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Traditional medicinal plants used in different districts of West Bengal by the tribal communities

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Abstract
Plants play one of the most important roles in providing nutrition and therapeutics to human beings and animals. Several research studies were published in different areas of the world focusing on the food content and medicinal value of plants. In rural areas, herbal products are the main source of medications for all types of diseases. The current study summarizes the uses of traditional medicinal plants by the tribal people of various parts of the state of West Bengal, India. The review highlights the use of 105 medicinally important plant species with their taxonomical features, ethno botanical uses, and pharmacological properties.

Keywords: Medicinal plants, West Bengal, tribal community, ethno botany, ethno pharmacology

Introduction
The indigenous population of India has been using medicinal plants since the prehistoric time [1]. All human civilizations used medicinal plants as a source of therapeutics because of their availability in the local environment, therapeutic activities, and fewer side effects. Plants provide various kinds of therapeutic agents that are used for the treatment of a wide range of diseases such as cancer, diabetes, malaria, inflammation, obesity, cardiovascular [2], and microbial infections [3]. Ayurveda is one of the oldest traditional healthcare systems and it is widely practiced in India and other major Asian countries.
In the ancient period, Atharva Veda (Around 1200 BC) summarized traditional medical science based on medicinal plants focusing on 600 herbs. Currently, more than 80,000 plants are used for therapeutic purposes. Developing countries significantly depend on medicinal plants for providing effective therapeutics at reasonable prices. According to WHO, 80% of developing countries 'populations use plants as a source of therapeutic agents.
In India, more than 6000 medicinal plant species were identified. These plants are used across all tribal communities in the country. In India, local communities use more than 50% of the plant species of any ecosystem for phytomedicine purposes and in general, over 7400 species are utilized in the primary healthcare system by various tribes. The plant biodiversity of India is one of the largest biodiversity systems in the world. Different plants are grown in different habitats with different therapeutic activities.
Plants differ in their names according to the region. Plant's local names are very important for any ethno botanical study of every specific tribal community. Plants are generally known by their local names, but the binomial nomenclature of plants is the only acceptable scientific system. A plant's local name is given based on some characteristic features including size, shape, habitat, taste, color, importance, smell, and utility. These local names reflect the plant's anatomy, pharmacognosy, uses, and ecology. The local name is vital for local the identification of plants. The floristic diversity of the state of West Bengal is very well known across the world. Many plant species are used not only as medicinal agents but as vegetables by the people of this state [4].

2. Discussion about medicinal plants used by tribal communities
In this study, 105 plant species of 60 families (Table 1) were found to be used for medicinal purposes by various tribes of West Bengal, India. We summarized their local names and medicinal and ethnobotanical uses by tribal communities of West Bengal.

