

Ethnomedicinal Plants Against Diarrhoea

a medico-bio aspect of kandha

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**ETHNOMEDICINAL PLANTS AGAINST DIARRHEOA: A
MEDICO-BIO ASPECT OF KANDHA**

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Photographs

Front Page: Putudi Water Fall (Photo © Satyabrata Mishra)

Back Cover: Illustration on importance of Traditional Knowledge

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PREFACE

Plants are frequently used as traditional medicines to treat different disease & disorders. The indigenous knowledge on plants to cure diseases and disorders passes from generation to generation. Still in this modern era, modern medical facilities are unable to reach to the tribal and rural people in remote areas. In these areas, communities use plants for food and medicinal purposes against common diseases. Among the common diseases of Odisha state, diarrhoea is most observed in remote areas caused by bacterial infections. In Odisha, there are about 62 identified tribal communities stay here having unique skills to uses plants against microbial infections. Among the 62 communities, Kandhas are most popular one, found in Kandhamal districts and adjoining regions of the state. Since primitive they are using plants for various purposes. Keeping the problems caused by diarrhoea and unique skills of Kandha tribe, a survey was made to enumerate the plants used by this tribe against diarrhoea and other stomach problems. In this book, their mode of uses and formulations practiced by Kandhas has documented. The Book will bring attention towards our rich traditional therapeutic systems and future scope for biologist & pharmacologist to formulate new drugs against microbial infections and will be helpful to minimize the anti-microbial resistance.

(Authors)

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INTRODUCTION

Diarrhoea is regarded worldwide as one of the killer disease and unfortunately, it happens to be among the symptoms of many other diseases. The main cause of death from diarrhoea is dehydration which results from the loss of electrolytes in diarrhoeal stools. The Kandhamal district is rich in plant biodiversity and majority of the population relies mainly on agriculture. Different tribes have their own way of living and adaptation. About 90 % of the rural population in hilly terrain depends on traditional healthcare systems. Most of the tribes are farmers and they prepared formulation using different types of plants to cure diseases. The plants sold in their weekly markets are mostly edible in nature having medicinal values. During survey, it was observed that tribal people of Kandhamal district mostly belief on traditional medicines as they have no side effects and locally available. Most of the well known plants like *Aegle marmelos*, *Asparagus racemosus*, *Azadirachta indica*, *Centella asiatica*, *Holarrhena pubescens*, *Terminalia chebula* etc. are mostly found in this area and used by the tribal people to treat the complications of diarrhoea. Kandhamal district in Odisha is home of various tribal and non tribal communities among which the Kandha tribe is predominant. Since long, plants are used traditionally by the Kandha community for their

healthcare. Kandhamal district offers an ample of scope for the study of plants used as traditional medicines due to diverse landscapes and their aboriginals. Basically the tribal and other forest dwelling communities reside in remote areas where communication and life system including healthcare are far from their reach. The Kandha community use plant parts such as roots, tuber, rhizomes, leaves, bark and fruits as medicines for treatment of various diseases like diarrhoea. They have experienced and learnt the herbal medicinal knowledge out of their suffering from disease through uses. Continuous observation and experimentation at root levels and this practice is carried forward to the next generation orally or learning from the traditional healers. Keeping all the importance and demand of herbal medicine in current situation where whole world are fighting with microbial infections like COVID-19. We surveyed to enumerate the plants used by Kandha tribal community against diarrhoea. The present study will give a base line data for formulation of future drugs against microbial infections.

CHAPTER 1

KANDHAMAL



KANDHAMAL

Kandhamal, a place for Kandha tribe, a beautiful district of Odisha having rich culture and bio-wealth. Kandhamal is mainly dominated by the populace of Schedule Caste (SC) & Schedule Tribe (ST). Kandha, Kutia Kandha, Kandha-gauda, Koi, Soura are major STs. Due to majority of populations of Kandha, the district has renamed as “Kandhamal” in 1994. Almost 66 % of the land area of the district is covered with dense forest and towering mountains, which is known for rich handicrafts, dokra, terra cotta, cane and bamboo. It is situated within the longitudes of 83° 30’ and 84° 35’ E & latitudes 19° 34’ to 20° 34’ N. The district is located in Central Odisha and bound by Boudha district in North, Rayagada in South, Ganjam and Nayagada districts in East and Kalahandi district in West. Phulabani and Baliguda are two sub-divisions of the district. Phulabani sub-division forms a broken plateau about 518 msl continuous mountains surround this sub-division from all sides. The district has two sub-divisions Baliguda and Phulabani including 12 Tehsils, 153 Gram Panchaytas and 2,456 villages. The district had a population of about 648,201 with about 322,799 Males and about 325,402 Females as per 2001 census. Most part of the district has red sandy soil and are generally light textured, porous and acidic in nature. The climate is sub-tropical in nature, characterized by hot and dry in summer and dry cold in winter. It has the highest forest coverage in Odisha and major portion of the forest is covered by Sal tree (*Shorea robusta*). Sal leaves, Sal seeds, Kendu leaves, Siali leaves and honey are collected by local

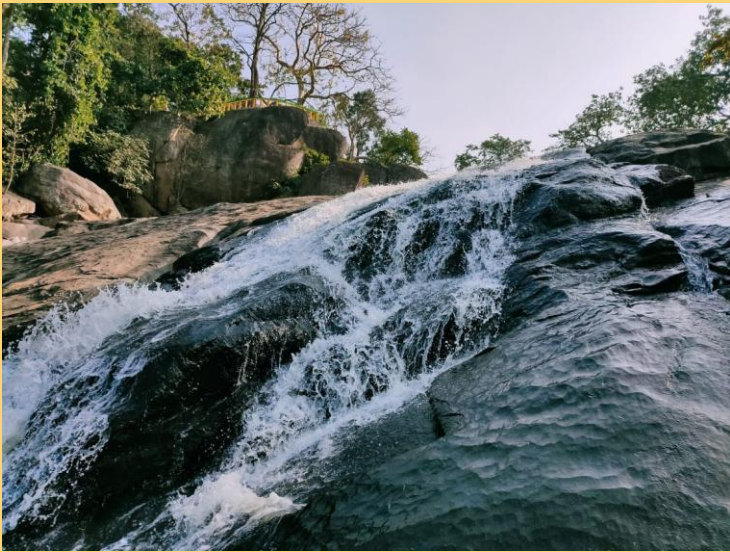
communities. Rural inhabitants depend on forests for firewood, small timber and other needs. 93 % population of the district is rural and the economy is mostly based on agriculture and forest produce with very limited industrialization. About 62 tribes notified as scheduled tribes in Odisha and about 29 types of tribal communities are found in Kandhamala district. Gouda, Kandha, Saora, Kandha-gouda and Kutia Kandha are the major among 29. The predominant tribe is Kandha or Khonds, identify themselves as Kuilaku or Kuinga. Kandhas can be classified into three sub-groups *i.e.* (i) Kutia Kandha, (ii) Malua Kandha and (iii) Desia Kandha. Kutia Kandha is predominant in Kotagarh, Tumudibandha and Belghar area of Baliguda sub-division. The Dongria or Malua Kandha lives in high lands of hilly areas of the district and they are less in number & the Desia or Odiya Kandha live in plain areas with the non-tribals community.

