

Ethnobotanical Studies of Less-known Wild Edible Plants and their Utilization in Ethnic Food Preparation by the Rengmas of Karbi Anglong District, Assam, India

Abstract: The main objective of the present study is to document the diversity of less-known wild edible plants and their utilization in ethnic food preparation. Prior informed consent (PIC) was signed by the village head and the informants. Data collection was done through open-ended questionnaires, field surveys, personal interviews, and group discussions. The study recorded 30 less-known wild edible plants (WEPs) from 28 genera and 24 families. Among the parts used for ethnic food preparation, the leaf is consumed the highest. The preparation of ethnic food of Rengmas is unique and has been recorded for the first time.

Keywords: Ethnobotany, Ethnic food, Rengma, wild edible plants

Due to unexpected climate changes, food is beyond reach for many people. Globally, more individuals are anticipated to experience severe food insecurity¹. This food insecurity will lead to malnutrition which will cause various health complications. It has been particularly difficult for developing countries to provide wholesome food to the poorer section of the population. Due to social and economic inequalities, food and nutrition continue to be major problems. India, as one of the developing countries, is still facing food insecurity and micronutrient deficiencies². Wild Edible Plants (WEPs) can play a crucial role in attaining food security and serve as a substitute source of food and nutrition across the globe. However many of these wild edible plants are underutilized and less known to common people.

Wild Edible Plants (WEPs) are those that flourish alongside other plants in their natural habitat. They are used extensively in many traditional practices but are not managed or grown for commercial purposes. They are used by indigenous people around the world for a variety of uses, including food, medicine, and fodder. These WEPs are a rich source of bioactive chemical compounds such as alkaloids, tannins, sugars, amino acids, flavonoids, and a wide range of minerals and vitamins. Additionally, WEPs

support the economic generation among rural communities. The knowledge of plants used as food is rich among the tribals or the ethnic groups inhabiting different regions around the world.

North East India, a home to more than 200 ethnic tribal groups³ with abundant bio resources contains a vast knowledge of WEPs that are less known to the larger communities. Located in the north eastern region, Assam is one of the seven sister states of India. The region lies in one of the richest mega biodiversity hotspots – the Indo-Burma hotspot. The district Karbi Anglong is situated between 25°33' N to 26°35' N latitude and 92°10' to 93°50' E longitude, occupying the largest area among the districts in Assam. Karbi, Dimas, Kuki, Rengma, Garo, Pnars, and Tiwa are some of the many tribal groups inhabiting the district⁴. The east Karbi Anglong and the west Karbi Anglong are the two divisions of the district. The east Karbi Anglong region, popularly referred to as the *Land of Orange*, is home to the Rengma Naga. The region is the treasure house of many wild edible plants. The rural communities are mostly cultivators and depend on wild plants that grow in their natural habitat for their diet. Over the years, wild edible plants ensures food security for the Rengmas. However, no extensive ethnobotanical research has been done in the area because of ethnic inclusivity, rugged terrain, and confined accessibility. Therefore, the main purpose of this work is to document the WEPs that are underutilized and less known by the general people.

Methodology

Field Survey and Data Collection: A field survey was conducted in Rengma inhabited area of Karbi Anglong, Assam between 2020 and 2022. PIC (Prior Informed Consent) was signed by the village Head and informants before conducting the survey. A variety of methods, including semi-structured questionnaires, field observation, one-on-one interviews, and group discussion were used to gather ethnobotanical data. Plants were collected for making herbarium. The herbarium specimens were identified and authenticated at Eastern Regional Centre, BSI, Shillong, Meghalaya, and with the help of available literature such as *Flora of Assam*⁵⁻⁸, *Flora of India*⁹⁻¹¹, and Plant

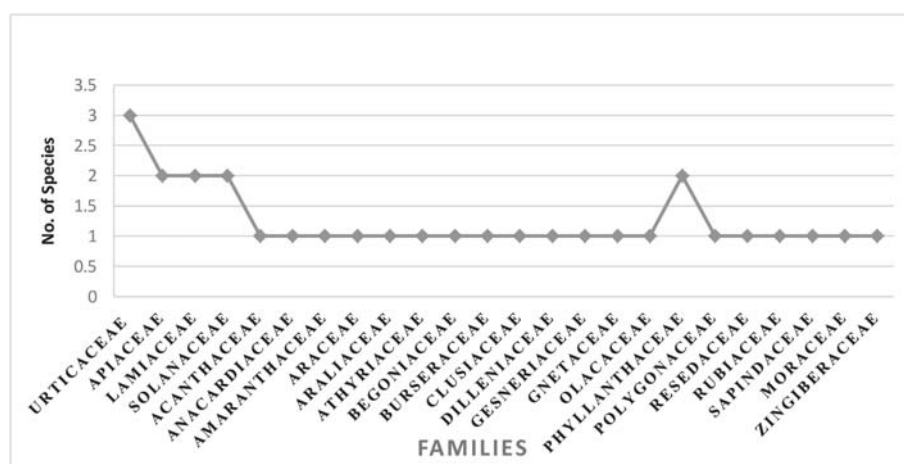


Fig. 1 Line Graph Showing the No. of Species in each Family of the Documented Lesser-known WEPs

