

Ethnobiological knowledge and socio-biodiversity value among Kutia-Kandha tribe of Odisha, India

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Abstract

A study on the socio-biodiversity was conducted in Kotagarh Wildlife Sanctuary (KWS) and nearby areas of Odisha, where the population of Kutia-Kandha tribe is dominant. It was found that, forest has provided tribes with enough materials for traditional used for therapeutic purpose. Information from secondary sources by interviews were conducted in eight villages surrounding Kotagarh Wildlife Sanctuary, in which 34 males, 22 females in the age group of 35 -75 and 8 therapeutic practitioners of Kutia Kandha tribe of Odisha were consulted. The tribes reported 54 different diseases, cured from 52 plant species belonging to 51 genera and 32 families, which are used for ethno medicinal practices. The Fabaceae found to be the dominant family among plants used for medicinal purpose, whereas for ethnozoological use, a total of 8 mammalian species were used for curing 17 different diseases, most of them are either threatened or endangered species. This paper narrates the ethnobiology and socio-biodiversity aspects of Kutia-Kandha community of Odisha, along with suggestions for alternate source of medicines for the Kutia-Kandha, to reduce dependency on forests product and reduce hunting of wildlife.

Keywords: Traditional knowledge, Medicine, Conservation, Tribes, Odisha

1. Introduction

The study of human interactions, biodiversity and the environment that surrounds them is discernment to human welfare and resource from the earth appears to be a promising discipline that can play a key role in the field of traditional knowledge and biodiversity management. The study of the relationship between plants, animals, people and environment is termed as Ethnobiology (Albuquerque and Alves, 2016). In a broader aspect, it is the cultural values and medicinal use of the plants around them by the local communities (Arshad *et al.*, 2014). The traditional knowledge and management of the biological resources by local communities

are important to improve the understanding and management of local and regional levels of conservation measure for flora and fauna (Dalle and Potvin, 2004). The indigenous community have tremendous knowledge on the use of plants and animals around them and how different species are used locally for therapeutic purpose (Amjad and Arshad, 2014). According to Sheldon *et al.* (1997) primary health care depends on traditional medicinal practices in developing the world. This aspect makes medical ethnobiology, an extremely important aspect and contributes to the knowledge and conservation of plant and animal derived medicines (Hedberg, 1993).

The *Kandha* tribe are numerically the largest tribe of Odisha with four functional groups viz. *mondal*, *bismajhi*, *jani* and *pujari*. A similar tribe *Kutia Kandha* mostly inhabit the Tumudibandha Block of Kandhamal district and Lanjigarh Block of Kalahandi district of Odisha and their tribe named after their house floor, below the level of the village road. A third category inhabit the high altitude hilly terrain of Odisha, they are popularly called as *Dongria Kandha*. They are mostly found in Bissamkattack and Muniguda Blocks of Rayagada district of Odisha. Other than this, there are sub-groups of the Kandha tribe like Sitha Kandha, Buda Kandha, Desia Kandha and Malua Kandha live in Koraput, Kandhamal and Bolangir districts of Odisha. The Sitha Kandhas (*Sitaranga*) are basket makers. The Malua Kandhas are well-known for their patterns of living in groups in hilly areas for which they are called so. On the other hand the Desia Kandhas are found in 'desh' or plains area for which they are called Desia Kandha. Accordingly to the population census of 2011, there the population of Kandhas is 627486 and the literacy rate is 46.95 % with males educated more than 50% of the total population. The population of Kandhas in Kandhamal district of Odisha is estimated to be 366784 (Anonymous, 2011). Similar to that of North Eastern Tribes, the Kandhas of Odisha also practice *jhuming* cultivation for agriculture in which mandia (*Eleusine coracana* Gaertn.), koshla (*Panicum vulgare*), Kandul (*Cajanus cajan* Millsp.), Jhunga (*Vigna unguiculata* Walp.), which are cereals, are the major seasonal crops. Apart, they also collect important forest produces viz. fire wood, bamboo, Kendu leave (*Dyospyros*

melanoxyton Roxb.) and Sal leaves (*Shorea robusta* Roth) etc. used for variety of purpose such as making thatched house, baskets, disposable plates (*khali*), bidi, country liquor (with Mohua flower) for their own use.

2. Materials and Methods

2.1 Study Area

The present study was conducted in Kotagarh Wildlife Sanctuary (KWS) and nearby areas, where the population of Kutia-Kandha tribe is dominant. The KWS constitutes a forest area of 269.50 km² and the revenue land of 129.99 km² comprising a total extent of 399.50 km² which forms the core area with native flora and fauna. The sanctuary is a part of Kotagarh–Chandrapur elephant corridor and is typical forest patch of Mahanadian Biogeographical sub-region of Odisha. This area is having a great ecological importance with a variety of flora and fauna of peninsular Indian Sub-Continent of Eastern Ghats of Biotic Province (6-D) of the Deccan peninsular zone (6) (Rodgers and Panwar, 1968). According to Champion & Seth (1968), the forest type categorised into Moist Peninsular Sal Forests, Moist Sal Savannah and Dry Bamboo Brakes, with the dominant plant species viz. Sal (*Shorea robusta*), Vijayasar (*Pterocarpus marsupium*), Asan (*Terminalia tomentosa*), Mahua (*Madhuca indica*), Kaim (*Mitragyna parvifolia*), Kassi (*Bridelia retusa*) and Bans (*Dendrocalamus strictus*).