Charms of Kandhamal

- 1. Phulabani:** The district head quarter is a place to relax with natural beauty. It is surrounded by hills. Pilasalunki River flows on its three side and the town is just on the grove of Sal trees. Other attractions of the town are its weekly markets, Jagannath Temple and Narayan temple.
- 2. Putudi Water Fall:** Putudi is a place of natural beauty where river Salunki falls from the height of 60 feet forming an enchanting ambience. The roaring sound

of the fall with dense forest all around creates a thrilling sensation.

- 3. Balaskumpa:** The beautiful place in the lap of nature is famous for the goddess Barala Devi, who is believed to be the savior of the world.
- 4. Chakapad:** It is famous for Lord Shiva and here god is worshiped as Birupakshya, Anandeswara and Jageswara.



CHARM OF PUTUDI WATER FALL, KANDHAMAL, ODISHA

CHAPTER 2

KANDHA



KANDHA

Kandhas are tribal communities of Odisha state of India. Kui is the mother tongue of Kandhas which belongs to Dravidian group of language. They are the largest tribes of the state in terms of population and staying in Kandhamal, Rayagada, Koraput, Balangir and Boudh. The word Kandha is derived from the Telugu word Konda which means a small hill and originally they were hill dwellers. Kui and Kuvi is two original linguistic spoken by them. Kuvi is spoken by a majority of the Kandha of undivided Koraput, Kalahandi & Bolangiri district and Kui is spoken by the Kandha of Kandhamal district. On the basis of the social-cultural values, the Kandha may be divided into several sections such as Desia Kandha, Dongria Kandha, Kutia Kandha, Sitha Kandha, Budha Kandha, Pengo Kandha, Malua Kandha etc. Among the several sections of the Kandha communities, two sub-sections, Kutia Kandha and Dongria Kandha have been identified as vulnerable tribal groups of the country. The dress of the Kandha is very simple. Men wear a long and narrow cloth which passed round the waste and between the legs, the ends of this cloth are brightly colored and hang down behind like a tall. Women wear two clothes, one around waist & another for upper portion of the body whereas women of Kutia Kandha wear only one cloth. They have sound love for ornaments and wear gold and silver necklaces, ear rings, nose rings and necklace. They have borne the entire rim of the ear with silver rings. They tattoo their faces before marriage but now tattooing is not preferred by the women of younger generation.



WOMEN OF KANDHA TRIBE IN TRADITIONAL DRESS

Women of Kutia Kandha don't have tattoo on their faces. Now a days, Kandhas are farmer. They practice both shifting cultivation on the hill tops and hill slopes and plough cultivation in valleys and low lands. They cultivate on three types of land namely Ddhipa upper land Berena and Sarada for paddy cultivation and they cultivate Kandala, Jununga, Biri etc in their hilly areas. They cultivate different kinds of crops such as paddy, ragi maize black gram, horse gram sesame, mustard bean etc. Also they cultivate vegetables in their kitchen garden for their own consumption and also for sale in the local market. They collect important forest produce like timber, fire wood, Siali leaves, Kendu and Sal leaves. They use timber and bamboo for house construction and making their hunting implements and fishing traps.



ORNAMENTS USED BY KANDHA COMMUNITY

They collect fire wood for their own use and also for sale in the local market. Collection of Kendu leaves and Sal leaves is an important source of income. They make leaf cups and plates for their own use and often for sale. They collect different seeds and flowers such as Karanja, Kusuma, Bhalia for extracting oil and also seeds of Sal tree for sale and Mahula flower for making wine. They also collect juice from different trees such as Sago palm (Salpa), Date-palm (Tadi) and Palm (Tala) and also gather edible root tubers, Jhuna and Tamarind from the forest. Therefore, they consider forest as their treasure house. They are also working as daily wage laborers and doing business to maintain their livelihood at present.



PREPARATION & USES OF SALAPA (*Caryota urens* Juice)

They consume rice with boiled green leaves and vegetables. Water rice is their staple food. They take rice twice or thrice in a day in the morning time they take water rice (Basi eju)

after finishing agricultural work they take boiled rice during the day and in the evening time they take meal (Benda eju) with curry and in dinner they take boiled rice or (Pala) with curry. They take seasonal cereals, pulses, green leaves & vegetables like Maize, Kandual, Jhudunga, Beans and Mushrooms. They smoke and chew tobacco leaves. Both men and women consume excessively Salapa and Mahula liquor on all occasions. Sometimes or in any occasions they eat non-veg food like fish, chicken, mutton and the flesh of wild pig. They usually cook food with oil extracted from wild seeds.



FOOD HABIT OF KANDHA, CONSUMING BENDA EJU

Mainly they get income from various sources like agriculture, and self-employed activities. They are mainly do shifting cultivations. They produce paddy from the up-lands, where ever available at the foot of the hills but mainly depends

upon minor millets and cereals. They also produce cash crops like Turmeric, Ginger, Mustards, Niger, Black gram and Green motor. They collect fire wood and forest product for their own and also sale in local markets. The main source of their income come from cups (Chaukuni) and plates (Pana) made by Sal leaves.



LIVELIHOOD OF KANDHA COMMUNITY

Houses of Kandhas are surrounded by mountains and land. The Mango groves as well as Mahula and Jackfruit trees are found at the village borders. Generally a village consists of a number of hamlets, which are locally known as Sahi or Pada. They cremate their dead body in the cremation ground. Generally their houses are made up of wooden planks of Sal

tree and bamboo splits with forest grass and leaves. The construction of their house is very simple. The walls of the house are made of planks of Sal trees covered with mud and trellis made of bamboo splits and its roof is thatched with wild grass. The house is of very low height, not exceeding 12 feet and its entrance is at a height of about 3-4 feet.



