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Some Edible Wild and Cultivated Plants Used as Food for Palaung Tribe in Kyaukme Township

Nyo Nyo Tin

Abstract

An ethnobotanical study on Palaung tribe in Kyaukme Township has been investigated. In this study, some edible wild and cultivated plants were recorded from Hu-koat, Pan-tha-pyay, Pan-kwan, Pan-phaet and Pan-kwan (hya-ma) villages in Kyaukme Township. Plants used as food consist of 29 species that belong to 25 genera of 18 families were collected and identified. The parts use, their traditional ways to prepare food and other uses of these plants have been investigated. The uses of twelve wild plants and their parts were also evaluated by comparing with literatures. The nutritional value of twelve wild plants used as vegetables by native people were determined. Among the twelve wild plants the protein contents were observed 44.63 % in the leaves of *Fagopyrum cymosum* Meissn (Wet-sa), 40.47% in flower buds of *Trevesia palmata* (Roxb. ex Lindl.) Vis (Hpaw-bu), 34.67 % in the pith of the stem of *Caryota urens* L. (Min-baw), 33.44% in flower buds of *Bauhinia acuminata* L. (Swe-daw-phyu), 29.42 % in young tender shoots of *Solanum americanum* Mill. (Baung-laung-nyo) and 26.43 % in the leaves of *Ficus hispida* L. (Phet-wah). The fresh leaves and shoots of *Fagopyrum cymosum* Meissn (Wet-sa) has the highest protein, Chlorophyll-a and total carotenoids contents; the highest moisture content in fresh pith of the stem of *C. urens* L. (Min-baw) and that of ash in fresh root of *Foeniculum vulgare* Mill. (Samon-saba). The determination of water soluble carbohydrate as glucose was found to be highest in roots of *F. vulgare* Mill. (Samon-saba) and lowest in young leaves of *Ficus virens* Ait. (Nyaung-shin).

Key words: Ethnobotanical study, Palaung tribe, traditional uses, wild plants.

Introduction

Man's history would not be complete without a look at the role of plants because human survive by using plants' materials as their daily need; food, clothing, shelter and medicine since they have evolved on the earth. The central role of plants in every-day life of ethnic people is obvious with daily activities revolving around agriculture, the gathering of fuel wood,

collecting of wild food plants, cooking and eating of largely plant-based food.

People of the ethnic group grow a number of cereals, millets, pulses, fruits, etc., but they were largely dependent on wild leafy vegetable, tubers, fruits, seeds, etc. Young bamboo shoot is a common vegetable.

The study area is situated between longitude 97° 02' 12.8" E and, latitude 22° 32' 15.1" N. Pan-kwan village is located at 24 miles away from Kyaukme and is of 3-4 hours drive. Hu-koat village is located at 17 miles away from Kyaukme and out of way from the road. Pan-kwan and Hu-koat are 7 miles apart from each other. Pan-tha-pyay and Pan-kwan villages were situated at one side of the road of Kyaukme on the way to Mogok.

Road, transportation and communication were difficult because all study villages were located at mountain and forest region. Palaung people that wear full dress live in 49 villages of Kyaukme Township. Location study for five representative villages is as shown in Table (1).

Table (1) Location and elevation of studied villages

Villages	Latitude N	Longitude E	Elevation
Pan-kwan	22°37' 50.0"	96°50' 33.9"	4462 ft
Pan-phaet	22° 37' 50.5"	96° 50' 49.8"	4600 ft
Pan-tha-pyay	22° 37' 38.2"	96° 50' 26.1"	4350 ft
Pan-kwan (hya-ma)	22° 37' 34.8"	96° 50' 22.4"	4434 ft
Hu-koat	22° 37' 39.8"	96° 50' 55.0"	4206 ft

Source –Measuring with GPS (Geographical Positioning System.)

Most of the people of Palaung tribe are vegetarian. They usually do not eat any meat in their meal. Mixed salad of Nyaung-shin is most famous in Palaung traditional food. This is usually made with other vegetables. The traditional food of Palaung tribe is dried pressed soybean and fermented soybean. This food is mostly liked by Palaung tribe. Dried pressed soybean and fermented soybean is a substitution of meat (for protein).

Camellia sinensis (Laphet) is also variously useful as food for this tribe, mainly mixed salad of laphet and other things. This is useful not only for food but also useful for traditional medicine. Palaung people also use tea for curing various diseases.

Palaung people are harvesting a number of edible plant products gathered naturally from forests, including leaves, fruits, roots and tubers. But other vegetables are cultivated, (eg: tea leaves, pe-boke, mustard and *Allium* species etc.).

Therefore the present study has focused on this area and people, and deals with the ethnobotanical research with the following **aims and objectives**:

- To study the role of plants in daily life and culture of Palaung tribe in study area.
- To analyse the nutritional value of wild plants used by Palaung tribe.