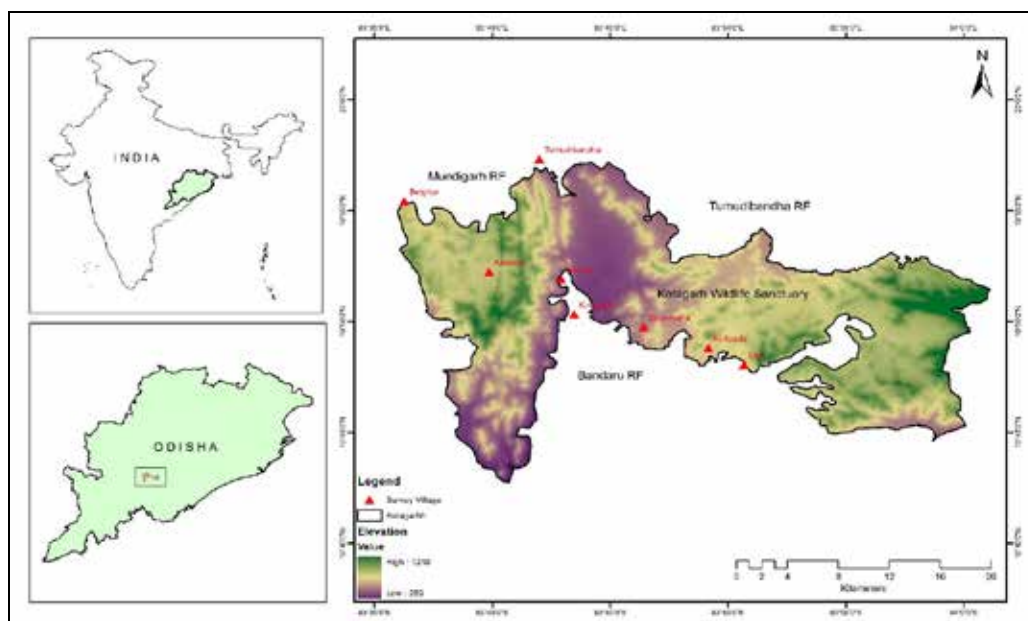


Figure 1. The location of tribal surveyed village in Kotagah wildlife sanctuary, Odisha

Methods

Ethnobiological data were collected between September 2012 to July 2013 from different parts of the sanctuary, based mainly on semi-structured interviews using questionnaire among the local tribes, health practitioners, and local healers. They were interviewed *viz.* local name of plants and animals, parts used, mode of preparation and use, disease cure and recommended doses, etc. The plant identification was done based on The Flora of British India (Hooker, 1872-1897); whereas, for ethnozoology, the mammalian species were identified based on the standard field guide (Menon, 2003). The collected information was scrutinized and compiled in a tabular form for further analysis purpose. Since, the study was undertaken in the Protected Area and as per law under the Wildlife (Protection) Act, 1972 and enacted by the Forest Department of Odisha for prohibition of any collection from inside

the National Parks and Sanctuaries. Therefore, no collection of plants was made or herbarium prepared. Also, since the plants are popular in nature and the authors are well acquainted with the species identification, majority of them were possible to be identified in the field itself. For those doubtful species, photographs were taken on the body parts, leaves and flowers and with the help of field guide, were identified up to species level.

2.3 Quantitative Analysis

The extract ethnobiological data was used for calculating the Relative Frequency Citations (RFC) to know the local importance of each medicinal plant among the tribe.

The Relative Frequency of Citations (RFC) was calculated as follows:

$$RFC = \frac{N}{NI} \quad (0 < RFC < 1)$$

Where, N is the number of informants, who mention the medicinal use of the plant/animal and N_i is the total number of participants in the interview/questionnaire ($N=64$). An RFC of one would indicate that all informants recognized the plant as medicinal and cited at least one use, whereas, an RFC of zero would indicate that no informants cited a medicinal use for the plant.

The fidelity level (FL) is the percentage of informants reporting the use of a particular plant/animal for the same purpose, was determined to find out the most frequently reported diseases (Friedman *et al.*, 1986).

The Fidelity Level was calculated as follows:

$$FL(\%) = \frac{Np}{N} \times 100$$

Where, Np is the number of informants independently reporting a use of a plant/animal in the treatment of a particular ailment, and N is the total number of informants using the plant/animal as ethnomedicine in the treatment of any particular disease.

The use value (UV) is a quantitative method that is used to calculate the relative importance of plant/animal species known locally (Phillips and Gentry, 1993; Dey *et al.*, 2016).

