



REVIEW ARTICLE

Review on the ethnomedicinal and nutritional value of some wild edible plants used by the tribal of Koraput District of Odisha, India

Sameer Jena¹, Sudhansu Sekhar Dash², Ipsita Priyadarsini Samal¹ & Gyanranjan Mahalik^{1*}

¹Department of Botany, School of Applied Sciences, Centurion University of Technology and Management, Odisha -752050, India

²Head Quarter, Botanical Survey of India, CGO Complex, Salt Lake City, Kolkata, West Bengal - 700064, India

*Email: gyanranjan.mahalik@cutm.ac.in



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Abstract

Due to its abundance of plant genetic resources, Odisha is often called a genetic refuge. However, the south Odisha tribal regions, despite their abundance of natural resources, have received scant ethnobotanical research. Human cultural diversity in Koraput is well-known, and the area is also a biodiversity hotspot for several food crops and forest species. The purpose of this study is to consolidate all available information on the ethnomedicinal uses of wild plants by indigenous peoples in the Koraput district. The reviewed nutritional analysis studies show that numerous species have high nutrient content, some of which are superior to some domesticated varieties. Wild edible plants are used as indigenous food and remarkably improve the nutritional security of several tribal people of Koraput. However, systematic study on the nutritional potential of these wild edible plants is meager. The present study evaluated the Carbohydrate, Fat, Protein, and Fiber content in selected wild edible plants of Koraput. Research shows that several species of tubers are in danger of extinction and hence included on the IUCN Red List of Threatened and Endangered Species. For this reason, the optimal use of this biodiversity is to meet the inhabitant's present and future food. The medicinal needs depend on extensive phytochemical inquiry, safe conservation, and sustainable use of wild tuber, all require strong community participation, which also fulfills the Sustainable Development Goals (SDG) 2 and 3, i.e., zero hunger and good health and well-being.

Keywords

Biodiversity; Ethno-medicine; Nutritional; IUCN; Sustainable Development Goals (SDG)

Introduction

Medicinal plants have been utilized for various conditions thanks to their therapeutic characteristics. Indian tribal people owe much of their health and longevity to the traditional healing system. Any treatment method passed down through generations of a culture or ethnic group is considered traditional medicine (1). Included are both conventional medical practices and alternative ones. Inadequate food consumption and food scarcity in developing countries are persistent problems that threaten global food and nutritional security (2,3). Exploiting wild edible plants is essential for rural communities to earn a living and a fallback option in times of nutritional distress (4). Neither cultivated nor domesticated, wild edible plants can be found in their natural habitat and are harvested for human consumption (5).

Increased productivity of the few cultivated crops available now and the use of underutilized wild species are necessary to meet the food needs of the world's over 800 million undernourished people (6). The role of wild edible plants in ensuring a stable food supply has been undervalued (7).

Although Odisha is widely recognized as a plant genetic resource paradise, the rich tribal lands of south Odisha have gotten less attention from the ethnobotanical community. Many different types of crops and forest species may be found in Koraput (8), and the region is also well-known for its rich cultural diversity (9). The dietary habits of the inhabitants in each area of the Koraput district are primarily governed by local food availability and artistic practices. The traditional eating habits of the tribe show that they make good use of the foods and ingredients that are easily accessible to them. When treating common ailments like diarrhea, dysentery, a cold, malaria fever, vomiting, headache, and so on, the tribal people have considerable knowledge and experience with wild edible plants (10). The Koraput area has been recognized as an Agrobiodiversity Hotspot by the Indian government (11). For centuries, indigenous and rural communities have gathered wild plants for cooking, medicine, and other essentials. Urbanization and settled agriculture erode this expertise, which could reduce the variety of native foods and contribute to nutritional deficiencies (12). Over the past 50 years, the region has experienced a substantial decline in the genetic diversity of several crops and a loss of forest species (13). A small number of site-specific research (14) have shown that tribal and rural impoverished people in India eat wild foods. It is said that very little work has been done on the district's ethnobotanical flora, with just infrequent reports (15) from varied sources available. Wild edible plant species in South Odisha, especially in and around Koraput, have not been fully documented in the ethnomedicinal aspect (16, 17).

The traditional use of medicinal plants dates back

thousands of years and remains an integral part of India's healthcare system today. Most doctors in Indian medical systems create and prescribe their unique recipes; hence, there is a need for extensive record-keeping and study in this area. About 40% of the population in Koraput has reported using an herb to cure medical illnesses in the previous year, reflecting a similar upward trend seen all over India. The rising incidence of adverse medication responses and the high expense of the modern medical system are increasing public, academic, and governmental interest in traditional treatments (11).

