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DOCUMENTATION OF WILD MEDICINAL PLANT RESOURCES IN WEST RAJABHATKHAWA RANGE OF BUXA TIGER RESERVE, WEST BENGAL, INDIA

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ABSTRACT

Medicinal plants are a rich source of biologically active compounds with therapeutic properties, historically utilized by various cultures to treat numerous ailments. Phytosociological surveys are crucial for identifying natural medicinal plant communities, documenting biodiversity, and understanding ecological changes over time. This study aimed to document the wild medicinal plant diversity in the West Rajabhatkhawa Range of Buxa Tiger Reserve, West Bengal, India, from 2019 to 2022. Covering an area of 6790.82 hectares, with 5631 hectares of forested land, a simple random quadrat sampling method was employed with a 0.1% sampling intensity, resulting in 140 randomly placed quadrats. The survey recorded 84 species from 42 families of wild medicinal plants, comprising 45% trees, 17% shrubs and 38% herbs. Asteraceae was the most represented family, accounting for 9% of the species, followed by Malvaceae (8%), Fabaceae (7%) and Apocynaceae (6%). The study emphasizes the need to improve the regeneration status of these medicinal plants and the extraction of their active ingredients for therapeutic use, highlighting the rich medicinal plant biodiversity in the region and its potential for future pharmacological research.

Keywords : Medicinal, Rajabhatkhawa Range, Biodiversity

Introduction

The use of plants for therapeutic purposes is deeply rooted in traditional knowledge systems and continues to be widely practiced, especially in developing countries where access to modern healthcare is limited (Payyappallimana 2010; Umair *et al*. 2017). In India, which possesses one of the world's richest repositories of plant biodiversity, traditional medicine systems like Ayurveda have utilized medicinal plants for millennia (Rahaman and Karmakar 2015). However, modernization threatens the preservation of this traditional wisdom, highlighting the need for scientific documentation of ethnomedicinal knowledge (Karmakar and Rahaman 2022). About 70% of the Indian population inhabits rural areas, and many of them reside in the vicinity of forests, using various plant parts as food, medicines, and for other purposes in their daily livelihoods. Indian people have been using medicinal plants since prehistoric times (Singh 2010). Indigenous healing practices have been culturally accepted during all phases of human culture and environmental evolution. Traditional medicine is widely used and accounts for about 40% of all healthcare delivered (WHO 2002). About 85% of traditional medicines are plant-derived (Fransworth 1988). According to the database developed by the Foundation for Revitalisation of Local Health Traditions (FRLHT), the checklist of medicinal plants of West Bengal consists of a total of 2800 taxa. Out of 2800 medicinal plant species recorded in West Bengal, a large portion of species, around 80-85%, are sourced from the wild, of which around 46% are herbs, followed by trees (23%), shrubs

(21%), and climbers (10%) (Kiran & Sahoo 2008; Jyoti & Shekhar 2009).

The Buxa Tiger Reserve (BTR) in West Bengal, India, represents a significant region for studying the medicinal plants used by local tribal communities. The reserve, encompassing an area of 760.87 sq. km, is a repository of rich biodiversity and serves as a crucial habitat for various flora and fauna (Sarkar & Das 2015). It is geographically situated between the latitudes of 26° 30' and 26° 55' N and the longitudes of 89° 20' and 89° 55' E, sharing its northern boundary with Bhutan and its eastern boundary with Assam (Bhattacharya *et al*. 2016; Acharya 2024). In West Bengal, forests cover an area of 11,879 sq. km, which is 13.38% of the state's geographical area (India State of Forest Report 2019). During the present study, detailed phytosociological surveys were conducted across various compartments within the Rajabhatkhawa Range of Buxa Tiger Reserve. Species with known medicinal properties were identified and their potential medicinal values were documented based on existing ethnobotanical literature and scientific studies (Jain 1967, 1981, 1986, 1987, 1989; Jain & Mudgal; Saklani & Sikarwar 2021). Each identified plant species was cross-referred with traditional uses reported by local healers and documented in various ethnobotanical studies. This approach ensured the accuracy of the recorded information and highlighted lesser-known medicinal plants that could be of significant therapeutic value (Yonzone *et al*., 2012). The comprehensive documentation of these plants serves as a crucial resource for preserving traditional knowledge and provides a valuable foundation for future pharmacological research and the development of new therapeutic agents derived from these traditional medicines. The BTR is home to numerous rare and threatened species of plants (Das 1996; Kadir 2001; Rai & Das 2008; Kadir & Das 2007; Sarkar & Das 2015, 2017). North Bengal possesses a rich resource of biodiversity due to its favourable climatic conditions. However, in the context of medicinal plants, many parts of North Bengal have remained underexplored. A few attempts have been made to study and document the medicinal plant species in this region, but much remains to be discovered and understood (Biswas & Chopra 1940, 1956; Yonzone *et al.,* 1984; Ghosh *et al.,* 2020).

Materials and Methods

The study was conducted in the West Rajabhatkhawa Range of Buxa Tiger Reserve, West Bengal, India, during the years 2019-2022. Buxa Tiger Reserve was established in 1983 as the country's 15th Tiger Reserve and is located in the Alipurduar district of West Bengal. The Reserve is situated between latitudes 26°30' and 26°55'N and longitudes 89°20' and 89°55'E, spreading 50 kilometres from west to east and 35 kilometres from north to south. The region's average daily temperature ranges from 12°C to 32°C, with an annual precipitation total of 4100 mm, influenced by the South-West monsoon. The West Rajabhatkhawa Range (Figure 1) covers an area of 6790.82 hectares, from which 5631 hectares are divided into 20 compartments. However, only 18 compartments were considered for the documentation of medicinal plants as there was no vegetation cover in the remaining two compartments, Dima-1 and Dima-2, as observed during the initial survey. The quadrat method was adopted to study the vegetation sampling of plant species. The minimum quadrat size was determined by the species-area curve method. A total of 140 nested quadrats sampling were laid out: 20m x 20m for trees, 5m x 5m for shrubs and 1m x 1m for herbs. The quadrats were set out with predefined coordinates to record medicinal plant resources of the region using the random quadrat sampling method with a sample intensity of 0.1%.