Materials and Methods

(1) Analytical Procedure for Determination of the protein content According to Kjeldahl Method

Procedure

(1) Digestion of sample

Preweighed dry powder or fresh sample (about 0.5g) was placed in digestion flask.

1 g of catalyst mixture and 10 ml concentrated sulphuric acid were added.

And then, a flask was placed in an inclined position and was heated gently until frothing ceases, and boiled briskly until the solution was cleared and colourless.

The flame was removed and the solution was allowed to cool, with frequent shaking to prevent solidifying.

(2) Distillation

After digestion, the sample in digestion flask was transferred into distillation flask by washing down with approximately 85 ml distilled water.

After dilution, the sample was cooled down to below 25°C.

A piece of granulated zinc was added and a solution of 20% NaOH was added till the litmus paper change to blue colour.

2g of sodium thiosulphate was poured into the flask. In the receiver, 50 ml of 0.1 N HCl and is added with 2 to 3 drops of methyl red indicator.

Immediately, the flask was connected to distilling bulb on the condenser, and with tip of condenser immersed in 0.1 N HCl in the flask. Then the flask was rotated by hand to mix the content thoroughly; it was then heated until all NH_3 has distilled out from the sample flask. Distillation was completed after about 45 minutes receiving a total volume of 150 ml.

(3) Titration

After distillation the distilled solution was titrated with 0.1 N NaOH and using methyl red indicator which change to orange at the end point.

(2) Analytical Procedure for Determination of Chlorophyll-a and Total Carotenoids

Procedure of sample preparation and UV-Vis-measuring

1. 10-20 mg sample was weighed into the glass centrifuge tube (or in the special mill tube).
2. Approx: 1 g of glass beads and 0.5 ml 90% acetone were added to the sample and carefully stirred with glass rod, the tube was closed with parafilm (or close the special mill tube) and the sample was put into the mill system.
3. The mill was started and the sample was shaken for 5 min; at the highest stage a smooth paste will result.

4. Approx: 5 ml 90% acetone was added to the tube, carefully stirred with glass rod, the tube closed with parafilm and put it into the centrifuge.
5. The centrifuge was started for 15 min at 4,500 rpm and room temperature (approx: 18-20°C)
6. The supernatant was transferred to a 25ml volumetric glass tube with cap.
7. The procedure was repeated of points 4 to 6 four times and the volumetric glass tube was filled up to 25ml with 90% acetone.
8. It was measured by photometer or spectrophotometer at 450 nm, 647 nm, 664 nm and 750 nm.

(3) Analytical Procedure for Determination of Ash content

Preparation of the sample

The sample of 50% must be smaller than 0.5 mm in size, if the particles are greater, the sample was ground in a mill. At least 12 g of sample must be used because (1) 2 × 3 g for the determination of the ash and (2) 2 × 3 g for the determination of the moisture.

Procedure

- (1) Ashing dishes had been glowd about 30 minutes to obtain constant mass.
- (2) The dishes were cooled in the desiccators and weighed immediately.
- (3) This preparation has to be done on the same day as the ash determination; the dishes were placed in the desiccators.
- (4) A double determination has to be done always.
- (5) 2 × 3g of sample were weighed exactly; 0.1 mg of each was placed into prepared dishes.
- (6) 1-2 ml ethanol was poured to the sample.
- (7) The dishes were placed in the furnace, at first near the door.
- (8) Wait until the samples were burned, then the dishes were put deeper into the oven, and the door was closed.

After 6 hours (the ash would be white), the furnace was switched off. The door was opened and waited for 5 min. The dishes were put on a pottery plate about 1 min.

The dishes were put in the desiccators. The closed desiccators was placed near the balance. The dishes have been cooled for 1 hour. If using a greater desiccators (with more than 4 dishes) the cooling time took about 2 hours. The cooling time should not be longer than 2 hours because the ash is very hygroscopic and the weight must be taken very fast.

(4) Analytical Procedure for determination of Carbohydrate as glucose

Preparation of sample solution:

0.3 g of sample powder was dissolved in 100 ml of hot water and shaken for ten minutes. 1 ml of this solution was then diluted to 10 ml with water and this solution was taken as the sample extract.

Preparation of standard sugar solution:

100 mg (1g) of hydrated glucose was exactly weighed and dissolved in 100 ml of distilled water. 1, 2, 4, 6, 8 and 10 ml of these solutions were drawn out and put in each 100 ml volumetric flask and diluted to the mark with distilled water. These solutions will thus contained 10, 20, 40, 60, 80 and 100 μ g of glucose per ml respectively.