The Use value index was calculated as follows:

$$UV = \frac{\sum U}{n}$$

Where, U is the total number of citations

per species and n is the number of informants interviewed for a given plant

3. Results and Discussion

A total of 64 persons were interviewed in eight villages surrounding the KWS, of which 34 were males, 22 females of age group between 35 -75, along with 8 local healers of Kutia Kandha tribe of Odisha were also consulted. The local community comprising mainly of Kutia-Kandha, reported 54 different diseases cured from 52 plant species belonging to 32 families and 51 genera which they used for ethnomedicinal practices (Figure. 2). A perusal of analysis indicates that, among the plants, Fabaceae family is dominant for medicinal practices by Kandha tribes whereas among animals, a range of species, at least eight among them, all mammalian body parts, are popular in use for ethnozoological purpose curing 17 different types of ailments (Table 2). It was observed that the plant roots are predominately used for making medicines (30%), although a mixture of leaves (22%) and fruits (13%) are also used for the purpose. The details of vernacular name, scientific name, family, part used for medicine, mode of preparation, disease cure and recommended dose as revealed by the interviewed tribes and healers are listed in the table 1 and 2.

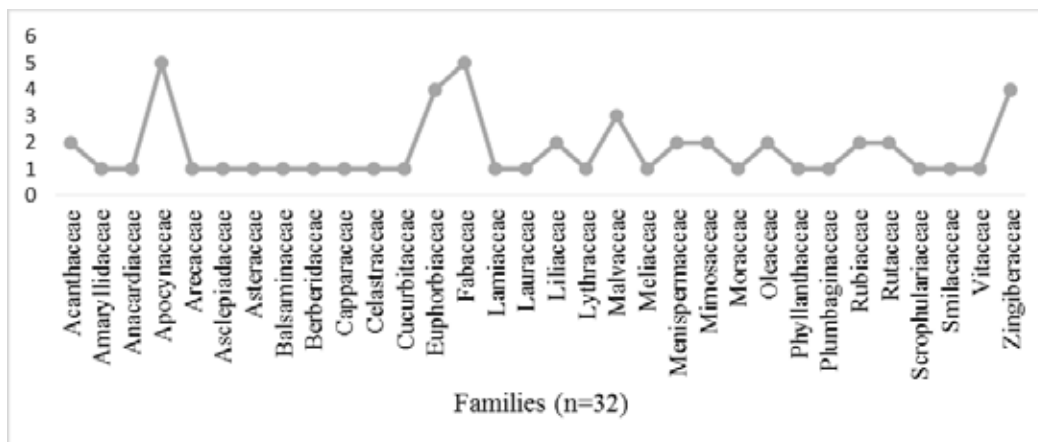


Figure 2. Family wise representation of plant species used as in ethobotanical remedies.

The quantitative data shows that *Pongamia pinnata* (0.968), *Azadirachta indica* (0.953) and *Mangifera indica* (0.906) have the highest relative frequency citation (RFC) in plants and *Hystrix indica* (0.250), *Elephas maximus* (0.219) and *Sus scrofa* (0.094) have the highest relative frequency citation among mammalian species. The Fidelity level (FL) of *Pongamia pinnata*, *Azadirachta indica* and *Mangifera indica* is also maximum in plants and *Hystrix indica* (25%),

Elephas maximus (21.875%) and *Sus scrofa* (9.375%) in animals. Nevertheless, the Use Value Index of *Aegle marmelos* (0.078), *Mimosa pudica* (0.047) and *Lawsonia inermis* (0.047) among plants, and *Panthera tigris* (0.094) among animals is used for curing maximum disease, whereas *Rusa unicolor* (0.047) and *Hystrix indica* (0.047) showed equal value in ethnozoological prospective (Table 1 and 2).



Figure 3. Parts of plants used for ethobotanical purpose by Kandha tribes of Odisha.

The traditional knowledge of medicinal plants and animals used for medicine of this region were documented for the first time and local medicinal knowledge from Kutia Kandha tribe is known. The current survey reveals that a total of 52

plants species and 8 mammalian species are used by the primitive tribes Kutia Kandha, for curing disease in this remote forest area of Odisha. We also found that all the traditional healers have strong faith towards ethnomedicines although

they are less aware about the documentation and preservation of ethnomedicinal values. Nevertheless, it is believed that ethnobiological practices are an important part of the primary healthcare system and therefore, need to be promoted, patented and tribal rights protected on use of traditional knowledge and ethnobiodiversity. Contrary to this, it is also evident from this documentation that, there are 8 animals or atleast their body parts are used for traditional medicine practices and most of them are either endangered or threatened species as per the list of IUCN (World Conservation Union) as well as listed in the Wildlife (Protection) Act, 1972 of Government of India (see Table 3).

Conclusion

The protection and conservation of the wildlife is equally important and with the traditional hunting by the tribes pose threats to the population and must be curbed with alternate ways. The Government of India and the state Government of Odisha should come up with better health facilities in the tribal district with distribution of medicines free of cost for the ailments as well as the enforcement agencies should create awareness among the tribal for refrain from hunting practices.

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Table 1. List of Plant species along with their medicinal uses by Kutia Kandha tribe of Odisha.

