

Sacred Groves—Repository of Medicinal Plant Resources: A Review

Sayantani Chanda*, T.V. Ramachandra

Energy and Wetlands Research Group, Centre for Ecological Sciences, Indian Institute of Science, Bangalore, Karnataka, India

Abstract

Sacred groves are traditionally protected forest or forest patches, with the rich repository of diverse flora with the medicinal plants. Ethno-medicinal knowledge on sacred grove plants have enormous prospects either in the form of natural resources and bio-prospecting. Now a days these small patches suffers from multiple disturbances grazing, encroachment, changing social perspective and hence medicinal plant resources. This study reviews medicinal plant resources in the sacred groves on distribution and usage pattern in five zones of Northern part of India. The study reported 827 medicinal plants where Leguminosae are the dominant family. Dominant plants include herbs with leaves having major use values. The endeavour emphasise the need to RET species of medicinal values.

Keywords: Medicinal plants, informant consensus factor (FIC), Fidelity level (FL). Threat, Conservation

***Author for Correspondence** E-mail: isayantani.chanda@gmail.com

INTRODUCTION

Historically indigenous people with the inheritance of traditional and cultural legacy were protecting the sacred groves with the practice of nature worship. It is well known that rural inhabitants of the developing countries have been using herbal medicine as healthcare to an extent of 80% global population (WHO 2001). It is also indicated that the usage of medicinal plant in regards to primary health care is still occupying the prominent position in developing countries (WHO 2002) [1]. Sacred groves are rich in rare and endemic species which are unharmed and protected by the local peoples due to the belief of the deities in the forests [2].

Tribal people in these grove areas depend on traditional medicine system for healthcare [3]. A sacred grove creates a cultural space among communities to affirm the identity and solidarity [4]. Sacred groves have been the repositories of valuable medicinal plants and wild relatives of cultivated species which have potential to address the countries food and medicine [5]. In India, studies on sacred groves with regard to ethno-medicinal plants

emphasized the local utilization of this age old tradition. Based on the review of contemporary works such as published literature, effort has been made to maintain and manage the collected records and information in consolidated form towards reviewing various aspects of ethno-medicinal plants. Objectives of the current study are (i) to develop a base line information on medicinal plant resources from sacred grove in five zones of Northern part of India, (ii) to understand the plant distribution and usage pattern, (iii) information on threats will play role in conservation and management planning.

METHODOLOGY

The current study reviews published literatures to understand the relevance of sacred groves and the goods and services.

Study Area

India has six broad geographical regions namely North-East India, Northern India, Eastern India, Western India, Central India and South India. Among these, the study covers:

North-East India: Sikkim, Assam, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura, Meghalaya.

Eastern India: West Bengal, Bihar, Jharkhand, Orissa.

Northern India: Uttar Pradesh, Himachal Pradesh, Uttarakhand, Punjab, Haryana, Jammu and Kashmir.

Western India: Rajasthan, Gujarat,

Central India: Madhya Pradesh, Chhattisgarh.

The study documented 489 sacred groves distributed across the study region (Figure 1a and b).

Data Collection

Data on ethno-medicinal plants in the sacred groves has been compiled from published papers. Effort has been made to analyse the collected data family wise medicinal plants, spatial distribution with the potential uses.

Data Analysis

Ethno-medicinal data were analysed to identify proportions of plant families with the known medicinal values, habit, plant parts, frequency and popularly used plants.

Statistical Analysis

Fidelity level (FL)

Fidelity level (FL) was computed (Friedmanetal, 1986) as per equation 1, to determine the most preferred ethnomedicinal plant species used in the treatment of a particular ailment [1].

$$FL (\%) = (Ip/Iu) \times 100 \quad (1)$$

Where, Ip is the number of informants who independently indicated the use of a species for the same major ailment and If the total number of informants who mentioned the plant for any major ailment (Friedman et al. 1986).

