



Ethno- botanical assessment of plant species of Hadagarh wildlife Sanctuary, Odisha, India

Evaluation ethno-botanique de certaines espèces végétales de la Réserve de Hadagarh, Odisha, Inde.

Ashis Kumar DASH, VP UPADHYAY* & HK PATRA

Résumé : Les groupes sociaux primitifs résidant dans le sanctuaire forestier de Hadagarh, dans le district de Kaonjhar – Odisha, en Inde dépendent de produits forestiers divers pour leur subsistance. Autour du sanctuaire, les résidents, Santhals, et Hos sont les ethnies prédominantes. Des observations ethno-botaniques ont été menées dans cette zone dans le but de déterminer quelles espèces de plantes jouent un rôle prédominant dans leur mode de vie.

L'étude a relevé 38 espèces de plantes appartenant à 29 familles largement utilisées comme nourriture et autres usages par la population. Certaines de ces plantes sont utilisées en médecine traditionnelle et sont aussi populaires au sein d'autres tribus de la région. Jusqu'ici, il n'existait pas d'étude systématique des produits forestiers utilisés par les groupes sociaux claniques de la zone protégée.

L'article apporte un éclaircissement sur les ressources naturelles traditionnellement utilisées par les différentes tribus pour leur auto-suffisance.

Mots-clés : Ethno-médecine, Population santhale, Sanctuaire Hadagarh, Végétation naturelle, Connaissance traditionnelle.

Abstract: The tribal communities residing inside the Hadagarh Sanctuary, in Keonjhar district, Odisha, India depend on the various kinds of forest products for their livelihood. Among the tribals residing around the sanctuary, the Santhals and Hos are prominent communities. Ethno botanical observations were carried out in this area with respect to plant species playing significant roles in maintaining their livelihoods. The study documented 39 plant species belonging to 29 families which were widely used for treating various diseases, for food and other needs by the tribal population living in the area. Traditionally, these plant species have been used for sustaining their life. Some of these plants used for medicinal purposes have been very effective for a healthy life of these forest dwellers and are very popular amongst other tribes in the district as well. There are no systematic studies available on the tribal's dependence on the forests in this protected area with reference to livelihood. This paper provides an insight into the self-sustaining life, traditionally adopted by these tribes with the use of naturally available resources in the forests.

Key words: Ethno medicine; Santhal tribe; Hadagarh Sanctuary, Village, Natural Vegetation, Traditional knowledge.

