



# Therapeutic uses of mangrove plants of Kansaridia forest block in Mahanadi delta of Odisha, India

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## ABSTRACT

An attempt has been made to highlight some of the plants growing in mangrove areas of Kansaridia forest block of Mahanadi Delta in Odisha, located along the east coast of India. A field survey was undertaken in this forest block to record the ethno-medicinal utility of certain mangrove plants. The present paper deals with 20 plant species of 14 genera belonging to 11 families. The collected plant specimens were identified using regional flora and herbarium deposited in the Mangrove Forest Division (Wildlife), Rajnagar.

**Key words:** Ethno-medicine, Kansaridia block, Mahanadi delta, mangrove plants

## INTRODUCTION

Mangroves are the coastal intertidal halophytic plants which play very important role in the estuaries and land-sea interface areas of deltaic ecosystem of both tropical and subtropical zones. Generally, mangroves survive in saline condition of coastal areas and most of them are evergreen vegetation. It has been recognized and realized that all over the world mangroves are threatened and endangered, though mangrove ecosystems are considered as most productive ecosystem of the world. Mangrove forest provides all the tangible benefits to the coastal communities by supporting the variety and variability of plants. The major forest produce from mangroves are fuel wood, fodder, timber, tannin, oil, industrial raw materials, medicinal plant etc., which are variously used by the coastal inhabitants for their livelihood.

India has a very rich heritage of traditional health care system through Ayurvedic, Unani and Homeopathy system of medicines (Pandit, 2010). Knowledge of ethno-medicine is available through Vedic texts and commentaries. Also there is in use another less exploited source of information

in use which comes from folklore and passed through generations in certain restricted and remote habitations (Jain, 1996). Ethno-medicinal practices are the holistic health care management methodologies adopted in non-literate cultures as the word 'ethno' means traditions or indigenous to local people. These practices have been percolating down from one generation to another by oral transmission. Hence the ethno-medicinal practices distinguish itself from well documented systems of other medicines (Sahoo and Misra, 2019). Due to over exploitation by local inhabitants and lack of proper records, these plant resources along with related indigenous knowledge are depleting to a great extent day by day.

Keeping this in view, the present study was undertaken in Kansaridia PRF of Mahanadi Delta to deal with the traditional indigenous knowledge used by the local people.

## STUDY AREA

Present study was undertaken during 2008-2010 in the Kansaridia Proposed Reserved Forest (PRF) of Mahanadi delta located in the Kendrapara

district of Odisha along the east coast of India. It is situated between 20° 20' 58.3" to 20° 22' 11.7" North latitude and 86° 45' 30" to 86° 46' 00" East longitudes near Hukitola lake (Chataka) to the north of Light house at the False point. It is bounded by Bay of Bengal at the north, Khola nala and Hetamundia PRF at the east, Batighar PRF at the south and Sanatubi PRF and Kansari nala in the west (Fig. 1). It spreads over an area of 1394.744 ha having periphery 19.12 km out of which 610 ha is under encroachment for prawn culture and the rest 784.744 ha of area harbours luxuriant mangrove vegetation. The area receives maximum rainfall during the month from June to October with average annual rainfall about 1641 mm. The climate is tropical, warm and humid having maximum temperature 42°C and the minimum is 9°C in the month of May and January respectively. Throughout the year the mean relative humidity ranges from 70-85%. Soil of the area is mostly alluvial with deposits of silt. Approximately 64 mangrove species and their associates are recorded from Mahanadi delta among which many plants have certain medicinal properties (Pattnaik, 2007).



**Fig. 1.** Map showing Kansaridia forest block

A total of 6 villages namely Kajalpatia, Kochilabelari, Batighar, Sanatubi, Badatubi and Barakolikholra are adjacent to this mangrove forest with more than 4500 inhabitants. They depend mostly on fishing and agriculture. These villages are

lacking modern facilities because of their remoteness. The inhabitants are utilizing mangrove forest resources to meet their various needs like construction of houses, food, fodder, fuel, medicine etc.

With a view to protect the mangroves in general and medicinal plant species in particular, 200 ha area of this forest block has been constituted as Medicinal Plant Conservation Area (MPCA) by the Forest Department, Government of Odisha.. The protection of the area is vested with Maa Ramachandi V.S.S which has been constituted on 8 November 2008 by the active cooperation of the villagers of Kochilabelari having 121 numbers of households.