Procedure:

1ml of sample solution and six standard sugar solutions containing 10, 20, 40, 60, 80 and 100 mg of glucose per ml were put in each test tube. 1 ml of 5% phenol solution was also added to each test tube and mixed. A blank was also prepared with 1 ml of distilled water instead of sugar solution. 5 ml of 96% sulphuric acid was again added to each tube so that the steam hit the liquid surface directly to produce good mixing. Each test tube was agitated during the addition of acid. After ten minutes, the tube were reshaken and placed in water bath at 25-30°C for twenty minutes. The yellow orange colour was stable for several hours. Absorbances were measured at 490 nm (using UV VIS Spectrophotometer Model 1601).

Results

Plants for Food

Most Palaung people living near forest and on mountain area rely on edible plants products, such as stems, buds, leaves, flowers, fruits, tubers, roots, shoots, and whole plants. The edible plants were consumed in different ways. Most of plants were products of small scale cultivation in their home garden. Study area of Palaung villages was about 24 miles away from Kyaukme. Transportation and road are difficult, especially in rainy season. Meat and other goods are not readily consumed. Therefore, the home garden was the low capital input (no agrochemicals applied, no special tools needed, planting by hand) and use of cheap family labor mostly in spare time. Every Palaung people' house had small home garden. They obtained fresh vegetables readily from their home garden. This is an advantageous fact because home gardens are well suited to feed the family.

There were 29 plants species traditionally used as food by Palaung people of Kyaukme Township. Their Scientific name, Myanmar name, belonging family, part used and uses were tabulated in Table 2. Among them the nutritional value of 12 wild plants were analysed and the results were shown in Tables 2 and 3.

Analysis of the Nutritional value of Plants

The nutritional value of 12 wild plants among the food plants were analysed. The results based on their protein, moistures, ash, chlorophylla, and total carotenoids percentage as given in Table 3 show that fresh leaves and shoots of *Fagopyrum cymosum* has the highest protein, Chlorophyll-a and total carotenoids contents; the highest moisture content in fresh pith of the stem of *Caryota urens*, and that of ash in fresh root of *Foeniculum vulgare*. The determination of water soluble carbohydrate as glucose was found to be highest in roots of *F. vulgare* and lowest in young leaves of *Ficus virens*.

Discussion and Conclusion

The studied ethnic group, Palaung people of Kyaukme township mostly lived in hilly regions and on the mountain. These ethnobotanically valued plants with their families, botanical name, Myanmar name, and parts

used were presented. Ethno-botanical data on 29 plants species (in 25 genera and 18 families) were found used for food by Palaung people.

The seeds of *Glycine max* were used for the preparation of Sufu, fermented soybean, dried pressed soybean and other purposes. Dried pressed soybean had multiple uses for the substitution of meat. The seeds of *Vicia faba* are eaten boiled, cooked, fried and roasted in Palaung people. However seeds are furnished as not only food for man and but also for the domestic animals (Hill, 1952).

The seeds of *Crinum arietinum* paste are used for the preparation of bean curd (Tofu). *C. arietinum* gram is consumed in several ways; 'Dal' is prepared by splitting the whole grain into two and removing the husks (the seed coat). This is one form in which gram is used in India. The flour of 'dal' is known as baisan. It is used in the preparation of unleavened bread and sweets. The whole grain is eaten as raw, roasted, parched or boiled. Gram is also used as cattle feed. It makes a nutritious feed for horses (Pandey, 2000).

The bulbs and young shoots of *Allium sativum* and *A. tuberosum* were eaten raw and used as spices in many curries. Garlic juice is given in the treatment of laryngeal tubercularis, lump, and duodenal ulcers. The bulbs are used as spices (Kapoor, 2001).

Brassica spp. were used as vegetables; *B. campestris* was especially the main dish of Palaung families and they were pickled and eaten the whole year round. Sour Mon-nyin was a favourite food for the Palaung people, which was made up of fresh mon-nyin, tomato, a small amount of sugar (or) small pieces of brown slab-sugar and other spices that were altogether boiled about 2 hours and then eaten. It has sweet-sour taste with nice aroma, and durable for a long time.

The economically importance plant of Palaung tribe was *Camellia sinensis*. Tea leaves are used for both food and medicine. Mixed of laphet was traditional pudding by many ethnic people. Vegetables of wild plants *Ficus virens*, *Piper altenuatum*, *Polygonum hydropiper*, *Ficus hispida* were used as food and also in traditional medicine. Mixed salad of *F. virens* (Nyaung-shin) was a favourite dish of Palaung families.

Other wild species of *F. hispida*, *Crinum asiatica*, *Bauhinia acuminata*, and *Elsholtzia stachyodes* were used both as food and in

traditional medicine. In literature, these species are used in medicine only (Lemmens and de Padua 1999).

