

Research Article



Identification of Forest by GIS and Ethnomedicinal Plant Survey in Rayagada, Odisha, India

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ABSTRACT

Ethnomedicine is the branch of ethnobiology in which the relationship between the use of medicinal plants and human culture is studied. Rayagada a tribal district of Odisha has rich in tradition of conservation of nature through religious and cultural practices. Ethnomedicine concentrates the attention about plants has been used and perceived in human societies. The tribal people in Rayagada district primarily depends upon medicinal plants for curing many diseases. The present research gives a clear identification of forest area in Rayagada district by ArcGIS and from tribal forest locality 30 medicinal plants species belonging 30 families are identified. Their English name, Local name, uses and phytoconstituents are reported in a significant way. Health, life sustainability and agedness enjoyed by the tribal people have been attributed by them to these ethnomedicinal plants of Rayagada district, Odisha. Ethnomedicinal plants and other economic plant species are cultivating in locality of Rayagada district and can play a key role in the economic development of these areas. Documentation and herbarium records of traditional knowledge on the ethnomedicinal use of these plants are essential for conservation of plant resources and development of new drugs.

Keywords: Ethnomedicine, Phytoconstituents, Medicine, Herbarium records, ArcGIS.

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INTRODUCTION

Ethnobotany is the scientific study of the relationships that exist between people and plants. Ethnomedicines aim to document, describe, and explain complex relationship between their cultures and use of plants. It focuses primarily on how plants are used, managed, and perceived across human societies. Ethnomedicine encourages awareness for creating a relationship between biodiversity and cultural diversity as well as the mutual influence of medicinal plants and humans. Medicinal plants are used as traditional herbal medicines in many parts of India, out of which the tribal people of Rayagada districts, Odisha a best community depending on the medicinal plants for different disease. Medicinal plants resources have served the basic needs of humans including healthcare since ancient time. In Indian literature, ethnomedicine can be much focused in the Charak Samhita, Charak Shusruta and Vedic literature appeared as the valuable works. Reeta kumara et. al. (2013) reported on the important medicinal parameters of *Rauwolfia Serpentina L.* which contains alkaloids, carbohydrates, flavonoids, glycosides, phlobatannins, phenols, resins, saponin sterols, tannins & terpenes¹. Khan H K (2009) reported that defense against diseases

can be increase by using *Emblica officinalis*². A brief review on phytochemical and pharmacological properties of *Curcuma Amada* is given by Mahadevi & Kavitha (2020)³. A substantial portion of Rayagada district was covered with forests which yields many medicinal plants. The Indigenous tribal people depend on for their clothes, shelter, food, and medicine⁴⁻⁷. In the tribal culture environmental knowledge is shared from hereditary from old people. They have a proper knowledge on natural treatment of different diseases by herbal medicine called "Ethnomedicine" or "Traditional medicine (TM)"⁸⁻¹⁰. According to WHO, traditional medicine strategy reported that majority population in developing countries including approximately 65% of Indigenous population confidences mostly on TM for the primary health care needs¹¹. WHO, Geneva reported that 80% world population use the traditional healing practices, while in India, 63% population is living in rural areas, remote areas, and forest environment, depend on T.M because T.M are safe, cost-effective and affordable¹². About 85% of the T.M used in main health care is obtained from plant species¹³. Therefore, the main objective of this research is to documents the ethnomedicinal plant species and their Indigenous knowledge used for preparation of traditional medicines by tribal people of Rayagada district, Odisha. The main objective of the research is to examine the practices of ethnomedicine species by the local people, to create a novel documentation for the ethnomedicinal plant species in the study area and to study the belief system in the tribal community of Rayagada district against



ethnomedicine and their utilization towards different human health problems.

MATERIALS AND METHODS

Study area and the tribal people

The tribal people of Rayagada i.e., Dangaria kandha, Lanjia soura, Bhattra, Bhumia, Gadaba, Holva, Mirdha and Munda etc., has been carried out in various villages of the Rayagada district of Odisha, shown in figure 1 (DMS-19°9'57.6"N, 83°24'57.6"E, DeWind- 19.66, 83.416, GEO URI-geo 19.66, 83.416). Rayagada is a district in southern part of Odisha. The district of Indigenous people in Rayagada is spoken in Odia, Kui and Sora language. The area of Rayagada district covers 7584.7 square kilometers and is divided into 11 blocks, 2673 villages. Ethnomedicinal studies of tribe are very rare. Some studies based on the ethno medicinal practices by people of Rayagada district, Odisha.