Informant's Consensus Factor (ICF)

Informant consensus factor (ICF) given in equation 2 [1], Heinrich et al. 1998, Trotter and Logan, 1986] provides insights to the use value of particular species among the large proportion of people based on the level of homogeneity among information provided by different informants.

$$ICF = (Nur - Nt)/(Nur - 1) \quad 2$$

Where, Nur = number of use reports from informants for a particular plant-use category; Nt = number of taxa or species that are used for that plant use category for all informants.

ICF Values range between 0 and 1, where '1' indicates the highest level of informant consent.

Determination of Threat

International Union of Conservation of Nature and Natural Resources (IUCN) categories threat status of rare, endangered plant species. The objective creating awareness about the importance of threatened species and conservation priorities at the local level.

RESULTS AND DISCUSSION

A total number of 827 medicinal plant species under 544 genera and 136 families have been recorded in this study based on the published literatures. Highest number of plant species found in Eastern zone (225 spp.) followed by Northeast (207 spp.), Northern zone (150 spp.), Central zone (125 spp.) and Western zone (125 spp.), as shown in Figure 2.

The dominant plant form is herbs (35.91 %) as represented in Figure 3 followed by trees (30.83 %), shrubs (20.07%), climbers (12.93%) and orchid (0.24%). Different plant parts have been used for curing many ailments.

It was also observed that some medicinally important plants have more than one part with the medicinal uses. Leaves have major use (25 %), along with root (16.13 %) and stem bark (11.66%), as per Figure 4.

It appears from the study that the most dominant families are Leguminosae (89 spp.) followed by Asteraceae (45 spp.) and Rubiaceae (39 spp.), depicted in Figure 5. *Ficus* with 11 species, *Dioscoreae* and *Phyllanthus* with 8 species are the most dominant genera found in the study region being depicted in Figure 6. Here 590 members of plant species have more than one use for remedial measure.

Aegle marmelos has wide use in 18 locations of different region followed by *Cynodon dactylon* (17 locations), *Azadirachta indica* (16 locations), *Ocimum tenuiflorum* (15 locations) and many are reported from at least 2 locations shown on Figure 7. The five zones of India are inhabitants by local tribes like

Kinnara, Amchi, Bodo, Bhil, Bhilala and Pataya, Meitei, Rawal, Gond, Bhumij, Kurmi, Santhal etc depends on local healthcare

system. The plant species which are used in different five zones of India for the treatment are listed for 33 ailments.



Fig. 1: (a) Spatial Distribution of Sacred Groves.

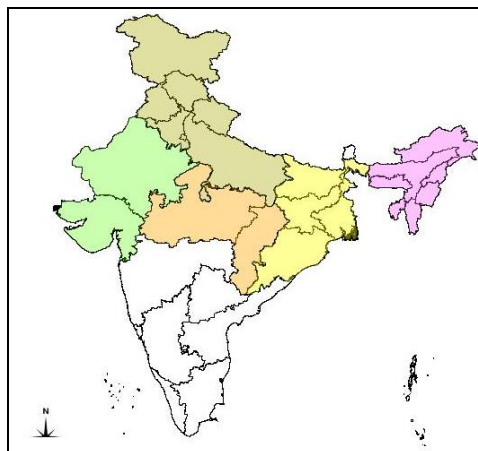


Fig. 1: (b) Five Zones of Study Area.

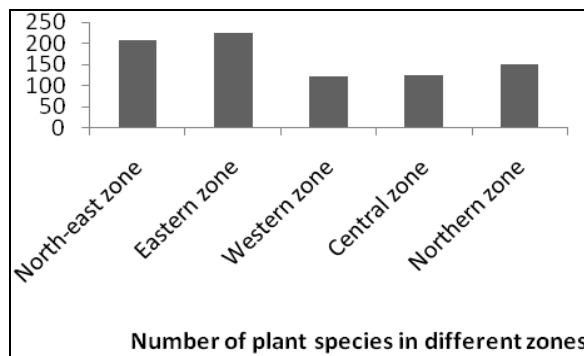


Fig. 2: Number of Plant Species in Different Zones.

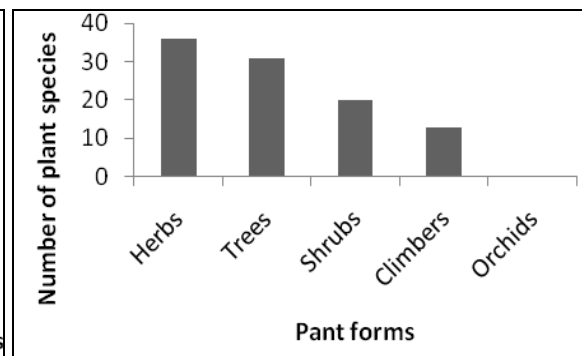


Fig. 3: Plant Forms are Reported in Different Zones.

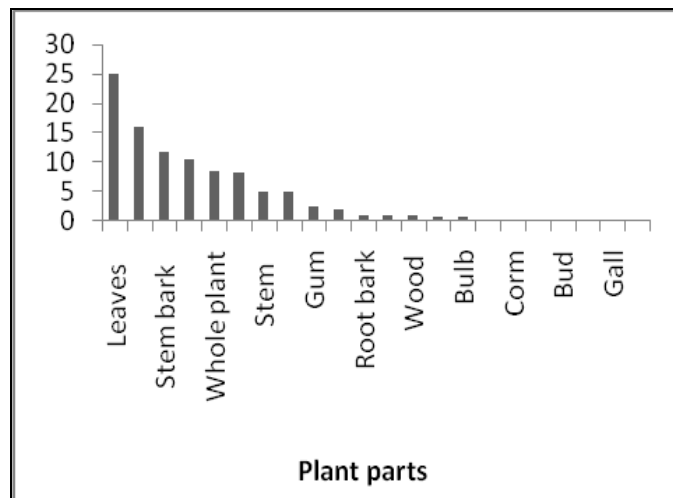


Fig. 4: Plants Part used for Curing Different Diseases.

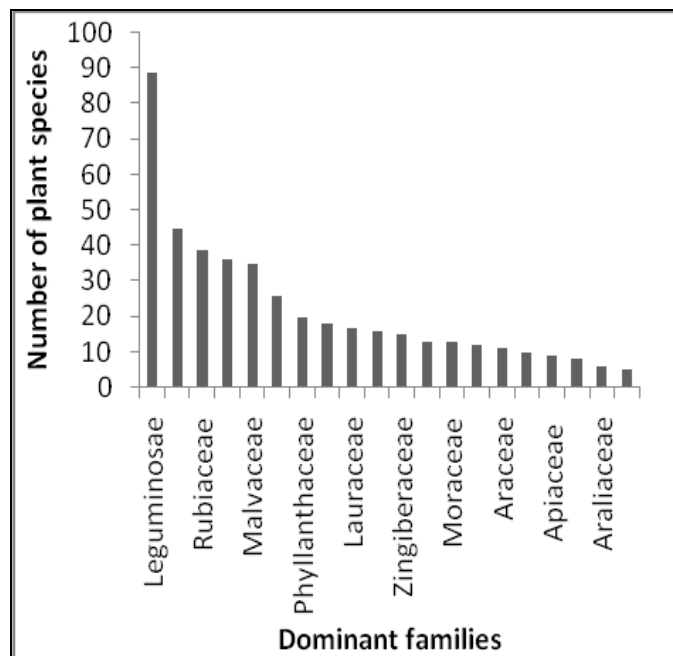


Fig. 5: Dominant Families among Different Parts of India.

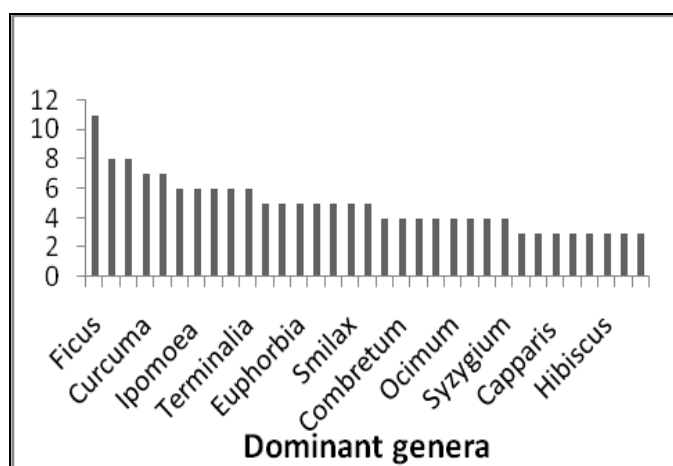


Fig. 6: Dominant Genera among Different Parts of India.

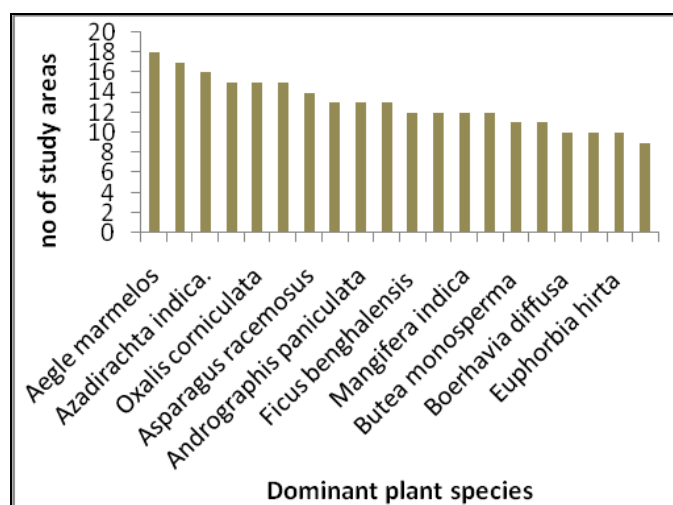


Fig. 7: Species Presence in Studied Area.

Among these, 157 plant species are noted for abdominal problem (diarrhoea, dysentery, dyspepsia, stomach ache, stomach problem), skin diseases with 141 plants species and respiratory problems (fever, cold, cough) with 138 species. Ninety plant species act as a drug (aphrodisiac, anthelmintic, laxative, febrifuge, antiseptic). 52 plant species act as remedy for the persons bitten by animals.

It was also reported that the plant species have medicinal benefits for animals. The ethno-veterinary medicine used from 12 plants against 9 disease (galactagogue, ulcer, wounds, eye disease, urination, loose evacuation, stomach ache, typhoid fever and for removing parasites from their skin.). Stem bark and seeds are most used plants parts for veterinary medicine than root, whole plants, leaves and fruits. The route of administration for animals is oral by using plant parts in the form of decoction, externally as a paste and powder. The ethno medicine for humans are used mostly paste followed by juice, powder, decoction as shown in Figure 8.

Fidelity Level

Table 1 lists the FL values which highlight the most important medicinal species among the five zones of India. Fidelity Level (FL) of plants has been calculated based on most dominant plant and showed the corresponding plant against a particular ailment. Higher values of Fidelity Level (%) indicate the most preferred dominant plant species for each particular ailment category. The analysis

showed that the highest FL value found in 3 plant species among the five study region for different diseases are *Gymnema sylvestre* (diabetes, 100%) followed by *Biden pilosa* (tooth problem, 100%) and *Valernia jantamansi* (stomach ache, 100%). The least FL values for *Oxalis corniculata* (23%) which indicates less preferred plant species in regards to constancy.

Informant Consensus Factor (ICF)

ICF is considered to know the traditional values of plants among the five zones of India to treat certain ailment categories (Table 2). From the study literature, out of the 489 sacred groves, 829 species with medicinal values, treating 33 different ailments. In our study, for the sake of simplicity out of 33 different ailments only 10 ailments are categorized. It is clear from the study that the ICF values varied from 0.04 to 0.64. Cold has the highest ICF value 0.64 with 40 use-reports for 15 plant species followed by diarrhoea have 0.24 with 76 use-reports for 58 plant species, wounds and cuts have 0.24 with 103 use-reports for 78 plant species.