Table 1: Major medicinal plants used by tribal communities of West Bengal, India

Sl. No.	Scientific Name	Family	Habit	Local Name (Bengali)	Traditional Uses	
					Ethno botanical uses in the locality	Pharmacological activities
1.	*Aegle marmelos*	Rutaceae	Tree	Bel	Fruit used in stomach diseases	Anti-inflammatory, Anti-cancer, Antimicrobial [5]
2.	*Reynoutria japonica*	Polygonaceae	Herb	Gangadha	Leaf juices are used for stomach diseases	Anti-inflammatory, Antioxidant [6]
3.	*Andrographis paniculata*	Acanthaceae	Herb	Kalmegh, Chirata	The leaf is used for skin diseases and diabetes	Anti-diabetic, Antioxidant, Anti-hepatotoxic, Anti-malarial [7]
4.	*Catharanthus roseus*	Apocynaceae	Herb	Nayantara	Leaf extract is used to treat diabetes	Antidiabetic, Antimicrobial, Ant-ulcer [8]
5.	*Tagetes patula*	Asteraceae	Herb	Gandha	Leaf extract is applied on cuts to stop bleeding	Antifibrinolytic, Anti-platelet aggregation, Antibacterial [9]
6.	*Thunbergia grandiflora*	Acanthaceae	Tree	Nil lata	Leaf paste is used for stomach diseases	Anti-inflammatory, Antioxidant [10]
7.	*Datura innoxia*	Solanaceae	Shrub	Kalo Dhutra	It is utilized in treating asthma, cough, breast pain	Anti-rabies, Anti-asthmatics, Anti-inflammatory, Anti-viral [11]
8.	*Curcuma longa*	Zingiberaceae	Herb	Halud	The rhizome paste is applied to treat skin diseases and inflammation	Antioxidant, Anti-inflammatory, Antibacterial [12]
9.	*Ocimumbasilicum*	Lamiaceae	Herb	Bana Tulsi or Dulal Tulsi	Seed paste is applied against stings of bees and insects	Antifibrinolytic, Anti-diabetic, Antioxidant, Antipyretic [13]
10.	*Boerhaavia diffusa*	Nyctaginaceae	Herb	Kumkum sak	The root is used in jaundice	Antibacterial, Anti-stress [14]
11.	*Rauvolfia tetraphylla*	Apocynaceae	Shrub	Sarpagandha	Roots are used to treat skin diseases	Antioxidant, Antibacterial, Anti-venom [15]
12.	*Hibiscus rosa-sinensis*	Malvaceae	Shrub	Jaba	Leaves juice is used to treat burning sensation, fatigue, and skin diseases	Antioxidant, Anthelmintic, Anti-diabetic Hypolipidemic, Astringent, Antimicrobial [16]
13.	*Mentha piperita*	Lamiaceae	Herb	Pudina	Leaf extract is used to treat motion sickness and headache	Analgesic, Anti-vomiting, Antioxidant [17]
14.	*Coriandrum sativum*	Apiaceae	Herb	Dhoney	Fruits are used as a digestive stimulant	Anthelmintic, Anti-diabetic, Antioxidant [18]
15.	*Nymphaea alba*	Nymphaeaceae	Herb	Sadasaluk	Seeds are used to treat diabetes	Anti-cancer, Anti-tumor [19]
16.	*Leucas cephalotes*	Lamiaceae	Herb	Halkasha, Gouthi	The plant is used as diaphoretic and antiseptic	Antioxidant, Anti-inflammatory, Cytotoxic [20]
17.	*Marsilea quadrifolia*	Marsileaceae	Herb	Susnisak	Leaf juice is used to treat skin diseases	Antioxidant, Anti-inflammatory [21]
18.	*Spondias pinnata*	Anacardiaceae	Tree	Amra	Fruit is used to cure the digestive problems	Anti-cancer, Antioxidant, Anti-diarrheal [22]
