



Wild edible plant used by ethnic peoples on the boundary of subtropical & temperate natural forest, Mamlay watershed, South Sikkim

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Wild edible plants (WEPs) are a rich bio-resource of Sikkim, Himalaya having a high nutritional value. Local people of the Sikkim commonly use wild edible plants in their diet on regular basis. This present study aimed at documenting wild edible plants utilized by the local inhabitants of Mamlay watershed which was carried out during the year 2017-2019. The study explored a total of 49 wild edible plants belonging to 31 families, 44 genera, and 49 species. About 34 WEPs were recorded from temperate natural forest TNF and 31 wild edible plants were recorded from subtropical natural forest STNF. Two studies conducted with a gap of twenty years revealed that a large part of WEPs recorded is from tree source showing a marked forest dependency. The collection of WEPs in the form of entire plants, roots or tubers was at the lowest suggesting the people's awareness to conservation and also revealed that market price value of wild edible plants has increased highly in the study area.

Keywords: Mamlay watershed, Market price, South Sikkim, STNF, TNF, Wild edible plant.

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Introduction

Wild edible plants (WEPs) are the first source of food to mankind that provided the required energy to the human race for its growth, development and multiplication¹. WEPs are referred to those plants which can be used as food if collected at an appropriate stage of growth and properly prepared². Since time unknown, the rural people of the Mamlay watershed acquired considerable knowledge concerning the use of wild edibles. Village elders and other knowledgeable community members are the key sources of plant lore and as such, wild-food consumption is very common in rural areas of the hill. WEP products consist of a variety of plants and leafy and tender parts of stalks, fruits, berries, seeds, roots, tubers, and flowers are generally used for consumption. Since the time immemorial aboriginal people use these wild edible plants not only as a food but also used for medicinal purpose and in traditional practices also. While these foods are not widely known or accessible, at the local context they are of great relevance for nutrition and food security in many countries mainly in China, India, S. E. Asian

countries, Africa, Australia, where several WEPs are consumed along with domesticated plant species³. WEPs are important in the livelihood strategies of forest dwellers/tribal populations. India has a tribal population of 42 million, of which ca. 60% live in forest areas and depend on forests for various edible products⁴. During the course of human civilization, nearly 3000 plant species have been used as food and about 150 species have ever been cultivated⁵. Less than 10 plant species are meeting over 90% of the world food demand⁶. Still, it is expected that the huge diversity of plants should be explored for their utility. Consuming wild edibles is a part of the food habits of people in many societies and intimately connected to all aspects of their socio-cultural, health care, and spiritual life⁷. They depend on forest not only for food but depend equally for medicine as well. It plays a major role in meeting the nutritional requirement and part of the health management system of the tribal population particularly in remote parts throughout the year where modern amenities are still lacking⁸. Wild edible plants are a rich bio-resource of Sikkim Himalaya having a high nutritional value. Local Peoples of the Sikkim commonly used wild edible plants for their diet and consumption regularly. The Mamlay watershed has been selected due to its

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extensive altitude profile, ethnic mixed-culture, and unique features of the forest, water resource, agriculture and trade aspects where the main occupation of the people of the watershed is agriculture and horticulture based. It has an elevation range of 300-2649 m above m.s.l. Two major forest types occur under this watershed: subtropical and temperate natural forest. The subtropical natural forest (STNF) is dominated by *Shorea robusta*, *Schima wallichii*, *Macaranga sp.*, *Eugenia sp.*, *Sapium sp.*, *Castanopsis sp.* generally mixed with shrubby species of *Baliospermum sp.*, *Clerodendrum sp.* and *Phyllanthus sp.* The temperate natural forest (TNF) is dominated by *Quercus lineata*, *Cryptomeria japonica*, *Leucosceptrum canum*, *Magnolia sp.*, *Juglans regia*, *Rhododendron sp.*, *Symplocos sp.* generally mixed with *Rosa sp.*, *Rubus sp.*, *Berberis sp.* and *Viburnum sp.* The top part of the watershed is covered by Tendong Reserve forest, the main catchment of the watershed. Similarly, the bottom of the watershed is covered by STNF called Kamrang forest. This paper supplements the minor details of some common wild edible plants available in STNF and TNF under the boundary of Mamlay watershed, South Sikkim.