The high ICF value for cold possibly showed that this ailment is common in the study area. High ICF values also helps searching for bioactive compounds and subsequently considered as more preferred traditionally to treat ailments. The low ICF value is for asthma due to lack of less constancy about the ailments.

Threats

These small patches have multiple disturbance factors like anthropogenic pressure, pollution, urbanization, soil erosion, logging, agriculture conversion of forest into land and road construction, invasion, over grazing, encroachment, developing industries, shifting social and cultural perspectives which put these medicinal plant resources under threat

category. Out of 829 medicinal plant species, herbs species have 3 spp. endangered, 1 spp. critically endangered, 27 spp. under least concern, where tree species, have 1 spp. near threatened, 2 spp. vulnerable, 18 spp. least concern, shrub have 8 spp. least concern, climber have 1 spp. vulnerable and 2 spp. least concern and even orchid also 1 spp. under least concern.

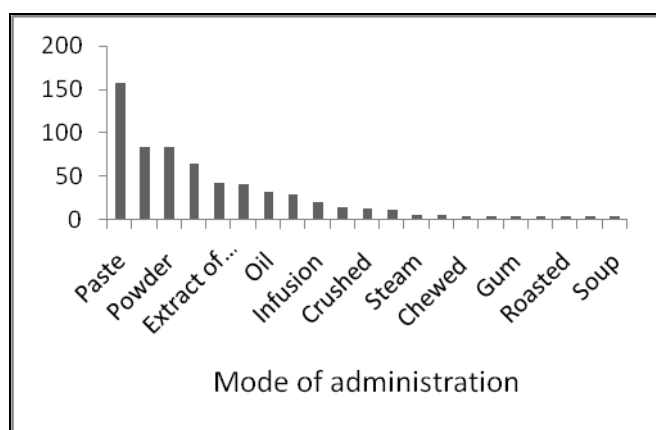


Fig. 8: Route of Administration used in Health Care System.

Table 1: Dominant Plant Species for a Particular Diseases and their Fidelity Level.

Disease	Dominant plants	Fidelity level
Diarrhoea	<i>Aegle marmelos</i>	37.5%
Cold	<i>Ocimum sanctum</i>	41.17%
Wounds & cuts	<i>Tridax procumbens</i>	78%
Skin problem	<i>Azadirachta indica</i>	70%
Malaria	<i>Andrographis paniculata</i>	50%
Diabetes	<i>Gymmema sylvestre</i>	100%
Tooth problem	<i>Bidens pilosa</i>	100%
Piles	<i>Oxalis corniculata</i>	23.07%
Stomach ache	<i>Valernia jantamansi</i>	100%
Asthma	<i>Emblica officinales</i>	25%

Table 2 Category of Different Diseases and their Informant Consensus Factor (ICF).

Disease	No of Plant Species	Used Report	ICF
Diarrhoea	58	76	0.24
Cold	15	40	0.64
Wounds and cuts	78	103	0.24
Skin problem	141	185	0.23
Malaria	23	29	0.21
Diabetes	39	49	0.2
Tooth problem	42	54	0.12
Piles	45	52	0.07
Stomach ache	17	20	0.15
Asthma	30	34	0.04

CONCLUSION

This study highlights the importance of sacred groves in rural informal healthcare management. Apart from its socio-religious importance, medicinal plants are one of the active benefits which people can connect with easily. Plants with multiple uses require special attention in restoration and conservation planning. The usefulness and protection of all the reported ethno medicinal plants need to be evaluated by phyto-chemical and pharmacological studies. Plants with high informant consensus factor, use report and fidelity level should be given main concern to carry out bioassay and toxicity studies. Awareness generation, participatory management planning, local awareness and thorough evaluation of these plant resources are key factors for long term survival of these groves.

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