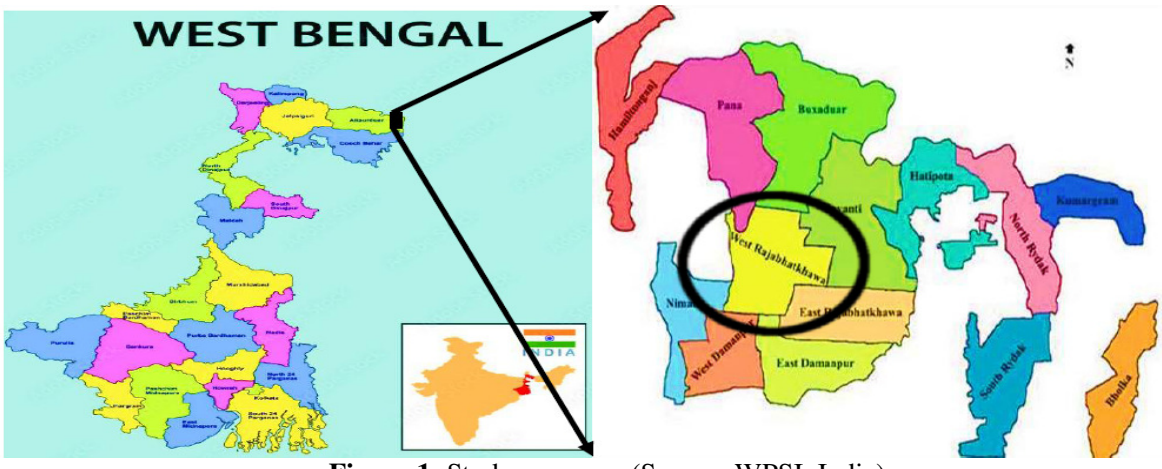

Figure 1: Study area map (Source: WPSI, India)

For simplicity, this study recorded only herbs, shrubs, and trees. Lianas, epiphytes, climbers, vines and twiners were excluded. Plants encountered in the quadrats were identified and recorded. Species with known medicinal properties were shortlisted based on existing ethnobotanical literature and scientific studies (Jain, 1967, 1981, 1986, 1987, 1989; Jain and Mudgal, 1999; Saklani and Sikarwar, 2021) and then tabulated. The identification of plants was supported by local forest dwellers, forest guards and taxonomists. Additionally, various field guidebooks and literature, such as "Forest Resources of North Bengal," "Flora of British India," "Buxa Tiger Reserve Conservation Plan (2015-2024)," and "Flora of Bhutan," were referenced. Online databases like www.theplantlist.org and powo.science.kew.org were also consulted for updated nomenclatural verification (though not for identification purposes). Voucher specimens of the recorded plants have been deposited in the Department of Forestry, Uttar Banga Krishi Viswavidyalaya (U.B.K.V.) for future reference and verification.

Results and Discussion

Based on extensive fieldwork, plants having medicinal and therapeutic benefits were identified and documented in this study. Species were recognized as medicinal based on previous literature ontraditional knowledge (Table 1). The study documented 84 medicinal plant species from the area. These species belong to 42 different families of wild medicinal plants. Asteraceae was the most represented family, accounting for 9% of the species, followed by Malvaceae (8%), Fabaceae (7%) and Apocynaceae (6%). Some families, such as Acanthaceae, Caryophyllaceae, and Zingiberaceae, were each represented by a single species, contributing 1% each (Figure 2). Among the 84 medicinal plant species, there were 38 species of trees (45 %), 32 species of herbs (38 %) and 14 species of shrubs (17 %). Notably, no climbers or epiphytes were documented. The habitats of these medicinal plants were classified into three categories: herbs (H) with 32 species, shrubs (S) with 14 species, and trees (T) with 38 species. Various plant parts were used for medicinal purposes, arranged in descending order by the number of species: leaf (41 species), root (32 species), bark (21 species), fruit (11 species), flower (10 species), whole plant (9 species), root bark (9 species), seed (8 species), stem (5 species), rhizomes (2 species), shoot (2 species), dried leaf (2 species), flowering bud (1 species), root stalk (1 species) and wood (1 species) (Figure 3).The conservation status of the documented species was also evaluated. Out of the 84 species, 25 species were classified as "Least Concern," 58 species were "Not Evaluated," and 1 species was "Vulnerable" (Figure 4). Figure 5 illustrates the number of diseases treated by the documented medicinal plants. The data highlights the diversity and significance of these plants in traditional medicine, showing their extensive use in treating a wide range of health conditions. The most common uses included treatment for dysentery (18 species), diarrhoea (18 species), anti-inflammatory purposes (16 species), wounds (13 species), diabetes (8 species), asthma (9 species), bronchitis (9 species), cancer (9 species), cough (9 species), indigestion (7 species), jaundice (7 species), anti-oxidant purposes (8 species), anthelmintic uses (4 species), etc.

Table 1: Wild Medicinal Plants of Rajabhatkhawa Range of Buxa Tiger Reserve [Abbreviations used: Habit: H = Herb; S = Shrub; T = Tree. IUCN list: LC= Least Concern; NE= Not Evaluated; VU= Vulnerable]