## MATERIALS AND METHODS

The traditional knowledge of plant based remedies for the treatment of diseases is confined with the medicine man, all of which belong to indigenous practitioners. The practices of traditional knowledge have been passed on orally from one generation to other generation. The main objective of the study is to document the history, method of preparation and application of plant part(s) used by the local ethnic community.

### Collection of ethno-medicinal data

After a thorough reconnaissance, the area was surveyed and demarcated with boundary pillars. Field tours were undertaken in different villages to collect information about traditional knowledge regarding the medicinal use of mangrove plants and their products. Before collection of information, a friendly base was established with them, because they were very much reluctant to share their traditional knowledge on plants to any outsiders. The respondents were mainly village headman, traditional healers, local herbalist and women folk who were selected on the basis of their recognition as knowledgeable members concerning folk medicine. Repeated queries were made to confirm the information.

### Identification of plants

Identification of collected plants was done using relevant flora (Haines, 1921-25; Benerjee and

Rao, 1990; Saxena and Brahmam, 1994-96) and the specimens collected during the investigation were preserved as herbarium materials.

## RESULTS AND DISCUSSION

During present investigation, 20 medicinal mangrove plant species belonging to 11 families

and 14 genera were studied. The plants are enumerated alphabetically by their botanical names along with their respective families within parenthesis, vernacular names, collection number, parts used and their medicinal uses (Table 1). The form of herbal preparations have also been presented against different kind of diseases.

**Table 1.** List of medicinal mangrove species of Kansaridia forest block in Mahanadi delta

Sl. No.	Botanical Name and Family Name	Local Name	Parts used	Form of herbal preparation	Diseases/ailments
1	<i>Acanthus ilicifolius</i> Linn. (Acanthaceae)	Harakancha - 68	Leaf Leaf Fruit	Decoction Extract Pulp	Rheumatism Body pain Blood purifier
2	<i>Aegiceras corniculatum</i> Linn. (Myrsinaceae)	Khalsi -72	Hypocotyle	Paste	Hyperacidity
3	<i>Avicennia alba</i> Blume. (Avicenniaceae)	Kala Bani -33	Bark Root	Paste Paste	Wounds and skin diseases Boils, Insects bite, stomach disorder
4	<i>Avicennia officinalis</i> Linn. (Avicenniaceae)	Dhala Bani -29	Leaf Bark	Paste Paste	Sprain Wounds & skin diseases
5	<i>Brownlowia tersa</i> Linn. (Tiliaceae )	Lati Sundari - 45	Leaf	Paste	Boils
6	<i>Bruguiera cylindrica</i> Linn. (Rhizophoraceae)	Kaliachua -76	Leaf Fruit Bark	Decoction Pulp Decoction	Conjunctivitis, eye irritation, Wild ant bite Diarrhoea & jaundice
7	<i>Bruguiera gymnorhiza</i> Linn. (Rhizophoraceae)	Bandari - 66	Leaf Fruit Bark	Decoction Pulp Decoction	Conjunctivitis, eye swelling, Wild ant bite Diarrhoea
8	<i>Bruguiera parviflora</i> Roxb. (Rhizophoraceae)	Dot -12	Leaf Fruit	Decoction Pulp	Eye irritation, eye swelling, conjunctivitis Wild ant bite
9	<i>Caesalpinia crista</i> Linn. (Caesalpinaceae)	Nentei - 52	Leaf Seed	Paste Paste	Scabies Rheumatism
10	<i>Ceriops decandra</i> Griff. (Rhizophoraceae)	Garani -30	Bark	Paste	Fish diseases
11	<i>Clerodendrum inerme</i> Linn. (Verbenaceae )	Chiani -46	Root	Powder	Jaundice
12	<i>Excoecaria agallocha</i> Linn. (Euphorbiaceae )	Guan -17	Latex	Raw	Cut wound, paralysis