Materials and Methods

Study area

The study was conducted in Mamlay watershed located at South Sikkim. The watershed extends between 27°10'8'' - 27°14'16'' N and 88°19'53'' - 88°24'53'' E. The elevation range of the watershed varies from 300-2640 m covering an area of 30.09 km². The watershed comprises of 9 blocks (Mamlay, Kamrang, Jaubari, Singhithang, Pabong, Pajer, Chemchey, Tingrithang, and Damthang) covering 34

villages. Rinjhi khola forms the outlet of the drainage system of the watershed which merges with the Rangit River. Two major forest types occur in the Mamlay watershed (i) Sub-tropical natural forest and (ii) Temperate natural forest with the dominance of mixed forest cover. The Mamlay watershed comprises of 5,725 inhabitants as per 2011 census.

Methodology

The present study was based on an extended and intensive survey conducted in representative parts of Mamlay watershed during 2017 to 2019 to investigate the utilization pattern and marketable price value of WEPs using standard questionnaire survey for documentation of high valued available resources and utilization of wild edibles and thus gathered information on availability and uses of WEPs. The people of different age groups were interviewed of which 47% of people were between 61-70 years, 38% of people were between 41-60 years, 10% of people were between 20-40 years and 5% of people were between 71 years and above. Identification, vernacular names, and information regarding their mode of use, market demand, marketing potential etc, was recorded with the help of groups of village elders and personal observation. The primary data hence collected was further verified with the available secondary literature^{8,9,10,11} and also cited along with the uses of the plants (Table 1). The correct botanical names and families of the documented plant species were updated by using <http://www.theplantlist.org> and Plants of the World online (<http://www.plantsoftheworldonline.org/>). Likewise, a local market survey was done during different seasons to draw data/information on plant part uses pattern and market price.

Table 1 — List of some available WEPs in the weekly market in Namchi, Mamlay watershed

S. No	Botanical names	Local name (Nepali)	Families	Habit & habitat	Parts used	Usage	Time of availability	Marketing price value (1992-1994)	Marketing price value (2017-2018)
1	<i>Allium hookeri</i> Thwaites	Dungdug	Amaryllidaceae	Herb, TNF	Leaves	It is good for digestive and circulatory system, cooked as vegetable	May - Jul.	-	15-20 [#]
2	<i>Baccaurea ramiflora</i> Lour.	Kusum	Phyllanthaceae	Tree, STNF	Fruit	It is used in constipation, high source of vitamin C, good source of natural antioxidants ¹⁹	Jun - Jul.	-	65-80 ⁺
3	<i>Bauhinia variegata</i> L.	Koirala	Fabaceae	Tree, STNF	Flower	It helps to control blood pressure, cooked as vegetable	Mar - Apr.	-	25-30 [#]
4	<i>Bergenia ciliata</i> (Haw.) Sternb.	Pakhanbet	Saxifragaceae	Herb, TNF	Shoot/ root	Used in tonic, fever, boils and astringent.	Throughout the year	35 ⁺	≠

(Contd.)

Table 1 — List of some available WEPs in the weekly market in Namchi, Mamlay watershed (Contd.)

