



Impact of non-timber forest products on Forest and in Livelihood Economy of the People of Adjoining Areas of Jalpaiguri Forest Division, West Bengal, India

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ABSTRACT

The past decade has witnessed a rapid growth of interest in non-timber forest products (NTFPs) among conservation and development organisations in India. Non-timber forest products are an imperative part of the traditional life style in Forest adjacent area of West Bengal. In this study the diversity of non-timber forest products (NTFPS) was assessed in the Forest Adjoining Areas of Jalpaiguri, West Bengal, India. The present investigation also revealed that although there is high resource potential in the study sites but need of awareness, scientific knowledge, expertise and adequate market information.

Keywords: NTFP, Biodiversity, Forest, Conservation, Livelihood.

INTRODUCTION

Forest fringe people of every corner of the world face a constant dilemma between economic development and pressure towards resource conservation. From the ancient time they used Forest Products as the important source of livelihood. But the increasing process of resource depletion leads to conservation oriented policies by the policy makers and commercialization of forest product has been restricted. Products from the forest can be differentiated in to two broad categories, Viz., Timber and Non Timber Forest Products (NTFPs). Non-Timber Forest Products are simply referring the products that are derived from forest with the exception of timber (Ahenkan and Boon, 2011). It is also defined as "all products obtained from plants of forest origin and host plant species yielding products in association with insects and animals or their parts and items of mineral origin except timber" (Mathur and Shiva 1996). NTFPs are also considered as minor products of forest. NTFP has received increased attention after the famous article by Peters *et al.* (1989).

In the present days NTFPs have gained global attention due to their contribution to food security, household livelihood, Poverty reduction, Sustainable development and biodiversity conservation (Ahenkan and Boon, 2011). NTFPs include twigs, leaves, inflorescence, flowers, fruits, spices, medicinal plants, oils, gums, resins, honey, mushrooms, weaving and dying materials, aromatics, and recreation. Such useful products are also a vital source of economy, nutrition and sustenance for many forest-based communities around the globe.

The marketing of non-timber forest products are the main source of income to earn a livelihood for the indigenous communities residing to the fringe areas of the forest. In the upliftment and upgradation of rural economics, the role and contribution of NTFPs are crucial. In addition, the promotion of a sustainable management mechanism for NTFPs could lead to the better conservation of biodiversity. Thus NTFP-based development has emerged as an economically acceptable ecological option for socioeconomic development and livelihood security of the local people subsisting in and around forests (Islam et al., 2014). India has enriched biodiversity and above 3000 NTFPs were recorded but 126 have developed the marketability (FAO, 1995). The marketing of NTFPs was regulated by different mechanisms in different states. Under the Forest Produce (Control and Trade) Act 1981, trading is largely controlled through public institutions, such as State Development Corporations, Federations, Cooperatives and tribal societies (Prasad et al., 1985). Like other parts of world, Non-timber forest products (NTFPs) have been a vital part of the local economies of Forest patches of Jalpaiguri forest division, West Bengal, India. In Jalpaiguri, the NTFPs are marketed through different channels depending upon a variety of factors such as nature of the product, demand, distance of the market etc. In addition of commercial impact on the study area, NTFPs have begun to appear on mainstream scientific study agendas in a variety of disciplines including Economics, Regional Geography, Medicine Science and Biological Sciences.

MATERIAL AND METHODS

Description of Study Site:

The study was conducted in the the Forest Patches of Jalpaiguri Forest Division and adjacent area. Jalpaiguri Forest Division is one of the largest biodiversity region of the earth. It is very rich in floral diversity and faunal

diversity. Within a relatively small geographic boundary, Jalpaiguri enjoys a diverse array of ecosystems. It shares the international border with Bangladesh and Bhutan. The population of Jalpaiguri is a great combination of ancient tribal communities and descendants of ancient migrants of Bangladesh, Nepal and Bhutan. As a result the traditional knowledges of tribal communities also combined with the traditional knowledges of migrants. The mixed traditional knowledge gradually modified through the experiences gained by the people during the interaction with the ecosystems (Kennedy, 2006). The combined traditional knowledge is thus developed and transmitted from generation to generation (Daya and Vinj, 2006). Now a days it has wide range of application. The forest Division includes Eight territorial forest ranges, namely Ramshai Range, Lataguri Range, Chalsa Range, Diana Range, Moraghat Range, Dalgaon Range, Nathua Range and Banarhat Range. The adjoining area includes Malbazar, Moulani, Chalsa, Meteli, Nagragata, Diana, Birpara, Lataguri, Batabari, Banarhat, Dalgaon, Chamurchi, Nathua, Duramari, Dhupguri, Maynaguri etc. (Sarkar and Mazumder, 2017).

Method:

A preliminary survey was conducted to gather information on the geographic area of villages, occupation pattern, and other socio-economic aspects of the households. The interaction was held with officials, local political leaders and local people to explore issues, challenges and opportunities of NTFP in the district. To gather knowledge about NTFPs gradual excursions were conducted during the period of January, 2015 to December, 2017. Plants, used as NTFP were collected along with photo data and noted down their related information. The ethnobotanical data was collected through interviews, discussions with the villagers and personal observations. Many traditional healers, senior villagers and patients who were associated with these healers for a quite long time were consulted, through repeated interview and by distributing questionnaires given by Parabia and Reddy (2002) with the modified pattern. For the documentation of edible plants and household products the local houses of tribes, markets, festivals, dance ceremonies and other functions were visited and observed. A simple random sampling method was adopted for the selection of samples, the unit of study being the household. From the each sampling site, fifty households (n = 50) were randomly selected for the study. The primary data and secondary data were collected as part of the study. A pre-tested questionnaire survey and semi-structured interview

was conducted with the help of local persons in the representative households of each tribal settlement. Similarly, from each selected market Fifty peoples (25sellers and 25 buyers) were sampled randomly. Further detailed information on NTFPs were done using semi-structured questionnaire regarding the used pattern of NTFPs. Valuable secondary information's were collected from literature, research article and books. Some informations were also collected from

literature written by locals for their own use in local language. The forest department officials specially forest guard's help was also sought to gather information on plants, their collection and identification. Knowledgeable persons and researchers were also consulted for identification of such plants and plant products. The data gathered through above methods were cross checked and validated with the similar person of different localities.

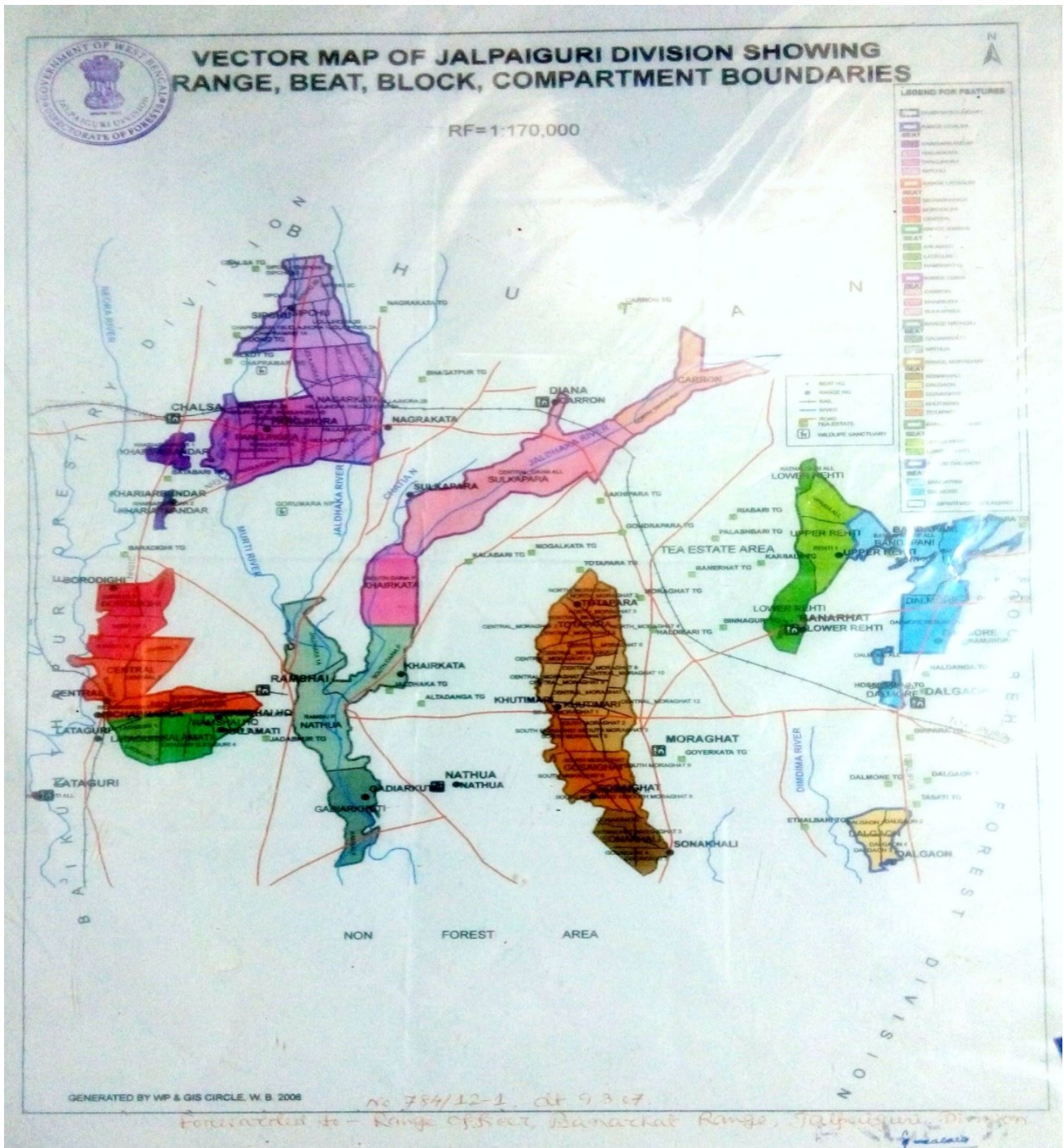


Fig. 1: Map of the Forest patches and adjacent area of Jalpaiguri Forest Division, West Bengal, India.