Due to the high concentration of indigenous people in the area, the name "land of aborigines" has come to be used to describe the district of Koraput. Hills, mountains, rivers, forests, waterfalls, wildlife, and native peoples all contribute to the hypnotic allure of this land. "Adivasi," which means "early occupants of this region," refers to the area's original people. Generally, they inherit the information dealing with the usage of plants and animals from their forefathers. Food, fodder, medicine, wine, fireworks, domestic equipment, etc., are only a few plant uses. Location plus climate equals a veritable paradise for plant and animal life one of the places where rice and millet first appeared (18).

The district, Koraput covers an area of 8,379 km² between 18°13' and 19°10' North latitude and 82°5' and 83° 23' East longitude. It is bordered to the east by "Rayagada District, Odisha" and "Srikakulam District, Andhra Pradesh," to the west by "Bastar District, Chhattisgarh," to the north by "Nabarangapur District, Odisha," and to the south by "Vijayanagaram and Visakhapatnam districts," Andhra Pradesh. The district showcases the wide range of landscapes and peoples in the Eastern Ghats (Figure 1). The plateaus are located between 500 and 3000 feet above sea level. The climate is mild, with most rain falling during the monsoon months of July through November. The typical yearly precipitation is 1522 mm. Most plants are dry deciduous and semi-evergreen varieties (19, 20).

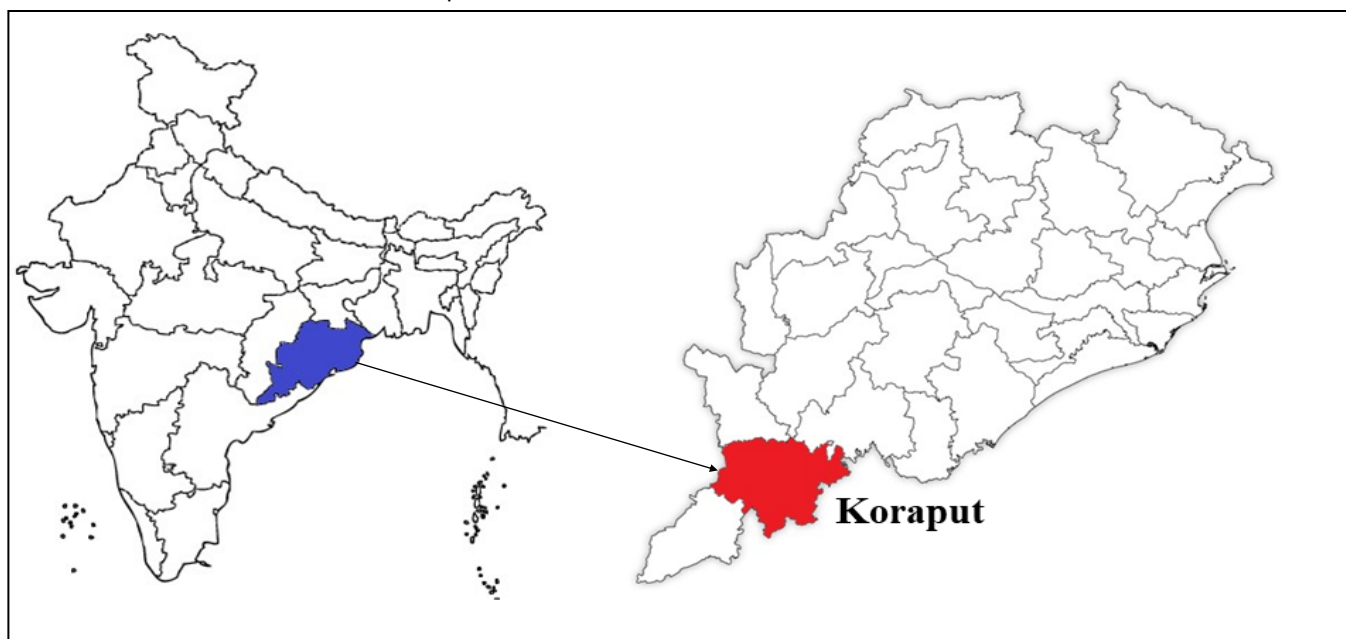


Figure 1: Map of study site Koraput

"Nutrition" refers to the physiological response to eating, which involves absorbing nutrients and producing energy. Nutrients are chemicals that supply the biomolecules and energy that the body needs to perform its many tasks. All life in the universe requires nutrition for survival and growth, but it satisfies this need in vastly different ways. While some species may meet their nutritional needs by eating inorganic molecules, others must rely on complex substances. Each species has its unique method of obtaining food (21).

Vitamins, minerals, proteins, carbs, and other vital nutrients are only some of the things that may be learned with the aid of nutrient composition. This data is essential to evaluate their potential role in a healthy diet. In many places, the potential of wild food plants is not fully realized. Analyzing their nutritional worth might reveal their possible significance in diversifying diets, especially in areas with limited access to various food sources (22). There are widespread malnutrition issues, especially in underserved and underdeveloped communities. Wild edible plants can supplement dietary shortages if their nutritional profiles are known. Wild edible plants can be used as a supplement or replacement food supply in areas where this is a problem, such as crop failure or seasonal scarcity. To make the most of them in times of need, you must first understand the nutrients they contain. Traditional knowledge and the cultural history of indigenous cultures frequently include extensive information about wild food plants. Traditional dietary habits and knowledge can be preserved and promoted by studying and documenting their nutritional worth. Wild edible plants can be enabled for preservation, and responsible use of their nutritional value is analyzed. This data is essential for designing conservation efforts that won't deplete the ecosystem's natural resources (23).