ARRANGEMENT OF HOUSES IN KANDHA COMMUNITY

The Kandhas perform different dance like Dhangeda, Krahendra, Singha Badya, Danda Nata etc and celebrate festivals like:

1. **Mati Puja:** Celebrated in the month of Baisakh (April-May) for worshipping earth goddess for good crops.
2. **Kandula Jatra:** Celebrated in Balliguda in the month of April.
3. **Balli Jatra:** Celebrated in Tumudibandh.
4. **Makara Jatra:** Celebrated in Nuagaon in January

5. **Rhas Jatra:** Celebrated at Kellapada (Phiringia)
6. **Kali Puja:** Celebrated at Nuapadar (Phiringia) in November
7. **Dashera Puja:** Celebrated at throughout the district
8. **Rama Lila Jatra:** Celebrated at Bisipada (Phulabani) in April
9. **Siva Ratri:** Celebrated at Birupakhsya Temple at Chakappad in February.
10. **Ratha Jatra:** Celebrated at Balliguda and Phulabani in July
11. **Thakurani Jatra:** Celebrated at Phulabani in April – May



SINGHA BADYA DANCE BY KANDHA COMMUNITY

12. **Laxmi Puja:** Celebrated at Sankarakhol, Kainjhar in September
13. **Danda Jatra:** Celebrated throughout the district in the month of March and April.
14. **Kendu Jatra:** Celebrated among Kandahs to worship the Earth goddess in March-April.

Family is the smallest social unit in Kandha society. Once the boy gets married, he builds a new house of his own and lives there separately from his parents. Females are responsible for all indoor household works like cooking ,fetching of water ,firewood ,serving of food in the family ,cleaning of utensil, clothes, cleaning of courtyard and cow shed , plastering of houses, mud plastering on the walls of new houses, harvesting of ripened crops etc.



RITUALS DURING CHILD BIRTHS

Pregnancy and child birth are the welcome events in their society. After child birth, bury the naval cord and placenta on the back side of the house just beneath the roof. Another hole is also dug near the buried place, where the new born will bathe for next twenty one days.



RELIGIOUS BELIEFS AMONG KANDHA COMMUNITY

Marriage is one of the important social functions in the society. They believe the months of Magasira, Pausa, Magha and Baisakha are the auspicious months for marriage. After marriage the son has to built a new house and separate himself from his parents. Only the youngest son has the right

to live in the parental house. When a person dies in Kandha, the body is kept in the North-South direction with the head towards North. Their lineage member remains present there and the dead body covered with a new cloth to the burial ground. They don't burn the corpse of child, pregnant women and small pox patients. A rituals known as Dosa is solemnized after one month or one year after death. Kandha religion is based on nature. They belief on all natural things such as plants, animals, rocks etc. They worship a number of gods & goddesses. The Earth goddess is their supreme deity. They also worship to Saru penu (Mountain god), Suga penu (Stream god), Bell penu (Sun god), Naju penu (Village deity), Jakeri penu (Sister of Earth god), Dharni penu (Earth god) and Tana penu (Land god).



SOCIAL LIFE OF KANDHA COMMUNITY

CHAPTER 3

PLANTS USED

AGAINST DIARRHOEA



PLANTS USED AGAINST DIARRHOEA

The survey revealed that more than 32-35 plants are used against diarrhoea among Kandha community. They take the medicines from the traditional healers or collected from forest, home gardens and peripheral areas of village with a strong spiritual belief. Their spiritual and magical aspect of this practice cannot be ignored in this modern era. They mostly use herbal medicines in the form of juice followed by herbal pills (Batika). It was observed that mostly root parts & fruits are used to make formulation against diarrhoea followed by bark, leaves, seeds and gum. The details are listed in Table 1.

Table 1: Ethnomedicinal plants used against diarrhoea in Kandhamal district of Odisha

Name	Local Name	Parts Used	Collection Site(s)
<i>Achyranthes aspera</i>	Apamaranga	Root	Gandagaon
<i>Aegle marmelos</i>	Belo	Fruit	Tilakabata
<i>Azadirachta indica</i>	Nimba	Bark	Tilakabata
<i>Alstonia scholaris</i>	Chhatiana	Bark	Gandagaon
<i>Asparagus racemosus</i>	Shatavari	Tuber	Ghatisahi
<i>Aloe vera</i>	Ghikuanri	Leaf	Tikabali
<i>Bryophyllum pinnatum</i>	Amarapoi	Leaf	Tilakabata
<i>Cissampelos</i>	Akanabindi	Root	Gudrigaon

<i>pareira</i>			
<i>Centella asiatica</i>	Thalkudi	Root	Tilakabata
<i>Citrus limon</i>	Lembu	Immature fruit	Gandagaon
<i>Diospyros melanoxylon</i>	Kendu	Seed	Tilakabata
<i>Elephantopus scaber</i>	Mayurachulia	Root	Tilakabata
<i>Holarrhena pubescens</i>	Kurei	Dry root	Ghatisahi
<i>Justicia adhatoda</i>	Basanga	Root	Pilika sahi
<i>Mentha piperita</i>	Podina	Leaf	Kambasahi
<i>Marsilea minuta</i>	Sunsunia	Root	Tilakabata
<i>Mangifera indica</i>	Amba	Bark	Gandagaon
<i>Musa acuminata</i>	Kadali	Immature fruit	Badruguda
<i>Nyctanthes arbor-tristis</i>	Gangasiuli	Leaf	Kainjhar
<i>Punica granatum</i>	Dalimba	Immature fruit	Tilakabata
<i>Psidium guajava</i>	Pijuli	Immature fruit	Tilakabata
<i>Phoenix acaulis</i>	Khajuri	Tuber	Kainjhar
<i>Phyllanthus emblica</i>	Aonla	Dry fruit	Gandagaon
<i>Soymida</i>	Rohini	Bark	Gandagaon

<i>febrifuga</i>			
<i>Syzygium cumini</i>	Jamu koli	Seed	Kalikheta
<i>Sphaeranthus indicus</i>	Bhuin Kadamba	Leaf	Tilakabata
<i>Tectona grandis</i>	Sagwan	Dry fruit	Kamba sahi
<i>Terminalia arjuna</i>	Arjuna	Bark	Gandagaon
<i>Terminalia chebula</i>	Harida	Fruit	Gudrigaon
<i>Woodfordia fruticosa</i>	Dhatiki	Root	Tilakabata
<i>Wrightia arborea</i>	Khira kanchana	Bark	Pilika sahi
<i>Shorea robusta</i>	Sala	Gum	Tilakabata

CHAPTER 3

ENUMERATION





zadirachta indica

Local name: Nimba

Family: Meliaceae

Botany

Habit: Tree

Leaves: Leaves compound leaflet opposite, serrate and acuminate.

Flower: Flowers yellowish white.

Fruits: Fruits elliptical and one seeded.

Habitat: Often occurring in forest as if wild.

Distribution: Cultivated and naturalized throughout India and many other Tropical countries. Native to India.

Mode of uses among Kandha

About 21 seeds of Black pepper (Golmaricha) mix with 1 g of dry Ginger (Sunthi) and bark of *Azadirachta indica* (Nimba) tree then grind with water and make an aqueous juice. One tablespoon of juice is taken 3 times per day till cure diarrhoea.



***Azadirachta indica* (Meliaceae)**

Local name: Nimba

Collected site: Tilakabata

Field data book number: APRF-D-01



Alstonia scholaris

Local name: Chhatiana

Family: Apocynaceae

Botany

Habit: Tall evergreen tree.

Stem: Bark dark grey, nearly smooth, lenticellate when bark is injured a milky juice comes out.

Leaves: The upper side of the leaves is glossy while the underside is grayish.

Flower: Greenish - white or cream, sub-capitate at the ends of the panicle branches.

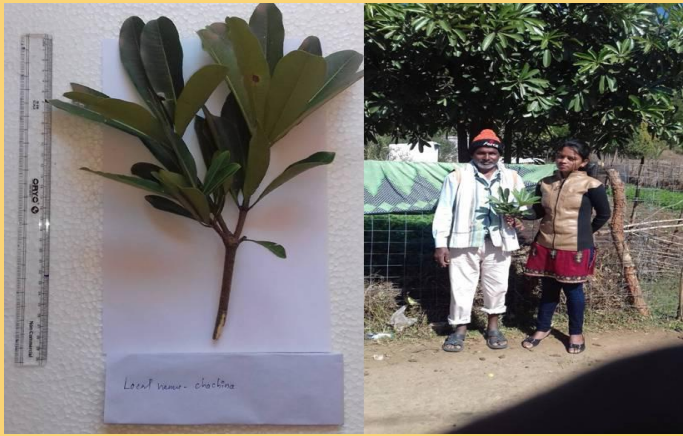
Fruits: Follicles 30-60 cm long and 0.3 cm in diameter, cylindrical pendulous in clusters.

Habitat: Common in valleys.

Distribution: Widely distributed in India, often planted in Sri Lanka.

Mode of uses among Kandha

About 15 seeds of Black pepper (Golmaricha) and 1 g of dry Ginger (Sunthi) and bark of *Alstonia scholaris* (Chhatiana) mix and grind with water to make an aqueous juice. One tablespoon of juice is taken 3 times per day till cure.



***Alstonia scholaris* (Apocynaceae)**

Local name: Chatiana

Collected site: Gandagaon

Field data book number: APRF-D-02



chyranthes aspera

Local name: Apamaranga

Family: Amaranthaceae

Botany

Habit: Perennial herb

Stem: Woody, stem only slightly pubescent to nearly glabrous

Leaves: Opposite, ovate, obovate-oblong

Flower: Flowers are scaly, very small and numerous, they are mostly, but can contain purple and pinks.

Fruits: The sharp-pointed fruits are orange to reddish purple or straw-brown capsule.

Habitat: Disturbed areas, road sides, gardens, crops, grasslands, and forest margins.

Distribution: throughout the tropical world. It can be found in many places.

Mode of uses among Kandha

21 seeds of Black pepper (Golmaricha) and 2 g of Apamaranga root mix and grind with water to make juice and then one tablespoon of juice are taken 3 times per day till cure.



***Achyranthus aspera* (Amaranthaceae)**

Local name: Apamaranga

Collected sites: Gandagaon

Field data book number: APRF-D-03



sparagus racemosus

Local name: Shatavari

Family: Asparagaceae

Botany

Habit: Shrub.

Stem: Woody climber growing to 1 to 2 meters in height.

Leaves: The leaves are like pine needles, small uniform.

Flower: White, sweet-scented, pedicels filiform, flowers have small spike.

Fruits: Fruits are globular & purplish black.

Habitat: Plant grows in tropical and subtropical forests.

Distribution: Throughout tropical and subtropical India.

Mode of uses among Kandha

About 10 seeds of Black pepper (Golmaricha) and 2 g of dry ginger (Sunthi) and 100 g of crystal sugar and tuber of *Asparagus racemosus* (Shatavari) mix and grind with water and make an aqueous juice. Then one tablespoon of juice is taken 3 times per day till cure.



***Asparagus racemosus* (Asparagaceae)**

Local name: Satavari, Ishwarjata

Collected sites: Ghati sahi

Field data book number: APRF-D-04

Bryophyllum pinnatum

Local name: Amarapoi

Family: Crassulaceae

Botany

Habit: Herb.

Stem: Stem usually above the ground erect ascending part of the plant body.

Leaves: Leaf opposite and simple.

Flower: Pale greenish and purple in lax panicle cymes.

Fruits: The fruits are follicles which are found in the persistent calyx and corolla.

Habitat: Frequent in rocky ground along streams.

Distribution: Tropical plains of India.

Mode of uses among Kandha

1 g of dry ginger (Sunthi) mix with one leaf of *Bryophyllum pinnatum* (Amarapoi) and then grind with water, make an aqueous juice. One tablespoon of juice is taken 3 times per day till cure.



***Bryophyllum pinnatum* (Crassulaceae)**

Local name: Amarapoi

Collected sites: Tikabali

Field data book number: APRF-D-05

C *issampelos pareira*

Local name: Akanabindi

Family: Menispermaceae

Botany

Habit: Climbing plant or herb.

Stem: Slender and glabrous to densely hairy.

Leaves: Arranged spirally & simple.

Flower: Unisexual, ovate to obovate hairy outside, greenish or yellowish in color.

Fruits: Fruit is round red.

Habitat: A perennial climbing under shrub. The plant is common in orchids, hedges and gardens on moist soils.

Distribution: Throughout tropical and sub-tropical regions.

Mode of uses among Kandha

about 5 seeds of Black pepper (Golmaricha) and root of *Cissampelos pareira* (Akanabindi) mix and grind with water to make an aqueous juice. Juice is taken thrice a day till cure.



***Cissampelos pareira* (Menispermaceae)**

Local name: Akanabindi

Collected sites: Gudrigaon

Field data book number: APRF-D-06

C*entella asiatica*

Local name: Thalkudi

Family: Apiaceae

Botany

Habit: Creeping herb.

Steam: Creeping stems with nodes having roots.

Leaves: Usually glabrous, entire, young leaves and petioles pubescent villous.

Flower: White, borne in 3-6 flowered umbels.

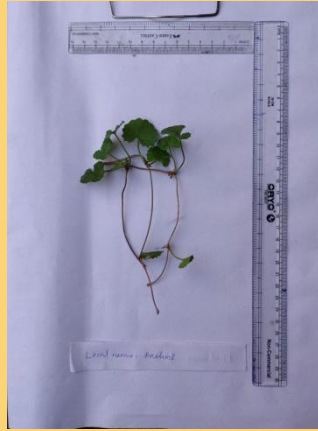
Fruits: Fruits and seeds laterally compressed.

Habitat: Common in wet places.

Distribution: Throughout India.

Mode of uses among Kandha

About 2 g of *Centella asiatica* (Thalkudi) root mix with 1 g of dry ginger and grind with water to make an aqueous juice. One tablespoon of juice is taken 3 times per day till cure.



***Centella asiatica* (Apiaceae)**
Local name: Thalkudi
Collected sites: Tilakabata
Field data book number: APRF-D-07

C *itrus limon*

Local name: Lembu

Family: Rutaceae

Botany

Habit: Small tree.

Stem: Woody, erect and solid often thorny.

Leaf: Alternate or opposite, simple, or compound.

Flower: Flowers are solitary or in small corymbs, each flower 2-4 cm diameter white in color.

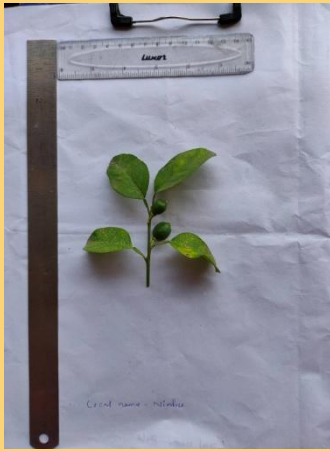
Fruits: The fruit is oval with a nipple like protuberance at the apex.

Habitat: Occasionally planted.

Distribution: Throughout the India.

Mode of uses among Kandha

About 21 seeds of Black pepper (Golmaricha) grind with an immature fruit of *Citrus lemon* (Lembu) with water to make an aqueous juice. One glass of juice is taken 6 times per day till cure.



***Citrus limon* (Rutaceae)**
Local name: Nimbu
Collected sites: Gandagaon
Field data book number: APRF-D-08

D *iospyros melanoxylon*

Local name: Kendu
Family: Ebenaceae
Botany

Habit: Tree.

Bark: The bark is black, rough, often in oblong plates.

Leaves: Sub-opposite or alternate and old leaves coriaceous.

Flower: Male flowers are pale purple in color sessile or nearly sessile.

Fruits: Olive green, ovoid or globose.

Habitat: Fairly common in open forest.

Distribution: Native to India and Sri Lanka. In India, it is distributed mostly in peninsular.

Mode of uses among Kandha

About 21 seeds of Black pepper (Golmaricha) mix with seeds of one fruit of *Diospyros melanoxylon* (Kendu) and grind with water to make aqueous juice. One cup of juice is taken 3 times per day till cure.



***Diospyros melanoxylon* (Ebenaceae)**

Local name: Kendu

Collected from: Tilkabata areas

Field data book number: APRF-D-09

E *lephantopus scaber*

Local name: Mayur chulia
Family: Asteraceae
Botany

Habit: Herb.

Stem: Slender and dichotomously branched.

Leaves: Leaves are obovate-oblong.

Flower: Purple in heads and closely packed.

Fruits: Fruits are small, one seeded that does not open to release the seed.

Habitat: Common in forests.

Distribution: Throughout India.

Mode of uses among Kandha

About 20 seeds of Black pepper (Golmaricha) mix with about 1 g roots of *Elephantopus scaber* (Mayur chulia) mix and grind with water to make aqueous juice and one cup is taken 3 times per day till cure.



***Elephantopus scaber* (Asteraceae)**
Local name: Mayur chulia
Collected sites: Tilakabata area
Field data book number: APRF-D-10

H *olarrhena pubescens*

Local name: Kurei
Family: Apocynaceae
Botany

Habit: Tree.

Stem: Stem has pale bark & smooth.

Leaves: Elliptic, ovate and acute to acuminate.

Flower: White color and pubescent.

Fruits: A pair of follicles about 1.5 inches long.

Habitat: Common in forest & wasteland.

Distribution: More or less throughout India.

Mode of uses among Kandha

About 21 seeds of Black pepper (Golmaricha) and dry root of *Holarrhena pubescens* (Syn: *Holarrhena antidysenterica*) (Kurei) mix with 1 g of dry ginger (Sunthi) and grind with water to make an aqueous juice. One tablespoon of juice is taken 3 times per day till cure.



***Holarrhena pubescens* (Apocynaceae)**

Local name: Kurei

Collected sites: Ghati Sahi

Field data book number: APRF-D-11

J *usticia adhatoda*

Local name: Basanga

Family: Acanthaceae

Botany

Habit: Shrub.

Stem: Herbaceous, erect and green to pale green in color.

Leaves: Simple, exstipulate, opposite decussate and lanceolate to ovate.

Flower: Flower are white.

Fruits: Fruits are pubescent, and are with club shaped capsule.

Habitat: Often found in and around rural & tribal villages.

Distribution: Throughout the plain of India and sub-tropical Himalayas.

Mode of uses among Kandha

About 5 g of dry root of *Justicia adhatoda* (Basanga) grind with water to make an aqueous juice. One cup of juice is taken 3 times per day till cure.



***Justicia adhatoda* (Acanthaceae)**
Local name: Basanga
Collected sites: Pilica sahi
Field data book number: APRF-D-12

M *agnifera indica*

Local name: Ambo
Family: Anacardiaceae
Botany

Habit: Tree.

Stem: Stem is cylindrical, woody and fissured bark.

Leaves: Variable in size and shape, usually lanceolate, elliptic to narrowly elliptic and acute to acuminate.

Flower: Greenish-yellow, polygamous & small.

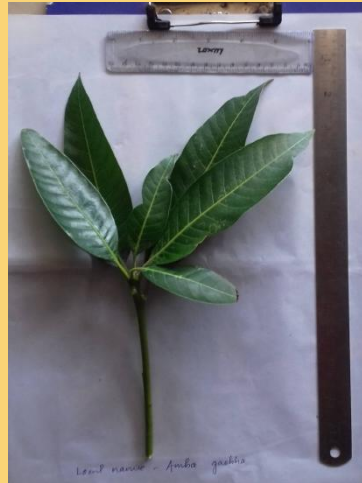
Fruits: Fruit an irregularly egg shaped and slightly compressed fleshy.

Habitat: Wild in valleys along the banks of streams.

Distribution: Throughout tropical India, widely cultivated throughout the tropics of both hemispheres.

Mode of uses among Kandha

A small pieces of bark of the *Magnifera indica* (Amba) mix with 1 gram of dry ginger (Sunthi) and grind with water to make juice. One cup of juice are taken 3 times per day till cure.



***Magnifera indica* (Anacardiaceae)**

Local name: Ambo

Collected site: Gandagaon

Field data book number: APRF-D-13

M

arsilea minuta

Local name: Sunsunia

Family: Marsileaceae

Botany

Habit: Aquatic fern.

Stem: Long, slender, and freely branched.

Leaves: Bright green leaves.

Habitat: Common in wetlands, brackish water and drains.

Distribution: Throughout Odisha.

Mode of uses among Kandha

About 4 g roots of *Marsilea minuta* (Sunsunia) grind with water to make an aqueous juice. Then one table spoon of juice is taken 3 times per day till cure.



***Marsilea minuta* (Marsileaceae)**

Local name: Sunsuniya

Collected site: Tilakabata area

Field data book number: APRF-D-14

M *entha piperita*

Local name: Podina

Habit: Family: Lamiaceae

Botany

Habit: Herb.

Stem: Purplish green in color.

Leaves: Petioled, ovate, or oblong-lanceolate.

Flower: Purplish in thick terminal spikes.

Fruits: The fruits are dark, four-sectioned and glossy ovoid.

Habitat: Cultivated in the house gardens.

Distribution: Widely distributed in the State and grow in wet environments.

Mode of uses among Kandha

About 21 seeds of Black pepper (Golmaricha) and 1 g of dry ginger (Sunthi) mix with *Mentha piperita* (Podina) leaf then grind with water to make juice. One cup of juice is taken thrice a day till cure.



***Mentha piperita* (Lamiaceae)**
Local name: Podina
Collection site: Kamba Sahi
Field data book number: APRF-D-15

M *usa paradisiaca*

Local name: Kadali
Family: Musaceae
Botany

Habit: Tree like herb with thick stem.

Stem: It has pseudo-stem.

Leaves: Leaves oblong, about 1.2-1.5 m spike.

Flower: White to yellowish-white in color.

Fruits: Berry, fleshy and narrow at both ends.

Habitat: Require hot moist climate.

Distribution: Indigenous in Bihar, Orissa and in the Eastern Himalayas.

Mode of uses among Kandha

Burn the immature fruit of *Musa paradisiaca* (Kasi kadali) and mixed with 1 g of dry ginger (Sunthi) and grind. The mixture is taken 3 times a day till cure.



***Musa paradisiaca* (Musaceae)**
Local name: Kadali
Collected site: Badruguda
Field data book number: APRF-D-16

N *nyctanthes arbor –tristis*

Local name: Ganga Siuli

Family: Oleaceae

Botany

Habit: Shrub or small tree.

Stem: Stem is flaky grey bark.

Leaves: Opposite, broadly ovate & acute or acuminate.

Flower: White and fragrant in the evening.

Fruits: Capsule up to 18 mm long and broad, compressed & cordate.

Habitat: Frequent in open forests.

Distribution: Throughout Odisha.

Mode of uses among Kandha

Leaves of *Nyctanthes arbor-tristis* (Ganga Siuli) mix with 1 g of ginger and make juice with water. One spoon of juice is taken 2 times per day till cure.



***Nyctanthes arbor-tristis* (Oleaceae)**

Local name: Ganga Siuli

Collected site: Kainjhar

Field data book number: APRF-D-17

Punica granatum

Local name: Dalimba

Family: Lythraceae

Botany

Habit: Shrub or medium sized tree.

Stem: Stem woody and spiny, bark smooth and dark gray.

Leaves: Simple, oblong or obovate & oppositely placed.

Flower: They are regular & solitary.

Fruits: A round berry.

Habitat: Cultivated in gardens.

Distribution: Throughout the country.

Mode of uses among Kandha

Immature fruit of *Punica granatum* (Dalimba) grind with water to make juice. Then one table spoon of juice is taken 3 times a day till cure.



***Punica granatum* (Lythraceae)**
Local name: Dalimba
Collected site: Tilakabata
Field data book number: APRF-D-18

P *sidium guajava*

Local name: Pijuli

Family: Myrtaceae

Botany

Habit: Shrub or small tree.

Stem: Bark smooth & pinkish brown.

Leaves: Opposite, oblong or elliptic oblong

Flower: White in color and scented flowers.

Fruits: Ovate shape fruit contain number of seeds.

Habitat: Commonly cultivated.

Distributed: Cultivated and naturalized throughout India & native of Tropical America.

Mode of uses among Kandha

Immature fruit of *Psidium guajava* (Pijuli) mix with some black peeper and grind with water to make juice. One table spoon of juice is taken thrice a day till cure.



***Psidium guajava* (Myrtaceae)**

Local name: Pijuli

Collected site: Tilakabata

Field data book number: APRF-D-19

P*hoenix acaulis*

Local name: Khajuri

Family: Arecaceae

Botany

Habit: Palm.

Stem: Covered with persistent petiole base.

Leaves: Leaves 0.6- 1.8 m long, leaf sheath reddish brown & fibrous.

Flowers: Spadix 20-30 cm long in flower.

Fruits: Fruit obovoid ripening from green with scarlet apices to blue black.

Habitat: Common in the drier and open grassy forests.

Distribution: Throughout India.

Mode of uses among Kandha

Some seeds of Black pepper (Golmaricha) and 5 g root of *Phoenix acaulis* (Khajuri) mix with crystal sugar then grind with water to make an aqueous juice. One table spoon of juice is taken thrice a day till cure.



***Phoenix acaulis* (Arecaceae)**

Local name: Khajuri

Collected site: Kainjhar

Field data book number: APRF-D-20

P*hyllanthus emblica*

Local name: Anola

Family: Phyllanthaceae

Botany

Habit: Tree.

Stem: Bark light grey, exfoliating & branch lets hairy.

Leaves: Leaves linear or linear oblong, aciculate glabrous.

Flower: Flowers monoecious, yellowish & minute in axillaries fascicles.

Fruit: Ovoid shape & fleshy yellowish-green.

Habitat: Common in forest.

Distribution: Throughout Odisha & Assam.

Mode of uses among Kandha

2 fruit of *Phyllanthus emblica* (Anola) and 1 g of dry ginger mix and grind with water to make an aqueous juice. One table spoon of juice is taken 3 times per day till cure.



***Phyllanthus emblica* (Phyllanthaceae)**

Local name: Aonla

Collected site: Gandagaon

Field data book number: APRF-D-21

S *phaeranthus indicus*

Local name: Bhuin kadamba

Family: Asteraceae

Botany

Habit: Annual pilose herb.

Stem: Stems and branches have toothed wings more or less covered with glandular hair.

Leaves: Sessile, decurrent & obovate-oblong.

Flower: Globose, ovoid in shape, purple in color.

Fruits: Small, dry one seeded fruit that does not open to release the seed & glabrous and stalked.

Habitat: Common in wet places.

Distribution: Throughout India.

Mode of uses among Kandah

3-4 leaves of *Sphaeranthus indicus* (Bhuin kadamba) mix with honey and make an aqueous juice. Then one table spoon of juice is taken 3 times per day till cure.



***Sphaeranthus indicus* (Asteraceae)**

Local name: Bhuin kadamba

Collected site: Tilakabata

Field data book number: APRF-D-22

S *horea robusta*

Local name: Sala

Family: Dipterocarpaceae

Parts: Gum of tree (Jhuna)

Botany

Habit: Tree.

Stem: The bark is rough & reddish brown.

Flower: Flowers yellowish-white, arranged in large terminal or axillary racemose panicles.

Habitat: Dense moist deciduous forest, on hill slopes, & flat grounds

Distribution: Throughout Odisha.

Mode of uses among Kandha

½ g of dry ginger (Sunthi) mix with honey and mixture of Jhuna then grind it to make an aqueous juice. The juice is taken 3 times per day till cure.



Gum of *Shorea robusta* (Jhuna) & Pure honey

Collected site: Tilakabata

Field data book number: APRF-D-23

Syzygium cumini

Local name: Jamu koli
Family: Myrtaceae
Botany

Habit: Tree.

Stem: Bark grey-brown or nearly black.

Leaves: Acute or acuminate & shining.

Flower: White in color & sessile.

Fruit: Fruit is oblong, ovoid. Unripe fruit looks green as it matures, its color changes to pink then to shining crimson red and finally to black color.

Habitat: Fairly common in the forests, often found near water bodies.

Distribution: Throughout Odisha.

Mode of uses among Kandha

1 g of dry ginger (Sunthi) mix with dried seeds of *Syzygium cumini* (Jamu koli) then grind with water to make an aqueous juice. One table spoon of juice is taken 3 times per day till cure.



Syzygium cumini (Myrtaceae)
Local name: Jamu Koli
Collected site: Kalikheta
Field data book number: APRF-D-24



Habit and Habitat of *Syzygium cumini*

Terminalia arjuna

Local name: Arjun

Family: Combretaceae

Botany

Habit: Tree.

Stem: Bark grey or pale green.

Leaves: Opposite or sub-opposite, sub sessile or shortly petiolate & having conical leaves.

Flower: In shortly panicle spikes & yellow flower.

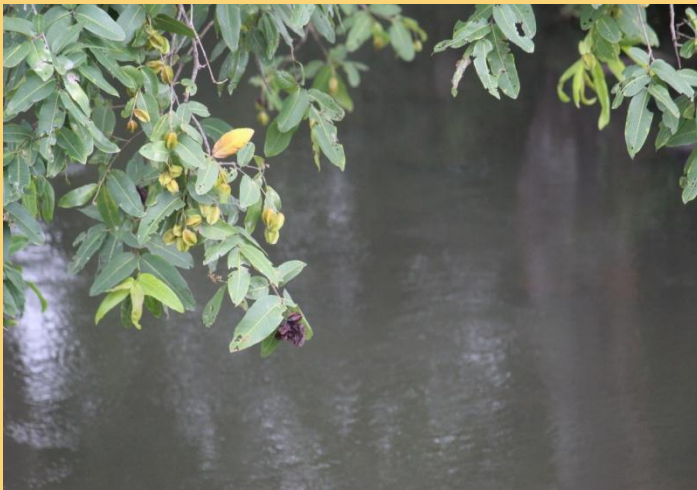
Fruits: fruit is fibrous-woody fleshy with thin skin about 2.5-5 cm in size.

Habitat: Common near water bodies.

Distribution: Widely distributed in India.

Mode of uses among Kandha

Cut small pieces of bark of the *Terminalia arjuna* (Arjun) and grind with water to make an aqueous juice. Then one table spoon of juice is taken 2 times per day till cure.



***Terminali arjuna* (Combretaceae)**
Local name: Arjun
Collected site: Gandagaon
Field data book number: APRF-D-25

Terminalia chebula

Local name: Harida

Family: Combretaceae

Botany

Habit: Tree.

Stem: Bark grey or dark grey.

Leaves: Usually sub opposite, ovate & silky hairy when young.

Flower: White in color.

Fruits: Fruits are green when unripe and yellowish grey when ripe.

Habitat: Common in Sal & mixed forests.

Distribution: Northern India & from Kumaon to Bengal.

Mode of uses among Kandha

1 dry fruit of *Terminalia chebula* (Harida) is burnt and mix 1 g of fresh ginger then make aqueous juice. One table spoon of juice is taken 2 times per day till cure.



***Terminalia chebula* (Combretaceae)**

Local name: Harida

Collected site: Gudrigaon

Field data book number: APRF-D-2

W *rightia arborea*

Local name: Khira kanchana

Family: Apocynaceae

Botany

Habit: Tree.

Stem: Bark light grey, thick & corky.

Leaves: Simple, opposite, estipulate, distichous & elliptic-ovate.

Flower: Greenish-orange or creamy.

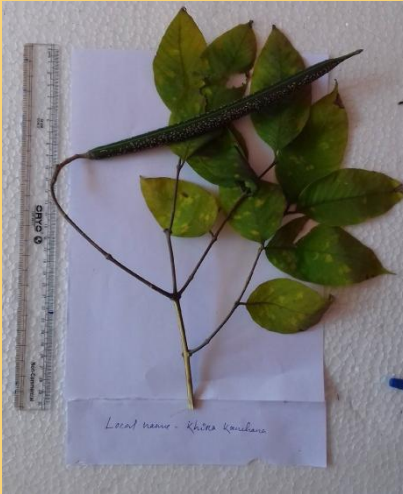
Fruits: Cylindrical, sub-terete, green sparsely white tubercle, rough & apically beaked.

Habitat: Frequent in deciduous forests.

Distribution: Throughout the hotter parts of India & Myanmar.

Mode of uses among Kandha

Powder of Dry bark of *Wrightia arborea* (Khira kanchana) mix with honey and make pills. One pill taken 3 times per day till cure.



***Wrightia arborea* (Apocynaceae)**
Local name: Khira kanchana
Collected site: Pilika sahi
Field data book number: APRF-D-27

W *oodfordia fruticosa*

Local name: Dhatiki

Family: Lythraceae

Botany

Habit: Shrub or medium sized tree.

Stem: Smooth & reddish brown in color.

Leaves: Sessile or sub sessile, lanceolate ovate-lanceolate or linear lanceolate.

Flower: Flower scarlet, in fascicled cymes, axillary and from the old wood, often completely covering the branches. Bright red in color.

Fruit: Capsule about 1cm long.

Habitat: Fairly common especially in the hills.

Distribution: Throughout the Odisha.

Mode of uses among Kandha

7 seeds of Black pepper (Golmaricha) and dry root of *Woodfordia fruticosa* (Dhatiki) mix and grind with water to make an aqueous juice. One table spoon of juice are taken 2 times per day till cure.



***Woodfordia fruticosa* (Lythraceae)**
Local name: Dhatiki
Collected site: Tilkabata
Field data book number: APRF-D-28



egle marmelos

Local name: Bela

Family: Rutaceae

Botany

Habit: Tree.

Stem: Erect, sometimes climbing branched & woody solid green.

Leaves: Spines, axillary & strong acuminate.

Flowers: White or greenish-white

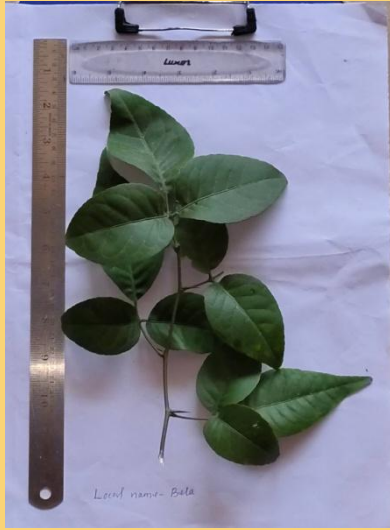
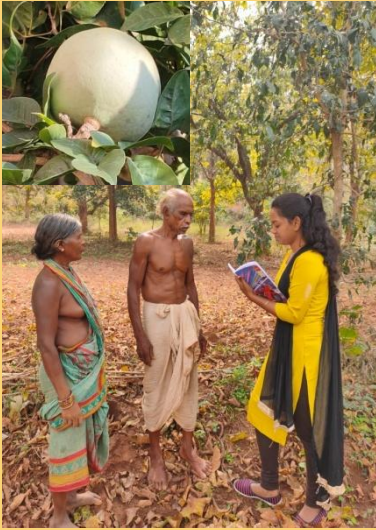
Fruits: Large up to 15 cm diameter, globose, ovoid or pyriform, 8-15 celled, rind grey or grayish-yellow, woody, pulp orange & sweet.

Habitat: It is suitable for dry forests on hills and plains.

Distribution: Throughout Odisha.

Mode of uses among Kandha

Take out the inner part of fruit (Belo) and mix with water then add some seeds of Black pepper and grind with water to make one glass juice. Drink one glass of juice before meal till cure.



***Aegle marmelos* (Rutaceae)**

Local name: Belo

Collected site: Tilakabata

Field data book number: APRF-D-29

Soyimida febrifuga

Local name: Rohini
Family: Meliaceae
Botany

Habit: Tree.

Stem: Dark brown.

Leaves: Broadly oblong.

Flower: White.

Fruits: Smooth & black when ripe.

Habitat: Common in dry deciduous forests.

Distribution: Throughout Odisha.

Mode of uses among Kandha

Dry bark of *Soyimida febrifuga* (Rohini) mix with fruits of *Terminalia arjuna* (Arjuna) and add honey and grind with water to make an aqueous juice. One table spoon of juice is taken 3 times per day till cure.



***Soymida febrifuga* (Meliaceae)**

Local name: Rohini

Collected site: Gandagaon

Field data book number: APRF-D-30



loe vera

Local name: Ghikuanri

Family: Asphodelaceae

Botany

Habit: Herb.

Leaves: It has thick fleshy leaves with sharp tooth like points or spikes at the edges. The leaves grow up to 18 inches in length. And 2 inches in width at the base.

Flower: Flowers are produced on a spike at least 90 cm tall, each flower being pendulous with yellow to red tubular corolla which is 2 to 3 cm long.

Fruit: It has a triangular capsule shaped fruit that contains numerous seeds.

Habitat: Found in sandy areas, road sides and similar places in full sun.

Distribution: It is naturalized and cultivated in all parts of world but it is considered native to south west Arabian peninsula.

Mode of uses among Kandha

Pill out the upper part of leaves and use the inner part of jelly and make one glass juice with water and take 3 times before food per day till cure.



***Aloe barbadensis* (Asphodelaceae)**

Local name: Ghikuanri

Collected site: Tikabali

Field data book number: APRF-D-31

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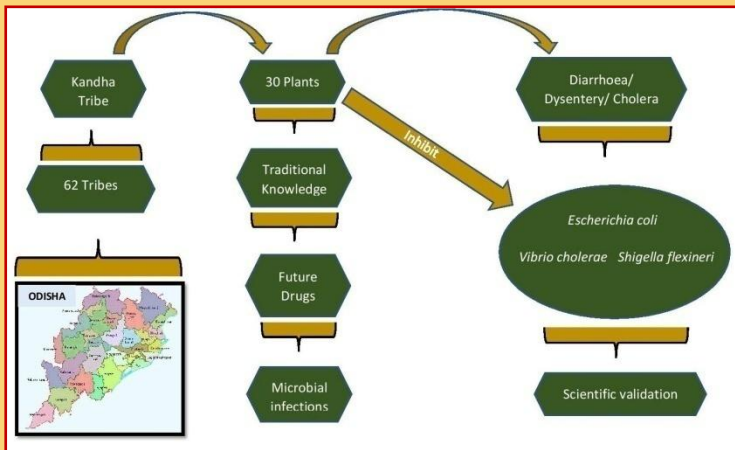
He is Founder & CEO of Ambika Prasad Research Foundation (APRF), Odisha, India. His current research focuses on plant taxonomy, relation between flora & fauna, biodiversity conservation, ethnobotany, medicinal plants, phytochemistry & anti-microbial resistance. He has 12 years of research experiences and worked in Eastern Ghats, Western Ghats, Sikkim Himalayas, Indo-Burma Biodiversity Hotspots & Chotanagpur Plateau. He has worked experience in RIE, Bhubaneswar; NIT, Rourkela; RPRC, Bhubaneswar & IBSD, Department of Biotechnology, Gol, Imphal. He has written 12 Books and published about 160 research papers in journals of national & international repute.



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