19.	*Anisomeles indica*	Lamiaceae	Herb	Gopali	Whooping cough is treated with the leaf juice	Anti-inflammatory, Anti-malarial, Analgesic [23]
20.	*Justicia adhatoda*	Acanthaceae	Herb	Basak	Leaf juice I used as an expectorant to treat cough	Anti-microbial, Antioxidant [24]
21.	*Terminalia chebula*	Combretaceae	Herb	Haritaki	Fruit is used against stomach disorders	Antibacterial, Anti-diabetic, Antifungal [25]
22.	*Heliotropium indicum*	Boraginaceae	Shrub	Hatisur	Root juice is used in eye and skin diseases	Anti-inflammatory, Antioxidant, Antifungal [17]
23.	*Cajanus cajan*	Fabaceae	Herb	Arhar	Leaf decoction is beneficial for jaundice	Anti-inflammatory, Antioxidant [26]
24.	*Ricinus communis*	Euphorbiaceae	Herb	Rerhi	Seed oil is used as a painkiller	Antibacterial, Antioxidant [27]
25.	*Glinus oppositifolius*	Molluginaceae	Herb	Gima	The plant is used to treat colds, coughs, and cancer	Anti-microbial, Anti-inflammatory, Anti-cancer [28]
26.	*Enhydra fluctuans*	Asteraceae	Herb	Hingcha	The leaf is used in viral infections and diabetes	Anti-viral, Anti-cancer, Anti-inflammatory [29]
27.	*Portulaca oleracea*	Portulacaceae	Herb	Nunasak	The plant is used in asthma and stomach diseases	Anti-asthmatics, Anti-diabetic, Antioxidant, Anti-inflammatory [30]
28.	*Centella asiatica*	Apiaceae	Herb	Thankuni	Plants are used as blood purifiers	Antioxidant, Anti-inflammatory, Antioxidant [31]
29.	*Oxalis corniculata*	Oxalidaceae	Herb	Amrul	The leaf is used in indigestion, scurvy treatment, and dysentery	Anti-helminthic, Anti-pyretic, Anti-diarrheal, Anti-cancer [32]
30.	*Commelina benghalensis*	Commelinaceae	Herb	Karos sak	Plant juice is used in treating insect bites and blister problems in the eye	Anti-inflammatory, Analgesic, Anti-cancer, Anti-viral [33]
31.	*Azadirachta indica*	Meliaceae	Tree	Neem	Leaf juice is used in diabetes and joint pain	Anti-diabetic, Anti-inflammatory, Anti-viral [3]
32.	*Ficus hispida*	Moraceae	Tree	Dumur	Root juice of the plant is used in curing fevers and in stomach disease	Anti-pyretic, Anti-diarrheal, Antimicrobial, Antioxidant [17]
33.	*Colocasia esculenta*	Araceae	Herb	Kachu	The leaf is used in scorpion bites and piles	Anti-fibrinolytic, Antimicrobial, Antioxidant [34]
34.	*Corchorus aestuans*	Malvaceae	Herb	Bonkhetay	The leaf is used to treat scorpion bites and piles	Antifungal, Antioxidant [17]
35.	*Clematis gouriana*	Ranunculaceae	Herb	Muurvaa	The leaf is used in insect bites	Anti-inflammatory, Anti melanogenic [17]
36.	*Ipomoea obscura*	Convolvulaceae	Herb	DangaKalmi	Leaf juice is used as an antidote for insect bites	Anti-tumor, Antibacterial [35]
37.	*Trigonella corniculata*	Fabaceae	Herb	Piringsak	Leaves are used as anthelmintic	Antioxidant, Anti-microbial [36]