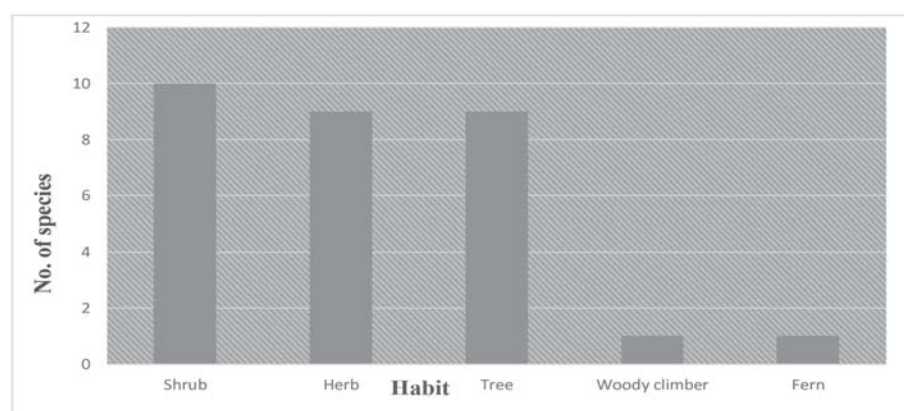


Fig. 2: Bar Diagram Representing the Habit of Documented WEPs.

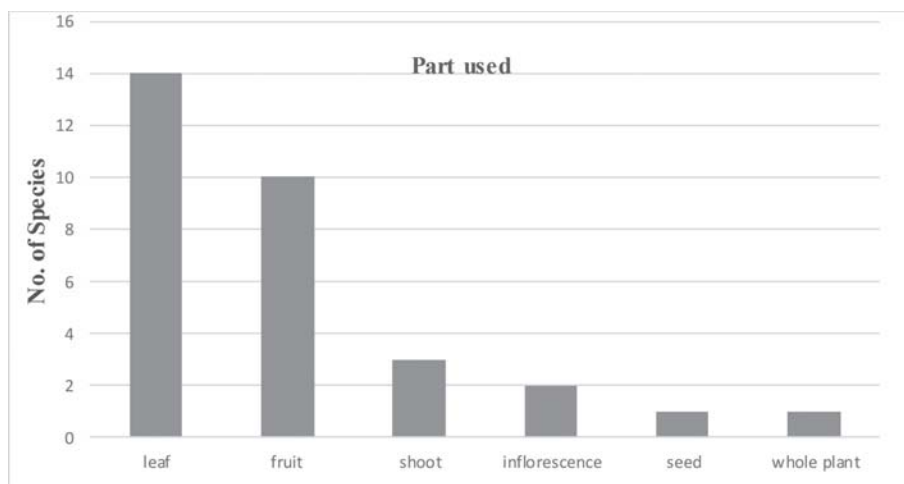


Fig. 3: Bar Diagram Representing the Part used in Food Preparation

resources of Nagaland¹². The plant specimens were photographed with a DSLR camera EOS 1500D and the voucher specimens were submitted at the Department of Botany, St. Joseph University, Nagaland.

Results

1. Taxonomic Diversity of Wild Edible Plants (WEPs):

30 underutilized wild edible plants from 28 genera and 24 families were identified during the study (Table 1, Fig. 4). The highest plant species represented belongs to the family Urticaceae (3 species), followed by Apiaceae (2 species), Lamiaceae (2 species), Phyllanthaceae (2 species) and Solanaceae (2 Species). The remaining family: Acanthaceae, Anacardiaceae, Amaranthaceae, Araceae, Araliaceae, Athyriaceae, Begoniaceae, Burseraceae, Clusiaceae, Dilleniaceae, Gesneriaceae, Gnetaceae, Moraceae, Olacaceae, Polygonaceae, Resedaceae, Rubiaceae, Sapindaceae, and Zingiberaceae are represented by one species each (Fig. 1). 10 species of the 30 WEPs are within the shrub category, 9 species are herbs, 9 species are trees, and 1 species each is a fern and woody climber (Fig. 2). The 30 recorded wild edible plants are the primary food consumed as a delicacy by the Rengmas. Among the parts used for food preparation, the leaf is consumed the highest (14 species), followed by fruit (10 species), shoot (3 species), inflorescence (2 species), seed (1 species), and whole plant (1 Species) shown in Fig. 3.