Materials and Methods

The pharmacological profile, nutritional analysis, and traditional applications of medicinal plants were reviewed, as were any relevant journals (40, 44), textbooks (Tribes of Koraput), magazines, websites, databases (Scopus, PubMed, Elsevier), and folklore information that may have been written about them.

Results

Ethnomedicinal data about medicinal plants used in traditional medicine

The various Indian medical systems are thought to use around 80,000 unique plant species. Dravya Guna Shastra, dedicated to studying plants and plant products, culminates thousands of years of research and development. Many well-defined biological metrics have been used to study plants, including rasa (taste), vipaka (metabolic characteristic), guna (quality), prabhava (natural effect), and virya (power) (potency). Over 25,000 plant medicinal compositions are recorded in the codified traditions that may be traced back to such research. Furthermore, it is estimated that over 50,000 different

formulas can be found in various folk and tribal practices. All of these things (24, 25) indicate that the people of this region have always had a strong affinity for and an in-depth understanding of medicinal plants.

India is famous for its ancient writings, the Zero and the Vedas. About 60% of the world's population relies on Indian medicine. These are utilized for primary health care in rural areas in impoverished countries and rich countries where modern medicines are primarily used. Herbal pharmaceuticals are manufactured from medicinal plants, but traditional medicines may include minerals and organic substances (26).

The results of the ethnobotanical data are presented in Table 1. The study revealed 89 ethnomedicinal plant species from 51 families frequently used for treating various ailments in the Koraput District. The medicinal value of each plant was enumerated in the following pattern: a) Sl no., b) Botanical name, c) Family, d) Local name e) Parts used, f) Medicinal importance & g) References. Traditional healers in Koraput District are using these plants to cure diseases related to stomach ache, joint pain, scabies, lactation, rheumatism, infections, dysentery, diarrhea, bleeding of the nose, skin disease, migraine, snake bites, boils vomiting, fever, skin problems, cold and cough, toothache, stomach ache, Wounds, burns, constipation, roundworms, fids, weakness, indigestion, diabetes, asthma and jaundice (Table 1).

The local traditional healers used different parts of these medicinal plants as medicine. Among the different plant parts, the leaves were most frequently used for treating diseases followed by fruit, bark, whole plant, root, and flowers (Figure 2).

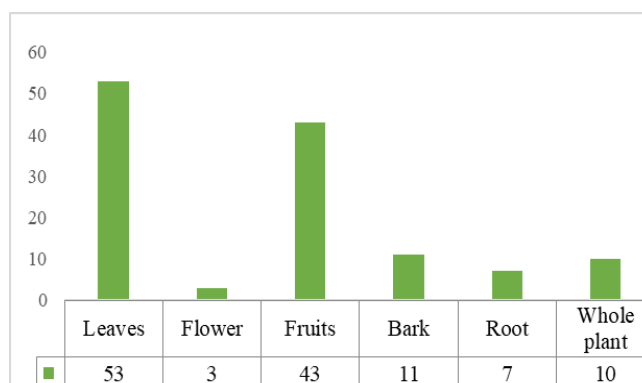


Figure 2 : Graph showing the consumption pattern of wild edible plant parts used by different tribal communities of Koraput presented in Table 1

Nutritional composition of some wild edible plants of Koraput

Many Koraput tribal people's nutritional security is significantly improved by using wild edible plants as a native diet. Still, very little systematic research has been done on the nutritional value of these wild edible plants (Table 2). This study assessed the relative amounts of lipid, protein, fat, and carbohydrates in a sample of Koraput wild plants. Table 2 displays values for the lipids, protein, fat, and carbs found in wild plants. For nutritional value, *Terminalia bellirica* Roxb. is the plant with the highest value, followed by *Spondias pinnata* (Linn. F.) Kurz with the lowest score.