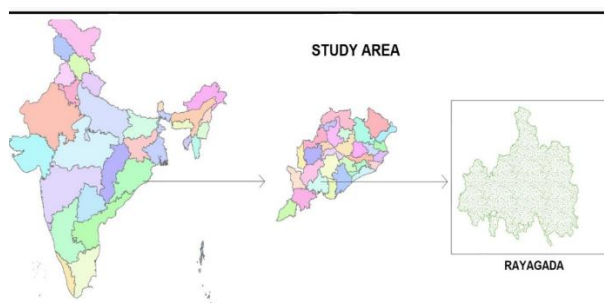


Figure 1: The identification of the Study area

The tribal people live in small village of foothills of different small mountain areas. Served visits were made to small 30 villages, namely Amalabhata, Ambaguda, Anakabadi, Antamada, Arjunguda, Badamandhara, Bajraguda, Biribadi, Bondhaguda, Chitrapada, Guma, Halua, Jallingi, Japakhal, Kaliaguda, Kotaguda, Madaladani, Mariguda, Leliri, Kerandi, Joridi, Kailashpur, Gunakha, Gaudaguda, Dumapai, Deopur, Champia, Bodopadia, Binisipur, Rayagada during July 2020- August 2022. The above 30 villages geographical area beautifies of small rocky hills, bushy area, dense forest, many streams etc. The average temperature of Rayagada district varies from 14.9°C to 36.7°C with optimum temperature of 26.5° C and average rainfall is 1312mm. The tribal district of Rayagada has a rich biodiversity and its climate is a typical tropical type. Health care facilities provided by Auxiliary Nurse Midwife (ANM) workers, multipurpose health workers (MPHW), Anganwadi workers, government of Odisha. The images for the LULC are obtained from ArcGIS 10.7.1 version

Data Collection Methods

From total population of 11 blocks and its 2673 village was collected by various methods namely interview, case study, sample survey, census survey and observation etc. The sample survey method includes local medicine practitioners, Baidya, chief and local communities, priests, household head and leaders of village etc. People

were interviewed in their local language with the help of local medicine practitioners, local Baidya, and experienced old people of community shown in figure 2. Taxonomic identification of ethnomedicinal plants were made with flora books of Odisha¹⁴⁻¹⁵. Again, the medicinal activity of certain plants was given in a book named "Udvida Sangraha"¹⁶. Application uses were collected from local Baidya, medicine practitioners etc. through interview technique.



Figure 2: Identification, discussion, and collection of ethnomedicinal plants with local tribal people of Rayagada, Odisha.

RESULTS AND DISCUSSION

The five-year data of Forest area, crop area and Rangeland in Rayagada district is identified with the help of ArcGIS and given in figure 3. From the figure the forest area (trees) decreased from 2017 to 2020 continually. In 2021 it is little bit increased then in 2022 again it is decreased. Similarly, the crop area increased gradually from 2017 to 2020 then decrease in the years 2021 and 2022. The increasing the crop area is due to consciousness of the tribal people and awareness programs conducted by Government.

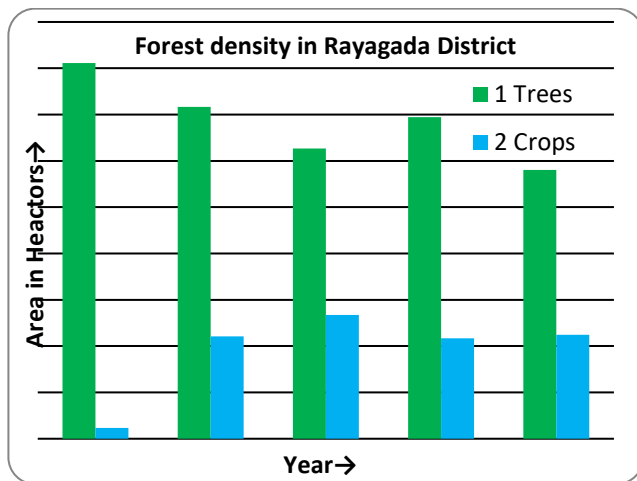


Figure 3: Identification of Tree, Crop & Rangeland area of Rayagada, Odisha by ArcGIS

The image of LULC can be obtained from ArcGIS 10.7.1 version by RFT tool in data management tools which are shown in figure 4. From the figure it is clearly identified the water, trees, rangeland, flooded vegetation, crops, built area & bare ground area. The tree area is nothing but forest region which is identified by the orange color in the district map.

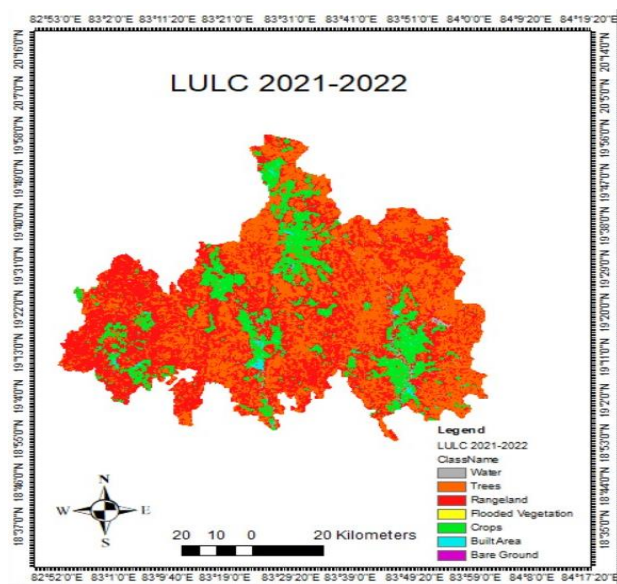


Figure 4: Rayagada Map Showing Tree & Crop Area 2021-2022 by ArcGIS

a) Socio- Demographic data:

According to the 2011 census demographically the district has a total number of 2,25,964 households with total number population is 9,67,911, out of which 4,71,960 are males and 4,95,951 are females. The population density of the Rayagada district is 137 (Person per square kilometres). The languages in the Rayagada district are Odia, Kui and Telugu with 42.80%, 33.36% and 10.43% respectively. The tribe has an exceptionally low literacy rate (6.39%), male literacy rate higher than the female literacy rate¹⁷.

b) Traditional health care and belief system:

Disari is otherwise called as medicine man. They do not believe in modern medicine. They only believe in the practices of natural treatment system. The Disari uses different plants or parts of plant for treating many diseases as per the traditional knowledge. They believe that God has chosen him/her for practicing their medicine and its knowledge is given through dreams. Any people who desire to be medicine women/men should worship their god by their traditional practices. Traditional medicine (TM) knowledge is difficult for transferring to younger generations due to their more education, exposure to modern lifestyle urbanization¹⁸.

c) Diversity of Ethnomedicinal Plants used:

The list of plant species used for ethnomedicine with details of scientific name, family name, local name, locality, uses and its phytoconstituents are presented in this paper. Thirty plants species belong to thirty genus and thirty families are documented. Asteraceae family belongs to two plants namely *Embllica officinalis*, *Tridax procumbers*. Zingiberaceae family belongs to two plants i.e., *Curcuma amada*, *Curcuma aromatic*. Cucurbitaceae family belongs to two plants namely *Coccinia grandis*, *Momordica charantia*. Rutaceae family belongs to three plants i.e., *Aegle marmelos*, *Murraya koenigii*, *Citrus aurantifolia*. Liliaceae family belongs two plants such as *Asparagus recemosus*, *Aloe vera*. Collections and uses of ethnomedicinal plants by local people of Rayagada, Odisha is shown in the figure-5.



Figure 5: Collections and uses of Ethnomedicinal plants by local people of Rayagada, Odisha

The data on ethnomedicinal plants, which is collected from 30 local inhabitants in Rayagada district, were analysed. The list of ethno medicinal samples collected, their scientific name, Family, English name, Local name, Locality, Uses and its phytoconstituents are represented below:-

1. *Rauvolfia serpentine*:

Family: Apocynaceae

English Name: Serpentine

Local name: Patalagaruda

Locality: Amalabhata

Uses: Reduce blood pressure, acts as a hypnotic and as an antidote to the bites of poisonous reptile like snakes depresses activity of central nervous system¹.

Phytoconstituents - Ajmaline, serpentine, serpentinine and yohimbine etc.

2. *Emblica officinalis*:

Family: Asteraceae

English Name: Indian gooseberry

Local name: Anola

Locality: Ambaguda

Uses: Antioxidant, immunomodulatory, antipyretic, analgesic, cytoprotective, antitussive and gastroprotective, memory enhancing, ophthalmic disorders, lowering cholesterol level, neutralizing snake venom².

Phytoconstituents - Ellagic acid, Gallic acid, Vitamin C and Epigallocatechin 3-O-gallate

3. *Curcuma amada*:

Family: Zingiberaceae

English Name: Mango ginger

Local name: Ambehalad, Amba Ada

Locality: Anakabadi

Uses: Anti-inflammatory, anti-bacterial, anti-cancer, anti-tubercular, anti-allergy, anthelmintic and anti-pyretic activities, skin diseases³.

Phytoconstituents- Curcumin, Dimethoxycurcumin, bismethoxycurcumin

4. *Swertia chirayita*:

Family: Gentianaceae

English Name: Chirata

Local name: Bhuinimba

Locality: Antamada

Uses: Reduction in cancer cells, stomachic, febrifuge, and anthelmintic, appetizer, laxative, alterative, antidiarrhoeic and antiperiodic¹⁹.

Phytoconstituents- swertiamarin, mangiferin, amarogentin

5. *Moringa oleifera*:

Family: Moringiaceae

English Name: Horseradish tree or drumstick tree.

Local name: Sajana

Locality: Arjunguda

Uses: Antiulcer, antispasmodic, diuretic, antitumor, antipyretic, antiepileptic, antiinflammatory, antihypertensive, cholesterol lowering, antioxidant, antidiabetic, hepatoprotective, antibacterial, cardiac, and antifungal activities²⁰.

Phytoconstituents: niazinin A, niazimicin, β -sitosterol, niazirin

6. *Calotropis gigantes*:

Family: Asclapidaeae

English Name: Crown flower or Giant Milkweed

Local name: Arakha

Locality: Badamandhara

Uses: Asthma, abortifacient, analgesic, antinociceptive activity, antifertility, emmenagogue, anti-inflammatory activity, anthelmintic activity, anti-cancer activity, antidote for scorpion stings and insect bites, anti-tumour activity, anti-diarrheal and anti-dysentery activities, antimicrobial activity, antiviral activity, anxiety and pain, CNS activity, cold, expectorant, cytostatic activity²¹.