RESULTS AND DISCUSSION

In the present study total of 161 species of non-timber plant belonging to 72 families were documented for various uses by the indigenous tribal groups of the region for their livelihood (Table 1) Among them

125 plants are dicot, 32 plants are monocot and 4 plants are fern. The people of this region are mainly dependant on agriculture and wage for their food and economy, and these NTFPs play a key role in better livelihood where people use this NTFPs as a raw material for constructing different materials.

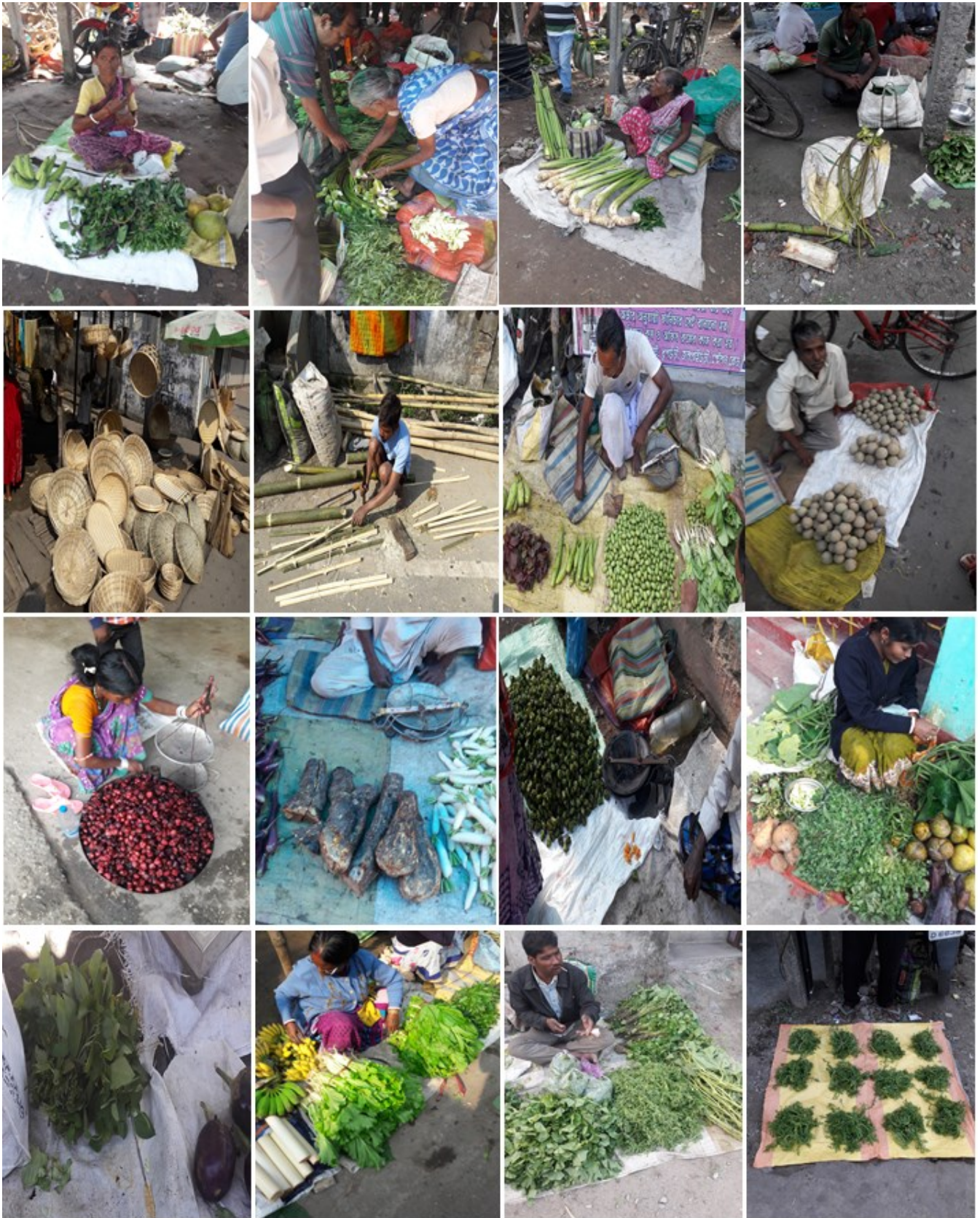


1. *Ipomoea aquatic* Forssk. , 2. *Trapa natans* L. , 3. *Cheilocostus speciosus* (J.Koenig) C.D.Specht , 4. *Ziziphus oenoplia* (L.) Mill. , 5. *Calotropis procera* (Aiton) Dryand. , 6. *Adhatoda vasica* Nees. , 7. *Duchesnea chrysantha* (Zoll.and Moritzi) Miq. , 8. *Thunbergia grandiflora* Roxb. , 9. *Cannabis sativa* L. , 10. *Solanum nigrum* L. , 11. *Boerhavia diffusa* L. , 12. *Acmella paniculata* (Wall. ex DC.) R.K.Jansen, 13. *Holarrhena pubescens* Wall. ex G.Don, 14. *Heliotropium indicum* L. , 15. *Curcuma caesia* Roxb. , 16. *Momordica dioica* Roxb. exWilld. , 17. *Senna sophora* L. , 18. *Cardiospermum*

halicacabum L. , 19. *Artocarpus lacucha* Buch.-Ham. , 20. *Amaranthus spinosus* L.



Different NTFP products and their marketization (1)



Different NTFP products and their marketization (2)

Table 1. Taxonomic and Economical aspects of NTFPs

Sr. No.	Name of the Plant	Family	Vernacular Name	Parts Used	Importance on the basis of use of local peoples
1	<i>Hygrophila auriculata</i> (Schumach.) Heine	Acanthaceae	Kule-khara	Tender shoot, Leaves	Use as cooked vegetable; Raw paste use as Blood forming supplement.
2	<i>Adhatoda vasica</i> Nees.	Acanthaceae	Vasaka	Leaves	Raw paste of leaves is use against cold and cough.
3	<i>Andrographis paniculata</i> (Burm.f.) Nees	Acanthaceae	Kalomegh	Whole plant	Leaf extract to treat jaundice, fever, different stomach problems.
4	<i>Thunbergia grandiflora</i> Roxb.	Acanthaceae	Githa (Nepali)	Whole plant	Effective use against snake bite.
5	<i>Amaranthus spinosus</i> L.	Amaranthaceae	Kantakhuria	Tender shoot, Leaves	Use as cooked vegetable; also use to treat anaemia, root paste applied for stomach to treat urinary disorder.
6	<i>Alternanthera philoxeroides</i> (Mart.) Griseb.	Amaranthaceae	Sanchi, Salincha	Tender shoot, Leaves	Use as cooked vegetable.
7	<i>Amaranthus tricolor</i> L.	Amaranthaceae	Lal note / Lalsak	Leaves & tender shoot	Preparation of curry
8	<i>Amaranthus viridis</i> L.	Amaranthaceae	Note sak	Tender shoot, Leaves	Use as cooked vegetable.
9	<i>Chenopodium album</i> L.	Amaranthaceae	Bathuasak	Tender shoot, Leaves	Use as cooked vegetable.
10	<i>Celosia argentea</i> L.	Amaranthaceae	Suggisak	Tender Shoot	Cooked as Vegetable
11	<i>Achyranthes aspera</i> L.	Amaranthaceae	Apang, Chirchiti	Tender shoot, Leaves	Use as cooked vegetable.
12	<i>Spondias pinnata</i> (L. f.) Kurz	Anacardiaceae	Amra	Unripe fruits	Eaten as raw and commonly uses in prickle and chutney preparation.
13	<i>Mangifera indica</i> L.	Anacardiaceae	Aam	Fruits	Eaten as raw and commonly uses in curries, chutney and pickle preparation.
14	<i>Annona reticulata</i> L.	Annonaceae	Nona, Madargam	Fruits	Ripe fruits uses as raw.
15	<i>Annona squamosa</i> L.	Annonaceae	Ata, Gam ja	Fruits	Ripe fruits uses as raw.
16	<i>Centella asiatica</i> (L.) Urb.	Apiaceae	Thankuni	Leaves	Use as cooked vegetable; Raw paste use as anti-diarrhoic medicine.
17	<i>Eryngium foetidum</i> L.	Apiaceae	Bilati-Dhonepata	Leaves	Use as salad, vegetable and flavouring agent of curries.
18	<i>Carissa carandas</i> L.	Apocynaceae	Karamcha	Fruits	Eaten as raw and commonly uses in curries and chutney preparation.
19	<i>Rauvolfia serpentina</i> (L.) Benth. ex Kurz	Apocynaceae	Sarpgandha	Tap root system	Use as local medicinal practice, Root extract used to treat fever.
20	<i>Holarrhena pubescens</i> Wall. ex G. Don	Apocynaceae	Kurchi	Leaves	Raw paste of leaves use as gastro-intestinal and anti-diarrhoic supplement.
21	<i>Alstonia scholaris</i> (L.) R. Br.	Apocynaceae	Chatim	Bark, leaves	Bark extract used to treat intestinal worm, bark juice used to treat fever and leaves use against pain.
22	<i>Calotropis procera</i> (Aiton) Dryand.	Apocynaceae	Akanda	Leaves, latex	Leaves are used to treat in pain relief, rheumatism and cuts; latex is used in dog bite .
23	<i>Typhonium trilobatum</i> (L.) Schott	Araceae	Ghetkachu	Leaves with Petioles	Cooked as vegetable
24	<i>Xanthosoma sagittifolium</i> (L.) Schott	Araceae	Sujikachu/ Dudhkachu	Corm, leaves	Use as vegetable and different cookeries.
25	<i>Amorphophallus paeoniifolius</i> (Dennst.) Nicolson	Araceae	Ool	Corm	Use as vegetable and different cookeries.