38.	*Polygonum plebeium*	Polygonaceae	Herb	Kezmi	Leaf juice is used as a liver tonic and infection	Antimicrobial, Anti-inflammatory, Antioxidant [37]
39.	*Amaranthus viridis*	Amaranthaceae	Herb	Ban notey, Lal notey	The leaf is used in chest pain, asthma, and diabetes	Antioxidant, Anti-pyretic, Hepato-protective [38]
40.	*Hygrophila auriculata*	Acanthaceae	Herb	Kulekhara	It is used in anemia and diabetes	Anti-diuretic, Hematopoietic, Anti-diabetic [37]
41.	*Tamarindus indica*	Fabaceae	Tree	Tentul, Ambli	The bark is used to cure wounds, ringworms and smallpox	Antioxidant, Hypolipidemic, Anti-cancer, Anti-obesity [39]
42.	*Xanthium strumarium*	Asteraceae	Herb	Okra phal	The plant is used in malaria and ulcers	Anti-arthritic, Anti-parasitic, Antioxidant, Anti-fungal [40]
43.	*Mimosa pudica*	Fabaceae	Herb	Lajjabati	It is used to treat burning sensation	Antioxidant, Anti-cancer, Anti-venom [10]
44.	*Basella alba*	Basellaceae	Herb	Puinsak	The root is used to treat tuberculosis and anemia	Antioxidant, Antimicrobial, Anti-depressant [41]
45.	*Flacourtia indica*	Salicaceae	Shrub	Bauch	The leaf is used in dysentery and fever	Anti-asthmatic, Antibacterial [42]
46.	*Bacopa monnieri*	Plantaginaceae	Herb	BramhiSak	The leaf is used in memory improvement	Antioxidant, Antimicrobial, Anti-epileptic [43]
47.	*Cocos nucifera*	Arecaceae	Tree	Narkel	Used to treat liver, skin problems, and kidney stones	Antitumor, Anti-cancer, Antibacterial, Antifungal [43]
48.	*Blumea lacera*	Asteraceae	Shurb	Kukshima, Kukursonga	Used to treat muscular pain and headache	Anti-diarrheal, Antimicrobial, Anxiolytic [44]
49.	*Barleria lupulina*	Acanthaceae	Herb	Bishalyakarani	Apply leaves paste to fresh wounds and cuts to stop bleeding	Anti-microbial, Anti-venom [45]
50.	*Chenopodium album*	Amaranthaceae	Herb	Bethosak	It is used in a dyspepsia	Anthelmintic, Antioxidant [46]
51.	*Paederia scandens*	Rubiaceae	Herb	Gadal	A fresh root decoction is used to treat rheumatism and dysentery	Anti-rheumatism, Antimicrobial, Anti-diabetic [47]
52.	*Cynodondactylon*	Poaceae	Shurb	Durba	The plant is used in bleeding and skin diseases	Anti-inflammatory, Antioxidant [46]
53.	*Oldenlandia corymbosa*	Rubiaceae	Shrub	Khet Papra	Leaf juice is used against snakebites and skin diseases	Antibacterial, Hepato-protective, Anti-rheumatic, Anti-malarial, Anti-diabetic [49]
54.	*Solanum xanthocarpum*	Solanaceae	Shurb	Kantakari	Fruit juice is applied twice a day to control eye problems	Anti-vomiting Anti-cancer Anti-asthmatic [50]
55.	*Polygonum dichotomum*	Polygonaceae	Herb	Biskathali	Leaves are crushed and used against dental problems	Anti-vomiting, Antioxidant, Anti-microbial [51]
56.	*Moringa concanensis*	Moringaceae	Tree	Sojne	The leaf is used in reducing high blood pressure and for rheumatism treatment	Anti-cancer, Antibacterial, Antifungal, Anti-diabetic [52]