Phytoconstituents: Di-(2-ethylhexyl) Phthalate, Anhydrosophoradiol-3-acetate, α -Taraxerol, Lupenyl-1-acetate.

7. *Vitex negundo*:

Family: Verbenaceae

English Name Chinese chaste tree, five-leaved chaste tree, or horseshoe vitex

Local name: Begunia

Locality: Bajraguda

Uses: Hepatoprotective, antioxidant, anticonvulsant, oxidative stress, anti-inflammatory, anti-rheumatic, antibiotic, anti-androgen, snake venom neutralization and anti-allergic activities²².

Phytoconstituents: 4-terpineol, nishindine, caryophyllene oxide and vitexin.

8. *Coccinia grandis*:

Family: Cucurbitaceae



English Name: Ivy gourd

Local name: Kunduri

Locality: Biribadi

Uses: Atimicrobial, antiulcer, antidiabetic, antioxidant, analgesic, antipyretic, anti-inflammatory, hypoglycaemic, hepatoprotective, antimalarial, antidyslipidemic, anticancer, antitussive, mutagenic²³.

Phytoconstituents: Lycopene, cryptoxanthin, xyloglucan, β -sitosterol.

9. *Curcuma aromatica*:

Family: Zingiberaceae

English Name: Wild turmeric

Local name: Banhaldi

Locality: Bondhaguda

Uses: Anti-cancer, anti-repellent, antitussive, anti-platelet activity, anti-inflammatory, wound healing, anti-melanogenic, antioxidant and free radical scavenging activity, anti-tumour, and antinephrotoxic activity²⁴.

Phytoconstituents- 1,8- cineole, Germacrone, isoborneol, camphene.

10. *Withania somnifera*:

Family: Solanaceae

English Name: Serpentine

Local name:- Ajagandha, Kanaje

Locality: Chitrapada

Uses: Nervous disorders, rheumatism, arthritis, intestinal infections, cold and coughs, ulcers, emaciation, diabetes, conjunctivitis, epilepsy, insomnia, senile dementia, leprosy, Parkinson's disease, bronchitis, asthma, impotence, and a suppressant in HIV/AIDS patients²⁵.

Phytoconstituents: 3-tert-Butyl-4- hydroxy anisole, 9-Octadecenal, 1-Tridecyne, Oleic acid

11. *Aegle marmelos*:

Family: Rutaceae

English Name: Wood apple

Local name: Bael

Locality: Guma

Uses: Fungal infection, microbial infection, inflammation, diabetes, liver toxicity, pyrexia and to relieve pain²⁶.

Phytoconstituents- Lupeol, Cineol, Citral, Citronella

12. *Azadiracta indica*:

Family: Meliaceae

English Name: Neem tree or Margosa tree

Local name: Nimba or Limba

Locality: Halua

Uses: Antibacterial, antiyeast, antiulcer, antifertility, antifilarial, abortifacient, analgesic, anthelmintic, antifungal, antihyperglycemic, anti-inflammatory, antiviral, antimalarial, diuretic, antinematodal, antipyretic, antispasmodic, insecticidal, antispermatogetic, antitumor, hypercholesteremic, hypoglycaemic, immunomodulator²⁷.

Phytoconstituents: Azadirachtin, meliacin, gedunin, nimbodin

13. *Colocasia esculenta*:

Family: Araceae

English Name: Elephant ear taro or edible arum

Local name: Saru

Locality: Jallingi

Uses: Analgesic, anti-inflammatory, anti-cancer, anti-diarrheal, astringent, nervine tonic, and hypolipidemic activity²⁸.

Phytoconstituents:- Cyaniding 3-glucoside, B-sitosterol, Saponins, Terpernes

14. *Mirabilis jalapa*:

Family: Nyctaginaceae

English Name: Four o'clock plant or Marvel of Peru

Local name: Bana Phula, Rangini, Ranagabana

Locality: Japakhal

Uses: Anti-diabetic, anti-inflammatory, anti-oxidative, anti-bacterial, anti-microbial, anti-fungal, anti-spasmodic, antinociceptive, anti-viral, diuretic, anthelmintic and urinary tract disorder²⁹.

Phytoconstituents: n-hexacosanal, β - sitosterol, tetracosanoic acid and tartaric acid

15. *Ocimum sanctum*:

Family: Lamiaceae

English Name: Sacred basil

Local name: Tulasi

Locality: Kaliaguda

Uses: expectorant, analgesic, anticancer, antiasthmatic, antiemetic, diaphoretic, antidiabetic, antifertility, hepatoprotective, hypotensive, hypolipidmic, antistress agents

Phytoconstituents- alkanoid, saponin, tannin, phenol³⁰.

16. *Tamarindus indica*:

Family: Caesalpiniaceae

English Name: Tamarind

Local name: Tentuli



Locality: Kotaguda

Uses: Antidiabetic, hypolipidemic, hepatoprotective and antimicrobial properties.

phytoconstituents- naringenin, catechin, leupeol, eriodectin³¹.