2. Method of Ethnic Food Preparation:

Most of the food is prepared from the products obtained from their natural habitat. The young leaves and shoots are simply eaten after being boiled or fried. The young shoot of *Oenanthe javanica* (Blume) DC. is eaten raw as salad. The inflorescence of *Phlogacanthus thyriformis* (Roxb. ex Hardw.) Mabb. and the young fruit of *Trevesia palmata*



Antidesma acidum Retz.



Amomum maximum Roxb.



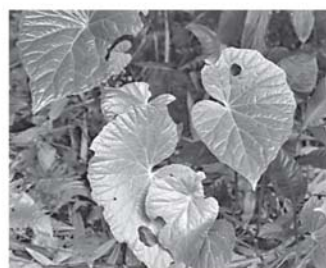
Artocarpus chama Buch. –
Ham.



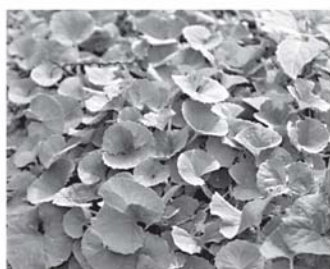
Amaranthus viridis L.



Baccaurea ramiflora Lour.



Begonia roxburghii
(Roxb.) A.DC.



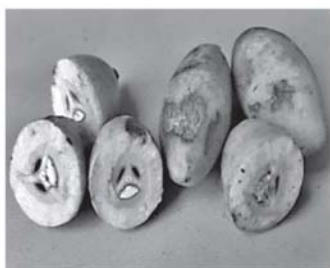
Centella asiatica L. Urb.



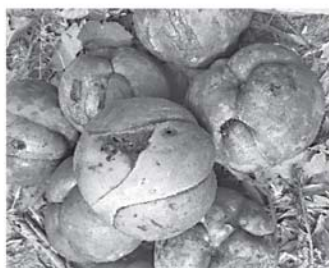
Clerodendrum glandulosum Lindl.



Clerodendrum laevifolium
Blume



Canarium strictum Roxb.



Dillenia indica L.



Diplazium esculentum (Retz.)
SW.



Elatostema integrifolium (D.
Don) Wedd.



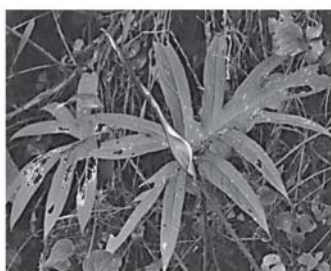
Gnetum gnemon L.



Garcinia lanceifolia Roxb.



Lepisanthes senegalensis (Poir.)
Leenh.



Lasiaspinosa (L.) Thwaites



Mussaenda roxburghii Hook.f.



Olax imbricata Roxb.



Oenanthe javanica (Blume) DC.



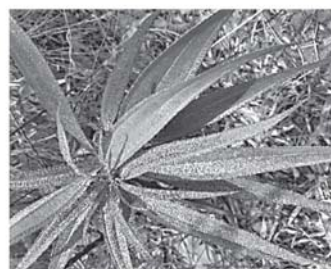
Persicaria chinensis (L.) H.
Gross



Phlogacanthus thyrsoformis
(Roxb. ex Hardw.) Mabb.



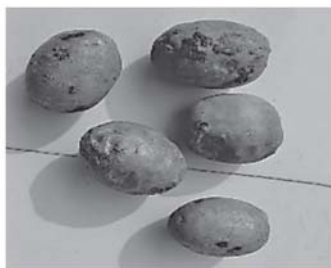
Rhynchosyris elliptica (Wall. ex
D. Dietr.) A.DC.



*Sarcochlamys
pulcherrima* (Roxb.) Guadich



Solanum nigrum L.



Spondias pinnata (L.f.) Kurz



Stixis suaveolens (Roxb.)



Solanum torvum SW.



Trevesia palmata
(Roxb. ex Lindl.) Vis.