26	<i>Colocasia esculenta</i> (L.) Schott	Araceae	kachu	Corm, Leaves with petiole	Corm, leaves and petiole use as vegetable and different cookerries.
27	<i>Alocasia macrorrhiza</i> (L.) G. Don	Araceae	Man-kachu	Leaves with petiole	Use as cooked vegetable.
28	<i>Lasia spinosa</i> (L.) Thwaites	Araceae	Kanta-Kachu	Leaves with petiole	Use as cooked vegetable.
29	<i>Borassus flabellifer</i> L.	Areaceae	Tal	Fruits, Leaves, Watery latex	Ripen fruits are used as raw and different cooking purposes; watery latex of tree trunk use as making of sugar-cake. Leaves use as hand-made fan, shading of house-roof; tree-trunk use as different household purposes.
30	<i>Phoenix sylvestris</i> (L.) Roxb.	Areaceae	Khejur	Fruits, Leaves, Watery latex	Ripen fruits are eaten as raw; watery latex of tree trunk use as making of sugar-cake.
31	<i>Cocos nucifera</i> L.	Areaceae	Narkol/Coconut	Seeds, Fibrous part of fruit, leaves and tree-trunk	Fruit fibre use in rope making; seed kernel use for making handcraft items; endosperm of seed is edible; dried leaves veins are used as broom and tree-trunk use for making of roof/ceiling of huts.
32	<i>Areca catechu</i> L.	Areaceae	Supari/Betel nut	Seeds, tree-trunk	Use as mouth-freshener; tree-trunk use for making of roof/ceiling of huts.
33	<i>Yucca</i> sp.	Asparagaceae	Yucca plant	Piece of stem with leaves, solid stem	Decorating and fencing purposes.
34	<i>Chromolaena odorata</i> (L.) R.M.King & H.Rob.	Asteraceae	Asamlata (Oraon, Munda); Tetram phang (Rava)	Leaves	Fresh leaf juice externally applied to cuts and wounds to stop bleeding.
35	<i>Enhydra fluctuans</i> Lour.	Asteraceae	Helench	Tender shoot, Leaves	Use as cooked vegetable.
36	<i>Eclipta prostrata</i> (L.) L.	Asteraceae	Keshutpata/Bhringraj	Leaves	Natural Hair colour and use against skin diseases.
37	<i>Acmella paniculata</i> (Wall. ex DC.) R.K.Jansen	Asteraceae	Rasun/Usni sag (Oraon); Harerphang (Rava)	Tender shoot, Leaves	Cooked as vegetable.
38	<i>Ageratum conyzoides</i> (L.) L.	Asteraceae	Uchanti; Bhusuripata (Oraon); Elame (Nepali)	Young leaves	Use to treat for cut.
39	<i>Mikania micrantha</i> Kunth	Asteraceae	Taralata, Josuralata; Mekanilata (Nepali)	Young leaves	Leaf sap prevents bleeding.
40	<i>Glebionis coronaria</i> (L.) Cass. ex Spach	Asteraceae	Babrisak	Leaves with tender shoot	Use as cooked vegetable.
41	<i>Diplazium esculentum</i> (Retz.) Sw.	Athyriaceae	Dhekisak	Tender shoot, Leaves	Use as cooked vegetable.
42	<i>Basella alba</i> L.	Basellaceae	PuiSak	Tender shoot and leaves	Use as cooked vegetable.
43	<i>Heliotropium indicum</i> L.	Boraginaceae	Hatisur; Nimplosuntiphang (Rava)	Root	Root sap is used in eye treatment.
44	<i>Brassica juncea</i> (L.) Czern.	Brassicaceae	Raisak	Leaves	Use as cooked vegetable.

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45	<i>Tamarindus indica</i> L.	Caesalpiniaceae	Tetul	Fruits	Eaten as raw and commonly uses in curries and chutney preparation.
46	<i>Senna sophera</i> L.	Caesalpiniaceae	Kalkasunda	Young leaves	Cook in curry.
47	<i>Senna tora</i> (L.) Roxb.	Caesalpiniaceae	Chekenda	Tender shoot, Leaves	Use as cooked vegetable.
48	<i>Cannabis sativa</i> L.	Cannabaceae	Vangpata	Leaves	Simulative, refreshness and pain killer.
49	<i>Carica papaya</i> L.	Caricaceae	Pepe/Papaya	Fruits, leaves	Eaten as cooked vegetable, gastritis medicine; leaves juice use in blood formation.
50	<i>Drymaria cordata</i> (L.) Willd. ex Schult.	Caryophyllaceae	Chimjera (Dukpa); Niltos	Leaves and whole plant	Leaves and whole plant used to treat Cough and cold, and pain.
51	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Combretaceae	Bahera	Fruits	Dried fruits use to treat against dyspepsia and Also use in serious gastritis problems.
52	<i>Terminalia chebula</i> Retz.	Combretaceae	Haritaki	Fruits, Seeds	Fruits and seeds are use against different gastritis, stomach disorder and Hindu puja purposes.
53	<i>Terminalia arjuna</i> (Roxb. ex DC.) Wight & Arn.	Combretaceae	Arjun tree	Bark	Bark decoction taken in empty stomach to treat cardiac trouble.
54	<i>Commelina benghalensis</i> L.	Commelinaceae	Kanchirasak	Tender shoot, Leaves	Use as cooked vegetable.
55	<i>Commelina diffusa</i> Burm.f.	Commelinaceae	Baspatarisak	Leaves	Use as cooked vegetable.
56	<i>Ipomoea batatas</i> (L.) Lam.	Convolvulaceae	MistiAalu/Rang alu/ShakAalu	Root tuber	Eaten as raw, Use as vegetable and different cookerries and sweets.
57	<i>Ipomoea aquatica</i> Forssk.	Convolvulaceae	Kolmisak	Tender shoot, Leaves	Use as cooked vegetable.
58	<i>Cheilocostus speciosus</i> (J.Koenig) C.D.Specht	Costaceae	Keu; Betlahari and Debkewa (Nepali)	Rhizome	Rhizome used to treat stomach problem, blood in urine, diabetes.
59	<i>Sechium edule</i> (Jacq.) Sw.	Cucurbitaceae	Squash/ Iskush	Fruits, Underground Rhizome, tender shoot	Eaten as cooked vegetable; rhizome Use as vegetable and different cookerries; tender shoot use in curry.
60	<i>Coccinia grandis</i> (L.) Voigt	Cucurbitaceae	Telakucha	Fruits	Young fruits use as vegetable and ripe fruits eaten as raw by birds.
61	<i>Luffa cylindrica</i> (L.) M.Roem.	Cucurbitaceae	Dhundhul / Khosafal	Unripe Fruits, Dried fruits	Young fruits use as vegetable and dried inner part of fruit use as body and dish cleanser.
62	<i>Momordica dioica</i> Roxb. ex Willd.	Cucurbitaceae	JangliKakrol	Fruits	Eaten as cooked vegetable.
63	<i>Tricosanthus cucumerina</i> L.	Cucurbitaceae	Banpatal	Unripe fruits	Eaten as cooked vegetable.
64	<i>Momordica balsamina</i> L.	Cucurbitaceae	Uchhe	Fruits	Eaten as cooked vegetable; anti-wormic and anti-diabetic.
65	<i>Benincasa hispida</i> (Thunb.) Cong.	Cucurbitaceae	Chalkumro	Young fruits	Young Fruits use as cooked vegetable.
66	<i>Dillenia indica</i> L.	Dilleniaceae	Chalta	Fruits	Eaten as raw and also uses in prickle and chutney preparation.
67	<i>Dioscorea alata</i> L.	Dioscoreaceae	Kham Aalu/ Chupri Aalu	Underground-Rhizome	Use as vegetable and different cookerries.
68	<i>Dioscorea bulbifera</i> L.	Dioscoreaceae	Banalu/Chamalu /Methealoo / Gachhalu	Underground-Rhizome	Use as vegetable and different cookerries.
69	<i>Dillenia pentagyna</i> Roxb.	Dilleniaceae	Tatari	Leaves	Use as fodder for cattle/ elephant.
70	<i>Shorea robusta</i> Gaertn. F.	Dipterocarpaceae	Sal	Dried leaves	Use for preparation of plate and local smoking raw materials.