Sl. No.	Vernacular Name	Scientific Name	Family	Parts used	Mode of preparation	Disease cure	Day of use	RFC	FL (%)	UV
1	Pedi Pedika	<i>Abutilon indicum</i> (Link) Sweet	Malvaceae	Leaves	Grinding with black pepper	Jaundice	Twice per day	0.5	50	0.016
2	Khaitra	<i>Acacia catechu</i> (L.f.) Hurter & Mabb.	Mimosaceae	Bark	Decoction	Plasmapheresis	Once per day	0.266	26.563	0.016
3	Basanga	<i>Adhatoda vasica</i> (L.) Nees	Acanthaceae	Leaves	Grinding	Dry Cough	3times/day	0.563	56.25	0.031
4	Basanga	<i>Adhatoda vasica</i> (L.) Nees	Acanthaceae	Leaves	Grinding	Asthma	3times/day	0.563	56.25	0.031
5	Bela	<i>Aegle marmelos</i> (L.) Corrêa	Rutaceae	Fruit	Powder	Gastric	2-3 times/day	0.828	82.813	0.078
6	Bela	<i>Aegle marmelos</i> (L.) Corrêa	Rutaceae	Fruit	Grinding	Syncope	2times per day for 3 days	0.828	82.813	0.078
7	Bela	<i>Aegle marmelos</i> (L.) Corrêa	Rutaceae	Leaves	Grinding and half drying	Plasmapheresis	2 times/day	0.828	82.813	0.078
8	Bela	<i>Aegle marmelos</i> (L.) Corrêa	Rutaceae	Leaves	Grinding and half drying	Acidity	once per day	0.828	82.813	0.078
9	Bela	<i>Aegle marmelos</i> (L.) Corrêa	Rutaceae	Fruit	Raw	Dyspepsia	2 times per day	0.828	82.813	0.078
10	Piyaja	<i>Allium cepa</i> L.	Liliaceae	Bulb	Raw	Sunstroke	2-3 times/day	0.641	64.063	0.016
11	Chati Ana	<i>Alstonia scholaris</i> (L.) R.Br.	Apocynaceae	Bark	Paste	Eczema /Lep-rosy	continuous	0.188	18.75	0.016
12	Bada Aleicha	<i>Amomum aromaticum</i> Roxb.	Zingiberaceae	Fruit	Grinding	A toothache & gum problem	2 times/day	0.125	12.5	0.016
13	Bhuin nimba	<i>Andrographis paniculata</i> (Burm.f.) Wall. ex Nees	Acanthaceae	Leaves	Chew 7 leaves	Plasmapheresis	per day	0.547	54.688	0.016
14	Satabari	<i>Asparagus racemosus</i> Willd.	Liliaceae	Root	Grinding and mixed with crystallized sugar lumps	Sickle cell anaemia	one week	0.359	35.938	0.016
15	Nimba	<i>Azadirachta indica</i> A.Juss.	Meliaceae	Whole parts	Decoction	Skin disease	3 times/week	0.953	95.313	0.031
16	Nimba	<i>Azadirachta indica</i> A.Juss.	Meliaceae	Branch	Chew raw	A toothache & gum problem	daily twice	0.953	95.313	0.031
17	Daru haladi	<i>Berberis asiatica</i> Roxb. ex DC.	Berberidaceae	Wood	rub and apply	Furuncle	2 /day	0.375	37.5	0.016
18	Gandha Palasa	<i>Butea monosperma</i> (Lam.) Taub.	Fabaceae	Leaves	Tie the leaves	Hydrocele	continuous tie for 7 days	0.109	10.938	0.016
19	Beta	<i>Calamus tenuis</i> Roxb.	Areaceae	Root	Grinding	A toothache & gum problem	2times/day	0.188	18.75	0.016

20	Pengu	<i>Celastrus paniculatus</i> Willd.	Celastraceae	Root	Grinding with black pepper	Costochondritis	20ml before breakfast/3 days	0.078	7.813	0.016
21	Bana sehati	<i>Chrysanthemum coronairum</i> L.	Asteraceae	Leaves	Grinding	Earache	3-4 drops/day	0.688	68.75	0.016
22	Tejaraja/Tejapatra	<i>Cinnamomum tamala</i> (Buch.-Ham.) T.Nees & C.H.Eberm.	Lauraceae	Fruit	Raw	Paralysis	2 times/day	0.266	26.563	0.016
23	Pangu/hada penguli	<i>Cissus quadrangularis</i> L.	Vitaceae	Root	Grinding	Dyspepsia	2 times/day	0.359	35.938	0.031
24	Pangu/hada penguli	<i>Cissus quadrangularis</i> L.	Vitaceae	Root	Grinding	Fractures	tie for 7 days	0.359	35.938	0.031
25	Lembu	<i>Citrus limon</i> (L.) Burm.	Rutaceae	Fruit	Grinding	Dysentery	2-3 times per day	0.703	70.313	0.016
26	Dahi dahia	<i>Cocculus hirsutus</i> (L.) Diels	Menispermaceae	Root	Grinding	Nocturnal emission	3 tea spoon/day	0.047	4.688	0.016
27	Baruna	<i>Crataeva nurvala</i> Buch.-Ham.	Capparaceae	Bark	Grinding	Menorrhagia	once/day	0.344	34.375	0.016
28	Lankajoda	<i>Croton sparsiflorus</i> Morong	Euphorbiaceae	Leaves	Leaves wrap apply hot steam	Syncope	continuous	0.281	28.125	0.016
29	Tala Muli	<i>Curculigo orchiooides</i> Gaertn.	Amaryllidaceae	Whole parts	Extract juice and mix with one tea spoon milk	Paralysis	2times/day	0.313	31.25	0.016
30	Bana Haladi	<i>Curcuma aromatica</i> Salisb.	Zingiberaceae	Root	Grinding roots and take raw	Taeniasis	3times/day	0.719	71.875	0.031
31	Bana Haladi	<i>Curcuma aromatica</i> Salisb.	Zingiberaceae	Root	Grinding	Plasmapheresis	3times/day	0.719	71.875	0.031
32	Sijhu	<i>Euphorbia antiqorum</i> L.	Euphorbiaceae	Latex	Latex mixed with black pepper	Dysentery	10gm per day	0.359	35.938	0.031
33	Sijhu	<i>Euphorbia antiqorum</i> L.	Euphorbiaceae	Latex	1-2 tea spoon raw latex	Piles	when necessary	0.359	35.938	0.031
34	Dimiri	<i>Ficus hispida</i> L.f.	Moraceae	Root	Roots, Sugar, Tamarind, Rice (raw), Black pepper	Amenorrhoea	once	0.406	40.625	0.016
35	Sugandhi	<i>Gardenia florida</i> L. nom. illeg.	Rubiaceae	Root	grinding the root	Myalgia	once a day	0.219	21.875	0.031
36	Sugandhi	<i>Gardenia florida</i> L. nom. illeg.	Rubiaceae	Root	Raw	A toothache & gum problem	once till the full cure	0.219	21.875	0.031
37	Sugandhi	<i>Gardenia florida</i> L. nom. illeg.	Rubiaceae	Root	Extract juice and mix with crystallized sugar lumps, <i>Mentha longifolia</i>	Plasmapheresis	2 dose/day	0.219	21.875	0.031