Sl. N.	Plant species	Family	Voucher specimen	Local name	Parts used	IUCN Red list	Habitat	Diseases	References
1	*Achyranthes aspera* L.	Amaranthaceae	065/DP	Apang	Whole Plant	LC	H	Cough, Bronchitis, Rheumatism, Malarial Fever, Dysentery, Asthma, Hypertension and Diabetes	Srivastav *et al.* (2011); Ghimire *et al.* (2015)
2	*Achyranthes bidentata* Blume.	Amaranthaceae	176/DP	Datiwan	Root	LC	H	Strengthen Bone and Muscles	Chen, Y. R. *et al.* (2024); He, X.*et al.* (2017)
3	*Acmella uliginosa* (Sw.) Cass.	Asteraceae	137/DP	Laatoghaans	Flower	LC	H	Antinociceptive, Mouth Ulcer, Tooth Ache, Sore Throat and Stomach-Ache	Ong, H. M. *et al.* (2011); Ahmad, A.*et al.* (2020)
4	*Ageratum conyzoides*L.	Asteraceae	046/DP	Bhedaa Jhar, Gandhe (Seto)	Leaf & Stem	NE	H	Common Wound, Antimicrobial, Arthrosis, Headache, and Dyspnoea	Okunade, A. L. (2002); Ming, L. C. (1999)
5	*Ageratum houstonianum* Mill.	Asteraceae	200/DP	Gandhe (Nilo)	Whole Plant	NE	H	Cuts and Wounds	Tennyson, S. *et al.* (2012); Pandey, A. *et al.* (2022)

6	*Alangium chinense* (Lour.) Harms	Cornaceae	038/DP	Bhalu paile	Roots, Leaves & Flowers	NE	T	Snake Bites, Circulation, Contraception, Haemostasis, Numbness, Poison, Rheumatism and Wounds	Hu, X. Y. *et al*. (2020); Xiao, T., Cheng, X. *et al*. (2023)
7	*Albizia lebbeck* (L.) Benth.	Fabaceae	092/DP	Siris	Whole Plant	LC	T	Scabies, Lung Ailments, Piles, Bronchitis, Abdominal Tumours, Cough and Eye Disorders	Verma, S. C. *et al.* (2013); Samant, S. S. *et al*. (2023)
8	*Alstonia scholaris* (L.) R.Br.	Apocynaceae	015/DP	Chatium	Bark	LC	T	Malaria, Jaundice, Gastrointestinal Troubles and Cancer	Khyade, M. S. *et al.* (2014); Kaushik, P. *et al.* (2011)
9	*Alternanthera sessilis* (L.) R.Br. ex DC.	Amaranthaceae	011/DP	BhiringiJhar	Leaf, Shoot & Bark	LC	H	Hepatitis, Tight Chest, Bronchitis, Asthma, Antihypertensive and Inflamed Wounds	Hwong, C. S. *et al.* (2022); Saqib, F., &Janbaz, K. H. (2016)
10	*Aquilaria sinensis* (Lour.) Spreng.	Thymelaeaceae	191/DP	Agar	Leaves	VU	T	Joint Pain, Inflammatory Ailments and Diarrhoea	Wang, Y.*et al.* (2021); Iskandar, M. I. I. (2023)
11	*Baccaurea ramiflora* Lour.	Phyllanthaceae	084/DP	Kusum	Bark, Roots & Wood	NE	T	Rheumatoid Arthritis, Cellulitis, Abscesses, Constipation and Injuries	Goyal, A. K. *et al.* (2022); Nesa, M. L. *et al.* (2018)
12	*Bauhinia purpurea* L.	Fabaceae	123/DP	Koiralo	Bark	LC	T	Dropsy, Pain, Rheumatism, Convulsions, Delirium and Septicaemia	Zakaria, Z. A. *et al.* (2011); Marimuthu, K., & Dhanalakshmi, R. (2014)
13	*Bauhinia variegate* L.	Fabaceae	130/DP	Koiralo	Roots	LC	T	Ulcers, Skin Diseases and Snake Bite	Parekh, J. *et al.* (2006); Mali, R. G.*et al.* (2007); Mali, R. G., & Dhake, A. S. (2009)
14	*Bischofia javanica* Blume	Phyllanthaceae	206/DP	Kaijal	Bark	LC	T	Tuberculosis, Stomach Ulcer, Mouth Ulcer and Athlete's Foot	Lee, S. *et al*. (2021); Susanto, Y. *et al.* (2021); Idramsa, I.*et al.* (2022)
15	*Bombax ceiba* L.	Malvaceae	023/DP	Simal	Root & Bark	LC	T	Fever, Diabetics and Stomach ache	Rameshwar, V. *et al.* (2014); Chaudhary, P. H., &Khadabadi, S. S. (2012)
16	*Bridelia tomentosa* Blume	Phyllanthaceae	110/DP	NA	Bark Leaves & Roots	NE	S	Pleurisy, Exudation, Cough, Fever and Asthma	Rahman, M. A. *et al.* (1997); Upadhya, V. *et al.* (2012); Rai, P. K., &Lalramnghinglova, H. (2011)
17	*Calotropis gigantea* (L.) W.T. Aiton	Apocynaceae	193/DP	Aank	Bark & Root	LC	S	Diarrhoea, Constipation, Stomach Ulcers, Toothache, Cramps, Joint Pain and Elephantiasis	Sivapalan, S. *et al.* (2023); Ranade, A., & Acharya, R. (2014)
18	*Calotropis procera* (Aiton) W.T. Aiton	Apocynaceae	006/DP	Aank	Leaf	LC	S	Snake Bite, Sinus Fistula, Rheumatism, Mumps, Burn Injuries, Body Pain and Jaundice	Tripathi, M. *et al.* (2022); Mohebi, Z. (2021); Neto, M. C. *et al.* (2013)
19	*Careya arborea* Roxb.	Lecythidaceae	002/DP	Kumbi	Bark	LC	T	Filarial, Colic, Loose Motions, Ulcers, Fever, Smallpox, Urinary Discharges and Rheumatic Pain	Ambardar, N., & Aeri, V. (2013); Rimi, S. *et al.* (2023); Navya, A. S., & Anitha, S. (2018)
20	*Chromolaena odorata* (L.) R.M. King & H.Rob.	Asteraceae	162/DP	Aule Banamaraa	Whole Plant	NE	S	Treat Wounds, Burns and Skin Infections	Omokhua, A. G. *et al*. (2016); Aziz, N. A. *et al*. (2020)
21	*Cinnamomum tamala* (Buch.-Ham.) T. Nees & Eberm.	Lauraceae	086/DP	Tejpatta	Bark & Dried Leaves	NE	T	Influenza, Coughing, Lack of Semen and Dysentery	Upadhyay, R. K. (2017); Thakur, S., & Chaudhary, G. (2021); Dandapat, S. *et al.* (2014)
22	*Cleome viscose* L.	Cleomaceae	150/DP	Hur Hure	Leaves, seeds & roots	NE	H	Rheumatic Arthritis, Hypertension, Malaria, Neurasthenia and Wound Healing	Joshi, T. *et al.* (2015); Khuntia, A. *et al.* (2022); Matsyagiri, L. *et al.* (2012)
23	*Clerodendrum infortunatum*	Lamiaceae	185/DP	Rajbeli	Leaf & root	NE	S	Tumors, Skin Diseases, Snake Bite, Scorpion Sting, Intestinal	Kuluvar, G. *et al*. (2009); Wang, J. H. *et al.* (2018);