Table 1: List of wild edible plants used by the tribal of Koraput

Sl. No.	Plant Name	Family	Local Name	Parts used	Medicinal Importance	References
1	<i>Boerhavia diffusa</i> L.	Nyctaginaceae	Puruni saga	Leaves	Treatment for night blindness, inflammation, anemia, other blood disorders	(27)
2	<i>Achyranthes aspera</i> L.	Amaranthaceae	Kukurjibi saga	Leaves and Flowers	Wound healing to bug and snake bites, gynecological disorders, asthma, hemorrhoids, and abdominal tumors.	(28)
3	<i>Aerva lanata</i> (L.) Juss.	Amaranthaceae	Paunsia saga	Leaves	The plant treats various ailments, including cough, strangury, headaches, and urolithiasis.	(29)
4	<i>Alternanthera philoxeroides</i> (Mart.) Griseb	Amaranthaceae	Madaranga Saga	Leaves	This plant's uses include alleviating symptoms caused by several different viruses (e.g., measles, influenza, and hemorrhagic fever).	(30)
5	<i>Alternanthera sessilis</i> (L.) R.Br .ex Dc.	Amaranthaceae	Paatru Saag	Leaves and Shoots	Hepatitis, tight chest, bronchitis, asthma, the antihypertensive effect is achieved by ingesting the cooked leaves and young stems.	(31)
6	<i>Amaranthus spinosus</i> L.	Amaranthaceae	Kanta bhaji saga	Leaves, Roots, and Whole plant	As a laxative, blood purifier, diuretic, and hypnotic, this plant is employed from its leaves down to its roots. Snake bites can be treated by drinking the juice extracted from the plant after it has been crushed and pressed. Miscarriages can be avoided by boiling the plant and ingesting the resulting tea.	(27)
7	<i>Amaranthus tricolor</i> L.	Amaranthaceae	Lal bhaji saga	Seed and Leaves	Flakes, flour, groats, muesli, and oil can all be made from this. Amaranth's high protein content makes it sound independent and as a fortifier in other cereal grains.	(32)
8	<i>Amaranthus viridis</i> L.	Amaranthaceae	Madaranga saga	Leaves, Roots, and Whole plant	Used to treat various illnesses, including those involving the urinary tract, liver, eyes, and genitourinary system.	(33)
9	<i>Celosia argentea</i> L.	Amaranthaceae	Serili Saag	Leaves and Seeds	Used to treat conditions such as hemorrhoids, uterine bleeding, bloody diarrhea, dysentery, and leukorrhea.	(30)
10	<i>Buchanania lanzan</i> Spr.	Anacardiaceae	Char Koli	Leaves, Stems, Fruits, and Bark	Utilized as a remedy for gastrointestinal distress, measles, impotence, spermatorrhea, menstrual cramps, diarrhea, and snakebite.	(34)
11	<i>Semecarpus anacardium</i> L. f.	Anacardiaceae	Ban Bhalia	Fruits	Used for the relief of coughing and piles.	(35)
12	<i>Spondias pinnata</i> (L.F.) Kurz.	Anacardiaceae	Ambala	Fruits and Bark	Used to treat stomach issues such as nausea, vomiting, and diarrhea.	(35)
13	<i>Annona reticulata</i> L.	Annonaceae	Ramaphala	Fruit and Leaves	A wide variety of diseases and conditions can be cured including epilepsy, diarrhea, cardiac issues, worm infestation, constipation, bleeding, antibacterial infection, and more.	(35)
14	<i>Annona squamosa</i> L.	Annonaceae	Badhal/Ata	Fruits and Leaves	Used in treating heart disease, thyroid issues, diabetes, and cancer.	(36)
15	<i>Carissa carandas</i> L.	Apocynaceae	Karanda Koli	Fruits and Leaves	Effective against biliousness, stomach ache, constipation, anemia, skin conditions, anorexia, and insanity	(37)