S. No	Botanical names	Local name (Nepali)	Families	Habit & habitat	Parts used	Usage	Time of availability	Marketing price value (1992-1994)	Marketing price value (2017-2018)
5	<i>Castanopsis lanceifolia</i> (Oerst.) Hickel & A. Calamus	Patle katus	Fagaceae	Tree, STNF/TNF	Fruit (nut)	Nuts are taken as raw and contains a good source of carbohydrates	Feb - Apr.	40 ⁺	20-30 [°]
6	<i>Castanopsis indica</i> (Roxb. ex Lindl.) A. DC.	Aulay katus	Fagaceae	Tree, STNF/TNF	Fruit (nut)	Nuts are taken as raw and contains a good source of carbohydrates	Feb - Apr.	40 ⁺	20-30 [°]
7	<i>Castanopsis tribuloides</i> (Sm.) A. DC.	Musure katus	Fagaceae	Tree, STNF/TNF	Fruit (nut)	Nuts are taken as raw and contains a good source of carbohydrates	Feb - Apr.	40 ⁺	20-30 [°]
8	<i>Choerospondias axillaris</i> (Roxb.) B. L. Burtt & A. W. Hill	Lapsi	Anacardiaceae	Tree, STNF	Fruit	Raw fruits are consumed and used as pickles, good source of natural antioxidants ¹⁹ , it is effective against blood dysentery and good appetizer	Oct - Nov.	4 ⁺	80-100 ⁺
9	<i>Cinnamomum verum</i> J. Presl	Sinkauli	Lauraceae	Tree, TNF	Stem bark & leaves	It is used in diarrhoea, controls blood sugar level & cholesterol level, also used as spices	Throughout the year	30 ⁺	30 – 60 [°]
10	<i>Colocasia esculenta</i> (L.) Schott	Pindalu	Araceae	Herb, STNF	Tubers	It is considered as good appetizer, used to treat digestive system disorder. Boiled and serve as vegetable	Feb - May	-	80-100 ⁺
11	<i>Dendrocalamus hamiltonii</i> Nees & Arn. ex Munro	Tama / Choya Bans	Poaceae	Herb, STNF/TNF	Young shoots	It is good source of carbohydrate and dietary fibre. Boiled and serve as vegetable and also used as pickles	Jun – Oct.	12 ⁺	40-6 ⁺
12	<i>Dioscorea alata</i> L.	Ghar tarul	Dioscoreaceae	Climber, STNF	Tubers	Tubers are anthelmintic useful in leprosy, piles and gonorrhoea It is also used in fever, leaves is used in rash and itch and plants is used in constipation	Jan – Mar.	-	60 – 100 ⁺
13	<i>Diploknema butyracea</i> (Roxb.) H. J. Lam	Chiuri	Sapotaceae	Tree, STNF/TNF	Fruit	It is used in diabetes and stomach problems	Nov-Dec.	3 ⁺	65-85 ⁺
14	<i>Diplazium esculentum</i> (Retz.) Sw.	Aulay Chipley Ningro	Aspleniaceae	Herb, TNF	Yong frond	It is effective in constipation, blood dysentery, and stomach disorder. It is good source of dietary fiber and protein.	Jun – Aug.	7-20 ^{**}	20-30 [#]
15	<i>Dioscorea hamiltonii</i> Hook. f.	Bantarul	Dioscoreaceae	Climber, STNF	Tuber	Good for stomach disorder	Jan – Feb.	5 ⁺	150-200 ⁺
16	<i>Dryopteris cochleata</i> (D. Don) C. Chr.	Dhante Ningro	Polypodiaceae	Tree fern, Shrub, TNF	Young frond	Fresh and young parts are consumed as vegetables. It is considered as good appetizer and antidiabetic	Jun – Aug.	-	20-30 [#]
17	<i>Elaeagnus loureiroi</i> Champ.	Musleri/ Maldhero	Elaeagnaceae	Shrub, STNF/TNF	Fruit	Appetizer, high source of vitamin C.	Feb - Mar.	-	70-80 ⁺
18	<i>Elaeocarpus lanceifolius</i> Roxb.	Bhadrasay	Elaeocarpaceae	Tree, TNF	Fruit	Contains high source of vitamin and minerals, good appetizer	Apr – Jun.	15-20 ⁺	≠
19	<i>Eriolobus indica</i> Schn.	Mehel	Rosaceae	Tree, STNF	Fruit	Fruit extract taken to cure blood dysentery ²⁰	Sep – Dec.	-	80-100 ⁺
20	<i>Eryngium foetidum</i> L.	Bhote dhania	Apiaceae	Herb, STNF	Leaves	Appetizer, extracted juice from aerial parts	May – Oct.		10-20 [#]
21	<i>Ficus auriculata</i> Lour.	Nebara	Moraceae	Tree, STNF/TNF	Fruit	Fresh fruit is consumed as it contains high source of dietary fiber, natural sugar, minerals and appetizer, it controls diabetes and constipation, it consist of diuretic, laxative and digestive regulating properties	Throughout the year	≠	≠

(Contd.)