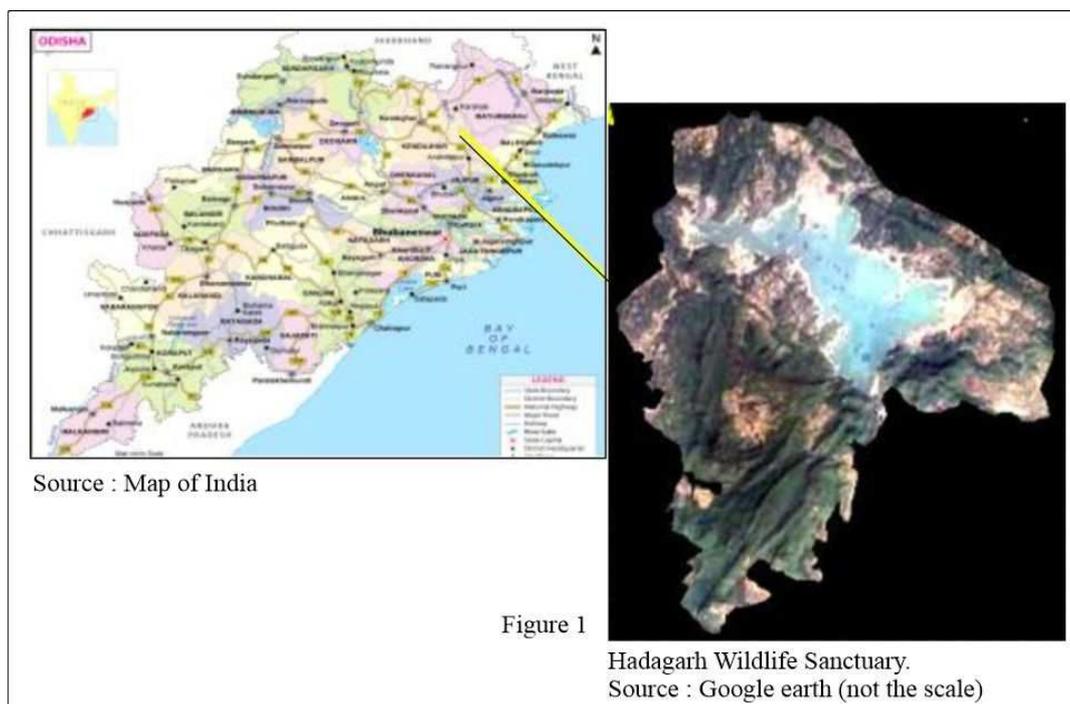
INTRODUCTION

Natural resources like plants and animals have been used by human beings for various purposes since time immemorial e.g. medicine, food, fodder, timber and culture etc. The traditional knowledge of use of different plant species, have been transmitted from one generation to other mostly through verbatim in earlier times. Gradually, it became a practice to gather more information about the forest wealth available in the surroundings in most part of India. Traditionally, this knowledge base is still preserved passionately in different languages and cultures by a few who are referred as Vaidyas or natural healers or by many other definitions. Also, use of plants and their parts for other livelihood needs of human beings have been described in many Hindu scriptures which are assiduously followed still today in many communities around the Indian subcontinent. There are activities like rites, ceremonies and sacrifices where plants have continued to play a great role in various forms e.g 'Yajnya Vrksa' is a group of trees which were used in sacrifices. Similarly, Ayurveda, Unani and Siddha are some of the systems followed in many parts of the world which has recognised importance of different plant species in treating various diseases. However, it is important to note that all these have become possible because human beings used to enjoy close proximity with nature by aligning their day to day affairs in a symbiotic manner. The Vedic literature indicates that man might have learnt the medicinal use of plants from the animals, who have the inherent capacity to recognise the medicinal plants from the nature. These tribes even today are still known to maintaining a close relation with the forest vegetation.

*Department of Botany (Environmental Sciences), Utkal University, Bhubaneswar

Odisha is the second largest tribal populated states in India. As many as 63 tribal communities inhabit in the state of Odisha and this diversity provides ample scope for ethno biological studies (Rout et al, 2015). Odisha along with its neighbouring states like erstwhile Madhya Pradesh (now Chhatisgarh), West Bengal and erstwhile Bihar (now Jharkhand) constitutes the major tribal population of India which includes 65 tribes (DANDA, 1996). Therefore, the importance of such study becomes more significant. The Scheduled Tribe population of Keonjhar district which was 448,675 in 1971 increased to 499,567 in 1981, thus registering a growth of 11.34 percent in a decade (1971-81). According to the census of 2011, the total population has increased to 8,18,878. There were 56 Scheduled Tribes in the district of which the principal tribes were Bathudi, Bhuyan, Bhumij, Gond, Ho, Juang, Kharwar, Kisan, Kolha, Kora, Munda, Oraon, Santhal, Saora, Shabar and Sounti. These sixteen tribes constitute 97.72 percent of the total tribal population of the district. (Population data of Keonjhar District and Comparison, 2018. www.kendujhar.nic.in)

In India about 16,000 flowering plants known to occur, out of which 3,000 are recognized as used in ethno medicine or folk medicine based on oral information from generation to generation. Out of the above, 1500 plants are used in organized systems of medicine like Ayurveda, Unani and Siddha and 700 have been investigated pharmacologically and chemically and their active principles are used in modern medicine system (VED PRAKASH, 1998). Six thousand medicinally important plant species have been reported from India (WARRIER *et al.*, 1993). It is obvious that the folk medicines are the original source that slowly entered in to the organized systems like Ayurveda etc. and finally investigated closely to be recognised among the modern medicines. Earth's biological diversity of living organisms comprises of as many as 30 million species of animals and plants inhabiting the earth in a variety of habitats and ecosystems (WILSON, 1992). Odisha is one of the richest biodiversity regions in Southeast Asia. SAXENA and BRAHMAM (1996) reported 2,727 species of plants under 228 families and 1062 genera of which 2561 species are indigenous and 166 species are cultivated. The ethno botany of Odisha, the medicinal plants of Koraput, Kalahandi, Bhadrak, and Mayurbhanj districts were studied by SAXENA *et al.*, (1996), DAS *et al.*, (1988), GIRACH *et al.*, (2001), NAYAK *et al.*, (2004) and ROUT *et al.*, (2010). The present papers reports the findings on the use of plant species by tribal communities residing around Hadgarh wildlife sanctuary, Odisha, India.