16	<i>Carissa spinarum</i> L. Rich. ex Walp.	Apocynaceae	Khirkoli	Fruits and Leaves	Used for treating various conditions, including chest pain, headaches, and gonorrhoea.	(38)
17	<i>Colocasia esculenta</i> (L.) Schott	Araceae	Saru	Tuber and Leaves	Applying tuber paste to a scorpion sting has been shown to provide anti-helminthic, anti-diabetic, and anti-inflammatory effects.	(39)
18	<i>Borassus flabellifer</i> L.	Arecaceae	Tala	Roots, Stem, Flower, Fruits, Sprout, Spadix, Seed embryo	Used traditionally for treating anti-inflammatory, antioxidant, antibacterial, anti-diabetic, and anti-diuretic activities.	(40)
19	<i>Elephantopus scaber</i> L.	Asteraceae	Mayurachendia saga	Leaves	Used to treat eczema, rheumatism, fever, and bladder stones; also acts as a heart tonic and diuretic.	(27)
20	<i>Emilia sonchifolia</i> (L.) Dc.	Asteraceae	Chelkani saga	Leaves and Seeds	Used to treat gastrointestinal disorders, gastrointestinal bleeding, ocular inflammation, nyctalopia, traumatic injuries, intermittent fever, pharynx dystonia, and asthma.	(41)
21	<i>Basella alba</i> L.	Basellaceae	Poi	Leaves and Shoots	Used as a laxative for both youngsters and pregnant women and to cure skin conditions.	(35)
22	<i>Cordia macleodii</i> Hook. f.	Boraginaceae	Silati	Stem and Bark	It can be used to treat jaundice and wounds.	(35)
23	<i>Cordia obliqua</i> Willd.	Boraginaceae	Bahal Saag	Leaves	As a medication, it is employed for the treatment of cough, as an astringent, analgesic, anti-inflammatory, anthelmintic, anti-malarial, diuretic, febrifuge, hepatoprotective, and antibacterial.	(27)
24	<i>Bauhinia vahlii</i> Wight and Arn.	Caesalpinaceae	Sialia	Whole Plant	Used to have cancer-fighting, germ-fighting, inflammation-reducing, goiter-preventing, liver-protecting, and antibody-forming characteristics.	(32)
25	<i>Tamarindus indica</i> L.	Caesalpinaceae	Tentuli	Whole plant	Traditional medicine treats piles, inflammation, indigestion, stomach pain, throat pain, and rheumatism.	(37)
26	<i>Senna tora</i> (L) Roxb	Caesalpinioideae	Chakunda Saag	Leaves	Commonly employed in treating skin disease, worm infection, asthma, and piles.	(42)
27	<i>Celastrus paniculatus</i> Willd.	Celastraceae	Pengu sag	Fruits and Leaves	It helps improve both mental and digestive health. The oil has a mild calming effect and treats skin irritation.	(43)
28	<i>Chenopodium album</i> L.	Chinopodiaceae	Bathua Saag	Whole plant	Blood purifier, sedative, diuretic, hepatoprotective, antiscorbutic laxative, and anthelmintic against roundworms and hookworms.	(27)
29	<i>Cleome icosandra</i> L.	Cleomaceae	Hulhulia	Fruits and Leaves	Effective in treating rheumatoid arthritis, high blood pressure, malaria, neurasthenia, and as a wound dressing.	(44)
30	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Combretaceae	Bahada	Whole plants	Used in Ayurvedic treatment of many conditions, including hepatitis, bronchitis, asthma, dyspepsia, piles, diarrhea, coughs, and eye illnesses.	(41)
31	<i>Terminalia chebula</i> Retz. and Willd	Combretaceae	Harda	Fruits and Leaves	It helps with digestion, stimulates the liver, settles the stomach, speeds up food movement through the digestive tract, and even acts as a gentle laxative.	(45)
32	<i>Commelina benghalensis</i> L.	Commelinaceae	Kena Saag	Whole plant	Used as a depressant, demulcent, emollient, and laxative, as well as for treating leprosy, sore throat, ophthalmia, burns, discomfort, and inflammation.	(46)
33	<i>Ipomoea aquatica</i> Forsk.	Convolvulaceae	Kolam Saag	Leaves	Beneficial for nursing mothers, it can stop nosebleeds and piles, works as an anthelmintic, and lowers blood pressure.	(35)

34	<i>Ipomoea mauritiana</i> Jacq.	Convolvulaceae	Bhuin kinda	Leaves and Seeds	Used externally to treat tuberculosis and for the treatment of external and breast infections. A decoction of the tuberous roots is used to make medicinal wine in Ayurvedic medicine.	(47)
35	<i>Melothria heterophylla</i> Cogn.	Cucurbitaceae	Bana kundri	Fruits	Used to alleviate the symptoms of asthma, arthritis, and chronic pain, all of which have been linked to inflammation.	(35)
36	<i>Momordica charantia</i> L.	Cucurbitaceae	Kalara	Fruits	Its pulp and fruit have been used to cure various conditions, including asthma, diabetes, colic, fever (malaria), gout, helminthiasis, leprosy, inflammation, skin illnesses, ulcers, and wounds.	(35)
37	<i>Momordica dioica</i> Roxb. ex Willd	Cucurbitaceae	Bana Kankad Kanda	Tuber	Effective in the treatment of diarrhea, rheumatism, and fever.	(44)
38	<i>Dillenia aurea</i> Sim. Null	Dilleniaceae	Karmata	Fruits and Bark	Used as a cataplasm in arthritis. Fruit juice is an ingredient in cough syrup and a refreshing beverage known for its calming effects on the nervous system.	(44)
39	<i>Shorea robusta</i> Gaertn. F.	Dipterocarpaceae	Sargi	Fruits and Leaves	In Ayurveda, it is used as an astringent.	(38)
40	<i>Diospyros malabarica</i> (Desr.) Kostel.	Ebenaceae	Mankada kendo	Fruits and Bark	Used to treat low blood sugar, infections, and cancer.	(40)
41	<i>Diospyros melanoxylon</i> Roxb.	Ebenaceae	Kendu Phal	Fruits	Used to cure sores and wounds and stomach pain.	(48)
42	<i>Bridelia retusa</i> Spr.	Euphorbiaceae	Katha/Kshira Koli	Leaves, Fruits and Bark	The bark effectively dissolves urinary concretions and has medicinal uses for lumbago and hemiplegia.	(49)
43	<i>Phyllanthus emblica</i> L.	Euphorbiaceae	Anal	Fruits	In Ayurveda, it is considered a powerful Rasayana, and in traditional medicine, it is used to cure diarrhea, jaundice, and inflammation.	(40)
44	<i>Atylosia scarabeoides</i> Benth.	Fabaceae	Ban Kalath	Fruits and Leaves	In traditional medicine, the leaves of this plant are used to treat indigestion and stop the body from producing too much pee.	(42)
45	<i>Bauhinia purpurea</i> L.	Fabaceae	Kailari sag	Leaves and Bark	Poultices made from the plant were traditionally used to cure dropsy, discomfort, rheumatism, convulsions, delirium, and septicemia by reducing inflammation and preventing scar tissue formation.	(42)
46	<i>Bauhinia variegata</i> L.	Fabaceae	Kanchana sag	Leaves	The traditional application includes healing dysentery, skin illness, and diarrhea.	(27)
47	<i>Leucas aspera</i> (Willd.) Spreng.	Lamiaceae	Bana gubi	Fruits and Leaves	Used traditionally as an antipyretic and pesticide.	(27)
48	<i>Vitex negundo</i> L.	Lamiaceae	Neelgundi Saag	Whole plant	Used to cure various tummy troubles, including bloating, gas, indigestion, and cholera.	(44)
49	<i>Abelmoschus moschatus</i>	Malvaceae	Bana bhendi	Leaves and Flowers	Their demulcent characteristics make them sound like a poultice for treating bruising, inflammation, bug bites, and so on, or as an internal remedy for treating respiratory illness, digestive inflammation, or urinary inflammation.	(50)
50	<i>Hibiscus sabdariffa</i> L.	Malvaceae	Kaunria saga	Leaves and Seeds	Used as a diuretic, a menstrual cramp reliever, and a cough suppressant.	(49)