	L.							Infections and Kidney Dysfunctions	Kar, P. *et al.* (2014)
24	*Commelina benghalensis* L.	Commelinaceae	036/ DP	Kane	Leaves	NE	H	Leprosy, Sore Throat, Ophthalmic, Burns, Pain and Inflammation	Ghosh, P. *et al*. (2019); Orni, P. R., (2018); Hossain, F. *et al.* (2014)
25	*Corchorus capsularis* L.	Malvaceae	102/ DP	Jute	Leaf & Root	LC	H	Indigestion, Fever and Dysentery	Al-Snafi, A. E. (2016); Zakaria, Z. A. *et al.* (2009)
26	*Crateva magna* (Lour.) DC.	Capparaceae	087/ DP	NA	Bark, Root & leaves	NE	T	Inflammation, Rheumatic Fever, Gastric Irritation and Constipation	Subarna, R. T. (2023);Chidambaram, K., Albert, J., & Karpagam, K. (2011)
27	*Crateva religiosa* G. Forst.	Capparaceae	088/ DP	Siplikhan	Bark	NE	H	Urinary Disorders and Kidney Stone Remover	Mohanapriya, R. *et al.* (2021); Ahama-Esseh, K. *et al.* (2017)
28	*Curcuma aromatic* Salisb.	Zingiberaceae	111/ DP	Ban Haledo	Rhizomes	NE	H	Anti-Inflammatory Agent, Remove Blood Stasis and Treatment Of Cancer	Sikha, A., & Harini, A. (2015); Anoop, K. (2015)
29	*Cynodon dactylon* (L.) Pers.	Poaceae	160/ DP	Dubo	Whole herb & root stalk	LC	H	Anasarca, Cancer, Convulsions, Cough, Cramps, Diarrhoea, Dropsy, Dysentery, Epilepsy, Headache, Haemorrhage, Hypertension, Hysteria, Measles, Rubella, Snakebite, Sores, Stones, Tumours, Urogenital Disorders, Warts and Wounds	Nagori, B. P., & Solanki, R. (2011); Biswas, T. K. *et al*. (2017); Bhangale, J., & Acharya, S. (2014)
30	*Deeringia amaranthoides* (Lam.) Merr.	Amaranthaceae	107/ DP	Kuro	Leaf	NE	H	Dysentery	Carag, H., &Buot Jr, I. E. (2017); Bharati, K., & Singh, M. K. (2023); Bose, D. *et al.* (2015)
31	*Dillenia indica* L.	Dilleniaceae	135/ DP	Chaltaa	Barks & Leaves	LC	T	Indigestion, Asthma, Influenza, Dysentery, Jaundice, Weakness and Rheumatic Pain	Gandhi, D., & Mehta, P. (2013); Gogoi, B. *et al.* (2020); Das, M. *et al*. (2023)
32	*Dillenia pentagyna* Roxb.	Dilleniaceae	187/ DP	Tartaree	Leaves, Bark & Fruits	LC	T	Cancer, Wound Healing, Diabetes and Diarrhoea	Saiful Yazan, L., &Armania, N. (2014); Prasad, S. B. *et al*. (2009)
33	*Dioscorea villosa* L.	Dioscoreaceae	143/ DP	Ban tarul	Roots & rhizomes	NE	H	Menopause, Joint Pain and Rheumatoid Arthritis	Obidiegwu, J. E. *et al.* (2020); Rahman, S., & Husen, A. (2022)
34	*Drymaria cordata* (L.) Willd. ex Schult.	Caryophyllaceae	013/ DP	Abhiijaalo	Whole Plant	NE	H	Cold, Headache, Bronchitis, Leprosy and Tumours	Thakur, R. *et al.* (2022); Patra, S. *et al.* (2020); Arya, A. *et al.* (2022)
35	*Euphorbia hirta* L.	Euphorbiaceae	161/ DP	Aankle jhar/Dudhejhar	Whole Plant	NE	H	Warts, gonorrhoea, diarrhoea, dysentery, respiratory infections, fungal infections, ocular issues, bronchial conditions and lactation enhancement.	Kumar *et al*. (2010); Patil *et al*. (2009)
36	*Erythrina stricta* Roxb.	Fabaceae	164/ DP	Mandar	Leaves	NE	T	Antiasthmatic, Antiepileptic, Antiseptic, Astringent, Anti-Inflammatory and Analgesic	Murthy *et al.* (2024); Akter *et al.* (2016); Ashokkumar *et al.* (2008); Parveen and Narayanan, (2015)
37	*Ecliptaprostrata* (L.) L.	Asteraceae	103/ DP	Bhringraj	Whole Plant	NE	H	Fever, jaundice, antiseptic properties, ulcers, leprosy, eye issues and relief for urinary scalding.	Feng *et al*. (2019); Chung *et al*. (2017)
38	*Flemingia bracteata* (Roxb.) Wight	Fabaceae	155/ DP	Bhatmase	Leaf & Root	NE	S	Epilepsy, Hysteria and Fever	Kumar, A., & Kumar, A. (2013); Madan, S. *et al.* (2013); Gavade, S. K.*et al.* (2020)
39	*Galinsoga parviflora* Cav.	Asteraceae	124/ DP	Chitlangejhar	Leaf	NE	H	Eczema, Lichen and Wounds	Ripanda, A.*et al.* (2023); Ali, S. *et al.* (2017); Bharathi, D. R.*et al.* (2021); Yadav, A. K., &Tangpu, V. (2008)