STUDY SITE AND METHODS OF STUDY

The **area of Hadagarh Wildlife Sanctuary** falls under the districts of Keonjhar and Mayurbhanj in the state of Odisha (Figure-1). It has an area of 191.06 Sq Kms (Longitude 86°10' to 86°22' E Latitude 21°23' to 21° 12' N). The Sanctuary was established vide Government notification dated 06.12.1978. (Odisha Wildlife Organization, 2020. www.wildlife.odisha.gov.in) Salandi River is one of the major tributaries of river Baitarani that forms the part of catchment for this sanctuary. Terrain wise the area can be divided into two parts e.g. hill and valley. The relative humidity in the area generally remains above 60% while the temperature reaches

to maximum 35 degree Celsius during April-May and falls to 6 degree Celsius during November – January of the year. Average rainfall ranges from 1718 mm to 2369 mm with 86 rainy days in a year. The forest type of this area has been categorised as Dry Peninsular Sal Forests and Northern dry mixed deciduous forests (Champion and Seth, 1968). Sandy loam is the prominent soil type and Quartzite, Quartz Schist Laterite are the main rocks found in the area.

The village population is dominated by backward classes and the hill tribes viz. Santhals, Hos, who represent sizeable population migrated to this area from Singhbhum, Mayurbhanj and Chhotanagpur region. Santhal villages can easily be recognized by the painted walls of their houses. Paddy and maize are their main crops; in addition they also sustain their lives on various forest resources like jungle roots, fruits, tubers, edible leaves, flowers etc. They also depend on the forest resources for their needs like timber for houses and agricultural implement, firewood, fencing materials, grazing, fodder leaves and fallen leaves for manure as well as for fuel, medicinal herbs, grasses and fruits etc. (Management Plan of Hadagarh Sanctuary, 2011-12 to 2020-21, Keonjhar Wildlife Division, Keonjhar, Orissa.) Besides the economic value, the non-economic value of NTFP for the forest dwellers is more important since quite a good number of such products do not enter into the market and are primarily consumed at local level with a little value addition. NTFPs are a part of the socio-cultural life of tribal people who mainly maintain a symbolic relationship with the forest and forest based products. (Odisha Forest Development Corporation Ltd, 2020. www.odishafdc.com/products_ntfp_ofdc.php.)



Figure-2 : A typical tribal village in the Sanctuary



Figure-3: Path used by Villagers inside the Sanctuary

The core of the sanctuary has two large sized villages viz., Dalki and Pitanau which have been re-located for a long time. Other villages in the buffer area are Ratnamara, Mushaghati, Maliposi, Saramunda,

Balipal, Sajanapal, Phuljhar, Tanla, Maira, Bhaunra, Raighati, Phalbani, Sialimalia, Sankata palia. Thus, there are 16 villages comprising of 1302 families with a population of about 6538 people who are fully dependent upon Hadagarh Sanctuary for their livelihood. These villages have been present since early seventies. In addition, there are many villages located within 10 km of the wildlife sanctuary boundary. These village tribals are also dependent on the forests and wild life of the sanctuary. 25 plant species have been declared as reserved species in the forests of Keonjhar. (Management Plan of Hadagarh Sanctuary, 2011-12 to 2020-21).The tribal population of Orissa are largely dependent on the Non Timber Forest Produce available in the area for enhancing their livelihood (KANDARI *et al*, 2009 & 2012)