51	<i>Sida rhombifolia</i> L.	Malvaceae	Chercher Saag	Leaves	Traditional medicines treat conditions like diarrhea, malaria, G.I. dysentery, fevers, asthma, and inflammation.	(44)
52	<i>Marsilea minuta</i> L.	Marsileaceae	Sunsunia	Fruits and Leaves	Used for inducing sleep and treating abscesses and snakebites.	(39)
53	<i>Azadirachta indica</i> A. Juss.	Meliaceae	Neema	Leaves, Flower, Seeds, Fruits, Roots and Bark	Used traditionally for treating inflammation, infections, fever, skin ailments, and dental issues.	(47)
54	<i>Cocculus hirsutus</i> (L.) Diels	Menispermaceae	Musani Saag	Leaves	Used to treat various conditions, including anemia and gastrointestinal and urinary issues.	(41)
55	<i>Acacia sinuata</i> (Lour.) Merr.	Mimosaceae	Sikakai	Fruits	Soap Nut fruit's tonic and astringent qualities help treat skin diseases.	(51)
56	<i>Xylia xylocarpa</i> (Roxb.) Taub.	Mimosaceae	Tangeni	Fruits	Used to prevent nausea, vomiting, and diarrhoea.	(41)
57	<i>Artocarpus lacucha</i> Lam.	Moraceae	Jeutha	Fruits	Indicated for the relief of stomach pain, headaches, and inflammation.	(43)
58	<i>Ficus bengalensis</i> L.	Moraceae	Bara	Fruits and Seeds	Used to treat a wide range of problems, including inflammation, gum disease, diabetic management, and irregular menstrual cycles.	(35)
59	<i>Ficus hispida</i> L.f.	Moraceae	Dumari	Whole plant	All parts of this plant have been shown to have activity against dysentery, ulcers, biliousness, psoriasis, anemia, piles, jaundice, and caustic, astringent, bitter, and cooling.	(43)
60	<i>Ficus religiosa</i> L.	Moraceae	Peepal	Leaves, Fruits, Roots and Bark	Traditional applications include treating ulcers, infections, diabetes, and skin conditions like gonorrhoea.	(47)
61	<i>Psidium guajava</i> L. Pomiferum L.	Myrtaceae	Jamba	Fruits and Leaves	Used for everything from treating wounds, cavities, and cough to gastrointestinal issues like vomiting and simple diarrhea.	(29)
62	<i>Syzygium cumini</i> (L.) Skeels	Myrtaceae	Goli Jaam	Fruits, Leaves, and Bark	The fruits have been used to treat various conditions, from coughs and diabetes to diarrhea and inflammation.	(39)
63	<i>Boerhavia diffusa</i> L.	Nyctaginaceae	Gada purni saga	Leaves	The traditional application includes the treatment of various skin and eye conditions and wounds.	(43)
64	<i>Antidesma acidum</i> Retz.	Phyllanthaceae	Amati Koli	Fruits and Leaves	Used in traditional medicine to ease children's stomach ache, aid digestion, and control blood sugar.	(49)
65	<i>Bambusa vulgaris</i> Schrad.	Poaceae	Kardi	Shoots	Used in traditional medicine to manage various disorders, including diabetes and cholesterol.	(52)
66	<i>Bambusa vulgaris</i> Schrad.	Poaceae	Bauns manji	Seed	In the treatment of worms, it has been used traditionally.	(49)
67	<i>Portulaca oleracea</i> L.	Portulacaceae	Nuni saga	Leaves and Roots	In herbal medicine, it plays a significant role because of its use as a diuretic, anti-inflammatory, purgative, emollient, and muscle relaxant.	(27)
68	<i>Ziziphus mauritiana</i> Lam.	Rhamnaceae	Barkoli	Fruits and Leaves	Effective in relieving symptoms of anemia and migraines.	(45)
69	<i>Ziziphus oenoplia</i> Mill.	Rhamnaceae	Katuuu Koli	Fruits	Effective in relieving nausea and vomiting.	(39)
70	<i>Ziziphus rugosa</i> Lam	Rhamnaceae	Chun Koli	Fruits and Leaves	Used for treating diarrhea, skin disease, cough, and hypotension.	(46)