17. *Tridax procumbens*:

Family: Asteraceae

English Name: Coat button, Local name-Bisaliyakarani, Raktakhai, Banasebati

Locality: Madaladani

Uses: Antiviral, antioxidant, hepatoprotective, antibiotic efficacies, wound healing, antidiabetic activity, hypotensive effect, immunomodulating property, bronchial catarrh, dysentery, diarrhoea and to prevent falling of hair promotes the growth of hair, and antimicrobial activity against both gram-positive and gram-negative bacteria, anti-cancer, anti-inflammatory activity and antitubercular³².

Phytoconstituents- Puerarin, Esculetin, Luteolin, Beta-sitosterol

18. *Murraya koenigii*:

Family: Rutaceae

English Name: Curry Leaf Tree,

Local name: Merasinga, Bhrusanga, Kathaneemba, Barasan

Locality: Mariguda

Uses: Stomachic, Carminative, internally in dysentery, vomiting. used as anthelmintic, analgesic, cures piles, allays heat of the body, thirst, inflammation, and itching.

Phytoconstituents: Koenimbine, Murrayacine, Girinimbine, Koenine³³.

19. *Citrus aurantifolia*:

Family - Rutaceae

English Name- Lime

Local name- Kagajilembu, Lembu

Locality- Leliri

Uses- Antioxidant, anthelmintic, antibacterial, analgesic, anti-inflammatory, antifungal, hypolipidemic properties, antihyperglycemic, antidiabetic, and hypoglycaemic activity³⁴.

Phytoconstituents- flavonoids, Limonoids, Coumarins and Phytosterols

20. *Asparagus recemosus*:

Family: Liliaceae

English Name: Satabari

Local name: Satamuli, Abhirupatri, Chhatuari

Locality: Kerandi

Uses: Inflammations, tumor, bronchitis, nervous disorder, dysentery, diabetic retinopathy, hyperacidity, certain infectious diseases, neuropathy, conjunctivitis, spasm, chronic fevers, and rheumatism³⁵.

Phytoconstituents: Shatavari, Rutin, Quercetin

21. *Mesua ferrea*:

Family: Guttiferae

English Name: Indian rose chestnut, cobra is saffron

Local name: Nag Champa, Nageswar

Locality: Joridi

Uses: Antimicrobial, antispasmodic, antivenom, antioxidant, hepatoprotective, anti-inflammatory, central nervous system (CNS) depressant, analgesic and immunostimulant activity³⁶.

Phytoconstituents: Mesuol, Mammeisin, Mesuagin, Mammeigin.

22. *Vetiveria zizanioides*:

Family: Toaceae/Graminae

English Name: Khus-khus grass, Vetiver.

Local name: Benchar, Khus

Locality: Kailashpur

Uses: Ringworm, indigestion, loss of appetite, skin disorders, cooling agent, tonic and blood purifier³⁷.

Phytoconstituents: Vetiverol, Vetivone, Khusimone, Khusimol.

23. *Aloe vera*:

Family: Liliaceae

English Name: Indian aloe

Local name: Gheekuanari

Locality: Gunakhal

Uses: Mild fever, wounds and burns, gastrointestinal disorders, diabetes, sexual vitality and fertility problems to cancer, immune modulation, AIDS and various skin diseases.

Phytoconstituents- anthraquinones, Barbaloin, Emodin³⁸.

24. *Vinca rosea*:

Family: Apocyanacea

English Name: Madagascar Periwinkle

Local name: Sada Bahar

Locality: Gaudaguda

Uses: Anti-Neoplastic activity, anti-helminthic activity, anti-diabetic activity, wound healing property,



hypolipidemic activity, anti-diarrheal property, anti-oxidant property, hypotensive property, enhancement of memory³⁹.

Phytoconstituents- terpenoids, tannins, flavonoids, saponins

25. *Terminalia chebula*:

Family: Combretaceae

English Name: Chebulic Myrobalan

Local name: Harida

Locality: Dumapai

Uses: Antibacterial, antifungal, antiviral, antidiabetic, antimutagenic, antioxidant, antiulcer and wound healing properties, cardiac damage, and kidney disease⁴⁰.

Phytoconstituents: Ellagic acid, Gallic Acid, Syringic Acid

26. *Saraca asoca*:

Family: Caesalpinaceae

English Name: Asoka

Local name: Ashok

Locality: Deopur

Uses: Anti-bacteria, anti-implantation, anti-tumour, anti-progesteration, spasmogenic, oxytocic, uterotonic, antiestrogenic activities against menorrhagia and anti-cancer

Phytoconstituents: Catechin, Leucocyanidin, Gallic acid⁴¹.

27. *Lawsonia inermis*:

Family: Lythraceae

English Name: Egyptian privet, Heena tree

Local name: Manjuati

Locality: Champia

Uses: Antifungal, antiviral, antiparasitic, antitypanosomal, antibacterial, antimicrobial, antidermatophytic, antioxidant, antifertility, tuberculostatic and anticancer properties

Phytoconstituents- Lawsoniaside, Lalioid, Fraxetin, Scopoletin⁴².