The study was carried out in the villages located in the buffer area of the sanctuary. It was found that most of the villagers are dependent on various ecosystem services in the forests. More than 70 % of the population depend on the plant products of various species. They traditionally believe that plant species have much curative properties in them. In addition, their dependency and close association with forests establishes that their livelihood needs like timber for house building, fodder for domestic animals, edible fruits & plant-parts, collection of leaves for manure etc. are met from natural forests. For collecting information of ethno traditional activities, mostly elderly persons were interviewed in the villages. In some of the villages there were few traditional healers, who were also consulted .The information thus gathered was used for verification during the phytosociological study conducted in the sanctuary by the authors. Specimen of plants were identified during interactions with local residents to know common names. The botanical names of sampled plant specimens were collected from forest officials, and records such as working Plan of Keonjhar Forest division and Management Plan of Hadagarh sanctuary during field visits and with the help of Flora of Orissa (SAXENA & BRAHMAM,1996) , Botany of Bihar and Orissa (HAINES,1925) and herbarium of Botany department, Utkal University, Bhubaneswar. Table-1 lists out the Non Timber Forest Produce (NTFP) used by tribes in the Sanctuary as recorded during study.

Table-1. Non Timber Forest Produce (NTFP) used by tribes in the Sanctuary

Sl no	Botanical Name	Common Name	Family	Traditional Uses	Details of utilisation
1	<i>Acacia nilotica L.</i>	Babul	Mimosaceae	Tanning, Medicine	Gum used for stomach disorder, Tanning of leather
2.	<i>Acacia catechu L.f.</i>	Khair	Mimosaceae	Food	Eaten with betel leaves
3.	<i>Achyranthes aspera L. Sp.Pl.</i>	Apamara ga	Amaranthaceae	Medicine,Food	Seeds eaten, used in fever, Gum problems etc.
4	<i>Aegle marmelos L.Corr.</i>	Bela	Rutaceae	Food, Medicine	Ripe fruits are used as food & medicine.
5	<i>Agave sisalana Perrine ex.</i>	Sisal	Agavaceae	Miscellaneous	Rope making ,weaving
6.	<i>Andrographis paniculata (Burm.f.)</i>	Bhuin neem	Acanthaceae	Medicine	Worm infestation, skin allergy
7.	<i>Anogeissus latifolia Roxb.ex.DC</i>	Dharua	Combretaceae	Dyeing, Medicine	Boiled gum used for stomach disorder
8.	<i>Azadirachta indica A Juss.,Mem</i>	Neem	Meliaceae	Medicine, Food	Fertilizer, young leaves & flowers cooked as vegetable
10	<i>Bauhinia vahlii Wt. & Arn. Prodr</i>	Siali Nai	Caesalpiniaceae	Medicine	Used in Diarrohea, pimples of skin.
11	<i>Bauhinia variegata L.Sp.Pl</i>	Kanchan	Caesalpiniaceae	Cordage Food	Young leaves are cooked and used as vegetables
12	<i>Bombax ceiba L. Sp. Pl.</i>	Simuli	Bombacaceae	Medicine, Food	Relief form pain from boils, restore fertility in women. Young fruits are cooked and eaten as vegetables
13	<i>Buchanania lanzan Spreng.J.Bot</i>	Chara	Anacardiaceae	Food ,Medicine	Ripe fruit eaten, Seeds are used after grinding for cooking and various diseases.
14	<i>Butea frondosa Koen.ex.Roxb</i>	Palas	Fabaceae	Miscellaneous use	Rope making
15	<i>Cassia fistula L.Sp.Pl</i>	Sunari	Caesalpiniaceae	Food & Misc. use	Blending and tanning of leather, flower edible
16	<i>Dillenia pentagyna Roxb.Pl</i>	Rai	Dilleniaceae	Food	Young fruits are eaten
17	<i>Dioscorea oppositifolia L.</i>	Panialu	Dioscoreaceae	Food	Rhizome boiled and eaten
18	<i>Diospyros melanoxylon Roxb.PI</i>	Kendu	Ebenaceae	Food	Fruits eaten