71	<i>Diospyros malabarica</i> (Desr.) Kostel.	Ebenaceae	Gab	Fruits	Mature fruit eaten as raw.
72	<i>Elaeocarpus floribundus</i> Blume	Elaeocarpaceae	Jalpai	Fruits	Eaten as raw and commonly uses in prickle and chutney preparation.
73	<i>Elaeocarpus ganitrus</i> Roxb. ex G.Don	Elaeocarpaceae	Rudraksha	Seeds	Use as mala and different ornamental things.
74	<i>Ricinus communis</i> L.	Euphorbiaceae	Reri	Seeds	Seed oil is used as pain killer .
75	<i>Jatropha gossypifolia</i> L.	Euphorbiaceae	Labharanda	Latex and seeds	Seeds oil use to cure various skin diseases and also use as haemostatic agent.
76	<i>Flacourtia indica</i> (Burm. f.) Merr.	Flacourtiaceae	Baichi	Fruits	Fruit eaten as raw or cooked.
77	<i>Sesbania grandiflora</i> (L.) Pers.	Fabaceae	Bok phul	Flowers	Eaten as cooked vegetable.
78	<i>Pachyrhizus erosus</i> (L.) Urb.	Fabaceae	Keshoralu	Root tuber	Eaten as raw vegetable and uses in preparation of different cooked vegetable.
79	<i>Butea monosperma</i> (La m.) Taub.	Fabaceae	Palashphul	Flowers	Use for making natural colour and in Hindu puja purposes.
80	<i>Aeschynomene aspera</i> L.	Fabaceae	Shola	Hollow stem	Preparation of different ornamental purposes.
81	<i>Ottelia alismoides</i> (L.) Pers.	Hydrocharitaceae	Panikola	Seeds	Eaten raw by Children.
82	<i>Vitex negundo</i> L.	Lamiaceae	Nishindra	Leaves	Leaves are used in curry; extract of leaves used against whitening of hair and memory loss.
83	<i>Leucas aspera</i> (Willd.) Link	Lamiaceae	Danda-kalas	Tender shoot, Leaves	Use as cooked vegetable.
84	<i>Ocimum sanctum</i> L.	Lamiaceae	Tulsi	Leaves	Raw paste of leaves is use against cold and cough.
85	<i>Ocimum americanum</i> L.	Lamiaceae	Bon-Tulsi	Leaves	Raw paste of leaves is use against cold and cough.
86	<i>Cinnamomum tamala</i> (Ham.) Nees & Eberm.	Lauraceae	Tejpata	Leaves	Leaves are use as spice and flavouring agent and use against cold and cough.
87	<i>Lathyrus sativus</i> L.	Leguminosae	Khesarisak	Young leaves, seeds	Young leaves are used as vegetable and seeds are used as dal.
88	<i>Asparagus racemosus</i> Willdenow.	Liliaceae	Satamul; Kaisalgo (Oraon); Kuriol (Nepali)	Root	Root is used against stomach disorder.
89	<i>Lawsonia inermis</i> L.	Lythraceae	Henna pata	Leaves	Decoction of leaves use as hand-print/ Mehendi, hair colouring agent.
90	<i>Trapa natans</i> L.	Lythraceae	JalSingara	Fruits	Eaten as raw.
91	<i>Corchorus aestuans</i> L.	Malvaceae	Desi pat pata	Leaves	Use as cooked vegetable.
92	<i>Corchorus capsularis</i> L.	Malvaceae	Pat	Leaves, fibre	Use as cooked vegetable; fibre use for making rope and different handcraft materials.
93	<i>Corchorus olitorius</i> L.	Malvaceae	Tita Pat	Leaves, fibre	Use as cooked vegetable; fibre use for making rope and different handcraft materials.
94	<i>Hibiscus rosa-sinensis</i> L.	Malvaceae	Jaba	Leaves	Leaves used to treat burning sensation, fatigue, skin diseases
95	<i>Malva verticillata</i> L.	Malvaceae	Laffa	Leaves	Use as cooked vegetable.
96	<i>Marsilea quadrifolia</i> L.	Marsileaceae	Sushnisak	Leaves	Use as cooked vegetable.
97	<i>Lansium parasiticum</i> (Osbeck) Sahni & Bennet	Meliaceae	Lotka	Fruits	Eaten as raw and commonly uses in curries and chutney preparation.
98	<i>Azadirachta indica</i> A. Juss.	Meliaceae	Neem	Leaves, Tender shoot	Use as cooked vegetable; Raw paste use against different skin diseases and young twig use as a good toothache.
99	<i>Tinospora sinensis</i> (Lour.) Merr.	Menispermaceae	Gulanha	Stem	Stem sap used against acidity and helminthic infection.

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100	<i>Glinus oppositifolius</i> (L.) Aug. DC.	Molluginaceae	Gimasak	Tender shoot	Use as cooked vegetable.
101	<i>Ficus hispida</i> L.f.	Moraceae	JangliDumur / Khoksa	Unripe Fruits	Eaten as cooked vegetable, Fried fruit reduce blood sugar level.
102	<i>Artocarpus heterophyllus</i> Lam.	Moraceae	Kanthal	Fruits, seeds, Leaves	Young fruits use as vegetable and ripe fruits eaten as raw, leaves are used for cattle.
103	<i>Ficus racemosa</i> L.	Moraceae	Jag-Dumur	Unripe Fruits	Eaten as cooked vegetable, Fried fruit reduce blood sugar level.
104	<i>Artocarpus lacucha</i> Buch.-Ham.	Moraceae	Deua	Fruits	Eaten as raw and commonly uses in curries and chutney preparation.
105	<i>Ficus rumphii</i> Blume.	Moraceae	Dumur	Unripe Fruits	Cook as vegetable.
106	<i>Moringa oleifera</i> Lam.	Moringaceae	Sajina	Fruits, leaves, Flowers	Leaves juice taken as high blood pressure remedy; fruit and flowers Eaten as cooked vegetable.
107	<i>Musa balbisiana</i> Colla	Musaceae	Bicha kola	Fruits, Inflorescence, Inner solid part of stem	Ripe Fruits eaten as raw; Young fruits and inflorescence eaten as cooked vegetable; leaves are used as tray/plate; Inner solid part of stem uses as cooked vegetable.
108	<i>Syzygium fruticosum</i> (Roxb.) DC.	Myrtaceae	Khudi jam	Fruits	Eaten as raw, blood purifier.
109	<i>Syzygium cumini</i> (L.) Skeels	Myrtaceae	Jam	Fruits	Eaten as raw, blood purifier.
110	<i>Psidium guajava</i> L.	Myrtaceae	Peyara	Fruits, Young twig, Leaves	Ripe fruits use as raw; leaves use effective in stomach problems; leaves and young twig use also toothache.
111	<i>Syzygium samarangense</i> (Blume) Merr. & L.M.Perry	Myrtaceae	White Jamrul	Fruits	Eaten as raw.
112	<i>Nelumbo nucifera</i> Gaertn.	Nelumbonaceae	Padda/Lotus	Leaves, fleshy thalamus and seeds	Leaves are use as plate to serve food; seeds are eaten as raw and vegetable.
113	<i>Nephrolepis cordifolia</i> (L.) C. Presl	Nephrolepidaceae	Fern	Leaves	Decorating and ornamental purposes.
114	<i>Boerhavia diffusa</i> L.	Nyctaginaceae	Punarnaba	Tender shoot, Leaves	Use as cooked vegetable.
115	<i>Nymphaea pubescens</i> Willd.	Nymphaeaceae	Dhaap/Saluk	Petioles and seeds	Petioles use as vegetable and fried seeds are used as dry food.
116	<i>Nymphaea rubra</i> Roxb. ex Andrews	Nymphaeaceae	Saluk	Petioles	Use as cooked vegetable.
117	<i>Nymphaea nouchali</i> Burm.f.	Nymphaeaceae	Sapla	Petioles	Preparation of curry
118	<i>Nyctanthes arbor-tristis</i> L.	oleaceae	sheuli	Leaves, flowers	Leaves juice effective against worm and stomach disorder.
119	<i>Helminthostachya zeylanica</i> Hook.	Ophioglossaceae	Dinshabalindo (Meich); Nagdhup(Rava)	Rhizome	Rhizome used to treat jaundice
120	<i>Papilionanthe teres</i> (Roxb.) Schltr.	Orchidaceae	Orchid	Flowers	Decorating purposes.
121	<i>Vanda tessellata</i> (Roxb.) Hook. ex G.Don	Orchidaceae	Orchid	Flowers	Decorating purposes.
122	<i>Averrhoa carambola</i> L.	Oxalidaceae	Kamranga	Fruits	Eaten as raw and commonly uses in curries and chutney preparation.
123	<i>Oxalis corniculata</i> L.	Oxalidaceae	Amrulpata	Leaves	Use as cooked vegetable; natural cleansing agent of kitchen appliances.
124	<i>Phyllanthus niruri</i> L.	Phyllanthaceae	BhuiAmla	Tender shoot, Leaves	Raw paste of leaves use as gastro-intestinal problems.