57.	*Acacia nilotica*	Fabaceae	Tree	Babla	The bark is used to cure toothache	Antibacterial, Antioxidant, Antispasmodic, Anti-pyretic [46]
58.	*Lawsoniainermis*	Lythraceae	Tree	Mehendi	Leaf juice is applied to reduce dandruff and hair fall	Antibacterial, Anti-diabetic, Anti-fertility, Analgesic [53]
59.	*Otteliaalismoides*	Hydrocharitaceae	Herb	Parmikalla	Leaf extract is used to treat chicken pox	Anti-inflammatory, Antibacterial, Anti-fungal [46]
60.	*Cassia occidentalis*	Fabaceae	Herb	Kasinda	Root extract is used in snakebites	Anti-hepatotoxic, Anti-plasmodial, Antidot [46]
61.	*Enhydra fluctuans*	Asteraceae	Herb	Hingcha	Leaf extract is applied on cuts to stop bleeding	Anti-cancer, Antioxidant, Antimicrobial [54]
62.	*Cassia alata*	Fabaceae	Herb	Chakora	The leaf is used for skin diseases and painful sensation	Antioxidant, Anti-cancer [55]
63.	*Clitoria ternatea*	Fabaceae	Herb	Aparajita	Root juice with honey is used for mental health improvement in children	Anti-inflammatory, Anti-pyretic, Antioxidant [56]
64.	*Butea monosperma*	Fabaceae	Tree	Palas-baha	Bark and seed are used for insects' bites and skin diseases	Antioxidant, Anti-inflammatory, Anti-cancer, Anti-ulcer [57]
65.	*Barleria cristata*	Acanthaceae	Herb	Swetjhinti	Leaf juice is used as tooth paste and jaundice	Anti-diarrheal, Anti-fertility, Anti-microbial [58]
66.	*Coccinia indica*	Cucurbitaceae	Shurb	Kuchfol	Leaf juice is used for head cooling and reducing blood sugar	Anti-diabetic, Anti-hyperglycemic, Anti-inflammatory [59]
67.	*Nyctanthes arbor-tristis*	Oleaceae	Tree	Siuliful	Leaf juice is used for diabetic treatment	Anti-pyretic, Anti-fungal, Anti-arthritic, Anti-diabetic [46]
68.	*Argemone mexicana*	Papaveraceae	Herb	Shialkanta	Leaf juice is used for jaundice. Seeds are used in ulcer treatment	Nematocidal, Anti-fertility, Anti-ulcer, Anti-HIV, Anti-stress [60]
69.	*Ziziphus mauritiana*	Rhamnaceae	Tree	Kul	Root juice is used as a blood purifier	Anthelmintic, Antibacterial, Anti-fungal [46]
70.	*Achyranthes aspera*	Amaranthaceae	Herb	Apang	Leaf juice is used in asthma and snake bites	Antimicrobial, Antibacterial, Anti-plasmodia [61]
71.	*Tribulus terrestris*	Zygophyllaceae	Herb	Gokhur	Extract of young leaves is eaten with honey	Antibacterial, Antioxidant, Anti-diabetic, Anti-spasmodic, Anti-urolithic [62]
72.	*Cleome gynandra*	Cleomaceae	Herb	Shulte	Leaf juice is used in jaundice	Anti-cancer, Antifungal, Antibacterial [63]
73.	*Artocarpus lakoocha*	Moraceae	Tree	Madar, Dahua	Leaf juice is used in worm diseases	Antimicrobial, Antioxidant, Anti-diabetic [64]
74.	*Sida rhombifolia*	Malvaceae	Herb	Jharugachh	The plant is used in skin diseases and rheumatism	Anti-inflammatory, Anti-microbial [65]
75.	*Melastoma malabathricum*	Melastomataceae	Herb	Futki	Whole parts are used to treat stomachache	Antioxidant, Antimicrobial, Anti-pyretic [66]
76.	*Tinospora*	Menispermacea	Herb	Gulancha	The bark is soaked in water for 6 to 8	Anti-diabetes, Antiviral,