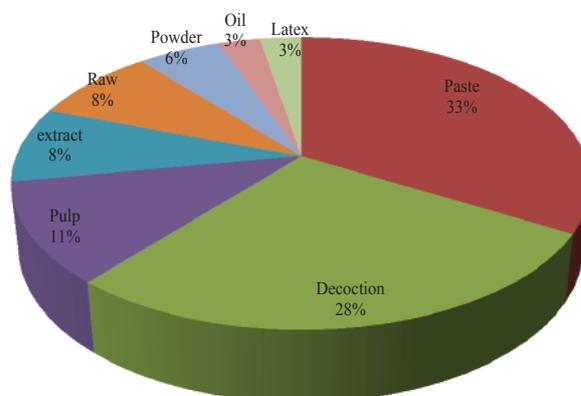
Sl. No.	Botanical Name and Family Name	Local Name	Parts used	Form of herbal preparation	Diseases/ailments
13	<i>Kandelia candel</i> Linn. (Rhizophoraceae)	Sindhuka -28	Stilt root	Powder	Hypertension
14	<i>Rhizophora apiculata</i> Blume. (Rhizophoraceae)	Rai- 59	Bark	Decoction	Hematuria, diarrhoea, dysentery
			Bark	Decoction	Bleeding
15	<i>Rhizophora mucronata</i> Linn. (Rhizophoraceae)	Rai - 60	Bark	Decoction	Hematuria, diarrhoea, dysentery
			Bark	Decoction	Bleeding, neck inflammation.
16	<i>Sonneratia apetala</i> Buch-Ham. (Sonneratiaceae)	Keruan -47	Fruit	Juice	Hemorrhage
			Fruit	Raw	Poor eye sight
17	<i>Sonneratia caseolaris</i> Linn. (Sonneratiaceae)	Orua 32	Fruit	Juice	Hemorrhage
			Fruit	Raw	Poor eye sight
18	<i>Tamarix troupii</i> Linn. (Tamaricaceae)	Jagula -61	Leaf	Raw	Stomach pain
19	<i>Xylocarpus mekongensis</i> Pierre. (Meliaceae)	Pitamari -44	Seed	Oil	Hair illuminant
20	<i>Xylocarpus granatum</i> Koen. (Meliaceae)	Sisumara -65	Seed	Paste	Breast tumor
			Bark	Paste	Cholera
			Fruit	Paste	Elephantiasis

It is evident from the present observation that the inhabitants living in and around the mangrove forests of Mahanadi delta have good knowledge about traditional use of plants. The ethno-medicinal study revealed therapeutic potential of 36 applications from 20 plants species for treating 51 different diseases and ailments. There is variation in frequencies of different plant parts used to treat the diseases (Table 2). There were 6 plant parts used by the traditional healers for treatment of diseases, out of which bark was most frequently used for 10 species (28.59%), followed by leaf and fruit for 9 species (25.71%) in each and root for 3 species (8.57%).

**Table 2.** Parts of medicinal plant used

Plant part	Frequency	Percentage (%)
Root	03	8.57
Leaf	09	25.71
Bark	10	28.59
Fruit	09	25.71
Seed	03	8.57
Hypocotyle	01	2.85

There were 8 herbal preparations observed from this study (Table 1). The most frequently used preparation was paste for 12 prescriptions (33.0 %), followed by decoction for 10 prescriptions (28.0 %), pulp for 4 preparations (11.0 %), extract and raw for 3 preparations (8.0 %) each, powder for 2 (6.0 %) and oil and latex for 1 prescription ( 3.0 ) each (Fig. 2).



**Fig. 2.** Percentage of herbal preparation

**Table 3.** Comparison of mangrove plants with other similar researches

Sl. .	Name of the Plant	Ravindran et al. (2005)	Onrizal and Mansor (2010)	Oratal et al. (2012)	Present study
1.	<i>Acanthus ilicifolius</i> L.	√	√		√
2.	<i>Aegiceras corniculatum</i> Linn.				√
3.	<i>Avicennia alba</i> Blume	√	√	√	√
4.	<i>Avicennia officinalis</i> L.	√			√
5.	<i>Brownlowia tersa</i> Linn.				√
6.	<i>Bruguiera cylindrica</i> Linn.			√	√
7.	<i>Bruguiera gymnorhiza</i> Lamar.	√	√		√
8.	<i>Bruguiera parviflora</i> Roxb.				√
9.	<i>Caesalpinia crista</i> Linn.				√
10.	<i>Calophyllum inophyllum</i> L.			√	
11.	<i>Capparis sepiaria</i> L.			√	
12.	<i>Cayratia trifolia</i> (L.) Domin			√	
13.	<i>Ceriops decandra</i> Griff.				√
14.	<i>Clerodendrum inermis</i> (L.) Gaertn.	√		√	√
15.	<i>Colubrina asiatica</i> (L.) Brongn.			√	
16.	<i>Derris scandens</i> (Aubl.) Pittler			√	
17.	<i>Derris trifoliata</i> Lour.			√	
18.	<i>Excoecaria agallocha</i> L.	√	√	√	√
19.	<i>Heritiera littoralis</i> Aiton			√	
20.	<i>Hibiscus tiliaceus</i> L.			√	
21.	<i>Ipomoea pescaprae</i> (L.) Sweet	√			
22.	<i>Kandelia candel</i> Linn.				√
23.	<i>Lumnitzera racemosa</i> Willd.			√	
24.	<i>Rhizophora mucronata</i> Lam.	√		√	√
25.	<i>Rhizophora apiculata</i> Blume	√	√	√	√
26.	<i>Salicornia brachiata</i> Roxb.	√			
27.	<i>Solanum trilobatum</i> L.			√	
28.	<i>Sonneratia alba</i> Smith		√		
29.	<i>Sonneratia apetala</i> Buch-Ham.				√
30.	<i>Sonneratia caseolaris</i> (L.) Engl.			√	√
31.	<i>Tamarix troupii</i> Linn.				√
32.	<i>Xylocarpus granatum</i> Koen	√	√		√
33.	<i>Xylopyrus mekongensis</i> Pierre				√
	Total	11	09	35	20