125	<i>Phyllanthus emblica</i> L.	Phyllanthaceae	Amlaki	Fruits	Paste of ripe fruit given to children to treat diarrhoea. Unripe fruit taken as cooling agent and Laxative. Fresh fruit and root paste use to treat jaundice. Seed paste used to treat eye inflammation.
126	<i>Bacopa monnieri</i> (L.) Pennell	Plantaginaceae	Brahmii sag	Tender shoot, Leaves	Use as cooked vegetable; Raw paste use as memorizing tonic supplement.
127	<i>Cynodon dactylon</i> (L.) Pers.	Poaceae	Durbaghas	Leaves	Use as cooked vegetable.
128	<i>Piper longum</i> L.	Piperaceae	Jangli Pan	Leaves	Eaten raw as condiment/ mouth refreshers.
129	<i>Piper nigrum</i> L.	Piperaceae	Gol -Marich	Fruits	Dried fruits use as spice, cough-cold remedy, anti-gastritis.
130	<i>Bambusa tulda</i> Roxb.	Poaceae	Banse	Tender shoot, mature stem	Cooked as curry and prickle preparation; Furniture, Construction material and different ornamental things.
131	<i>Bambusa balcooa</i> Roxb.	Poaceae	Banse	Tender shoot, mature stem	Young twig is used as vegetable and pickle preparation; Furniture, Construction material and different ornamental things.
132	<i>Cymbopogon citrates</i> (DC.) Stapf	Poaceae	Citronella	Petiole	Use as insect repellent and natural perfumery agent.
133	<i>Thysanolaena latifolia</i> (Roxb. ex Hornem.) Honda	Poaceae	Broom/ Jhadu plant	Inflorescence	Inflorescence/ Flowering panicles are used to make light dust brooms.
134	<i>Rumex maritima</i> L.	Polygonaceae	Ban palang	Tender shoot	Use as cooked vegetable.
135	<i>Portulaca oleracea</i> L.	Portulacaceae	Nuniasak/ Baralaynia	Tender shoot	Use as cooked vegetable.
136	<i>Ziziphus mauritiana</i> Lam.	Rhamnaceae	Kul	Fruits, Seeds	Eaten as raw and commonly uses in curries and chutney; dried powder of seeds use as savoury.
137	<i>Ziziphus oenoplia</i> (L.) Mill.	Rhamnaceae	Bon kul	Fruits, Seeds	Eaten as raw and commonly uses in curries and chutney preparation.
138	<i>Duchesnea chrysantha</i> (Zoll. and Moritzi) Miq.	Rosaceae	Jangli Strawberry	Mature fruits	Eaten as raw.
139	<i>Paederia foetida</i> L.	Rubiaceae	Gandhovadal, padalipata	Leaves	Use as cooked vegetable; Raw paste use as gastro-intestinal and anti-diarrhoic supplement.
140	<i>Neolamarckia cadamba</i> (Roxb.) Bosser.	Rubiaceae	Kadam	Flower	Cooked as vegetable and uses in different ornamental purposes.
141	<i>Limonia acidissima</i> L.	Rutaceae	Kath bel	Fruits	Eaten as raw and commonly uses in curries and chutney preparation.
142	<i>Citrus sinensis</i> (L.)	Rutaceae	Kamala lebu, Orange	Fruits, Leaves	Ripe fruits use as raw, leaves uses as flavouring/perfumery agents.
143	<i>Citrus maxima</i> Merr.	Rutaceae	Batabi, Jambura	Fruits, Leaves	Ripe fruits use as raw, leaves uses as flavouring/perfumery agents.
144	<i>Citrus aurantiifolia</i> (Christm.) Swingle	Rutaceae	Kaghzilebu	Fruits	Ripe fruits use as raw, anti-gastritis.
145	<i>Aegle marmelos</i> (L.) Corrêa	Rutaceae	Bel	Fruits, Leaves	Fruit pulp eaten as raw, juice; fruits are useful in Gastrointestinal problems; Leaves use as Hindu Puja/ritual purpose.
146	<i>Murraya koenigii</i> (L.) Spr.	Rutaceae	Curry pata	Leaves	Use as flavouring agent in different cooking items; Use as cooked vegetable.
147	<i>Glycosmis pentaphylla</i> (Retz.) DC.	Rutaceae	Ashshewra	Tender shoot	Use as toothache.
148	<i>Cardiospermum halicacabum</i> L.	Sapindaceae	Lataphatkari; Sibjhul; Bhado (Rajbanshi)	Leaves	Leaves used to treat snake bite.

149	<i>Mimusops elengi</i> L.	Sapotaceae	Bakul	Ripe Fruits	Eaten as raw.
150	<i>Houttuynia cordata</i> Thunb.	Saururaceae	Much-muchinda / Astapata	Tender shoot	Use as cooked vegetable and stomach disorder.
151	<i>Smilax zeylanica</i> L.	Smilacaceae	Kumarilata/Ramdatan	Root, Rhizome	Use for abscesses, boils, swellings and rheumatism and also for Dyosgenin.
152	<i>Solanum nigrum</i> L.	Solanaceae	Kakmachi	Leaves	Use as cooked vegetable.
153	<i>Melochia corchorifolia</i> L.	Sterculiaceae	-----	Leaves	Use as cooked vegetable.
154	<i>Physalis minima</i> L.	Solanaceae	Bantipariya	Leaves	Cooked as vegetable.
155	<i>Solanum lycopersicum</i> L.	Solanaceae	Tomato	Ripe fruits	Eaten as raw in salad and commonly uses in curries and chutney preparation.
156	<i>Cissus quadrangularis</i> L.	Vitaceae	Harjora	Stem	Stem extract is used to treat broken bone
157	<i>Zingiber officinale</i> Roscoe	Zingiberaceae	Aada	Rhizome	Rhizome paste use to treat in cough-cold and stimulant and also use as spice.
158	<i>Curcuma amada</i> Roxb.	Zingiberaceae	Aam-Ada	Rhizome	Rhizome paste use in appetizer, stomachic, carminative, stomatitis, bronchitis.
159	<i>Curcuma longa</i> L.	Zingiberaceae	Holud	Rhizome	Rhizome paste is applied to treat skin diseases, bone fracture and inflammation and spice.
160	<i>Curcuma caesia</i> Roxb.	Zingiberaceae	Bon-Holud/ Kaloholud	Rhizome	Rhizome paste is applied to treat skin diseases, bone fracture and inflammation.
161	<i>Amomum subulatum</i> Roxb.	Zingiberaceae	Large cardamom	Fruits, Seeds	Use as spice.

Table 2: Source and commercial information of NTFPs

Sr. No.	Name of the plant	Purpose	Demand in market	Supply in market	Alternative source	Sells rate (Rs.)
1	<i>Hygrophila auriculata</i> (Schumach.) Heine	Edible/ Medicinal	Medium	Adequate	Non Commercially Cultivated	5-10/ 250 gm.
2	<i>Adhatoda vasica</i> Nees.	Medicinal	No Demand	Not Required	Non Commercially Cultivated	Collected locally
3	<i>Andrographis paniculata</i> (Burm.f.) Nees	Medicinal	Less	Adequate	Non Commercially Cultivated	Collected locally
4	<i>Thunbergia grandiflora</i> Roxb.	Medicinal	No Demand	Not Required	Only Wild	Collected locally
5	<i>Amaranthus spinosus</i> L.	Edible	Medium	Adequate	Only Wild	5-10/ 500 gm.
6	<i>Alternanthera philoxeroides</i> (Mart.) Griseb.	Edible	Less	Adequate	Only Wild	5/ 500 gm.
7	<i>Amaranthus tricolor</i> L.	Edible	Medium	Adequate	Commercially Cultivated	10/ 250 gm.
8	<i>Amaranthus viridis</i> L.	Edible	Less	Adequate	Only Wild	Collected locally
9	<i>Chenopodium album</i> L.	Edible	High	Adequate	Commercially Cultivated	5-10/250 gm.
10	<i>Celosia argentea</i> L.	Edible	Less	Adequate	Only Wild	Collected locally
11	<i>Achyranthes aspera</i> L.	Edible	No Demand	Not Required	Only Wild	Collected locally
12	<i>Spondias pinnata</i> (L. f.) Kurz	Edible	Medium	Adequate	Non-Commercially Cultivated	40-50/kg.
13	<i>Mangifera indica</i> L.	Edible	High	Adequate	Commercially Cultivated	30-50/kg.
14	<i>Annona reticulata</i> L.	Edible	High	Inadequate	Commercially Cultivated	80-120/kg.
15	<i>Annona squamosa</i> L.	Edible	High	Inadequate	Commercially Cultivated	80-120/kg.