28. *Momordica charantia*:

Family: Cucurbitaceae

English Name: bitter melon; bitter apple; bitter gourd; bitter squash; balsam-pear

Local name: Kalara

Locality: Bodopadia

Uses: Anti-diabetic, anti-ulcerogenic, anti-mutagenic, antioxidant, anti-tumour, anti-lipolytic, analgesic,

abortifacient, anti-viral, hypoglycemic and immunomodulatory.

Phytoconstituents: Momorcharins, Erythrodiol, Galacturonic acids, Gentsic acid⁴³.

29. *Paederia foetida*:

Family: Rubiaceae

English Name: Chinese flower

Local name: Posaruni

Locality: Binisipur

Uses: Anti-ulcer, anti-diarrhoeal, antihyperglycemic, antioxidant, antitussive, anthelmintic, hepatoprotective activity⁴⁴.

Phytoconstituents: Friedelin, Campesterol, Ursolic acid, Hentriacontane

30. *Ziziphus mauritiana*:

Family: Rhamnaceae

English Name: Indian jujube, Indian plum, Chinese date, Chinese apple

Local name: Barakoli, Bodokoi, Bodori

Locality: Rayagada

Uses: Antiplasmodial, anti-infectious, antidiabetic, diuretic, antimicrobial, hypoglycemic, analgesic, anticonvulsant and anti-inflammatory activities⁴⁵.

Phytoconstituents: Zizyberenic acid, Betulonic acid, Oleanonic acid

Familywise classification of ethnomedicinal Plants:

Familywise classification of the plants is 30 families, and 30 genera were identified in Rayagada district, Odisha is shown in figure 6. Rutaceae is the dominant family (3 species) Apocynaceae, Caesalpinaceae, Cucurbitaceae, Liliaceae, Zingiberaceae each with two species. The other families contained with one species.

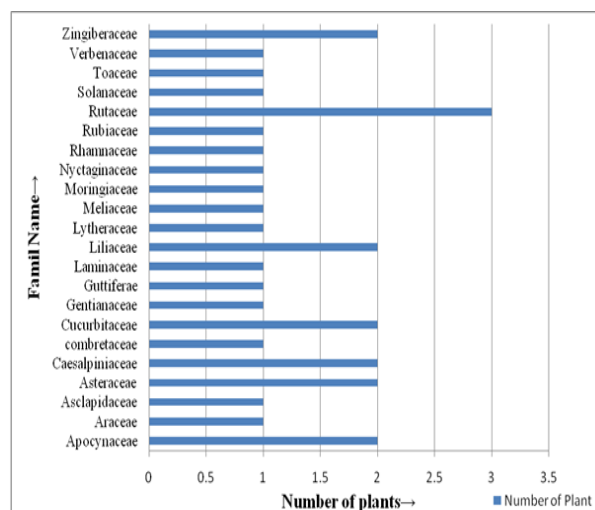


Figure 6: Familywise Classification of Ethno-medicinal Plants

Plant Habits VS. Percentage of Plant Species:

Familywise classification of the plants is 30 families, and 30 genera were identified in Rayagada district, Odisha. Herb is the first dominant habits (14 species), Tree is the second dominant habits (12 species), Shrub is the third dominant habits (4 species) shown in figure 7.

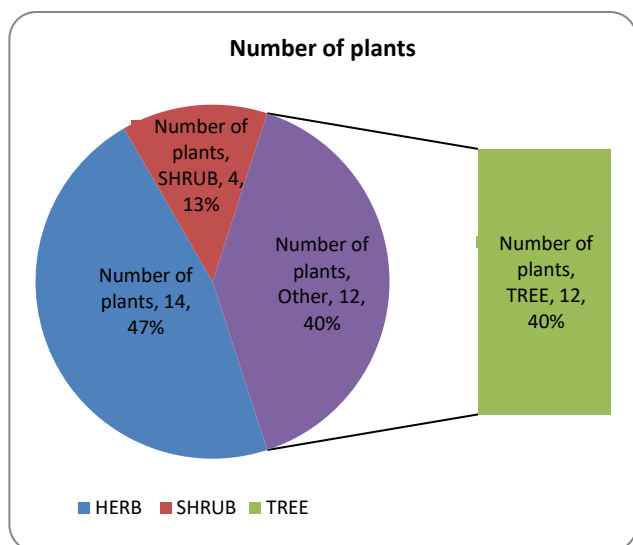


Figure 7: Plant Habits Vs. Percentage of Plant Species

CONCLUSION

Tribal people in Rayagada district use ethnomedicines for their health care as compared to modern medicine. The future of ethnomedicine is in danger because lack of interest in ethnomedicine and its practice by the younger generation, uses of forest land for development of buildings and industry leading to threat of ethnomedicinal plants. It is also identified from the five-year ArcGIS study of the district maps that the tree area gradually decreasing. In the present research we have documented ethnomedicinal uses of 30 plants by tribal people of Rayagada district, Odisha. The survey of Rayagada district, Odisha emphasized that ethnomedicine or herbal medicine are mostly used by tribal people and these medicines have great potentially in cure distinct types of disease. The different medicinal plants have declined medicinal plants day-to-day in their natural habitat. Greater efforts are required to herbarium records or documents their traditional knowledge of the local tribal people to open new vistas in plant research fields. Therefore, conservation of rich biodiversity in Rayagada district will be developed strategy by Plant taxonomist, Anthropologist, Ethnobotanist, ecologist, pharmacologist, scientist, and academic persons.