Table 1 — List of some available WEPs in the weekly market in Namchi, Mamlay watershed (Contd.)

S. No	Botanical names	Local name (Nepali)	Families	Habit & habitat	Parts used	Usage	Time of availability	Marketing price value (1992-1994)	Marketing price value (2017-2018)
22	<i>Ficus lacor</i> Buch.-Ham.	Kabra	Moraceae	Tree, STNF	Tender shoot	Appetizer, high source of dietary fiber, natural sugar minerals, good for diabetes, used as pickles	Feb – Mar.	8-10 ⁺	70-80 ⁺
23	<i>Fragaria nubicola</i> (Lindl. ex Hook. f.) Lacaita	Bhui aiselu	Rosaceae	TNF Herb	Fruit	Ripe fruits are consumed and contains a good source of minerals and taken against anaemia and diabetes.	Mar. – May	≠	≠
24	<i>Girardiana diversifolia</i> (Link) Friis	Bhangre sisnu	Urticaceae	Herb, STNF/TNF	Inflorescence and Young leaves	It is good in high blood pressure and serve as vegetable	Sep – Nov.	-	20-30 [#]
25	<i>Tetrataenium wallichii</i> (DC.) Manden.	Chimping	Apiaceae	Herb, TNF	Fruit	Good appetizer, dried fruits decoction taken in stomach disorder, cough and cold. Dried fruits chewed to treat influenza and sinusitis ²¹	Jul – Oct	2-10 [^]	10-20 [^]
26	<i>Juglans regia</i> L.	Okhar	Juglandaceae	Tree, TNF	Fruit	Beneficial in cardiovascular diseases and asthma, fruit oil headache and rheumatism, high source of vitamins and minerals.	Sep – Nov.	20 [°]	50-80*
27	<i>Laportea bulbifera</i> (Siebold & Zucc. Wedd.	Patle sisnu	Urticaceae	Herb, TNF	Inflorescence and Young leaves	Good in high blood pressure	Sep – Nov.	-	20-30 [#]
28	<i>Machilus edulis</i> King ex Hook. f.	Pomsee	Lauraceae	Tree, TNF	Fruit	Consumed to control blood sugar level, Pulp in the rind is consumed	Nov. - Jan.	10 ⁺	60-120 ⁺
29	<i>Mangifera sylvatica</i> Roxb.	Chuche anp	Anacardiaceae	Tree, STNF	Fruit	Improves digestion, high source of vitamin A, used to maintain normal blood pressure and heart rate	Jul – Aug.	10 ⁺	70-120 ⁺
30	<i>Mentha arvensis</i> L.	Pudina	Lamiaceae	Herb, TNF	Leaves	Used as pickles and contains a good property of Astringent, carminative, stomachic, antispasmodic, stimulant, sedative	Throughout the year	-	5-10 [#]
31	<i>Nasturtium officinale</i> W. T. Aiton	Simrayo	Brassicaceae	Herb, TNF	Leaves/stem	It is used to control high blood pressure, jaundice and body ache and serve as vegetable	Nov – Jan.	4 [#]	20-30 [#]
32	<i>Nephrolepis cordifolia</i> (L.) C. Presl	Pani amala	Nephrolepidaceae	Herb, STNF/TNF	Fruit, leaves	Used for cough, rheumatism, chest congestion, anorexia, good in treatment of jaundice leaves are used for decorations.	Throughout the year	≠	≠
33	<i>Perilla frutescens</i> (L.) Britton	Silam	Lamiaceae	Herb, STNF/TNF	Fruit	Mature seeds chewed to control cough, Made into pickles	Dec – Apr./ Feb – Apr.	-	20-30 [°]
34	<i>Phyllanthus emblica</i> L.	Amala	Phyllanthaceae	Tree, STNF	Fruit	Fresh or dried fruits taken against piles, constipation, gastritis, common cold and it enhance liver function, rich in vitamin C, fruit is antipyretic	Oct. – Jan.	4 ⁺	80-100 ⁺
35	<i>Phlogacanthus thyrsoformis</i> (Roxb. ex Hardw.) Mabb.	Titay	Acanthaceae	STNF, Shrub	Inflorescence	It is used to control blood sugar level & blood pressure, highly effective in bronchitis and asthma	Feb – Apr.	-	30-50 [#]
36	<i>Koenigia mollis</i> (D. Don) T. M. Schust. & Reveal	Thotney	Polygonaceae	Herb, STNF/TNF	Young shoots	Contains good Appetizer, used in pickle	Throughout the year		≠
37	<i>Rhus chinensis</i> Mill.	Bhakimlo	Anacardiaceae	Tree, TNF	Fruits	Fruits Used in colic, dysentery, coughs, diarrhoea, night sweats and used to stop intestinal and uterine bleeding.	Oct. - Dec.		≠