16	<i>Centella asiatica</i> (L.) Urb.	Edible/ Medicinal	Medium	Adequate	Only Wild	Collected locally
17	<i>Eryngium foetidum</i> L.	Edible	Medium	Adequate	Non Commercially Cultivated	Collected locally
18	<i>Carissa carandas</i> L.	Edible	Occasionally Demand	Adequate	Commercially Cultivated	70-90/kg.
19	<i>Rauvolfia serpentina</i> (L.) Benth. ex Kurz	Medicinal	Less Demand	Adequate	Commercially Cultivated	Collected locally
20	<i>Holarrhena pubescens</i> Wall. ex G.Don	Medicinal	No Demand	Not Required	Non Commercially Cultivated	Collected locally
21	<i>Alstonia scholaris</i> (L.) R. Br.	Medicinal	No Demand	Not Required	Non Commercially Cultivated	Collected locally
22	<i>Calotropis procera</i> (Aiton) Dryand.	Medicinal	No Demand	Not Required	Only Wild	Collected locally
23	<i>Typhonium trilobatum</i> (L.) Schott	Edible	Medium	Adequate	Non Commercially Cultivated	20-25/kg.
24	<i>Xanthosoma sagittifolium</i> (L.) Schott	Edible	High	Adequate	Commercially Cultivated	40-60/kg.
25	<i>Amorphophallus paeoniifolius</i> (Dennst.) Nicolson	Edible	High	Inadequate	Commercially Cultivated	130-160/kg.
26	<i>Colocasia esculenta</i> (L.) Schott	Edible	High	Adequate	Non Commercially Cultivated	15-20/kg.
27	<i>Alocasia macrorrhiza</i> (L.) G. Don	Edible	Medium	Adequate	Non Commercially Cultivated	10-20/kg.
28	<i>Lasia spinosa</i> (L.) Thwaites	Edible	No Demand	Not Required	Only Wild	Collected locally
29	<i>Borassus flabellifer</i> L.	Edible	High	Inadequate	Commercially Cultivated	15-40/ Piece(fruit)
30	<i>Phoenix sylvestris</i> (L.) Roxb.	Edible	High	Inadequate	Commercially Cultivated	30-50/kg.
31	<i>Cocos nucifera</i> L.	Edible/ Ornamental	High	Adequate	Commercially Cultivated	25-40 (fruit); 20- 30 (tuft of midrib of leaves)
32	<i>Areca catechu</i> L.	Edible/ Ornamental	High	Adequate	Commercially Cultivated	170-250/kg.
33	<i>Yucca</i> sp.	Ornamental	Less	Adequate	Only Wild	Collected locally
34	<i>Chromolaena odorata</i> (L.) R.M.King & H.Rob.	Medicinal	No Demand	Not Required	Only Wild	Collected locally
35	<i>Enhydra fluctuans</i> Lour.	Edible	Medium	Adequate	Only Wild	Collected locally
36	<i>Eclipta prostrata</i> (L.) L.	Medicinal	Less	Adequate	Only Wild	Collected locally
37	<i>Acemella paniculata</i> (Wall. ex DC.) R.K.Jansen	Edible	Less	Adequate	Only Wild	Collected locally
38	<i>Ageratum conyzoides</i> (L.)L.	Medicinal	Less	Adequate	Only Wild	Collected locally
39	<i>Mikania micrantha</i> Kunth	Medicinal	No Demand	Not Required	Only Wild	Collected locally
40	<i>Glebionis coronaria</i> (L.) Cass. ex Spach	Edible	Medium	Adequate	Commercially Cultivated	5-10/250 gm.
41	<i>Diplazium esculentum</i> (Retz.) Sw.	Edible	High	Adequate	Only Wild	5-10/250 gm.
42	<i>Basella alba</i> L.	Edible	High	Adequate	Commercially Cultivated	5-10/250 gm.
43	<i>Heliotropium indicum</i> L.	Medicinal	Less	Adequate	Only Wild	Collected locally
44	<i>Brassica juncea</i> (L.) Czern.	Edible	Medium	Adequate	Commercially Cultivated	20/kg.

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45	<i>Tamarindus indica</i> L.	Edible/ Ornamental	High	Adequate	Commercially Cultivated	50-60/kg.
46	<i>Senna sophora</i> L.	Edible	No Demand	Not Required	Only Wild	Collected locally
47	<i>Senna tora</i> (L.) Roxb.	Edible	No Demand	Not Required	Only Wild	Collected locally
48	<i>Cannabis sativa</i> L.	Medicinal	Occasionall y Demand	Adequate	Only Wild	Collected locally
49	<i>Carica papaya</i> L.	Edible/ Medicinal	High	Adequate	Non Commercially Cultivated	20-40/kg.(fruit)
50	<i>Drymaria cordata</i> (L.) Willd. ex Schult.	Medicinal	No Demand	Not Required	Locally collected	Collected locally
51	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Medicinal	High	Adequate	Commercially Cultivated	5-10/Piece(fruit)
52	<i>Terminalia chebula</i> Retz.	Medicinal	High	Adequate	Commercially Cultivated	5-10/Piece(fruit)
53	<i>Terminalia arjuna</i> (Roxb. ex DC.) Wight & Arn.	Medicinal	High	Adequate	Commercially Cultivated	50-80/kg.
54	<i>Commelina benghalensis</i> L.	Edible	No Demand	Not Required	Only Wild	Collected locally
55	<i>Commelina diffusa</i> Burm.f.	Edible	No Demand	Not Required	Only Wild	Collected locally
56	<i>Ipomoea batatas</i> (L.) Lam.	Edible	Medium	Adequate	Only Wild	30-40/kg. (root)
57	<i>Ipomoea aquatica</i> Forssk.	Edible	High	Adequate	Only Wild	5-10/250 gm.
58	<i>Cheilocostus speciosus</i> (J.Koenig) C.D.Specht	Medicinal	No Demand	Not Required	Only Wild	Collected locally
59	<i>Sechium edule</i> (Jacq.) Sw.	Edible	High	Adequate	Commercially Cultivated	20-40/kg. (fruit); 80-90/kg. (Rhizome)
60	<i>Coccinia grandis</i> (L.) Voigt	Edible	High	Adequate	Only Wild	20-30/kg.
61	<i>Luffa cylindrica</i> (L.) M.Roem.	Edible	Medium	Adequate	Only Wild	20-25/kg(Young fruit); 5/ Piece (fiber of dry fruit)
62	<i>Momordica dioica</i> Roxb. ex Willd.	Edible	Medium	Adequate	Only Wild	20-35/kg
63	<i>Tricosanthus cucumerina</i> L.	Edible	Less	Inadequate	Only Wild	10-15/kg
64	<i>Momordica balsamina</i> L.	Edible/ Medicinal	High	Adequate	Commercially Cultivated	35-50/kg
65	<i>Benincasa hispida</i> (Thunb.) Cong.	Edible	High	Adequate	Commercially Cultivated	15-25/ piece
66	<i>Dillenia indica</i> L.	Edible	Medium	Adequate	Commercially Cultivated	5-10/ piece
67	<i>Dioscorea alata</i> L.	Edible/ Medicinal	Less	Inadequate	Only Wild	15-20/250 gm.
68	<i>Dioscorea bulbifera</i> L.	Edible/ Medicinal	Less	Inadequate	Only Wild	15-20/250 gm.
69	<i>Dillenia pentagyna</i> Roxb.	Edible	No Demand	Not Required	Only Wild	Collected locally
70	<i>Shorea robusta</i> Gaertn. F.	Ornamental	High	Adequate	Commercially Cultivated	10-20/ kg.
71	<i>Diospyros malabarica</i> (Desr.) Kostel.	Edible	Less	Adequate	Non Commercially Cultivated	Collected locally
72	<i>Elaeocarpus floribundus</i> Blume	Edible	High	Adequate	Non Commercially Cultivated	80/ kg.

73	<i>Elaeocarpus ganitrus</i> Roxb. ex G. Don	Ornamental	Medium	Adequate	Commercially Cultivated	10/ Piece
74	<i>Ricinus communis</i> L.	Medicinal	Less	Adequate	Only Wild	Collected locally
75	<i>Jatropha gossypifolia</i> L.	Medicinal	Less	Adequate	Non Commercially Cultivated	Collected locally
76	<i>Flacourtia indica</i> (Burm. f.) Merr.	Edible	Less	Adequate	Non Commercially Cultivated	Collected locally
77	<i>Sesbania grandiflora</i> (L.) Pers.	Edible	Medium	Adequate	Non Commercially Cultivated	60-100/ kg.
78	<i>Pachyrhizus erosus</i> (L.) Urb.	Edible	High	Adequate	Commercially Cultivated	40-60/ kg.
79	<i>Butea monosperma</i> (Lam.) Taub.	Ornamental	Medium	Less Adequate	Non Commercially Cultivated	5/ 250 gm.
80	<i>Aeschynomene aspera</i> L.	Ornamental	High	Inadequate	Non Commercially Cultivated	Collected locally
81	<i>Ottelia alismoides</i> (L.) Pers.	Edible	No Demand	Not Required	Only Wild	Collected locally
82	<i>Vitex negundo</i> L.	Edible/ Medicinal	No Demand	Not Required	Only Wild	Collected locally
83	<i>Leucas aspera</i> (Willd.) Link	Edible	Medium	Adequate	Only Wild	Collected locally
84	<i>Ocimum sanctum</i> L.	Medicinal	No Demand	Not Required	Non Commercially Cultivated	Collected locally
85	<i>Ocimum americanum</i> L.	Medicinal	No Demand	Not Required	Only Wild	Collected locally
86	<i>Cinnamomum tamala</i> (Ham.) Nees & Eberm.	Edible/ Medicinal	High	Adequate	Commercially Cultivated	5-10/ 100 gm.
87	<i>Lathyrus sativus</i> L.	Edible	Medium	Adequate	Commercially Cultivated	60-80/ kg.
88	<i>Asparagus racemosus</i> Willdenow.	Medicinal	Occasionally Demand	Adequate	Commercially Cultivated	10/100gm.
89	<i>Lawsonia inermis</i> L.	Ornamental	Occasionally Demand	Adequate	Commercially Cultivated	10/100gm.
90	<i>Trapa natans</i> L.	Edible	High	Adequate	Commercially Cultivated	40-80/ kg.
91	<i>Corchorus aestuans</i> L.	Edible	Occasionally Demand	Adequate	Only Wild	5-10/ 500 gm.
92	<i>Corchorus capsularis</i> L.	Edible/ Ornamental	High	Adequate	Commercially Cultivated	5-10/ 500 gm.
93	<i>Corchorus olitorius</i> L.	Edible	High	Adequate	Commercially Cultivated	5-10/ 500 gm.
94	<i>Hibiscus rosa-sinensis</i> L.	Medicinal	Less	Adequate	Non Commercially Cultivated	Collected locally
95	<i>Malva verticillata</i> L.	Edible	Medium	Adequate	Commercially Cultivated	10/ 500 gm.
96	<i>Marsilea quadrifolia</i> L.	Edible	Medium	Adequate	Non Commercially Cultivated	10/ 250 gm.
97	<i>Lansium parasiticum</i> (Osbeck) Sahni & Bennet	Edible	Occasionally Demand	Adequate	Non Commercially Cultivated	80-130/ kg.
98	<i>Azadirachta indica</i> A. Juss.	Edible/ Medicinal	Less	Adequate	Non Commercially Cultivated	10/ bunch
99	<i>Tinospora sinensis</i> (Lour.) Merr	Medicinal	Less	Adequate	Non Commercially Cultivated	Collected locally
100	<i>Glinus oppositifolius</i> (L.) Aug.	Edible	Medium	Adequate	Only Wild	10/ 250 gm.