REFERENCES

1. Kumaria R, Rathib B, Ranic A, Bhatnagar S, *Rauvolfia serpentina* L. Benth. ex Kurz.: Phytochemical, Pharmacological and Therapeutic Aspects, *Int. J. Pharm. Sci. Rev. Res.*, 2013;23(2):348-355.
2. Khan K.H: Roles of *Embllica officinalis* in Medicine - A Review; *Botany Research International*, 2009;2(4):218-228.
3. R Mahadevi, R Kavitha: Phytochemical and pharmacological properties of *Curcuma amada*: A Review; *International Journal of Research in Pharmaceutical Sciences*, 2020;11(3):3546-3555.
4. Panda T, Panigrahi S K & Padhy R N, A sustainable use of phytodiversity by *Kandha* tribe of Orissa, *Indian J Tradit Know*, 2005;4(2):173-178.
5. Panda T & Padhy R N, Sustainable food habits of the hill-dwelling *Kandhat*tribe in Kalahandi district of Orissa, *Indian J Tradit Know*, 2007;6(2):103-105.
6. Panda T & Padhy R N, Ethnomedicinal plants used by tribes of Kalahandi district, Orissa, *Indian J Tradit Know*, 2008;7(2):242-249.
7. Mallik, B K, Panda T & Padhy R N, Ethnoveterinary practices of aborigine tribes in Odisha, India, *Asian Pacific J Tropical Biomedicine*, 2 (Spl) (2012) S1520-1525.
8. Das S P, *Anthropology of Primitive Tribes*, (Serials Publication, New Delhi), 2006, p. 647.
9. WHO, *WHO traditional Medicine Strategy 2011*, (WHO/EMP/MIE/2011/2.3, Geneva), 2011, p. 1-14.
10. Mallik B K, Panda T & Padhy R N, Traditional herbal practices by the ethnic people of Kalahandi District of Odisha, India, *Asian Pacific J Trop Biomed*, 2012;2(2):988-994.
11. WHO, *Traditional Medicine Strategy: 2014-2023*, (WHO, Geneva) 2013. P-76.
12. WHO, *Traditional Medicine and Alternative Medicines*, (WHO, Geneva), 2002, p. 271.
13. Farnsworth N R, *Screening plants for new medicines* (Chapter-9), In: *Biodiversity*, edited by E.O. Wilson and F M Peter, (National Academies Press, Washington DC), 1988, p. 83-97.
14. Haines H H, *The Botany of Bihar and Odisha*, (Andesite Press), 2017, p-960.
15. Saxena H O & Brahman M, *The Flora of Odisha*, (Orissa Forest Development Corporation Ltd., Bhubaneswar, Vol I-IV), 1994-96, p. 2918.
16. Mishra M K, *Udvida Sangraha* (Odia), (Published by M M Misra, Berhampur), 2003, p. 218.
17. www.censusindia.gov.in, (Office of the Registrar General & Census Commissioner, India, New Delhi), 2011 (Retrieved 3 November 2017)
18. Umair M, Altaf M & Abbasi A M, An ethnobotanical survey of indigenous medicinal plants in Hafizabad district, Punjab-Pakistan, *PLoS One*, 2017;12(6):88-95.
19. K. P. S., Kumar; Bhowmik B; Chiranjib ; Biswajit ; Chandira M: *Swertia chirayita*: a traditional herb and its medicinal uses; *Journal of Chemical and Pharmaceutical Research*, 2010;1(2):262-266.
20. Patel S, Thakur A S, Chandy A and Manigauha A: *Moringa Oleifera*: A Review of There Medicinal and Economical Importance to the Health and Nation; *Drug Invention Today* 2010;2(7):339-342.
21. Suresh Kumar P, E .Suresh and Kalavathy S: Review on a potential herb *Calotropis gigantea* (L.) R. Br.; *Scholars Academic Journal of Pharmacy*, 2013;2(2):135-143
22. Ladda PL. and Magdum CS.: *Vitex negundo* Linn.: Ethnobotany, Phytochemistry and Pharmacology- A Review; *International*