### Comparative analysis with similar study

Rabindran et al. (2005) have reported 11 mangrove medicinal species from Pichavaram mangroves of East coast, Tamil Nadu whereas Ornizol and Mansor, 2010 have reported 9 species from North Sumatra, Indonesia and Oratal et al. (2012) have reported 35 mangrove plants from Phra Peninsula of Sonkhla province as against 20 species reported during the present day. As reported three plant species such as *Avicennia alba*, *Excoecaria agallocha* and *Rhizophora apiculata* have some medicinal properties which is in agreement with the present observation. Contrary to the previous findings *Aegiceras corniculatum*, *Brownlowia tersa*, *Bruguiera parviflora*, *Caesalpinia crista*, *Ceriops decendra*, *Kandelia candel*, *Sonneratia apetala*, *Tamarix troupii* and *Xylocarpus mekongensis* are the plants found only from the present study area (Table 3).

Twenty medicinal plant species identified from Kansaridia forest block are being utilized to cure 29 diseases and ailments. Family Rhizophoraceae represents highest number of species (7) as regards to their medicinal properties is concerned followed by Avicenniaceae and Sonneratiaceae represented by 2 species each. The genus *Bruguiera* is represented 3 species followed by *Rhizophora*, *Sonneratia* and *Xylocarpus* are representing 2 species. *Acanthus illicifolius* and *Caesalpinia crista* have the potentiality to cure rheumatism. At the same time *xylocarpus granatum* is not only very popular in the locality to be used against breast tumor, but also have miraculous effect against elephantiasis. *Bruguiera cylindrica* is used long since as a curative measure against jaundice and latex of *Excoecaria agallocha* against paralysis in such a remote part of the country.

Since time immemorial, plants are indispensable source of natural products for the health of human beings and they have a great potential for producing new drugs (Nascimento et al., 2000; Litteton et al., 2005) as they contain compounds of therapeutic value (Panda et al., 2009). Even today the people who live adjacent to the forest areas, use plant products to cure chronic diseases. According to WHO, plants are a source

of compounds having ability to combat diseases, antimicrobial, antiviral and antifungal activities (Nascimento et al., 2000; Gazim et al., 2008). Plant products are less toxic and environmentally friendly and less pollutant are produced in course of their production and have minimum health hazards (Opra and Wakocha, 2008).

At present context, new diseases are arising day by day and infectious diseases are the second most serious cause of death worldwide (Abeysinghe et al., 2010). In the present health care system of the world, the rise of antibiotic resistant micro-organisms is one of the severe problems. Thus, WHO is trying to promote traditional medical system (Bizimina, 1997) in order to combat diseases. In such a scenario mangroves of Mahanadi delta will act as an epitome of phytomedicines for benefit of the society. Therefore, long term conservation measures by way of creating awareness on the rural folk should be undertaken on a priority basis.

### CONCLUSION

The present investigation has included the therapeutic values employed to cure certain important diseases and ailments like breast tumor, cholera, elephantiasis, eye-sight problems, hemorrhage, hyperacidity, hypertension, jaundice, paralysis, rheumatism, skin diseases, stomach disorders, etc. These ethno-medicinal plants are subjected to intensive phyto-chemical screening in view of their immense potential to cure certain vital diseases and ailments.

The inhabitants of fringe villages around mangrove forests live in remote rural areas where modern health care facilities are not available. Besides the plant species studied, many plants are also used for the preparation of various medicines. But the secretiveness of the medicinal practitioners and fear of overexploitation of the plant resources by the outside people, their communities pose reluctance to disclose all the information which is still with them.