(Contd.)

Table 1 — List of some available WEPs in the weekly market in Namchi, Mamlay watershed (Contd.)

S. No	Botanical names	Local name (Nepali)	Families	Habit & habitat	Parts used	Usage	Time of availability	Marketing price value (1992-1994)	Marketing price value (2017-2018)
38	<i>Rumex nepalensis</i> Spreng.	Halhalay	Polygonaceae	Herb, STNF/TNF	Leaves and root	Fresh or dried root orally used in hepatitis, loss of hair and plant also used as dyes, leaves are used in piles.	Throughout the year	10 ⁺	≠
39	<i>Rubus ellipticus</i> Sm.	Aiselu	Rosaceae	Shrub, TNF	Fruits	Fruit extract is used in the treatment of fever, colic, coughs and sore throat Used as Astringent, febrifuge, Kidney, stomachic properties.	Sep – Nov.	≠	≠
40	<i>Solanum americanum</i> Mill.	Jangali bihi	Solanaceae	Herb, STNF/TNF	Fruits	It is used to control high blood pressure, fruits are useful in stomach problems	Jul. – Nov.	-	≠
41	<i>Swertia chiraita</i> Buch.-Ham. ex Wall.	Chirowto	Gentianaceae	Herb, TNF	Whole plant	Used in skin diseases, chronic fever, tonic and leucoderma	May – Oct.	10 ⁺	≠
42	<i>Tamarindus indica</i> L.	Titiri	Fabaceae	Tree, STNF	Fruit	Appetizer, it is used as blood purifier	Feb – Mar.	5 ⁺	30-40 ⁺
43	<i>Tectaria gemmifera</i> (Fee) Alston	Aulay kali ningro	Polypodiaceae	Herb, STNF/TNF	Young frond	It controls diarrhoea, blood dysentery, gastritis, food poisoning, antidiabetic. Consumed as vegetable and pickles,	Jun – Jul.	-	30-50-
44	<i>Terminalia belerica</i> Wall.	Barra	Combretaceae	Tree, STNF	Fruit	Dried fruits taken during sore throat, cough, fever, piles and constipation	Jan – Mar.	20 ⁺	40-60 ⁺
45	<i>Tetradium fraxinifolium</i> (Hook.) T. G. Hartley	Khanakpa	Rutaceae	Tree, TNF	Fruits and seeds	Fresh or dried fruits taken during indigestion, gastritis, food poisoning and dysentery. Ripe fruits paste applied on forehead during vertigo ²¹	Sept. – Nov.		
46	<i>Terminalia chebula</i> Retz	Harra	Combretaceae	Tree, STNF	Fruit	Raw fruits chewed in cough, sore throat, tonsillitis and diabetes; fruit extracts consumed to treat asthma, tonsillitis and pharyngitis ²¹	Feb – Mar.	10 ⁺	40-50 [#]
47	<i>Trichosanthes tricuspidata</i> Lour.	Indreyni	Cucurbitaceae	Climber, STNF/TNF	Fruit, seeds	Fruit used as carminative, seeds are good purgative ²² Seed juice taken to cure mouth ulcers ²³	Nov – Jan.	≠	40-200 ⁺
48	<i>Urtica dioica</i> L.	Gharia sisnoo	Urticaceae	Herb, TNF	Shoot tip	It is used to control high blood pressure serve as vegetable	Jun – Jul.	5 [#]	160-240 ⁺
49	<i>Viscum album</i> L.	Harchur	Santalaceae	Shrub, STNF/TNF	Vegetative part	Paste is used as poultice for treating muscular pain, bone fracture etc. decoction taken orally in body and muscle pain	Throughout the year	5 ⁺	≠

⁺ Per kg, ^{*}Per dozen, [#]Per bundle [°]Per 100 g, [^]per 50 g, ^ˆ250 g, [≠] Non- marketable Marketing price of above 20 years ago was reported in 1992-1994^{10, 11}.