19	<i>Embelica officinalis Gaertn.</i>	Aonla	Euphorbiaceae	Food, Medicine	Fruits eaten and used in arthritis ,pain
20	<i>Grewia tiliifolia Vahl, Symb.Bot</i>	Dhaman	Tiliaceae	Miscellaneous	Rope making
21	<i>Hemidesmus indicus (L.) R. Br</i>	Antamaula	Periplocaceae	Medicine	Used for fever, chronic pain etc
22	<i>Madhuca indica J. Gmelin.</i>	Mahula	Sapotaceae	Food, Medicine ,others	Young fruits used as vegetable, Flowers used for making country liquor.
23	<i>Mangifera indica L.</i>	Amba	Anacardiaceae	Food	Fruits eaten.
24	<i>Pongamia pinnata L. Pierre</i>	Karanja	Fabaceae	Medicine	Used for Headache, gum ache etc.
25	<i>Pterocapus marsupium Roxb.</i>	Piasal	Fabaceae	Medicine	Bark used as medicine
26	<i>Schleichera oleosa Lour. Oken</i>	Kusuma	Sapindaceae	Food, Medicine, others	Oil seed, medicine and soap
27	<i>Semecarpus anacardium L.f.</i>	Bhalia	Anacardiaceae	Food	Fruit and kernel eaten
28	<i>Shorea robusta L.</i>	Sal leaves	Dipterocarpaceae	Miscellaneous	Used for Cooking, soap making, lighting
29	<i>Smilax macrophylla Roxb.Fl</i>	Muturi	Smilacaceae	Medicine	Used in cases of Rheumatoid pain.
30	<i>Solena amplexicaulis Lam.</i>	Bana-kundari	Cucurbitaceae	Food	Root tuber used as vegetable
31	<i>Sterculia urens Roxb.PI</i>	Genduli	Sterculiaceae	Confectionary	
32	<i>Streblus asper Lour. Fl. Cochinch.</i>	Sahada	Moraceae	Medicine	tooth ache, root paste applied on dog bite, leaf paste on skin for itching
33	<i>Syzigium cumini L</i>	Jamu	Myrtaceae	Food, medicine	Diabetes and stomach disorders
34	<i>Tamarindus indica L.Sp.PI</i>	Tentuli	Papilionaceae	Food	Fruits and young leaves eaten
35	<i>Terminalia alata Heyne ex Roth.</i>	Asan	Combretaceae	Miscellaneous	Incense and cosmetics
36	<i>Terminalia bellerica Gaertn.oxb.Pi</i>	Bahada	Combretaceae	Medicine	Used in cough, Laxative
37	<i>Ziziphus oenoplia (L.) Mill.</i>	Kanteikuli	Rhamnaceae	Food	Fruits edible
38	<i>Ziziphus jujuba L.Gaertn.</i>	Barakoli	Rhamnaceae	Food	Fruits edible
39	<i>Alangium salvifolium (L.)Wang</i>	Ankula	Alangiaceae	Medicine	Applied as paste in cases of Mad dog and cat bite,

RESULTS AND DISCUSSION

The tribal population living in and around the sanctuary depend on the forest resources for varied purposes, ranging from food, fodder, firewood, house building, rope making, medicines, collection of dried leaves for manure, fuel wood, to religious beliefs etc. Therefore, the tribes are dependent on the forests vegetation of the area for all their livelihood. Varieties of NTFPs are collected in the district of Keonjhar, which are important sources of food and income for the local tribals and rural people. (Working Plan of Keonjhar (T) Division and Keonjhar (WL) Division, 2007-08 to 2016-17.

Among the 16 villages of the sanctuary, Santhals and Hos are the dominant tribes in the area whose day to day requirements like firewood, grazing of domestic animals, timbers, medicine, edible plants etc are fulfilled from the resources available in the forests. Plant species like *Shorea robusta*, *Cassia fistula* etc. have local economic importance because of their timber properties. Plant species like *Acacia nilotica*, *Azadirachta indica*, *Strychnos nux-vomica*, *Andrographis paniculata*, *Alangium salvifolium*, *Smilax macrophylla*, etc have been used by the local population for years for preparation of medicines. *Madhuca indica*, *Tamarindus indica*, *Semecarpus anacardium* .etc are used for their fruits and food values. Similar use of plant species have been reported by various authors in India and abroad (BRAHMAM & SAXENA 1990; Girach RD 1992; SAHOO & MUDGAL 1995; MOHANTY *et al* 1996; BRAHMAM *et al* 1996; AMINNUDIN & GIRACH 1996; MAURER *et al.* 2006; KHAN *et al* 2011;MEHRA *et al* 2014; BAJPAI *et al* 2016; ROUT *et al* 2010; ROUT *et al* 2018).Such types of plant species needs urgent attention from the conservation point of view as their numbers are decreasing owing to factors like unsystematic and uncontrolled harvesting, grazing pressure from domestic animals and many other anthropogenic pressures. Extensive use of natural vegetation in the sanctuary in the past has decreased the provisioning services and the consequence of the imbalance in supply of these services and the increasing human

demands has been responsible for deterioration in the condition of the natural habitats and increasing rarity of plant biodiversity (GIAM *et al* 2010).