38	Guda Mari	<i>Gymnema sylvestre</i> R. Br.	Asclepiadaceae	Leaves	7-12 leaves with Black pepper	Diabetes	take on an empty stomach	0.063	6.25	0.016
39	Ananta Mula	<i>Hemidesmus indicus</i> (L.) R.Br.	Apocynaceae	Root	Grinding	Dyspepsia	3 times/day	0.406	40.625	0.016
40	Mandara	<i>Hibiscus rosa-sinensis</i> L.	Malvaceae	Flowers	Powder and mix with ash	Acne	once a day	0.469	46.875	0.016
41	Kurei	<i>Wrightia antidysenterica</i> (L.) R.Br.	Apocynaceae	Root	Powder	Plasmapheresis	2 tea spoon in morning before breakfast	0.016	1.563	0.031
42	Kurei	<i>Wrightia antidysenterica</i> (L.) R.Br.	Apocynaceae	Bark	Grinding	Syncope	2 dose/day	0.016	1.563	0.031
43	Hara gauri	<i>Impatiens balsamina</i> L.	Balsaminaceae	Root	Grinding	A toothache & gum problem	2times/day	0.859	85.938	0.016
44	Menjuati	<i>Lawsonia inermis</i> L.	Lythraceae	Flowers	Keep flower on right side of ear	Insomnia	whole night	0.656	65.625	0.047
45	Menjuati	<i>Lawsonia inermis</i> L.	Lythraceae	Root	Root mix with finger millet	Jaundice	2times per day for 3 days	0.656	65.625	0.047
46	Menjuati	<i>Lawsonia inermis</i> L.	Lythraceae	Root	grind root and mixed with raw rice	Jaundice	3times for 7days	0.656	65.625	0.047
47	Amba	<i>Mangifera indica</i> L.	Anacardiaceae	Bark	Grinding	Dysentery	one time for 3days	0.906	90.625	0.016
48	Lajakuli	<i>Mimosa pudica</i> L.	Fabaceae	Whole parts	Decoction and mix with Black pepper	Dysentery	10-15ml dose 3times/day	0.531	53.125	0.047
49	Lajakuli	<i>Mimosa pudica</i> L.	Fabaceae	Whole parts	Decoction and mix with black pepper	Body ache	10-15ml dose 3times/day	0.531	53.125	0.047
50	Lajakuli	<i>Mimosa pudica</i> L.	Fabaceae	Whole parts	Decoction and mix with black pepper	Dyspepsia	10-15ml dose 3times/day	0.531	53.125	0.047
51	Kalara	<i>Momordica charantia</i> L.	Cucurbitaceae	Fruit	Decoction	Malaria	1 years continuously	0.891	89.063	0.016
52	Brahma Tatia	<i>Moniera cuneifolia</i> Michx.	Scrophulariaceae	Leaves	Decoction	Dyspepsia	2-3 times	0.188	18.75	0.016
53	Ganga Shiuli	<i>Nyctanthes arbor-tristis</i> L.	Oleaceae	Leaves	Grinding and mix with honey	Malaria	7 drops for 7-21 days	0.531	53.125	0.031
54	Ganga Siauli	<i>Nyctanthes arbor-tristis</i> L.	Oleaceae	Root	Powder	Malaria	2 times/day	0.531	53.125	0.031
55	Tulasi	<i>Ocimum tenuiflorum</i> L.	Lamiaceae	Leaves	Grinding and mix with honey	Cough	3 days	0.938	93.75	0.031
56	Tulasi	<i>Ocimum tenuiflorum</i> L.	Lamiaceae	Leaves	Grinding and mixed with salt	Tinea	put 2-3 days	0.938	93.75	0.031