The nutritional value of 12 wild plants of the edible portions such as Swe-daw-phyu, Phet-hinn-hent, Phet-wah, Phet-phe, Min-baw, Samon-saba, Nyaung-shin, Wet-sa, Baung-laung-nyo, Hpaw-bu, Shan-say-kha and Sa-yo were analysed based on protein, carbohydrate, chloro-phyll a, carotenoids etc. These wild edible plants of Palaung people are the main dishes and they were very much liked by them.

The fresh pith of stem of *Caryota urens* (Min - baw) had **34.67%** protein content. Protein content of Soy beans is **35.9%** (Vaughan and Geissler 1997); therefore the wild plant *C. urens* is one of the most used supplements of protein for Palaung people. The pith of stem of Min-baw was the favourite food of Palaung tribes and this plant was abundant in study area. That are cut as slices and soaked with water for one night and then cooked with slight rice powder. Thus, cooked Min-baw was a table dish of Palaung families.

Fresh leaves of *Elsholtzia stacyodes* (Phet-hinn-hent) had **27.40%** protein content. Protein content of Peanuts is 25.6% (Vaughan and Geissler 1997), therefore the wild plant *E. stacyodes* was a nutritious food plant for Palaung people. The leaves are eaten as spices, boiled and fried with other vegetables.

Fagopyrum cymosum (Wet-sa) is one of the wild vegetables, which has sour taste and they were cooked or fried. It contains 44.63% of protein, 1.086% of chlorophyll a, and 6.71% of water soluble carbohydrate as glucose. It had the highest protein content among the wild plant investigated.

Among the wild plants used as food, the protein contents of *Trevesia palmata* (Hpaw-bu) was second 40.47% and *C. urens* (Min-baw) with 34.67% of protein was third. The protein and carbohydrate contents of baung-laung-nyo are 29.42% and 5.97%, and the carbohydrate contents of *C. urens* (Min-baw) and *Bauhinia acuminata* (Swe-daw-phyu) are 13.82% and 10.88%.

Therefore, most Palaung people ate wild vegetables than cultivated plants. But, they were not knowledgeable of diet; these senses were obtained from traditional practical eating habit. In their surrounding wild

edible plants grew and later they planted them in their home garden for readily cooking and eating purposes.

Therefore most Palaung families were healthy and had a long lifespan. Many wild plants were used for vegetable, although the Palaung people had not record the wild plants they eat and their nutritional value. In this study, some local plants used as traditional vegetable were identified and the nutritional value were also analysed.

They used a variety of plants (both wild and cultivated) for their food, but this study work focused on wild plants than cultivated plants.

Recommendation

Information of edible wild plants which can be economically cultivated should be shared for other ethnic groups because some wild plants contain valuable amount of nutrient.

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Table (2) List of Some Plants used for food by Palaung Tribes in Kyaukme Township

No.	Scientific Name	Myanmar-Name	Family	Part Used	Uses
1	<i>Allium sativum</i> L.	Kyet-thun-phyu	Alliaceae	Bulb and young shoot	Food, Medicine
2	<i>Allium tuberosum</i> Roxb.	Gyu-myyit	Alliaceae	Young shoot with bud and roots	Food
3	<i>Alpinia conchigera</i> Griff.	Padegaw	Zingiberaceae	Rhizome	Food
4	<i>Bauhinia acuminata</i> L.	Swe-daw-Phyu	Caesalpiniaceae	Flowers	Food, Medicine
5	<i>Brassica campestris</i> L.	Mon-nyin	Brassicaceae	Young leaves and shoots	Food
6	<i>Camellia sinensis</i> (L.) Kuntze	Laphet(tea)	Theaceae	Young tender shoot	Food, Medicine
7	<i>Caryota urens</i> L.	Min-baw	Arecaceae	The pith of stem	Food
8	<i>Centella asiatica</i> (L.) Urb.	Myin-hwka	Apiaceae	Leaves	Food, Medicine
9	<i>Cydonia cathayensis</i> Hemsl.	Chinsaw-ga	Rosaceae	Fruit	Food
10	<i>Cyphomandra betacea</i> Sendt.	Sin-hkayan-gyi	Solanaceae	Young fruit	Food
11	<i>Dendrocalamus strictus</i> (Roxb.) Nees	Myin-wa	Poaceae	Young shoots	Utensils, Food
12	<i>Elsholtzia stachyodes</i> (Link) Raizada and Saxena	Phet-hinn-hent	Lamiaceae	Young shoots and leaves	Food, Medicine
13	<i>Eryngium foetidum</i> L.	Shan-nan-nan	Apiaceae	Young shoots and leaves	Food
14	<i>Fagopyrum cymosum</i> Meissn	Wet-sa	Polygonaceae	Young shoots and leaves	Food
15	<i>Ficus hispida</i> L.	Phet-wah, