NT**- Near threatened-Likely to become endangered in near future**, LC**-Least concern-Low risk to become near threatened
- Convention on International Trade of Endangered Species of Wild Flora and Fauna **(CITES)** regulates the removal of species from the wild conditions and trade across international borders. Appendices are of 3 categories, Appendix-I list of the **Threatened** species, Appendix-II includes those that are **Vulnerable** and Appendix-III includes species which are close vigil.











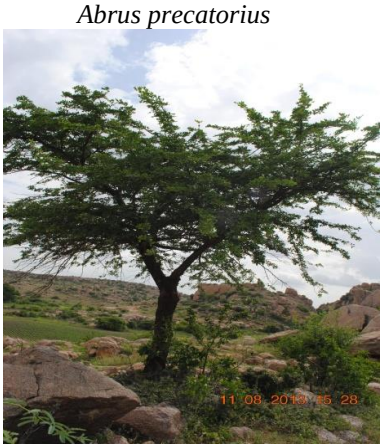
(Plate-I)

Forest view of Yadgir district in various seasons (Dry/moist deciduous to scrub forest)

Abrus precatorius

Bacopa monniera

Gloriosa superba



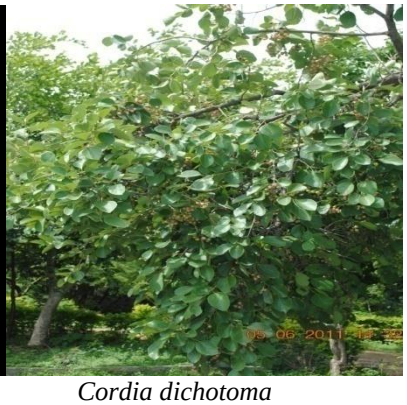
Limonia acidissima

(Habit and fruits)

Soymida fabrifuga

Wrigtia tinctoria

Boswellia serrata



Cordia dichotoma


Balanites roxburghii


***Terminalia** arjuna*


Caesalpinia bonduc

Plate-II. A Few Rare, endangered and threatened plants of the forest

IV. CONCLUSION

It is of fundamental importance for understanding biodiversity and ecosystem functioning, as it provides us with the data to explore and describe biodiversity through scientific analysis. The study provides the basic information about the habit of the plant species and information about Rare and Threatened plants which are currently found in the study area. Such list could play an important role for the local and regional authorities interested in future to conserve and sustainable use the phytodiversity for the sustainable development of the area. Forest managers can also use such information on important forestry plant species and common tree species alike to help manage habitat as well as provide cultural resource values of these trees. It will also provide a hand list on plant species distribution and diversity in Yadgir district. More attention to be given towards protection of rare or endangered plants abundantly found in the forest by means of in situ conservation for flourishment of such species for generations.

V. ACKNOWLEDGEMENTS

Authors are thankful staff members of Forest Department for feasible help during the fieldwork and Department of Statistical Records, Yadgir circle, Karnataka for extending their service and providing information.

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