57	Pasaruni	<i>Paederia scandens</i> (Lour.) Merr.	Rubiaceae	Leaves	Decoction	Jaundice	2-3 times/day	0.031	3.125	0.016
58	Khadisijhu	<i>Pedilanthus tithymalooides</i> L.	Euphorbiaceae	LateX	Directly apply	Piles	2 times per day	0.234	23.438	0.016
59	Amla	<i>Phyllanthus emblica</i> L.	Phyllanthaceae	Fruit	Raw	Amenorrhoea	2-3 times/day	0.766	76.563	0.031
60	Amla	<i>Phyllanthus emblica</i> L.	Phyllanthaceae	Fruit	Grinding	Blood pressure	2-3 times/day	0.766	76.563	0.031
61	Chinta mula	<i>Plumbago zeylanica</i> L.	Plumbaginaceae	Root	Grinding	Eczema	2 times/day	0.531	53.125	0.031
62	Chinta mula	<i>Plumbago zeylanica</i> L.	Plumbaginaceae	Root	Grinding	Piles	2 times/day	0.531	53.125	0.031
63	Chitapari	<i>Plumbago zeylanica</i> L.	Plumbaginaceae	Root	Grinding	Antifertility	once/day	0.078	7.813	0.016
64	Karanja	<i>Milletia pinnata</i> (L.) Panigrahi	Fabaceae	Seed	Extract oil	Scabies	2 times/day	0.969	96.875	0.016
65	Rakta chandana	<i>Pterocarpus santalinus</i> L.f.	Fabaceae	Trunk	Grinding and apply	Thrombophlebitis	2 times/day	0.094	9.375	0.016
66	Arandhi	<i>Ricinus communis</i> L.	Euphorbiaceae	LateX, root	Latex put in tongue and extract juice from leaves and drink	Rabies	3 times/day	0.031	3.125	0.016
67	Patala Garuda	<i>Rauwolfia serpentina</i> (L.) Benth. ex Kurz	Apocynaceae	Root	Powder	Asthenospermia	2-3 times/day	0.625	62.5	0.031
68	Patala Garuda	<i>Rauwolfia serpentina</i> (L.) Benth. ex Kurz	Apocynaceae	LateX	Latex mixed with one tea spoon sugar	Hydrocele	Put 7-21 drops/week	0.625	62.5	0.031
69	Ashoka	<i>Saraca asoca</i> (Roxb.) Willd.	Fabaceae	Bark	Decoction	Infertility	3 times	0.297	29.688	0.016
70	Muturi	<i>Smilax zeylanica</i> L.	Smilacaceae	Root	Powder	Metrorrhagia	take in empty stomach	0.063	6.25	0.016
71	Banakapa	<i>Thespesia lampas</i> (Cav.) Dalzell & A. Gibson	Malvaceae	Fruit	grind	Nausea	2 times/day	0.016	1.563	0.016
72	Golachi Lata	<i>Tinospora cordifolia</i> (Thunb.) Miers	Menispermaceae	Leaves	grind	Rheumatic disease	1 tea spoon/day	0.563	56.25	0.031
73	Golachi Lata	<i>Tinospora cordifolia</i> (Thunb.) Miers	Menispermaceae	Leaves	Decoction	Pyrexia	10ml/day	0.563	56.25	0.031
74	Ada	<i>Zingiber officinale</i> Roscoe	Zingiberaceae	Stem	Grinding and mix with a pinch of salt	Cough	3 times per day	0.813	81.25	0.031
75	Ada	<i>Zingiber officinale</i> Roscoe	Zingiberaceae	Stem	Grinding and mix with 7 Black pepper, Honey	Dry Cough	3 times per day	0.813	81.25	0.031
76	Ekangi	<i>Zingiber zerumbet</i> (L.) Roscoe ex Sm.	Zingiberaceae	Whole parts	Grinding	Syncope	twice per day	0.094	9.375	0.031
77	Ekangi	<i>Zingiber zerumbet</i> (L.) Roscoe ex Sm.	Zingiberaceae	Whole parts	Extract oil	Paralysis	2 times/day	0.094	9.375	0.031

Table 2. List of mammalian species along with their medicinal use, RFC, FL (%) and UV index.

Sl. No.	Vernacular name	English name	Scientific name	Parts use	Mode of preparation	Disease cure	Day of use	RFC	FL (%)	UV
1	Hathi	Elephant	<i>Elephas maximus</i> Linnaeus, 1758	Dung	Dung ash mix with coconut oil	Tinea/Fungal skin disease	Apply for 15-25 days	0.219	21.875	0.016
2	Belara Mussa	Giant Squirrel	<i>Ratufa indica</i> (Erxleben, 1777)	Musk	Raw	Antifertility		0.063	6.25	0.016
3	Pangolin	Pangolin	<i>Manis crassicaudata</i> E. Geoffroy, 1803	Scale	Scrape and apply	Lumbago	2/days	0.016	1.563	0.016
4	Jhinka	Porcupine	<i>Hystrix indica</i> Kerr, 1792	Intestine	Grinding and mix with honey	Smallpox	2-3 times/day	0.031	3.125	0.047
5	Jhinka	Porcupine	<i>Hystrix indica</i> Kerr, 1793	Meat	Direct	Myalgia	2/day	0.016	1.563	0.047
6	Jhinka	Porcupine	<i>Hystrix indica</i> Kerr, 1794	Bile	Mix with water	Arthritis	Once	0.25	25	0.047
7	Sambar	Sambar	<i>Rusa unicorn</i> (Kerr, 1792)	Body fat	Lotion	Skin disease	2 times per day for 7 days	0.047	4.688	0.047
8	Sambar	Sambar	<i>Rusa unicorn</i> (Kerr, 1792)	Intestine	Decoction	Abdominal pain (Colic)	Once/day	0.016	1.563	0.094
9	Sambar	Sambar	<i>Rusa unicorn</i> (Kerr, 1792)	Horn	Scrape and apply	Angina pectoris	2/days	0.016	1.563	0.094
10	Pani Musha	Small Clawed Otter	<i>Aonyx cinereus</i> (Illiger, 1815)	Blood	Raw	Pulmonary tuberculosis/Cancer	Once in a week	0.031	3.125	0.016
11	Bagha	Tiger	<i>Panthera tigris</i> (Linnaeus, 1758)	Tongue	Grinding	Asthma	Once	0.031	3.125	0.094
12	Bagha	Tiger	<i>Panthera tigris</i> (Linnaeus, 1758)	Tongue	Grinding and mix with <i>Shorea robusta</i> leaves	Smallpox	Thrice a day	0.016	1.563	0.094
13	Bagha	Tiger	<i>Panthera tigris</i> (Linnaeus, 1758)	Tongue	Grind and apply 2 drops in nose	Epilepsy	Thrice a day	0.016	1.563	0.094
14	Bagha	Tiger	<i>Panthera tigris</i> (Linnaeus, 1758)	Meat	Raw	Deglutition	Once in a day for seven days	0.016	1.563	0.094
15	Bagha	Tiger	<i>Panthera tigris</i> (Linnaeus, 1758)	Body Fat	One tea spoon fatty oil	Syncope	Thrice in a day for seven days	0.016	1.563	0.094
16	Bagha	Tiger	<i>Panthera tigris</i> (Linnaeus, 1758)	Bile	Mixed with rice	Pulmonary tuberculosis	One doses for three days	0.016	1.563	0.094
17	Bartha	Wild Boar	<i>Sus scrofa</i> Linnaeus, 1758	Teeth	Scrape and apply	Boils	2/days	0.094	9.375	0.016

Table 3. Status of plants and animals used for traditional medicinal practices by Kandha community of Odisha

Sl.No.	Family	Scientific name	Vernacular name	English name	IUCN Status
1	Malvaceae	<i>Abutilon indicum</i> (Link) Sweet	Pedi Pedika	Indian Mallow	Not evaluated
2	Mimosaceae	<i>Acacia catechu</i> (L.f.) Hurter & Mabb.	Khaira	Black Cutch	Not evaluated
3	Acanthaceae	<i>Adhatoda vasica</i> (L.) Nees	Basanga	Malabar nut	Not evaluated
4	Rutaceae	<i>Aegle marmelos</i> (L.) Corrêa	Bela	Apple wood	Not evaluated
5	Liliaceae	<i>Allium cepa</i> L.	Piyaja	Onion	Not evaluated
6	Apocynaceae	<i>Alstonia scholaris</i> (L.) R.Br.	Chati Ana	Blackboard tree	Not evaluated
7	Zingiberaceae	<i>Amomum aromaticum</i> Roxb.	Bada Aleicha	Bengal cardamom	Not evaluated
8	Acanthaceae	<i>Andrographis paniculata</i> (Burm.f.) Wall. ex Nees	Bhuin nimba	India echinacea	Not evaluated
9	Liliaceae	<i>Asparagus racemosus</i> Willd.	Satabari	Asparagus	Not evaluated
10	Meliaceae	<i>Azadirachta indica</i> A.Juss.	Nimba	Margosa Tree	Not evaluated
11	Berberidaceae	<i>Berberis asiatica</i> Roxb. ex DC.	Daru haladi	Tree Turmeric	Not evaluated
12	Fabaceae	<i>Butea monosperma</i> (Lam.) Taub.	Gandha Palasa	Flame of the Forest	Not evaluated
13	Arecaceae	<i>Calamus tenuis</i> Roxb.	Beta	Mây dang	Least Concern
14	Celastraceae	<i>Celastrus paniculatus</i> Willd.	Pengu	Black-Oil tree	Not evaluated
15	Asteraceae	<i>Chrysanthemum coronairum</i> L.	Bana sebati	Crown daisy	Not evaluated
16	Lauraceae	<i>Cinnamomum tamala</i> (Buch.-Ham.) T.Nees & C.H.Eberm.	Tejaraja/Tejapatra	Indian Bay leaf	Not evaluated
17	Vitaceae	<i>Cissus quadrangularis</i> L.	Pangu /hada penguli	Devil's backbone	Not evaluated
18	Rutaceae	<i>Citrus limon</i> (L.) Burm.	Lembu	Lemon of India	Not evaluated
19	Menispermaceae	<i>Cocculus hirsutus</i> (L.) Diels	Dahi dahia	Broom Creeper	Not evaluated
20	Capparaceae	<i>Crataeva nurvala</i> Buch.-Ham.	Baruna	Three leaved caper	Not evaluated
21	Euphorbiaceae	<i>Croton sparsiflorus</i> Motrong	Lankajoda	Kowli seeds	Not evaluated
22	Amaryllidaceae	<i>Curculigo orchitoides</i> Gaertn.	Tala Muli	Golden eye-grass	Not evaluated
23	Zingiberaceae	<i>Curcuma aromatica</i> Salisb.	Bana Haladi	Wild turmeric	Not evaluated
24	Euphorbiaceae	<i>Euphorbia antiqiorum</i> L.	Sijhu	Triangular Spurge	Not evaluated
25	Moraceae	<i>Ficus hispida</i> L.f.	Dimiri	Hairy Fig	Not evaluated
26	Rubiaceae	<i>Gardenia florida</i> L. nom. illeg.	Sugandhi	<i>Gardenia</i>	Not evaluated
27	Asclepiadaceae	<i>Gymnema sylvestre</i> R. Br.	Guda Mari	Periploca of the woods	Not evaluated
28	Apocynaceae	<i>Hemidesmus indicus</i> (L.) R.Br.	Ananta Mula	Indian Sarsaparilla	Not evaluated
29	Malvaceae	<i>Hibiscus rosa-sinensis</i> L.	Mandara	China rose	Not evaluated