40	*Gamochaeta purpurea* (L.) Cabrera	Asteraceae	019/DP	NA	Leaves	NE	H	Antioxidant, Antibacterial Antifungal, Anti-Complement, Antitussive. Expectorant, Insect Antifeedant, Cytotoxic, Anti-Inflammatory, Antidiabetic and Antihypouricemic	Cruz *et al*. (2007)
41	*Gmelina arborea* Roxb. ex Sm.	Lamiaceae	118/DP	Gamhar	Root	NE	T	Indigestion, Giddiness, Burning Sensation, Fever, Thirst, Emaciation, Heart Diseases, Nervous Disorders and Piles	Warrier, R. R. *et al.* (2021); Shankar, R. *et al.* (2017); Panda, S. K. *et al.* (2018)
42	*Glinus oppositifolius* (L.) Aug.DC.	Molluginaceae	029/DP	NA	Leaf	NE	H	Blood purifier, improve strength, diabetes	Sheu *et al*. (2014)
43	*Heliotropium indicum* L.	Boraginaceae	005/DP	HaathisundeJhaar	Whole Plant	NE	H	Antibacterial, Antitumor, Uterine Stimulant Effect, Antifertility, Wound Healing, Anti-Inflammatory, Antinociceptive and Diuretic Activities	Dash, G. K., & Abdullah, M. S. (2013); Sarkar, C. *et al.* (2021); Roy, A. (2015)
44	*Hibiscus rosa-sinensis* L.	Malvaceae	096/DP	Japa Kusum	Flowers, Leaves & Roots	NE	S	Wounds, Inflammation, Fever, Coughs, Diabetes, Hair Loss and Gastric Ulcers	Khristi, V., & Patel, V. H. (2016); Shelke, M. *et al.* (2021); Sanadheera, S. *et al.* (2021).
45	*Holarrhena pubescens* Wall. ex G.Don	Apocynaceae	014/DP	Ban Khirro	Seeds	NE	T	Anaemia, Jaundice, Dysentery, Stomach Pains, Diarrhoea, Epilepsy and Cholera	Khan, S. *et al.* (2021); Rani, A., & Bansal, R. (2023); Sripahco, T.*et al.* (2021)
46	*Justicia adhatoda L.*	Acanthaceae	054/DP	Asuro, Kalo Bhasaka	Leaves, Roots, Flowers & Bark	NE	S	Bronchitis, Tuberculosis and Other Lung and Bronchiole Disorders	Jothimangalam, M. S., & Deepa, M. (2022); Ameer, M. R. *et al.* (2023); Singh, K. J., &Huidrom, D. (2013); Sharma, A., & Kumar, A. (2016)
47	*Lagerstroemia speciosa* (L.) Pers.	Lythraceae	132/DP	Jarul	Bark	NE	T	Diarrhoea and Diabetes	Al-Snafi, A. E. (2019); Sharmin, T.*et al.* (2018); Nasrin, F., & Ahmad, S. (2012)
48	*Lannea coromandelica* (Houtt.) Merr.	Anacardiaceae	168/DP	Jhingat/Hallongre	Leaves	NE	T	Hepatitis, Diabetes, Ulcers, Heart Disease and Dysentery	Amelia, P. *et al.* (2021); Malú, Q. *et al.* (2024); Ha, H. A. *et al.* (2024)
49	*Lantana camara* L.	Verbenaceae	094/DP	Ban Phanda, Sutkeri Kanda	Leaves	LC	S	Cancers, Chicken Pox, Measles, Asthma, Ulcers, Swellings, Eczema, Tumours, High Blood Pressure, Bilious Fevers, Catarrhal Infections, Tetanus, Rheumatism and Malaria	Kalita, S. *et al.* (2012); Nawaz, A., *et al.* (2016); Lonare, M. K. *et al.* (2012)
50	*Leea macrophylla* Roxb. ex Hornem.	Vitaceae	022/DP	Galeni	Root	NE	S	Anticancer, Cytotoxic, Antimicrobial, Antidiabetic, Hepatoprotective, Cardiovascular, and CNS Activity	Sarvade, D. D. (2019); Malik, M., & Upadhyay, G. (2020); Hossain, F. *et al*. (2021)
51	*Magnolia champaca* (L.) Baill. ex Pierre	Magnoliaceae	116/DP	Chaap	Flowers & Stem Bark	NE	T	Anti-Microbial, Anti-Pyretic, Anti-Inflammatory, Anti-Oxidant, Insecticidal, Anti-Uretic, Anti-Dynic, Carminative and Anti-Diabetic	Hasan, M. M. *et al.* (2020); Maghfiroh, K. *et al.* (2021); Hasan, M. M., *et al.* (2024)
52	*Mallotus philippensis (Lam.) Müll.Arg.*	Euphorbiaceae	021/DP	Kamlaa	Roots	NE	T	Anthelmintic, Antibacterial, Anti-Inflammatory, Anti-Oxidant, Anti-Cancerous	Kumar *et al.* (2020); Bodas *et al.* (2022); Ali *et al.*(2024)
53	*Melastomamalabathricum* L.	Melastomataceae	078/DP	Angeree	Whole Plants	NE	S	Diarrhoea, Dysentery, Haemorrhoids, Cuts and Wounds, Toothache and Stomach-ache	Joffry, S. M. *et al.* (2012); Mazura, M. P. *et al.* (2007); Zheng, W. J. *et al.* (2021).

54	*Meyna spinosa* Roxb. ex Link	Rubiaceae	026/DP	Dumphar	Leaves & Stems	NE	T	Cold, Dysentery, Indigestion, Skin Infection and Intestinal Worm	Singh, A. D. *et al.* (2022); Singh, N. K. *et al.* (2015); Singh, B., & Borthakur, S. K. (2011)
55	*Mimosa pudica* L.	Fabaceae	027/DP	Lajjaawatee	Leaves	NE	H	Urogenital Disorders, Piles, Dysentery, Sinus and Wounds	Adurosakin. *et al.* (2023); Ahmad, H. *et al.* (2012); Joseph, B. *et al*. (2013); Kokane, D. D. *et al.* (2009).
56	*Morinda angustifolia* Roxb.	Rubiaceae	030/DP	Hardikath	Root	NE	S	Asthma, Common Cold, Vomiting, Dysentery, Wound and Urinal Problems	Hasan, M. M. *et al.* (2022); Das, S. C., & Rahman, M. A. (2011); Singh, B. *et al.* (2022)
57	*Morinda citrifolia* L.	Rubiaceae	008/DP	Noni	Whole Fruit, Juice, Seed, Leaf, Bark & Root	LC	T	Antibacterial, Antiviral, Antifungal, Antitumor, Analgesic, Hypotensive and Anti-Inflammatory	Abou Assi *et al.* (2017); Ahmad *et al.* (2016); Almeida *et al.* (2019); Torres *et al.* (2017)
58	*Murraya koenigii* (L.) Spreng.	Rutaceae	125/DP	Curry Patta	Leaves	NE	S	Piles, Inflammation, Itching, Fresh Cuts, Dysentery, Bruises, and Enema	Gahlawat*et al.* (2014); Tripathi *et al.* (2018); El-Shiekh *et al.* (2024)
59	*Oroxylum indicum* (L.) Kurz	Bignoniaceae	106/DP	Totela	Root, Bark, Root Bark & Seeds	LC	T	Jaundice, Arthritic and Rheumatic Problems, Gastric Ulcers, Tumours, Respiratory Diseases, Diabetes, Diarrhoea and Dysentery	Mangal *et al.* (2017); Kumar *et al.* (2021); Rai *et al.* (2022); Sultana *et al.* (2022)
60	*Paederia foetida* L.	Rubiaceae	047/DP	Patebiree, Paadeiree	Leaves & root	NE	H	Inflammation, Piles and Diarrhoea	Ojha *et al.* (2018); Karmakar *et al.* (2020); Dutta *et al.* (2023); Soni *et al.* (2013)
61	*Piper nigrum* L.	Piperaceae	182/DP	Pipla	Fruit & seeds	NE	H	Anti-Inflammatory, Analgesic, Anticonvulsant and Neuroprotective	Takooree*et al.* (2019); Ashokkumar *et al.* (2021); Saleem *et al.* (2022)
62	*Plantago asiatica* L.	Plantaginaceae	053/DP	Isabagol	Seeds	NE	H	Liver Disease, Stomach Problems, and Urinary Inflammation	Huan *et al.* (2023); Wen *et al.* (2022); Yin *et al.* (2010); Ye *et al.* (2011)
63	*Portulaca oleracea* L.	Portulacaceae	063/DP	Kulfa saag	Dried Leaves & Stem	NE	H	Febrifuge, Antiseptic, Vermifuge, Antibacterial, Antiulcer genic, Anti-Inflammatory, Antioxidant and Wound	Zhou *et al.* (2015); Iranshahy*et al.* (2017); Aini *et al.* (2022); Kumar *et al.* (2022)
64	*Premna serratifolia* L.	Lamiaceae	037/DP	Dhaule	Root	NE	T	Cancer, Parkinson Disease, Rheumatoid Arthritis, Skin Melan genesis, Leishmaniosis, Hepatoprotection, Diabetes, Atherosclerosis, and Obesity	Simamora *et al.* (2020); Singh *et al.* (2021); George *et al.* (2022); Octavianus *et al.* (2022)
65	*Pseudognaphalium luteoalbum* (L.) Hilliard &B.L.Burtt	Asteraceae	097/DP	Kairo Jaar	Leaves	NE	H	Antibacterial, Antifungal, Antioxidant Anti- Inflammatory and Cytotoxic Effects	Smissen*et al.* (2023); Aderogba*et al.* (2014)
66	*Pterospermum acerifolium* (L.) Willd.	Malvaceae	156/DP	Champa	Flowers	NE	T	Inflammation, Ulcers, Blood Problems, and Tumours	Vijay *et al.* (2023); Datta *et al.* (2020); Jena *et al.* (2023); Deshwal and Sharma, (2021)
67	*Saurauia roxburghii* Wall.	Actinidiaceae	042/DP	Gogun	Leaf	NE	T	Indigestion, Boils, Fever, Gout, Piles, Eczema, Asthma, Ulcers, Bronchitis, Epilepsy, and Hepatitis B	Nhrin *et al.* (2020); Ahmed *et al.* (2013)
68	*Scoparia dulcis* L.	Plantaginaceae	120/DP	Paataalmishree	Leaf	NE	H	Diarrhoea, Stomach-Ache, Kidney Stones, Kidney Problems and Fever	Jiang *et al.* (2021); Lin *et al.* (2023); Chen *et al.* (2024)
69	*Sida rhombifolia* L.	Malvaceae	093/DP	Bariyar	Fruit, Leaves & Root	LC	H	Swelling, Headache and Rheumatism	Gopinath *et al.* (2016); Xu *et al.* (2022); Ahirrao, (2024)

70	*Solanum aculeatissimum* Jacq.	Solanaceae	198/DP	Kunti Karra	Leaves, Fruit & Root	NE	H	Bacterial Infections, Cough, Indigestion, Antiproliferative, Antiseizure, Antioxidant, Antiviral, Anti-inflammatory and Hepatoprotective	Silva *et al.* (2024); Dantas *et al.* (2020); Silva *et al.* (2015)
71	*Solanum viarum* Dunal	Solanaceae	115/DP	KaaloBiheen	Root, Stem, Fruit Seeds & Flower	NE	H	Antioxidant, Antipyretic, Antimicrobial, Antifungal, Analgesic, and Anaemia	Thakur *et al.* (2024); Saha, (2024); Confortin*et al.* (2024)
72	*Sterculia villosa* Roxb. ex Sm.	Malvaceae	173/DP	Udal	Root	NE	T	Inflammation, Throat Infection, and Food Adjunct	Singh *et al.* (2024); Hossain *et al.* (2016); Talukder *et al.* (2016)
73	*Stereospermum colais* (Buch.-Ham. ex Dillwyn) Mabb.	Bignoniaceae	073/DP	Kuber bacha, jinghal, parhori	Leaves & Flower Buds	NE	T	Indigestion, Hiccups, Vomiting, Diarrhoea, Pain, Fever, Diabetes, Liver Disorders, Asthma and Wounds	Prema *et al.* (2013); Latha *et al.* (2020)
74	*Syzygium cumini* (L.) Skeels	Myrtaceae	152/DP	Jamun	Bark	LC	T	Sore Throat, Bronchitis, Asthma, Biliousness, Dysentery and Ulcers	Khan *et al.* (2024); Gajera *et al.* (2024)
75	*Syzygium nervosum* A.Cunn. ex DC.	Myrtaceae	117/DP	Kalo Jamun	Leaf, Fruit & Root	NE	T	Fomentation, Rheumatism and Embrocation	Nguyen, (2023); Utama *et al.* (2022); Pham *et al.* (2023)
76	*Tabernaemontana divaricata* (L.) R.Br. ex Roem. & Schult.	Apocynaceae	101/DP	Firfirefful	Roots, Leaves & Flowers	NE	S	Gonorrhoea, Leprosy, Syphilis, Diarrhoea, Dysentery, Worms and Malaria	Bhat *et al.* (2024); Akanda *et al.* (2024); Devi, (2024);
77	*Tectona grandis* L.f.	Lamiaceae	040/DP	Sagaun	Leaves	LC	T	Inflammation, Liver Disorders, Biliousness, Diabetes, Bronchitis, Leprosy and Dysentery	Irinmwinuwa*et al.* (2023); Muhammed *et al.* (2021); Asdaq*et al.* (2022)
78	*Terminalia bellirica* (Gaertn.) Roxb.	Combretaceae	129/DP	Barro	Fruit	LC	T	Hepatitis, Bronchitis, Asthma, Dyspepsia, Piles, Diarrhoea, Coughs and Eye Diseases	Gupta *et al.* (2020); Kumar and Khurana, (2018)
79	*Terminalia chebula* Retz.	Combretaceae	090/DP	Harra	Fruit	LC	T	Appetite, Digestive Aid, Liver Stimulant, Stomachic, Gastrointestinal Prokinetic Agent, and Mild Laxative	Bulbul *et al.* (2022); Sultan *et al.* (2023); Kim *et al.* (2022)
80	*Toona ciliate* M.Roem.	Meliaceae	199/DP	Tunee	Bark	NE	T	Chronic Dysentery, Leprosy, Cures Fever, Headache, Blood Complaints, Cardio tonic, Aphrodisiac and Ulcer	Kumar *et al.* (2012); Singh *et al.* (2023); Kavitha and Satish, (2013)
81	*Trevia nudiflora* L.	Euphorbiaceae	180/DP	Bhellar/ Trewia	Leaf & Shoot	NE	T	Flatulence, Gout, Rheumatism, Leukaemia Hepatoma- Biliary Affections, Excessive Bile, Sputum and Wounds	Khatun *et al.* (2023); Sultana *et al.* (2022); Ripa*et al.* (2022)
82	*Urena lobata* L.	Malvaceae	051/DP	Naalukuro	Roots	NE	H	Fractures, Wounds, Mastitis, Snake Bite, Colds, Dysentery, Enteritis, Goitre, Indigestion, Leucorrhoea, Malaria, Rheumatism and Tonsillitis	Islam *et al.* (2015); Purnomo and Tilaqza, (2022); Purnomo *et al.* (2023)
83	*Zanthoxylum armatum* DC.	Rutaceae	151/DP	Timar	Fruits	NE	T	Stomachic, Carminative, Anthelmintic, Dental Problems and Scabies	Irshad *et al.* (2021); Agnihotri *et al.* (2023)
84	*Ziziphus mauritiana*Lam.	Rhamnaceae	018/DP	Bayar	Fruit	NE	T	Fever, Indigestion, Liver Disease, Diarrhoea, Wound Healing and Jaundice	Prakash *et al.* (2021);Butt *et al.* (2021)

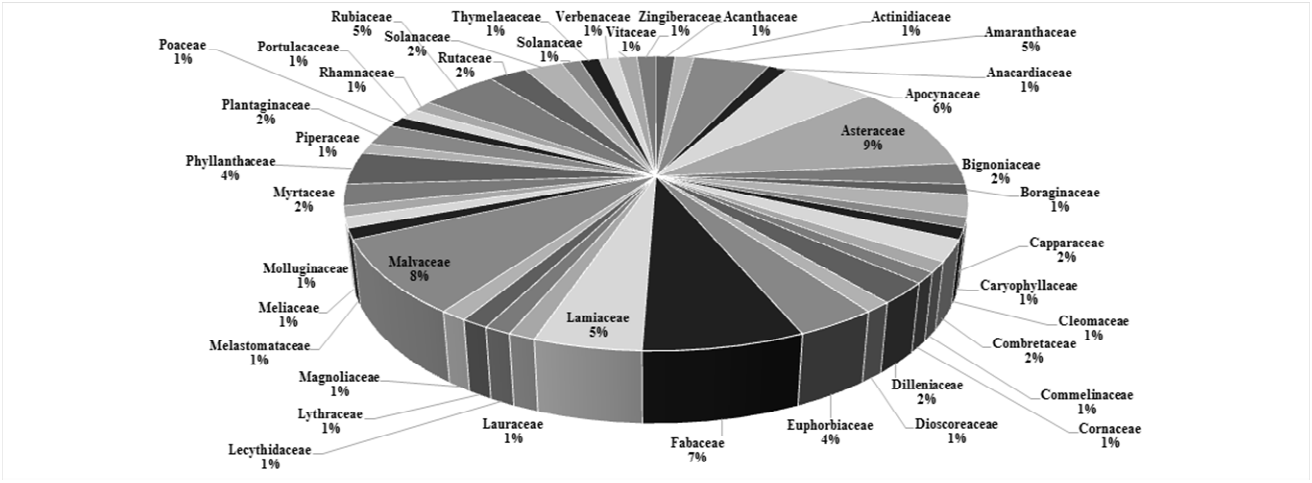

Figure 2. Family wise distribution

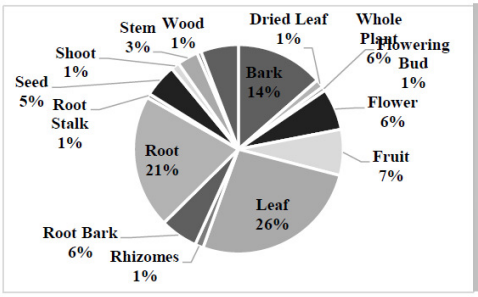

Figure 3: Distribution of parts used.

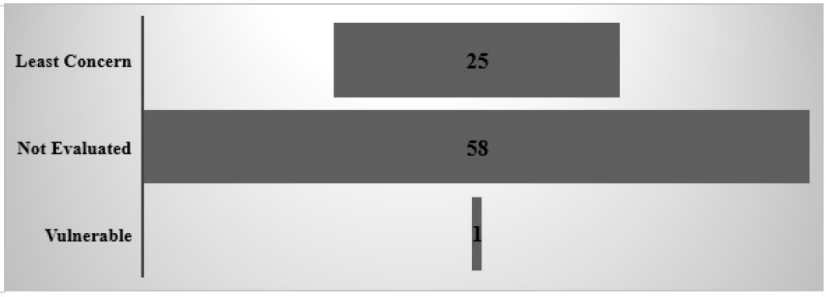

Figure 4. IUCN conservation status bar.

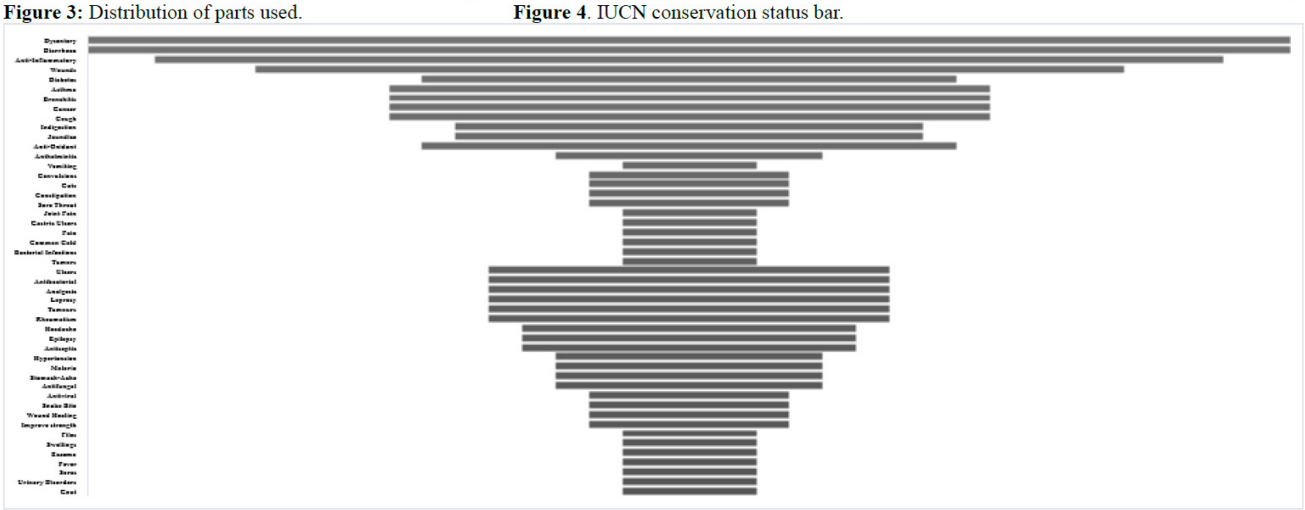

Figure 5: Number of Diseases Treated

Studies by Sarkar and Das (2012 & 2015) highlight the vital role of Non-Timber Forest Products (NTFPs) in the rural economy and subsistence of communities in Jayanti, Buxa Tiger Reserve. NTFPs contribute to nearly 50% of forestry revenue in India. In Jayanti, 112 plant species were used, with 60 species for commercial purposes, 27 for subsistence, and 35 regularly harvested for income. Additionally, 58 species are used daily for food and medicine. Another study in Jayanti forest documents 413 species of flora, including 396 angiosperms, 16 pteridophytes and one gymnosperm, reflecting the area's rich biodiversity and underscoring the importance of sustainable harvesting practices Sarkar & Das (2017).

Previous studies recorded 25 out of 46 threatened species from three MPCAs in North Bengal Das *et al.* (2010). Earlier research identified 41 rare, endemic, and threatened species in the Terai-Duars region, with major threats being exploitation and habitat loss Biswas et al. (2017, 2020). Pramanik and Das (2015) also conducted a similar survey in NRVK-9 and

NRVK-10 of Medicinal Plant Conservation Areas (MPCA) of BTR. Conservation within MPCA's is effective not only for medicinal plants but also for other species needing protection. Additionally, the findings of Konar et al. (2022), which documented 105 medicinal plant species across 60 families in West Bengal, emphasizing traditional knowledge and the use of plants for ailments like stomach diseases, diabetes, and skin conditions. The recurring presence of families like Asteraceae and Fabaceae highlights their importance in traditional medicine.

Conclusion

The comprehensive study in the West Rajabhatkhawa Range of Buxa Tiger Reserve highlighted the region's rich medicinal plant diversity, documenting 84 species across 42 families. Notably, Asteraceae, Malvaceae, Fabaceae and Apocynaceae were the most represented families. The plants documented are used extensively in traditional medicine, addressing a wide range of health conditions such as dysentery, diabetes, cancer etc. This research underlines the significance of preserving traditional knowledge and the potential for discovering new pharmacological agents from these medicinal plants.

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