Fig. 4: Photographs of Wild Edible Plants from the Study Area

Table 1: List of Enumerated WEPs from the Study Area

Sl. No.	Botanical Name/ Family	Local Name	Part Used/ Habit	Uses/Method
1	<i>Antidesma acidum</i> Retz. Phyllanthaceae	Hingche ben	Leaf Shrub	Young sour leaves cooked with meat or fish
2	<i>Amomum maximum</i> Roxb. Zingiberaceae	Changrhi sha	Young inflorescence Herb	Young inflorescence cooked and eaten as vegetable
3	<i>Artocarpus chama</i> Buch. –Ham. Moraceae	Chareng sha	Tree Fruit/seed	Ripe fruits eaten raw. Seed roasted/ cooked and eaten
4	<i>Amaranthus viridis</i> L. Amaranthaceae	Menthü tho	Leaf Herb	Tender leaves cooked and consumed as vegetable
5	<i>Baccaurea ramiflora</i> Lour. Phyllanthaceae	Tenyhu sha	Fruit Tree	Ripe fruits eaten raw
6	<i>Begonia roxburghii</i> (Roxb.) A.DC. Begoniaceae	Nku nyi	Leaf Herb	Young leaves cooked with meat or fish
7	<i>Centella asiatica</i> L. Urb. Apiaceae	Thüjeng Rungho	Whole plant Herb	Whole plant either eaten raw or after boiling
8	<i>Clerodendrum glandulosum</i> Lindl. Lamiaceae	Hingcherang	Leaf Shrub	Young leaves cooked and eaten as vegetable
9	<i>Clerodendrum laevifolium</i> Blume Lamiaceae	Hengshen	Leaf Shrub	Young leaves cooked and eaten as vegetable
10	<i>Canarium strictum</i> Roxb. Burseraceae	Engthin sha	Fruit Tree	Mature ripe fruits eaten raw
11	<i>Dillenia indica</i> L. Dilleniaceae	Thadyü sha	Fruit Tree	Mature ripe fruits eaten raw, pickled, or sun dried and grounded into powder.
12	<i>Diplazium esculentum</i> (Retz.) SW. Athyriaceae	Süro	Leaf Fern	Young leaves or fronds cooked and eaten as vegetable. It is also eaten raw as salad.
13	<i>Elatostema integrifolium</i> (D. Don) Wedd. Urticaceae	Hingbu	Leaf Herb	Young leaves cooked and eaten as vegetable
14	<i>Gnetum gnemon</i> L. Gnetaceae	Hing Penenh	Leaf Tree	Young leaves simply boiled and eaten as vegetable
15	<i>Garcinia lanceifolia</i> Roxb. Clusiaceae	Shen nyu rasha	Fruit Shrub	Ripe fruit eaten raw
16	<i>Lepisanthes senegalensis</i> (Poir.) Leenh. Sapindaceae	Tingrhi sha	Fruit Tree	Ripe fruits eaten raw
17	<i>Lasiaspinosa</i> (L.) Thwaites Araceae	Sethetpuv	Leaf/petiole Herb	Young leaves and petioles cooked and eaten as vegetable
18	<i>Mussaenda roxburghii</i> Hook.f. Rubiaceae	Tebemeing	Leaf Shrub	Young leaves cooked and eaten as vegetable
19	<i>Olex imbricata</i> Roxb. Olacaceae	Misi hing	Leaf Shrub	Young leaves cooked and eaten as vegetable
20	<i>Oenanthe javanica</i> (Blume) DC. Apiaceae	Thopong	Young shoot Herb	Young shoot either eaten raw as salad or boiled and eaten as vegetable
21	<i>Persicaria chinensis</i> (L.) H. Gross Polygonaceae	Tukü nyi	Young shoot Herb	Shoots cooked and eaten as vegetable
22	<i>Pouzolzia sanguinea</i> (Blume) Merr. Urticaceae	Hing masi	Leaf Shrub	Young leaf or shoot cooked and eaten as vegetable
23	<i>Phlogacanthus thyrsiformis</i> (Roxb. ex Hardw.) Mabb. Acanthaceae	Tabomah	Inflorescence Shrub	Young inflorescence cooked and eaten as vegetable or make chutney
24	<i>Rhynchoetichum ellipticum</i> (Wall. ex D. Dietr.) A.DC. Gesneriaceae	Hingchueng marü	Leaf Shrub	Young leaves cooked and eaten as vegetable
25	<i>Sarcochlamys pulcherrima</i> (Roxb.) Guadich. Urticaceae	Ghaque nyi	Leaf Tree	Young leaves cooked and eaten as vegetable

Sl. No.	Botanical Name/ Family	Local Name	Part Used/ Habit	Uses/Method
26	<i>Solanum nigrum</i> L. Solanaceae	Gwacherohing	Young shoot Herb	Young shoots cooked and eaten as vegetable
27	<i>Spondias pinnata</i> (L.f.) Kurz Anacardiaceae	Khing ben sha	Fruit Tree	Ripe fruits eaten raw
28	<i>Stixis suaveolens</i> (Roxb.)Baill. Resedaceae	Sayang tarüdi sha	Fruit Woody climbers	Ripe fruits eaten raw
29	<i>Solanum torvum</i> SW.Solanaceae	Budha sha	Fruit Shrub	Fruits boiled and used for making chutney
30	<i>Trevesia palmata</i> (Roxb. ex Lindl.) Vis. Araliaceae	Than sha	Young fruit Tree	Young fruits cooked and eaten as vegetable

(Roxb. ex Lindl.) Vis. is wrapped in banana leaves and burned under the warm ashes. The cooked flowers and fruits are then used to prepare chutney. The ripe fruits of *Canarium strictum* Roxb., *Garcinia lanceifolia* Roxb., *Lepisanthes senegalensis* (Poir.) Leenh., *Stixis suaveolens* Roxb. Baill., *Spondias pinnata* (L.f.) Kurz, are eaten raw or sun-dried. One of the most unique ethnic dishes of Rengmas is called Hingkenju Heng which is consumed at every meal. It is prepared by cooking all the leafy wild vegetables together with the corm of *Colocasia esculenta* (L.) Schott. The leaf of *Clerodendrum laevifolium* Blume, *Elatostema integrifolium* (D. Don) Wedd., *Mussaenda roxburghii* Hook.f., *Olex imbricata* Roxb., *Persicaria chinensis* (L.) H. Gross, *Rhynchoetechum ellipticum* (Wall. ex D. Dietr.) A.DC. and *Sarcochlamys pulcherrima* (Roxb.) Gaudich are the most commonly used plants for preparing the ethnic dish Hingkenju Heng. The fruit of *Dillenia indica* L. is sun dried and is grounded in traditional wooden mortar and pestle. The pulpy residue of fruit is then mixed with salt, ginger, and chilly and eaten directly.

Discussion

In the current research paper, 30 underutilized wild edible plants are highlighted for their usage in a variety of traditional recipes. The study depicts that the enumerated less-known WEPs were commonly utilized by the Rengmas in their daily diet. The plants were found to use for the preparation of different local dishes and also to give flavour or garnish other dishes. The use of the underutilized fruit *Stixis suaveolens* (Roxb.) Baill. was also reported by Das, et.al¹³ while reviewing the underutilized and underexploited fruits of Tripura. Terangpi, et.al¹⁴ reported the use of underutilized edible plants *Gnetum gnemon* L. and *Rhynchoetechum ellipticum* (Wall. ex D. Dietr.) A.DC. by the Karbis of Northeast India which resembles the findings of the current study. The utilization of *Begonia roxburghii*

(Miq.)A.DC., *Canarium strictum* Roxb., *Mussaenda roxburghii* Hook.f., *Pouzolzia sanguinea* (Blume) Merr., *Spondias pinnata* (L.f.) Kurz and *Trevesia palmata* (Roxb. ex Lindl.) Vis. as vegetables and fruits were also reported by Taram, et.al¹⁵. Moreover, Nakhuru, et.al¹⁶ reported the use of *Solanum torvum* SW., *Solanum nigrum* L., *Clerodendrum glandulosum* Walp., and *Amaranthus viridis* L. while assessing the vitamin C content of wild edible plants of Northeast India. The usage of *Clerodendrum laevifolium* Blume, *Elatostema integrifolium* (D. Don) Wedd., *Lepisanthes senegalensis* (Poir.) Leenh., *Olex imbricata* Roxb., and *Oenanthe javanica* (Blume) DC., as traditional food is little known. This similarities between studies on how various ethnic groups use wild plants for food demonstrates the veracity and accuracy of reported plant species.

Conclusion

Based on their traditional knowledge, the Rengmas make extensive utilization of WEPs. The investigation emphasizes the use of many wild plants that are rare to the common people. Their daily food is reliant on the natural world. Their food habit and preparation of local dishes were found unique. The plants are found rich in bioactive phytochemicals that have health benefits. The plant species can therefore be used as a backup food source to ensure food security. Documentation of ethnic food and underutilized WEPs can help conserve priceless endangered plant species in addition to enhancing nutritional security. Therefore, further quantitative analysis and documentation should be encouraged that will contribute more to improve human health and increases the recommendation in the nutritional daily diet.

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