- journal of advances in pharmacy, biology, and chemistry, 2012;1(3):71-76.
23. S. S Pekamwar, T.M. Kalyankar, and S.S. Kokate: Pharmacological Activities of *Coccinia grandis*: Review; Journal of Applied Pharmaceutical Science 2013;3(05):114-119.
 24. A Sikha, A Harini, L Hegde Prakash: Pharmacological activities of wild turmeric (*Curcuma aromatica* Salisb): a review; Journal of Pharmacognosy and Phytochemistry 2015; 3(5): 01-04
 25. Umadevi M, Rajeswari R , Rahale C S ,Selvavenkadesh S, Pushpa R, Sampath Kumar K.P.,Bhowmik D: Traditional and Medicinal Uses of *Withania Somnifera*; 2012;9(1):102-110
 26. Sharma G N , Dubey S K , Sharma P, Sati N: Medicinal Values of Bael (*Aegle marmelos*) (L.) Corr.: A Review; 2011, 3(1), 12-22
 27. Hashmat I, Azad H and Ahmed A: Neem (*Azadirachta indica* A. Juss) - A Nature's Drugstore: An overview; International Research Journal of Biological Sciences, 2012;1(6):76-79.
 28. Prajapati R, Kalariya M, Umbarkar R, Parmar S, Sheth N: *Colocasias esculenta*: A potent indigenous plant, 2011;2(1):90-96.
 29. Saha S, Deb J and Deb N K: Review on *Mirabilis jalapa* L., (Nyctaginaceae): A medicinal plant, International Journal of Herbal Medicine 2020;8(2):14-18
 30. Siva M, Shanmugam KR, Shanmugam B, Venkata Subbaiah G. , Ravi S. , Sathyavelu Reddy K. , Mallikarjuna K(2003): *Ocimum sanctum*: a review on the pharmacological properties, DOI: <http://dx.doi.org/10.18203/2319-2003.ijbcp20161491>
 31. Meher B, Dash D.K, Roy A: a review on: phytochemistry, pharmacology and traditional uses of *tamarindus indica*, World journal of pharmacy and pharmaceutical sciences, 2014;10(3):229-240.
 32. Bhagat VC and Kondawar MS: A comprehensive review on phytochemistry and pharmacological use of *Tridax procumbens* Linn. Journal of Pharmacognosy and Phytochemistry 2019;8(4): 01-10.
 33. Handrail HC K, Pandith A and Sd S: Review on *Murraya koenigii*: multi potential medicinal plant, Asian Journal of Pharmaceutical and Clinical Research, 2012;4(5):51-55.
 34. Chaudhari S.Y, Ruknuddin G, Prajapati P: Ethno medicinal values of Citrus genus: A review; Medical Journal of Dr. D.Y Patil Vidyapeeth, 2016;5(9):560-565.
 35. Hasan N , Ahmad N, Zohrameena S , Khalid M, Akhtar J: *Asparagus racemosus*: for medicinal uses & pharmacological actions, International Journal of Advanced Research 2016;3(4):259-267.
 36. Chahar M .K, D. S. Sanjaya K, Geetha L., Lokesh T. and Manohara K. P.: *Mesua ferrea* L., A review of the medical evidence for its phytochemistry and pharmacological actions; African Journal of Pharmacy and Pharmacology, 2013;7(6):211-219.
 37. Pareek A and Pumar A: Ethnobotanical and pharmaceutical uses of *Vetiveria zizanioides* (Linn) nash: a medicinal plant of Rajasthan, International Journal of Life Science & Pharma Research, 2013;4(3):44-51.
 38. Manvitha K, Bidya B, Aloe vera: a wonder plant its history, cultivation and medicinal uses, Journal of Pharmacognosy and Phytochemistry 2014;2(5): 85-88.
 39. Allamsetty J, Pedada S .M, Pedada N, Dhanunjayarao K: A basic review on *Vinca rosea*; International Journal of Pharmacognosy and Chemistry, 2020;1(1):31-36.
 40. Gupta P.C: Biological and pharmacological properties of *Terminalia chebularetz*. (haritaki)- an overview, International Journal of Pharmacy and Pharmaceutical Sciences, 2012;3(4):34-39.
 41. Pradhan P , Joseph L, Gupta V, Chulet R, Arya H , Verma R , Bajpai A: *Saracaasoca* (Ashoka): A Review, Journal of Chemical and Pharmaceutical Research, 2009, 1(1):62-71.
 42. Chaudhary G, Goyal S, Poonia P; *Lawsoniainermis linnaeus*: A Phytopharmacological Review; International Journal of Pharmaceutical Sciences and Drug Research 2010; 2(2): 91-98.
 43. Raghavan Anilakumar K, Phani Kumar G, Ilaiyaraja N: Nutritional, pharmacological, and medicinal properties of *Momordica charantia*, International Journal of Nutrition and Food Sciences 2015; 4(1): 75-83.
 44. Soni R .K R, Dixit V and Alok S: *Paederiafoetida* linn: phytochemistry, pharmacological and traditional uses; International Journal of Pharmaceutical Sciences and Research, 2013;4(12): 4525-4530
 45. Goyal M, Nagori B. K, Sasmal D: Review on ethnomedicinal uses, pharmacological activity and phytochemical constituents of *Ziziphus mauritiana* (Z. jujuba Lam., non-Mill); Spatula DD. 2012; 2(2):107-116.

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