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	DC.					
101	<i>Ficus hispida</i> L.f.	Edible/ Medicinal	Medium	Adequate	Only Wild	30-40/ kg.
102	<i>Artocarpus heterophyllus</i> Lam.	Edible	High	Adequate	Non Commercially Cultivated	25-40/ piece(fruit); 60-80/ kg.(seeds)
103	<i>Ficus racemosa</i> L.	Edible/ Medicinal	Medium	Adequate	Non Commercially Cultivated	30-40/ kg.
104	<i>Artocarpus lacucha</i> Buch.-Ham.	Edible	Less	Adequate	Only Wild	20/ kg.
105	<i>Ficus rumphii</i> Blume.	Edible	Medium	Adequate	Only Wild	30-40/ kg.
106	<i>Moringa oleifera</i> Lam.	Edible/ Medicinal	High	Adequate	Non Commercially Cultivated	50-200/ kg.(fruit)
107	<i>Musa balbisiana</i> Colla	Edible/ Ornamental	High	Adequate	Non Commercially Cultivated	5 piece(fruit), piece (fruit), 20-30/ piece (inflorescence), 5-10/ piece(solid stem)
108	<i>Syzygium fruticosum</i> (Roxb.) DC.	Edible/ Medicinal	No Demand	Not Required	Only Wild	Collected locally
109	<i>Syzygium cumini</i> (L.) Skeels	Edible/ Medicinal	High	Adequate	Non Commercially Cultivated	80-100/ kg.(fruit)
110	<i>Psidium guajava</i> L.	Edible/ Medicinal	High	Adequate	Non Commercially Cultivated	5-10/ piece
111	<i>Syzygium samarangense</i> (Blume) Merr. & L.M.Perry	Edible	High	Adequate	Non Commercially Cultivated	100-120/ kg.
112	<i>Nelumbo nucifera</i> Gaertn.	Edible/ Ornamental	Occasionally Demand	Adequate	Commercially Cultivated	10/ piece (flower)
113	<i>Nephrolepis cordifolia</i> (L.) C. Presl	Ornamental	High	Adequate	Only Wild	2/ piece (leaves)
114	<i>Boerhavia diffusa</i> L.	Edible	No Demand	Not Required	Only Wild	Collected locally
115	<i>Nymphaea pubescens</i> Willd.	Edible	Medium	Adequate	Only Wild	40/ 100 gm. (seeds), 10-15/ kg. (petiole and leaves)
116	<i>Nymphaea rubra</i> Roxb. ex Andrews	Edible	Medium	Adequate	Only Wild	10-15/ kg. (petiole and leaves)
117	<i>Nymphaea nouchali</i> Burm.f.	Edible	Medium	Adequate	Only Wild	10-15/ kg. (petiole and leaves)
118	<i>Nyctanthes arbor-tristis</i> L.	Edible/ Medicinal	No Demand	Not Required	Only Wild	Collected locally
119	<i>Helminthostachya zeylanica</i> Hook.	Medicinal	No Demand	Not Required	Only Wild	Collected locally
120	<i>Papilionanthe teres</i> (Roxb.) Schltr.	Ornamental	High	Adequate	Only Wild	20-30/ flower stock
121	<i>Vanda tessellata</i> (Roxb.) Hook. ex G.Don	Ornamental	Less	Adequate	Only Wild	Collected locally
122	<i>Averrhoa carambola</i> L.	Edible/ Medicinal	High	Adequate	Commercially Cultivated	50-100/ kg.
123	<i>Oxalis corniculata</i> L.	Medicinal	No Demand	Not Required	Only Wild	Collected locally
124	<i>Phyllanthus niruri</i> L.	Medicinal	No Demand	Not Required	Only Wild	Collected locally
125	<i>Phyllanthus emblica</i> L.	Edible/ Medicinal	High	Adequate	Commercially Cultivated	150-200/ kg.

126	<i>Bacopa monnieri</i> (L.) Pennell	Edible/ Medicinal	High	Adequate	Non Commercially Cultivated	10/ 100 gm.
127	<i>Cynodon dactylon</i> (L.) Pers.	Edible	No Demand	Not Required	Only Wild	Collected locally
128	<i>Piper longum</i> L.	Edible	High	Adequate	Commercially Cultivated	5-10/ 100gm.
129	<i>Piper nigrum</i> L.	Edible/ Medicinal	High	Adequate	Commercially Cultivated	500-600/ kg.
130	<i>Bambusa tulda</i> Roxb.	Edible/ Ornamental	High	Adequate	Commercially Cultivated	50-100/ piece
131	<i>Bambusa balcooa</i> Roxb.	Edible/ Ornamental	High	Adequate	Commercially Cultivated	50-100/ piece
132	<i>Cymbopogon citrates</i> (DC.) Stapf	Ornamental	No Demand	Not Required	Commercially Cultivated	Collected locally
133	<i>Thysanolaena latifolia</i> (Roxb. ex Hornem.) Honda	Ornamental	High	Adequate	Only Wild	25-40/ kg.
134	<i>Rumex maritime</i> L.	Edible	No Demand	Not Required	Only Wild	Collected locally
135	<i>Portulaca oleracea</i> L.	Edible	No Demand	Not Required	Only Wild	Collected locally
136	<i>Ziziphus mauritiana</i> Lam.	Edible	High	Adequate	Non Commercially Cultivated	40-50/ kg.
137	<i>Ziziphus oenoplia</i> (L.) Mill.	Edible	High	Adequate	Only Wild	50-60/ kg.
138	<i>Duchesnea chrysantha</i> (Zoll.and Moritzi) Miq.	Edible	No Demand	Not Required	Only Wild	Collected locally
139	<i>Paederia foetida</i> L.	Edible/ Medicinal	Medium	Adequate	Non Commercially Cultivated	10/ 250gm.
140	<i>Neolamarckia cadamba</i> (Roxb.) Bosser.	Edible/ Ornamental	No Demand	Not Required	Non Commercially Cultivated	Collected locally
141	<i>Limonia acidissima</i> L.	Edible	High	Adequate	Non Commercially Cultivated	5-15/ piece
142	<i>Citrus sinensis</i> (L.)	Edible	High	Adequate	Commercially Cultivated	1-5/ piece
143	<i>Citrus maxima</i> Merr.	Edible	Medium	Adequate	Non Commercially Cultivated	5-10/ piece
144	<i>Citrus aurantiifolia</i> (Christm.) Swingle	Edible/ Medicinal	Medium	Adequate	Commercially Cultivated	2-5/ piece
145	<i>Aegle marmelos</i> (L.) Corrêa	Edible/ Medicinal	High	Adequate	Non Commercially Cultivated	5-10/ piece
146	<i>Murraya koenigii</i> (L.) Spr.	Edible	Less	Adequate	Non Commercially Cultivated	Collected locally
147	<i>Glycosmis pentaphylla</i> (Retz.) DC.	Medicinal	No Demand	Not Required	Only Wild	Collected locally
148	<i>Cardiospermum halicacabum</i> L.	Medicinal	No Demand	Not Required	Only Wild	Collected locally
149	<i>Mimusops elengi</i> L.	Edible	No Demand	Not Required	Non Commercially Cultivated	Collected locally
150	<i>Houttuynia cordata</i> Thunb.	Edible	No Demand	Not Required	Only Wild	Collected locally
151	<i>Smilax zeylanica</i> L.	Medicinal	No Demand	Not Required	Only Wild	Collected locally
152	<i>Solanum nigrum</i> L.	Edible	Less	Adequate	Only Wild	Collected locally
153	<i>Melochia corchorifolia</i> L.	Edible	No Demand	Not	Only Wild	Collected locally

				Required		
154	<i>Physalis minima</i> L.	Edible	No Demand	Not Required	Only Wild	Collected locally
155	<i>Solanum lycopersicum</i> L.	Edible	High	Adequate	Commercially Cultivated	20-100/ kg.
156	<i>Cissus quadrangularis</i> L.	Medicinal	Less	Adequate	Only Wild	50-80/ kg.
157	<i>Zingiber officinale</i> Roscoe	Edible/ Medicinal	High	Adequate	Commercially Cultivated	80-160/ kg.
158	<i>Curcuma amada</i> Roxb.	Medicinal	Less	Adequate	Only Wild	20-30/ kg.
159	<i>Curcuma longa</i> L.	Edible/ Medicinal	High	Adequate	Commercially Cultivated	100-150/ kg.
160	<i>Curcuma caesia</i> Roxb.	Medicinal	Less	Adequate	Only Wild	20-30/ kg.
161	<i>Amomum subulatum</i> Roxb.	Edible	High	Inadequate	Commercially Cultivated	500/ kg.