71	<i>Anthocephalus chinensis</i> (Lam.) A. Rich. ex Walp.	Rubiaceae	Kadam Phal	Bark and Leaves	Used in Ayurvedic treatment of various conditions, including bleeding disorders, anemia, and leprosy.	(53)
72	<i>Meyna spinosa</i> Roxb. Ex Link.	Rubiaceae	Mamagoa	Fruits	Beneficial for the treatment of wounds.	(29)
73	<i>Paederia foetida</i> L.	Rubiaceae	Pasaruni	Fruits and Leaves	Traditional herbal remedy for treating diarrhea, piles, and inflammation.	(39)
74	<i>Citrus grandis</i> (L.) Osbeck	Rutaceae	Tabha	Fruits and Leaves	Treatment for ulcers, fever, dyspepsia, lumbago, cardiogenic, G.I. issues, diabetes, and heart disease.	(48)
75	<i>Limonia acidissima</i> L.	Rutaceae	Kainth	Fruits	The unripe fruit is used to cure gum infections, sore throats, coughs, dysentery, and diarrhea, while the pulp and powdered rind are applied as a poultice for insect bites and stings.	(46)
76	<i>Murraya koenigii</i> (L.) Spr.	Rutaceae	Versunga	Fruits, Leaves, and Roots	Green leaves relieve symptoms of piles, inflammation, itching, fresh cuts, diarrhea and bruising; Purgative properties can be found in the roots.	(38)
77	<i>Schleichera oleosa</i> (Lour.) Oken	Sapindaceae	Kusum	Bark	The bark is applied topically to treat various skin conditions, including acne, eczema, itching, and inflammation. It is a pain reliever, antibacterial, and remedy for dysentery.	(32)
78	<i>Madhuca indica</i> Gmel.	Sapotaceae	Mahua (Tola Manji)	Fruits and Leaves	It has several medicinal uses, including as an emetic and galactagogue, and in treating skin illnesses, rheumatism, headache, chronic constipation, piles, and hemorrhoids when applied topically.	(47)
79	<i>Manilkara hexandra</i> (Roxb.) Dubard	Sapotaceae	Khiri Koli	Fruits	Used in medicinal herbal remedies to heal many ailments such as jaundice, fever, colic dyspepsia, helminthiasis, hyper dyspepsia, and burning sensation.	(37)
80	<i>Smilax zeylanica</i> L.	Smilacaceae	Mutrimalar Koli	Fruits and Roots	It has long been used as a remedy for ulcers. In some cases, the root has been utilized to treat infections and inflammation when combined with other plants.	(37)
81	<i>Physalis minima</i> L.	Solanaceae	Tipali	Fruits and Leaves	Treatment for dermatitis, asthma, and malaria. Isolated phytoconstituents from <i>Physalis angulata</i> showed anticancer activity in vitro against various cancer cell lines.	(46)
82	<i>Solanum nigrum</i> L.	Solanaceae	Kakamachi	Whole plant	Ulcers and other skin disorders can be treated using the plant's juice. The fruits have many medicinal purposes, including tonic, laxative, appetite stimulant, and asthma remedy. Asthma and whooping cough can be treated with root juice.	(46)
83	<i>Solanum torvum</i> L.	Solanaceae	Bana began	Fruits	Asthma and cough, as well as drugs for diabetes, high blood pressure, cavities, and fertility issues.	(27)
84	<i>Cardiospermum grandiflorum</i>	Spindaceae	Putputiya Saag	Whole plant	Effective in treating various ailments, including hyperthermia, rheumatism, stomach discomfort, orchitis, dropsy, lumbago, skin infections, cough, and neurological disorders.	(45)
85	<i>Premna mollissima</i> Roth.	Verbenaceae	Putrani Saag	Leaves	It's used to heal wounds and regulate menstruation.	(49)
86	<i>Gmelina arborea</i> L.	Verbenaceae	Ghamari Phal	Whole plant	It has cardiogenic, diuretic, laxative, pulmonary, and nervous system tonic, astringent, and bitter properties.	(40)
87	<i>Cissus quadrangularis</i> L.	Vitaceae	Hadbhanga	Root, Stem, Herb powder	Herb powder is used to cure haemorrhoids and some types of bowel infections. At the same time, the stems are effective against osteoarthritis, rheumatoid arthritis, and osteoporosis and in treating bone fractures.	(42)
88	<i>Leea indica</i> Merrill	Vitaceae	Manabadakili Kucha	Leaves and Shoots	Utilized in the therapy of aches and pains, lacerations, fever, skin disorders, dizziness, and wounds. To heal wounds, boil the shoots in water.	(37)
89	<i>Hedychium coronarium</i> J. Koenig.	Zingiberaceae	Ram kedar	Stem, Seeds and Rhizomes	The mashed stem is applied to wounds and bumps for relief. The rhizome and stems have long been utilized as a natural headache remedy.	(27)