Results and Discussion

The present study reveals that the study area is floristically rich and provides diverse useful species having immense potential for human consumption as well as support to the economy. The present study recorded 49 wild edible plants classified among 49 species, 44 genera and 31 families along with local names, habit, parts used and seasonal availability etc. 34 wild edible plants are recorded from TNF and 31 wild edible plants are recorded from STNF. The result of the study revealed that the dominant families were Rosaceae, Fagaceae, Anacardiaceae, Urticaceae have

the highest proportion of the edibles. The growth form of the species includes herbs, shrubs, trees and climbers. Trees were the most dominant growth forms accounting (43%) followed by Herbs (41%); Shrubs (10%); Climbers (6%) (Table 2). Among the parts used, fruits accounted the highest usages (22 species) followed by leaves (8 species); shoot (4 species); 3 species each in young fonds and tubers; 2 species each in the stem, inflorescences and seeds; 1 species each in flowers, bark, root and vegetative part (Table 3). The documented plants were used to treat various diseases and ailments such as fever, cough,

Table 2 — Growth form of wild edible plants from study area

Growth form	No. of growth form
Tree	21
Herb	20
Shrub	5
Climber	3

Table 3 — Use frequency of different wild edible plant parts in study area

Plant parts	No. of plant parts
Fruit	22
Leaves	8
Shoot	4
Young frond	3
Tubers	3
Inflorescence	2
Seed	2
Stem	2
Flower	1
Bark	1
Root	1
Vegetative part	1

cold, stomach disorder anaemia, jaundice, rheumatism, chest congestion, muscle pain, bone fracture, diabetes, high blood pressure etc. The highest number of species (11 species) were used for the treatment of stomach disorder followed by high blood pressure (10 species); cough (7 species); constipation (6 species); 5 species each in dysentery and fever; diabetes (4 species); 3 species each of asthma and piles; 1 species each of bone fracture, muscle pain, skin diseases, heart rate, jaundice etc (Table 4). Out of 49 species recorded, 15 species are used as vegetables viz., *Allium hookeri* Thwaites, *Bauhinia variegata* L., *Colocasia esculenta* (L.) Schott, *Dendrocalamus hamiltonii* Nees & Arn. ex Munro, *Dioscorea alata* L., *Diplazium esculentum* (Retz.) Sw., *Dioscorea hamiltonii* Hook. f., *Dryopteris cochleata* (D. Don) C. Chr., *Eryngium foetidum* L., *Girardiana diversifolia* (Link) Friis, *Laportea bulbifera* (Siebold & Zucc. Wedd., *Mentha arvensis* L., *Nasturtium officinale* W. T. Aiton, *Tectaria gemmifera* (Fee) Alston, *Urtica dioica* L. Whereas, 9 species were used for medicinal purpose viz., *Bergenia ciliata* (Haw.) Sternb., *Cinnamomum verum* J. Presl, *Tetrataenium wallichii* (DC.) Manden., *Rumex nepalensis* Spreng., *Swertia chiraita* Buch.-Ham. ex Wall., *Terminalia belerica* Wall., *Terminalia chebula* Retz, *Trichosanthes tricuspidata* Lour., *Viscum album* L.. Therefore, the WEPs recorded from the study area were commonly used as vegetables, many of them are