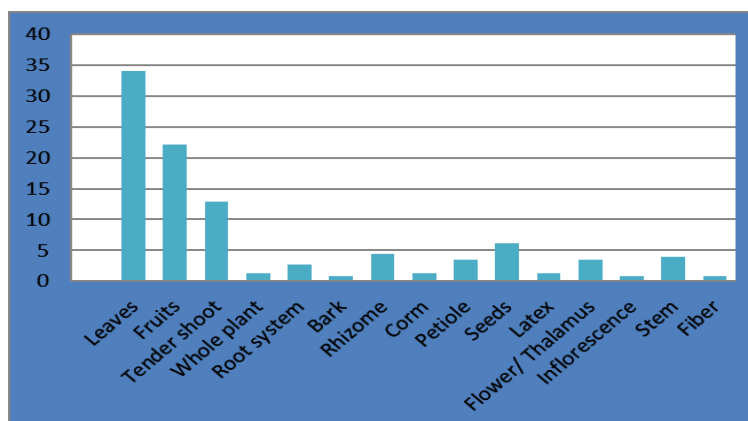
Table 3: Status of Species under each Family.

SL. NO.	FAMILY	NO. OF SPECIES
1	ACANTHACEAE	4
2	AMARANTHACEAE	7
3	ANACARDIACEAE	2
4	ANNONACEAE	2
5	APIACEAE	2
6	APOCYNACEAE	5
7	ARACEAE	6
8	ARECACEAE	4
9	ASPARAGACEAE	1
10	ASTERACEAE	7
11	ATHYRIACEAE (FERN)	1
12	BASELLACEAE	1
13	BORAGINACEAE	1
14	BRASSICACEAE	1
15	CAESALPINIACEAE	3
16	CANNABACEAE	1
17	CARICACEAE	1
18	CARYOPHYLLACEAE	1
19	COMBRETACEAE	3
20	COMMELINACEAE	2
21	CONVOLVULACEAE	2
22	COSTACEAE	1
23	CUCURBITACEAE	7
24	DILLENIACEAE	2
25	DIOSCOREACEAE	2
26	DIPTEROCARPACEAE	1
27	EBENACEAE	1
28	ELAEOCARPACEAE	2
29	EUPHORBIACEAE	2
30	FLACOURTIACEAE	1
31	FABACEAE	4
32	HYDROCHARITACEAE	1
33	LAMIACEAE	4
34	LAURACEAE	1
35	LEGUMINOSAE	1
36	LILIACEAE	1

SL. NO.	FAMILY	NO. OF SPECIES
37	LYTHRACEAE	2
38	MALVACEAE	5
39	MARSILEACEAE (FERN)	1
40	MELIACEAE	2
41	MENISPERMACEAE	1
42	MOLLUGINACEAE	1
43	MORACEAE	5
44	MORINGACEAE	1
45	MUSACEAE	1
46	MYRTACEAE	4
47	NELUMBONACEAE	1
48	NEPHROLEPIDACEAE (FERN)	1
49	NYCTAGINACEAE	1
50	NYMPHAEACEAE	3
51	OLEACEAE	1
52	OPHIOGLOSSACEAE (FERN)	1
53	ORCHIDACEAE	2
54	OXALIDACEAE	2
55	PHYLLANTHACEAE	2
56	PIPERACEAE	2
57	PLANTAGINACEAE	1
58	POACEAE	5
59	POLYGONACEAE	1
60	PORTULACACEAE	1
61	RHAMNACEAE	2
62	ROSACEAE	1
63	RUBIACEAE	2
64	RUTACEAE	7
65	SAPINDACEAE	1
66	SAPOTACEAE	1
67	SAURURACEAE	1
68	SMILACACEAE	1
69	SOLANACEAE	3
70	STERCULIACEAE	1
71	VITACEAE	1
72	ZINGIBERACEAE	5



Fig2. Status of Dicot, Monocot and Fern



Graph1: Numerical classification of Plant parts used as NTFP in the Forest patches and adjoining area of Jalpaiguri forest division.

CONCLUSION

The current study indicates that NTFPs have a great socio-economic significance because of their food and medicinal values. The presented inventory also reveal that many NTFPs of the studied area are not properly marketized. Proper commercialization of such products will be most effective for the development of forest adjacent people. However mass attention is needed to protect the biodiversity. Though the people never take off the whole plant but sometimes they collect all fruits or reproductive parts due to lack of proper scientific knowledge of plant regeneration. Awareness-cum-trainings camps, Workshop of Plantation and Biodiversity based programmes needs to be organized, for effective implementation and execution of the sustainable management of NTFPs. In this way the traditional knowledge of the forest fringe area is also incorporated in the mainstream scientific research. For example the chemical analysis of edible and medicinal NTFPs will provide nutritional and phytochemical profiles that could be useful for assessing the health benefits of such foods and medicines.

Care should also taken about the balanced use of forest products. Evolving participatory strategies for multiplication and domestication of the economically valuable species can contribute to conservation of these plant in the forest and adjacent area. Only a balanced interaction between the people and forest ecosystem can implement the success of conservation and sustainable management of NTFPs.

Conflicts of interest: Not declared

REFERENCES

- Ahenkan A. and Boon, EK (2008) Enhancing Food Security and Poverty Reduction in Ghana through Non-timber Forest Products Farming: Case Study of Sefwi Wiawso District". GRIN Publishers, Munich.
- Ahenkan A and Boon E (2011) Non-Timber Forest Products (NTFPs): Clearing the confusion in semantics. *Journal of Human Ecology*, 33(1): 1-9.
- Ali I and Das I (2003) Tribal Situation in North-East India *Studies of Tribes and Tribals* 1(2),141-148.
- Bhattacharya P and Hayat SF (2003) Sustainable NTFP Management for Livelihood and Income Generation of Tribal Communities: A Case from Madhya Pradesh, India, in *Proceedings of Workshop on Policies, Management, Utilization and Conservation of Non-Timber Forest Products (NTFP) in the South Asia Region*. Bangalore: Ashoka Trust for Research in Ecology and the Environment.
- Daya Y and Vinj N (2006) Protecting traditional ethnobotanical knowledge in South Africa through the intellectual property regime, *Agrekon*, 45(3) 319-338.
- FAO (1995) Non-wood forest products for rural income and sustainable forestry. *Non-Wood Forest Products* 7, Rome, Italy.
- Hajra PK and Boissya AK (1980) *Ethnobotanical notes on Miris (Missings) of Assam plain*; Jain S K: *Glimpses of Indian ethno botany*: Oxford and IBH Publishers, New Delhi. 161-169.
- Islam MA, Quli SMS, Rai R and Sofi PA (2013) Livelihood contributions of forest resources to the tribal communities of Jharkhand. *Indian Journal of Fundamental and Applied Life Sciences*,3(2),131-144.
- Islam MA, Quli SMS, Rai R and Ali A (2014) Exploration of variables predicting livelihood assets status of tribal communities subsisting in forests of Jharkhand, India. *Journal of Human Ecology*,47(3), 241-249.
- John Kennedy SM (2006) Commercial non timber forest products collected by the tribals in the Palani hills. *Indian Journal of Traditional Knowledge*. 5920: 212-216.
- Kalita P, Deka S, Saharia BJ, Chakraborty A, Basak M, Deka MK (2014) An overview and future scope on traditionally used herbal plants of Assam having Antidiabetic activity. *IJAPBC*. 3(2):2277-4688.

- Mahapatra AK and Tewari DD (2005) Importance of non-timber forest products in the economic valuation of dry deciduous forests of India. *Forest Policy and Economics*, 7(3), 455-467.
- Mathur RB and Shiva MP (1996) Standard NTFP classification and documentation manual. Dehra Dun: Khanna Bandhu.
- Olaniyi OA, Akintonde JO and Adetumbi SI (2013) Contribution of Non-Timber Forest Products to household food security among rural women in Iseyin local government area of Oyo state, Nigeria. *Research on Humanities and Social Sciences*, 3(7), 41-50.
- Parabia M and Reddy MN (2002) Protocol for Ethnomedicinal studies in forestry Ethnobotany. Avishkar publisher, Distributor 807, Vyars. Building, Chaura Rasta Jaipur, India.383-393.
- Peters CM, Gentry AH and Mendelsohn RO (1989) Valuation of an Amazonian rainforest. *Nature* 339:655-656.
- Prasad BN (1985) Regional Non Wood Forest Product Industries. Forest Industries Development Group. Asia Pacific Region, FAO, Kualalampur.
- Prasad N and Siddiqui MH (2006) Promotion and protection of Jharkhand forests to mitigate problem of livelihood. *My Forest*, 42(4), 405-409.
- Sarkar AK and Mazumder M (2016) Surveillance to Evaluate the Diversity, Dominance and Community Structure of Tree Species in Nagrakata Forest Beat of Chalsa Forest Range, West Bengal, India *Int. J Pure App. Biosci.* 4(5):133-143.
- Sarkar AK, Dey M and Mazumder M (2017) Ecological status of medicinal plants of Chalsa forest range under Jalpaiguri division, West Bengal, India, *International Journal of Herbal Medicine*.5(5):196-215.
- Sarkar AK, Dey M and Mazumder M (2017) Evaluation of ecological status of natural vegetation of Diana forest range under Jalpaiguri division, West Bengal, India. *International Research Journal of Biological Sciences*. 6(8), 17-33.