Table 2: List of nutritional compositions of some wild edible plants used by the tribal of Koraput.

Sl. No	Name of the plant	Nutritional analysis				Reference
		Carbohydrate	Fat	Protein	Fiber	
1	<i>Aegle marmelos</i> L.	✓ (High)	✓ (Moderate)	✓ (High)	✓ (Moderate)	(54)
2	<i>Annona reticulata</i> Linn.	✓ (High)	✓ (Low)	✓ (Moderate)	✓ (High)	(55)
3	<i>Anthocephalus chinensis</i> Roxb.	✓ (High)	✓ (Moderate)	✓ (Low)	✓ (Moderate)	(56)
4	<i>Averrhoa carambola</i> L.	✓ (High)	✓ (Low)	✓ (High)	✓ (Moderate)	(57)
5	<i>Bauhinia vahlii</i> Wight and Arn	✓ (Moderate)	✓ (High)	✓ (High)	✓ (Low)	(58)
6	<i>Dillenia indica</i> L.	✓ (High)	✓ (Low)	✓ (High)	✓ (High)	(59)
7	<i>Diospyros melanoxylon</i> Roxb.	✓ (High)	✓ (Moderate)	✓ (Moderate)	✓ (High)	(60)
8	<i>Ficus hispida</i> Linn.	✓ (Moderate)	✓ (Moderate)	✓ (Low)	✓ (High)	(61)
9	<i>Melothria heterophylla</i> (Lour.) Cogn	✓ (Moderate)	✓ (Low)	✓ (High)	✓ (Moderate)	(62)
10	<i>Phyllanthus emblica</i> L.	✓ (Moderate)	✓ (Moderate)	✓ (High)	✓ (Moderate)	(63)
11	<i>Psidium guajava</i> L.	✓ (High)	✓ (Low)	✓ (Moderate)	✓ (Moderate)	(64)
12	<i>Semecarpus anacardium</i> Linn.	✓ (High)	✓ (High)	✓ (Low)	✓ (Moderate)	(65)
13	<i>Spondias pinnata</i> (Linn. F.) Kurz	✓ (Low)	✓ (Low)	✓ (Low)	✓ (Low)	(66)
14	<i>Terminalia bellirica</i> Roxb.	✓ (Moderate)	✓ (High)	✓ (High)	✓ (High)	(67)
15	<i>Terminalia chebula</i> Retz.	✓ (Low)	✓ (Moderate)	✓ (High)	✓ (Moderate)	(68)
16	<i>Ziziphus mauritiana</i> L.	✓ (Moderate)	✓ (Moderate)	✓ (Low)	✓ (Moderate)	(69)

Conclusion

The analysis highlights the importance of conservation efforts to safeguard wild edible plants and their natural environments. The study also found that the edible fruit plants of Koraput have superior nutritional status in terms of their fat, protein, carbohydrate, and fiber levels. The investigation shows how wild edible fruits can be used as dietary supplements. The survival of these plants is essential not just for the indigenous peoples' diets but also for preserving their unique cultures. The pharmacological validation of these traditional medicines would require additional scientific investigation into the ailments for which the plants are used. In conclusion, the tribal groups in the Koraput District rely heavily on the nutritional benefits provided by wild edible plants, and there is an obvious need for additional research and activities to encourage the sustainable exploitation and conservation of these unique resources. The indigenous peoples of the region can benefit from this information in terms of both their health and their ability to provide for themselves nutritionally.

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Authors' contributions

SJ: Writing, data collection, interpretation, and arrangement of data; GM & SSD: Conceptualization of work, critically revising the manuscript; SJ & IPS: writing and reviewing the manuscript; All authors read and approved the final version of the manuscript.

Compliance with ethical standards

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