	cordifolia	e			hours and taken for rheumatism.	Anti-inflammatory [46]
77.	*Artocarpus heterophyllus*	Moraceae	Tree	Kathal	The leaf is used in fever and skin diseases	Anti-inflammatory, Antimicrobial [67]
78.	*Musa balbisiana*	Musaceae	Tree	Kala	Used for the treatment of blood the diseases	Antibacterial, Hypo-testicular, Antioxidant [68]
79.	*Ficus religiosa*	Moraceae	Tree	Aswatha	To treat asthma and diabetes	Anti-diabetic, Anti-inflammatory, Anti-vomiting [46]
80.	*Streblus asper*	Moraceae	Tree	Sheora	Used in the treatment of dental problems	Antifungal, Anti-pyretic, Anti-microbial [69]
81.	*Piper peepuloides*	Piperaceae	Herb	Pipul	Used in the treatment of cold	Anti-biotic, Antioxidant, Antibacterial [70]
82.	*Piper betle*	Piperaceae	Herb	Pan	Used for weak nerves of legs and earaches	Anti-allergic, Anti-cancer, Antimicrobial [71]
83.	*Toddalia asiatica*	Rutaceae	Herb	Junglilebu	Used as tonic	Antioxidant, Anti-diabetic [72]
84.	*Hemidesmus indicus*	Apocynaceae	Herb	Ananta mul	Used for a stomach trouble	Anti-inflammatory, Antioxidant [73]
85.	*Mimusops elengi*	Sapotaceae	Tree	Bokul	Boiling the tree bark helps to relieve toothache	Anti-pyretic, Anti- Anti-diabetic, Anti-urolithiasis [74]
86.	*Solanum torvum*	Solanaceae	Herb	Banbegun	Ripe fruit is boiled in mustard oil	Anti-microbial, Anti- ulcerogenic [2, 3]
87.	*Ixora coccinea*	Rubiaceae	Shurb	Rongon	Hiccups, nausea, and eczema	Antioxidant, Antibacterial, Anti-ulcer, Anti-septic [17]
88.	*Tridax procumbens*	Asteraceae	Herb	Bishalyakarani	Used to stop bleeding from cuts	Wound Healing, Antifungal, Anti-oxidant [75]
89.	*Allium cepa*	Amaryllidaceae	Herb	Peyaj	The juice of onions can be applied to burns, insect bites, and wounds	Antimicrobial, Anti-cancer, Anti-hypertensive, Anti-thrombotic [46]
90.	*Albizia lebbeck*	Fabaceae	Tree	Sirish	To cure piles and body pains	Anti-inflammatory, Anti-dysenteric [76]
91.	*Nymphaea rubra*	Nymphaea	Herb	Lal saluk	To treat female diseases	Antimicrobial [77]
92.	*Jatropha gossypifolia*	Euphorbiaceae	Herb	Lal bharanda	To treat tuberculosis	Anticancer [78]
93.	*Dioscorea bulbifera*	Dioscoreaceae	Herb	Ban-alu	Used against asthma and snakebites	Anti-cancer, Anti-diabetic, Antimicrobial [46]
94.	*Impatiens trilobata*	Balsaminaceae	Herb	Jonglidopati	The root is used for treating migraines	Antioxidant, Anti-cancer, Anti-bacterial [79]
95.	*Ceiba pentandra*	Malvaceae	Tree	Swet Simul	Used to treat leprosy and arthritis	Anti-inflammatory, Antioxidant [80]
96.	*Talinum portulacifolium*	Portulacaceae	Herb	Takpui	Used as an aphrodisiac	Antimicrobial, Anti-ulcer, Anti-diabetic [81]
97.	*Citrullus colocynthis*	Cucurbitaceae	Climber	Ban kakur	The fever is cured by ripe fruit	Antioxidant, Antimicrobial [82]
98.	*Pithecellobium dulce*	Fabaceae	Shurb	Jilapi phal	Used as astringent and reduce high blood pressure	Antioxidant, Anti-inflammatory, Antibacterial [83]
99.	*Cinnamomum tamala*	Lauraceae	Tree	Tejpata	Helpin digestion and cold	Antimicrobial, Anti-inflammatory [46]
100.	*Bryophyllumpinnatum*	Crassulaceae	Herb	Pathorkuchi	Used to treat blood dysentery	Anti-diabetic, Anti-inflammatory [46]
101.	*Coccinia cordifolia*	Cucurbitaceae	Climber	Telakucha	For diabetes treatment, applied to the head for cooling	Antioxidant, Anti-diabetic, Anti-inflammatory [84]
102.	*Abroma augusta*	Malvaceae	Shrub	Ulotkombol	Used in decreasing blood sugar	Anti-diabetic, Antioxidant [85]
103.	*Gloriosa superba*	Colchicaceae	Herb	Ulatchandal	Used in skin diseases and the snakebites	Antioxidant, Antimicrobial, Anthelmintic [86]
104.	*Lantana camara*	Verbenaceae	Shrub	Lantana	Used in skin diseases and ulcers	Anti-oxidant, Antimicrobial [87]
105.	*Amorphophallus campanulatus*	Araceae	Herb	Ool	Used in throat and diabetes	Anti-inflammatory, Anti-histaminic [88]

Conclusions

Almost in every corner of West Bengal, plants are used as medicine by local tribal communities. Herbal preparations made from traditional medicinal plants are used to treat common ailments prevalent in the area such as cuts, wounds, cough and cold, pain, stomachache, liver problems, diabetes, skin disorders, microbial infections, and tuberculosis [89-104]. This review provides a glimpse of traditional medicinal plant uses by the tribal communities of West Bengal. We summarized the ethnobotany and ethnopharmacology uses of plants to provide researchers with the necessary information to study these plants from the scientific point of view. Therefore, the current review article will attract the attention of ethno botanists, phytochemists, and pharmacologists for further critical investigation of medicinal plants present in West Bengal, India which are typically used by the tribal communities since ancient times.

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Conflict of interest

The author declares no conflict of interest.

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