This research work was conducted in remote areas to record and document the utilization of mangrove plants which have been helpful to them in the treatment of various diseases. Apart from

that awareness campaign should be conducted by the NGO's and governmental organizations about the utility, preservation and conservation of the mangrove plant species along with their associates on priority basis. With the development of modern medicines which are very effective, traditional medicinal practices have been overlooked. Though modern medicines are believed to cure most of the ailments, such facilities could not be available in each and every corner in proper form. Furthermore, such medicines are very costly and not readily available in remote pockets. The main loopholes that prevailing in the localities are improper diagnosis of the diseases, delay in treatment and age-old superstitions that cause casualties among the people. At present there is urgent need for exploration and documentation of medicinal plant wealth of mangroves of Mahanadi delta. It will not only help in conservation of mangroves but also lead to the integrated development of the local community.

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#### REFERENCES

- Abeyasinghe, P.D. 2010. Antibacterial activity of some medicinal mangroves against antibiotic resistant pathogenic bacteria. *Indian J. Pharm. Sci.* **72**(2): 167–172.
- Bizimina, N. 1997. Scientific evidence of efficacy of medicinal plants for animal treatment, Ethnoveterinary medicine: Alternative for livestock development, Proceedings of an International Conference, Pune, 4-6 November, Abstr., pp 11-12.
- Benerjee, L.K. and Rao, T.A. 1990. *Mangroves of Orissa coast and their ecology*. Bishen Singh Mahendra Pal Singh, Dehra Dun.
- Gazim, Z.C., Rezende, C.M., Fraga, S.R., Svidzinski, T.I. and Cortez, D.A. 2008. Antibacterial activity of the essential oil from *Calendula officinalis* L. (Asteraceae) growing in Brazil. *Braz. J. Microbiol.* **39**: 61–63.
- Haines, H.H. 1921-25. *The Botany of Bihar and Orissa*. Arnold and Sons, London.
- Jain, S.K. 1996. *Ethnobotany in Human welfare*. Deep Publications, New Delhi.
- Litteton, J., Rogers, T. and Falcone, D. 2005. Novel approaches to plant drug discovery based on high throughput pharmacological screening and genetic manipulation. *Life Sci.* **78**: 467–475.
- Nascimento, G.G.F, Locatelli, J., Freitas, P.C. and Silva, G.L. 2000. Antibacterial activity of plant extracts and phytochemicals on antibiotic resistant bacteria. *Braz. J. Microbiol.* **31**: 247–256.
- Onrizal and Mashhor Mansor, 2010. *Ethnobotanical study of medicinal plants from mangrove forests in North Sumatra, Indonesia*. Paper presented at the 1st Pharmaceutical Sciences Conference and Exhibition (PSCE) 2010 on 27-28 September 2010 at Vistana Hotel, Penang, Malaysia.
- Opra, E.U. and Wokocho, R.C. 2008. Efficacy of some plant extracts on the in vitro and in vivo control of *Xanthomonas campestris* P.v. Vesicatoria. *Agric. J.* **3**: 163–170.
- Oratal, N., Patcharin, S., Kornkanok, Y. and Narumon, S. 2012. A survey of medicinal plants in mangrove and beach forests from sating Phra Peninsula, Songkhla Province. *J. Med. Plant Res.* **6**(2): 2421-2437.
- Panda, S.K., Thatoi, H.N. and Dutta, S.K. 2009. Antibacterial activity and phytochemical screening of leaf and bark extracts of *Vitex negundo* from Similipal, Orissa. *J. Med. Plant Res.* **3**: 294–300.
- Pandit, P.K. 2010. Inventory of ethno veterinary medicinal plants of Jhargram Division, West Bengal, India. *Indian Forester* **136**(9): 1183-1194
- Pattnaik, M.R. 2007. *Integrated Mangrove Ecosystem of Bhitarkanika: Evaluation, Utilization and Conservation*. D.Sc. Thesis submitted to Utkal University, Orissa.
- Ravindran, K.C., Venkatesan, K., Balakrishnan, V., Chekkapan, K.P. and Balasubramanian, 2005. Ethnomedicinal studies of Pichavaram mangroves of East coast, Tamil Nadu. *Indian J. Tradit. Know.* **4**(4): 409-411.
- Sahoo, H.K. and Misra, R.C. 2019. Indigenous phytotherapy of Kandha tribe for primary healthcare in Kandhamal district, Odisha. *e-planet* **17** (1): 1-8
- Saxena, H.O. and Brahmam, M. 1994-96. *The Flora of Orissa*. Orissa Forest Development Corporation, Bhubaneswar and Regional Research laboratory, Bhubaneswar, Orissa.