30	Apocynaceae	<i>Wrightia antidysenterica</i> (L.) R.Br.	Kurei	White Angel	Not evaluated
31	Balsaminaceae	<i>Impatiens balsamina</i> L.	Hara gauri	Garden balsam	Not evaluated
32	Lythraceae	<i>Lawsonia inermis</i> L.	Menjuati	Henna	Not evaluated
33	Anacardiaceae	<i>Mangifera indica</i> L.	Amba	Mango Tree	Not evaluated
34	Fabaceae	<i>Mimosa pudica</i> L.	Lajakuli	Touch me not	Not evaluated
35	Cucurbitaceae	<i>Momordica charantia</i> L.	Kalara	Bitter gourd	Not evaluated
36	Scrophulariaceae	<i>Moniera cuneifolia</i> Michx.	Brahma Tatia	Thyme leaved gratiola	Not evaluated
37	Oleaceae	<i>Nyctanthes arbor-tristis</i> L.	Ganga Shiuli	Night-flowering Jasmin	Not evaluated
38	Lamiaceae	<i>Ocimum tenuiflorum</i> L.	Tulasi	Holy basil	Not evaluated
39	Rubiaceae	<i>Paederia scandens</i> (Lour.) Merr.	Pasaruni	Chinese Fevervine	Not evaluated
40	Euphorbiaceae	<i>Pedilanthus tithymaloides</i> L.	Khadisijhu	Jew's Slipper	Not evaluated
41	Phyllanthaceae	<i>Phyllanthus emblica</i> L.	Amla	Indian Gooseberry	Not evaluated
42	Plumbaginaceae	<i>Plumbago zeylanica</i> L.	Chinta mula	Ceylon leadwort	Not evaluated
43	Fabaceae	<i>Milletia pinnata</i> (L.) Panigrahi	Karanja	Indian beech	Not evaluated
44	Fabaceae	<i>Pterocarpus santalinus</i> L.f.	Rakta chandana	Red Sandal Wood	Endangered
45	Euphorbiaceae	<i>Ricinus communis</i> L.	Arandhi	Castor-oil-plant	Not evaluated
46	Apocynaceae	<i>Rauvolfia serpentina</i> (L.) Benth. ex Kurz	Patala Garuda	Indian Snakeroot	Not evaluated
47	Fabaceae	<i>Saraca asoca</i> (Roxb.) Willd.	Ashoka	Ashoka Tree	Vulnerable
48	Smilacaceae	<i>Smilax zeylanica</i> L.	Muturi		Not evaluated
49	Malvaceae	<i>Thespesia lampas</i> (Cav.) Dalzell & A. Gibson	Banakapa		Not evaluated
50	Menispermaceae	<i>Tinospora cordifolia</i> (Thunb.) Miers	Golachi Lata	Tinospora	Not evaluated
51	Zingiberaceae	<i>Zingiber officinale</i> Roscoe	Ada	Ginger	Not evaluated
52	Zingiberaceae	<i>Zingiber zerumbet</i> (L.) Roscoe ex Sm.	Ekangi	Bitter ginger	Not evaluated
Sl.No.	Family	Scientific name	Vernacular name	English name	IUCN Status
1	Elephantidae	<i>Elephas maximus</i> Linnaeus, 1758	Hathi	Asian Elephant	Endangered
2	Sciuridae	<i>Ratufa indica</i> (Erxleben, 1777)	Belara Mussa	Giant Squirrel	Least Concern
3	Manidae	<i>Manis crassicaudata</i> E. Geoffroy, 1803	Pangolin	Pangolin	Endangered
4	Hystriidae	<i>Hystrix indica</i> Kerr, 1794	Jhinka	Porcupine	Least Concern
5	Cervidae	<i>Rusa unicorn</i> (Kerr, 1792)	Sambar	Sambar	Vulnerable
6	Mustelidae	<i>Aonyx cinereus</i> (Illiger, 1815)	Pani Musha	Small Clawed Otter	Vulnerable
7	Felidae	<i>Panthera tigris</i> (Linnaeus, 1758)	Bagha	Tiger	Endangered
8	Suidae	<i>Sus scrofa</i> Linnaeus, 1758	Bartha	Wild Boar	Least Concern