Table 4 — Diseases treated by documented species

Diseases name	No. of diseases treated
Heart problem	1
Bone fracture	1
Skin disease	1
Jaundice	1
Muscle pain	1
Asthma	3
Piles	3
Diabetes	4
Dysentery	5
Fever	5
Constipation	6
Cough	7
Blood pressure	10
Stomach disorder	11

used for medicinal purposes and some are eaten raw and some are consumed after boiling and many of them are taken as alternatives to the usual food crops. The main source of drawing information is a local market survey where it was found that a total of 37 wild edibles have commercial value among locals and are commonly sold in the local markets whereas 12 wild edibles have non-commercial value (Table 1). As per the previous scientific study and literature, 23 WEPs were recorded¹⁰ from the same site of study, Mamlay watershed, but the present study recorded 49 wild edible plants. Comparing the present research with the previous scientific literature¹⁰ (around twenty years ago) it was found that some species like *Allium hookeri* Thwaites, *Baccaurea ramiflora* Lour., *Bauhinia variegata* L., *Eriolobus indica* Schn., *Eryngium foetidum* L., *Mentha arvensis* L., *Perilla frutescens* (L.) Britton, *Phlogacanthus thyrsoformis* (Roxb. ex Hardw.) Mabb. Which were not commercial some twenty years ago but at present these plants have acquired a good commercial value and these can be due to the increasing population and increased awareness to possessing more and good knowledge of consumption and utilization pattern of these plants. Similarly some plants like *Tetradium fraxinifolium* (Hook.) T. G. Hartley, *Ficus auriculata* Lour., *Nephrolepsis cordifolia* (L.) C. Presl, *Rhus chinensis* Mill., *Koenigia mollis* (D. Don) T. M. Schust. & Reveal, *Elaeocarpus lanceifolius* Roxb., *Rumex nepalensis* Spreng., and *Rubus ellipticus* Sm., *Fragaria nubicola* (Lindl. ex Hook. f.) Lacaita is not much in demand commercially though the plants are still harvested. According to these present data the two most important plants such as *Bergenia ciliata*

(Haw.) Sternb., Which has a good medicinal purpose like fever^{12,13}, boils¹², cough, pulmonary affection, anti-scorbic¹⁴ and *Rumex nepalensis* Spreng which also consist of good herbal value including Hepatitis, loss of hair¹³, food poisoning, cut and wounds¹⁴ were most commonly used by the peoples twenty years ago but nowadays the use of these plants has declined. Also, by comparing the market price of these wild edibles with the previous record it is found that there is a considerable increment in the market price in the study site the Mamlay watershed. Hence, According to the present study some plants such as *Bergenia ciliata* (Haw.) Sternb., *Rumex nepalensis* Spreng which were having a good commercial value are now declined and within twenty years it is found that there is a huge difference in market price and its main reason is overpopulation in the area, continuous flow of people from rural to urban for their jobs etc. has brought up this situation. Therefore, more focus on the production and utilization of these high valued resources plants is to be addressed. Adequate agro-technologies, e.g., field promoting agro-forestry a practice involving government and non-governmental organizations is to be imparted so that the treasure house of genetic resources will be conserved in their natural habitat reducing the risk of imbalance of the fragile mountain ecosystem. It should be stressed that WEPs will further provide improved nature-based livelihood option to the communities involved. Above all, work should be done to safeguard to genetic resources in their natural habitat, reducing the threat of species extinction due to over exploitation in the wild. Furthermore, there is an urgent need to assess the nutraceutical potentials of WEP species in present context though such studies are carried out in a limited number of plant species^{15,16,17,18,19}. A detailed list of commercially and non commercially important wild edible plants, along with the botanical names, local names, families, plant parts used, uses, time of availability and comparison of marketable price with twenty years before are presented in (Table 1).

Conclusion

The major finding of this study is the increment trend in the use of wild edible plants and its sustenance in the twenty years time frame among local inhabitants of Mamlay watershed. The people have become aware of its rich source of healthy nutrients and high potentialities to become valuable staple food and important alternative to the usual food crops. Some of the local peoples have started

cultivating many of the wild species for household use and the surplus to sell in the market. However, the cultivation of these wild edible plants is always under pressure due to lack of sustainable harvesting practices, modernization, over population and agricultural expansion, etc. It should be encouraged to the farmers, community based management and public awareness should be done in order to conserve natural resources in their natural habitat. Further study on nutraceutical potential and proper screening of such resources can help many ways to solve different health related issues arising due to modern lifestyle changes within different communities.

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