

Study Of Rare And Endangered Plants Of Pachmarhi Biosphere Reserve, India

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ABSTRACT India is one of the 17 countries designated as mega biodiversity centers among the 196 countries of the world and geologically has elements of the Palearctic and Indo Malayan Realm. Situated in Central India are the lofty hills and plateaus of Satpura Ranges made up of multilayered sandstone dating from Permian to Cretaceous. Pachmarhi, a UNESCO declared Biosphere Reserve covering an area of 4,98172 sq. km at an elevation of 1100 meters above mean sea level, is located amidst these ranges, at 22° 11' to 22°50'N and 77°47' to 78°52' E meridian. Pachmarhi is endowed with moderate tropical summer and up to 1200 mm rainfall which foster dense forest. The medicinal plants of Pachmarhi were studied with a view to understand the habitat, biodiversity, availability and their status. Large trees form the upper canopy of the forest with one of the finest timber yielding species of *Tectona grandis* and *Shorea robusta*. The midsized tree, shrubs and climbers together with undercover herbs lodge a treasure trove of medicinal plants. The study revealed more than 600 species of Angiosperms having medicinal value; some species which were once common but now rare and threatened are *Aristolochia indica*, *Berberis aristata*, *Balanites aegyptiaca*, *Boswellia serrata*, *Chlorophytum tuberosum*, *Gardenia gummifera*, *Gloriosa superba*, *Pterocarpus marsupium*, *Rouxwolfia serpentina*, *Eulophia nuda*, *Pueraria tuberosa*, *Mallotus philippensis*, *Oroxylum indicum*, *Litsea glutinosa*, *Terminalia bellerica*, *T. chebula*, *Uraria picta*. **Keywords:** Artificial intelligence value-loading problem, United Nations Sustainable Development Goals, artificial intelligence safety. With the unsustainable harvesting by local inhabitants and overexploitation by profiteers for commercial purposes, their availability has subsequently declined to the extent that many species have become endangered up to critical levels. To salvage this dwindling treasure immediate attention is required for their in-situ and ex-situ conservation

Introduction

Diversity is an inherent characteristic of nature, which pervades the whole universe. Diversity of medicinal plant is continuously under the threat of extinction as a result of over-exploitation, incorrect harvesting techniques and unregulated trade of medicinal plants (Chen, Yu, Li and Steinmetz, 2016; UNESCO, 2009). India is one of the 12 mega biodiversity centers of the world. It has been accepted that indigenous medicines are more economical and more acceptable. To understand the status, utilization and diversity of medicinal plants, a survey or surveys? was conducted? at the Pachmarhi Biosphere Reserve (PBR). The total area of the reserve is 4,98172 sq. km. PBR envelops three wild life conservation units namely Bori Sanctuary, (518.00 sq km), Satpura National Park (524.37 Sq km) and Pachmarhi Sanctuary (461.37 sq km) (UNESCO 2009). The altitude varies from 320 m to 1352 m. Out of the three units 1555.23, sq. km. comprises the core zone and the remaining area of 1785.82 sq. km. and 1649.91 sq km surrounding the core zone serve as buffer zone and transition zone respectively (Fig. 1) (UNESCO 2009). The main tribal communities living in this area are

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and Mobasi.

Pachmarhi is located in the Satpura forest ranges which is rich in its biodiversity and a representative of unique ecosystem. It is a natural junction of two most important timber species, Teak (*Tectona grandis*) and Sal (*Shorea robusta*) and. The dense forest is a mixed deciduous tropical forest. Out of 21 preservation plots identified in the state covering various representative forest types, four plots are located in the Pachmarhi Biosphere Reserve (Ministry of Environment and Forests, 2008). The Government of India has identified 26 endemic centers all over the country, Pachmarhi is one of these endemic centers (Ministry of Environment and Forests, 2008).

The present knowledge of uses of medicinal plants has been gathered through ages since Vedic period. The uses of plant resources have been documented in Charak Samhita, Sushruta Samhita and Books on Ayurveda. A large number of works on this aspect have been conducted since 19th century (Fawkes, 1986). Fawkes (1896) was the first after Harshburger (1895) to adopt the term ethnobotany as a discipline of study. Barrows (1900) was the first recipient of doctorate in ethnobotany from the University of Chicago. Schultes (1962) of Harvard University was the pioneer worker on this field. Likewise, Aikman (1974) and Anonymous (1979) have also compiled the medicinal wealth. Status and utilization of medicinal plants in Rangamati of Bangladesh were studied by Sharif and Banik (2006).

Poul Ssegwa and John massan (2007) have reported 163 genera from 58 families of medicinal plants from Southern Uganda. Raafat H. Abd El-Wahab et al. (2008) have studied diversity and distribution of medicinal plants in North Sinai, Egypt.

India is one of the treasure troves of ethnobotanical wealth. Janki Ammal (1955) was first who ventured on the ethnobotanical study of subsistent food plants of certain tribe of South India. With this initiation, publication of the Dictionary of the Economic Product of India was a land mark in modern ethnobotany (Watt, 1972). Likewise, "Wealth of India:" A dictionary of Indian Raw Materials and Industrial Product (CSIR 1948-1976) have also become a reference source of ethnobotanical information. Jain and his associates carried out organized studies among the tribes of Central India. (Jain, 1963, 1964, 1965, 1997). Work carried out by Botanical Survey of India and various reports and documents have been published on conservation, assessment and management of threatened species by Rao (1983); Maheshwari (1977); Molur (1978) and Ved et al. (2003). Samant et al. (2007) have reported 643 species of medicinal plants from Himachal Pradesh.

The district floras from Madhya Pradesh such as flora of Bhopal (Oommachan 1977); Flora of Jabalpur (Oommachan & Shrivastava 1996); Flora of Madhya

Pradesh (Roy et al. 1992); Flora of Pachmarhi (Mukherji 1984); Flora of Bilaspur district (1989); Flora of Western Madhya Pradesh (Samvatsar ,1996) all have mentioned the rarity status of plants based on taxonomical observations.

carried out by Jain (1965), Chaghtai et al. (1978) Khan and Chaghtai (1979), Bhalla et al. (1986, 1990) Oommachan and Masih (1987, 1990). Rai (1987), Pandey and Shrivastava (1989), Shah and Singh (1990), Singh (1997), Verma et al. (1995), and Dwivedi (2003). Kadel and Jain (2006) reported plants used in ethno-veterinary practices in Jhabua district. Jadav (2006) reported plants used in Ethnomedicine in Ujjain District. Jain et al. (2010) (2011) reported plants used in Phyto-diversity of Dindauri District. Mishra, et al. (2012) reported Ethno-Veterinary Medicine of Betul District.

Methodology

An intensive field survey was conducted at 30 remote areas over 03 prominent part of each zone in Pachmarhi Biosphere Reserve during July, 2009 to June, 2011. Survey were made in monsoon winter and summer seasons. Plant species were categorized as Trees, Shrubs, Climbers, Parasites, Epiphytes, Grasses and Herbs. Some economically important medicinal plants were collected along with the vital form of whole plants, rhizomes, corms, bulbs and seeds for their ex-situ conservation.

Collection, identification and status have been evaluated using Phytosociological methods and IUCN list of endangered and rare species (Mishra, 1968; IUCN, 2013)). Ethnobotanical information was gathered from knowledge bearing tribals. Local herbarium was prepared following the guidelines of Jain and Rao (1984). Identification was carried out with the help of standard Flora. The plants collected during this study were arranged following the Bentham and Hookers system of classification (1862-1883).

Medicinal plant collected from Biosphere-Reserve comprised of 265 species belonging to 215 genera of 91 families. Out of these there are 9 families of Pteridophytes and 3 of gymnosperms besides the Angiosperms where 212 (80%) belongs to Dicotyledons, 34 (13%) to Moncotyledons, 14 (5%) pteridophytes and 5 (2%) species belongs to gymnosperms.

Discussion

Pachmarhi forest, located in the heart of Indian sub continent can be classified in to three major types viz moist deciduous, dry deciduous, and central Indian sub-tropical hill forest.

The area is rich in plant diversity and gene pool as the combination of favourable climatic condition, suitable edaphic factor and altitudinal specialties help perpetuate rich and luxuriant vegetation, amongst one of the richest in central India. Apart from medicinal plants, the occurrence of relic population of the timber tree sal (*Shorea robusta*) in the predominance and teak (*Tectona grandis*) bearing area is a unique ecological phenomenon in the biosphere reserve. Pachmarhi Plateau is regarded as Botanist's paradise. Presence of deep groves on the plateau have resulted in creation of several water falls marshy places, perennial streams and hills of various elevations. Some of gorges are deep enough with narrow bank preventing of the sun rays to reach of these bottom of perennial streams. Such Perennial streams with gorges have favoured the growth of several moisture loving species of ferns, orchids, bryophyte and algae. Some rare and important species left in small numbers may be considered as "gene bank" of rare species in the syion.

Some of the important rare and endangered species are *Aristolochia indica*, *Berberis aristata*, *Balenites aegyptica*, *Bosweilia serrata*, *Chlorophytum tuberosum*, *Gardenia gummifera*, *Gloriosa superba*, *Pterocarpus marsupium*, *Rouwolfia serpentina*, *Eulophia nuda*, *Pureria tuberosa*, *Mallotus philipens*, *Qroxylum indicum*, *Litsea glutinosa*, *Terminalia belleirica*, *T. chebula*, *Uraria picta*.

Some of the significant causes responsible for biodiversity loss are due to constant anthropogenic activities such as increasing number of tourist, very high pressure of pilgrimage, excessive collection of wood in the form of head load and excessive grazing by animal.

Conclusions

Degradation of forest through over harvesting, fire, over grazing, excursion tours, pilgrims, tourist over exploitation of know medicinal plant by local tribes and traders has reduced availability of valuable medicinal plants. This has also led to extinction of many valuable plants. Therefore, efforts are necessary for reintroduction of medicinal plants and eco-restoration for enhancing ability of medicinal plants. Following points are required to be paid due attention to maintain and check further exploration of Pachmarhi Biosphere Reserve present status

Training to local people: Tribals and extension agencies should be trained on scientific ways of harvesting and in-stu conservation of medicinal plants. Social forestry is an attempt made by State government to create a forest near villages to fulfill the need of villagers in term of various micro forest products (viz. fodder, wood, herb, etc.)

Documentation of indigenous knowledge: Tribal of the area have good traditional indigenous knowledge on the use of plants in health care. There is an urgent need for documentation of this traditional indigenous knowledge. Due to urbanization tribes are shifting from their native zone and their traditional knowledge is being lost in successive generations. Therefore, it is rather more important to conserve the relationship between plant and man.

Tourist Facilities: There is great potential for local inhabitants to develop moderate lodging boarding and excursion facilities for visitors.

Systematic agro-ecological study: A systematic agro ecological study of the medicinal herbs and identification of rare, endangered and vulnerable species should be made, so as to propose the possible methods for conservation of these species.

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