Of the 39 species recorded in the study area, it is observed that about 36% of the total species being used by tribals have medicinal values, 39% food and 24% other miscellaneous uses (Fig.4).

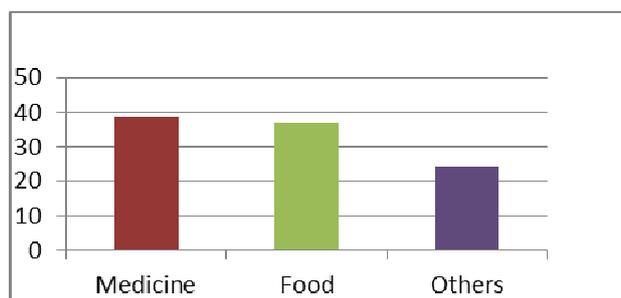


Figure-4 : Percentages use of NTFPs by tribes living in Hadagarh wildlife Sanctuary

The forest department, Government of Odisha has declared several forest species as “Reserved Species” (Table 2) and cutting of such trees is not permitted without assessment of their ecological importance of particular area. This is a significant step towards ensuring conservation and protection of these species, most of which are used by tribal communities for their life sustain activities.

Table-2. Species declared as reserved species in Odisha

SI No	Botanical Name	Local Name	SI No	Botanical Name	Local Name
1.	<i>Shorea robusta</i>	Sala	14.	<i>Madhuca indica</i>	Mahula
2.	<i>Pterocarpus marsupium</i>	Piasal	15.	<i>Artocarpus integrifolia</i>	Panasa
3.	<i>Dalbergia sisso and Dalbergia latifolia</i>	Sisoo	16.	<i>Acacia catechu</i>	Khair
4.	<i>Diospyros melanoxylon</i>	Kendu	17.	<i>Ougenia oojenensis</i>	Bandhan
5.	<i>Gmelina arborea</i>	Gambhari	18.	<i>Xylia xylocarpa</i>	Kangada
6.	<i>Adina cordifolia</i>	Kuruma	19.	<i>Syzygium cumini</i>	Jamu
7.	<i>Terminalia tomentosa</i>	Asana	20.	<i>Soymida febrifuga</i>	Swan(Rohini)
8.	<i>Schleichera oleosa</i>	Kusum	21.	<i>Caryota virens</i>	Salap
9.	<i>Terminalia chebula</i>	Harida	22.	<i>Chloroxylon swietenia</i>	Bheru
10.	<i>Terminalia belerica</i>	Bahada	23.	<i>Terminalia arjuna</i>	Arjuna
11.	<i>Emblica officinalis</i>	Aonla	24.	<i>Buchnanian lanzen</i>	Chara
12.	<i>Mangifera indica</i>	Amba	25.	<i>Anogeissus latifolia</i>	Dhaura
13.	<i>Tamarindus indica</i>	Tentuli			

In addition to the tribes residing inside this protected area, there is also a large population residing on the outer areas of the sanctuary boundary. They have also been dependent on the forest vegetation of the sanctuary for various purposes. Thus, their dependence on the forest ecosystem of the area has become inseparable. There has been recommendation for constituting a conservation reserve on the exterior part of the Hadagarh sanctuary for protecting the elephant movement corridors. This part of sanctuary will provide a link between Similipal, Hadagarh and Kuldiha sanctuaries (Mohanty, 2011). The villagers living around the areas between three sanctuaries have also been protecting the corridors and the forests, therefore, the area has potential for constituting a conservation reserve. The traditional knowledge available amongst the tribes of the area therefore deserves more studies. Therefore, attention of researchers and policy makers is called for to find out the long-term effects of such usages on the biodiversity of the area. The vegetation of the area is vulnerable to various

forms of interferences. Hence it is also imperative to devise mechanisms to promote sustainable harvesting of the NTFPs available in the area.

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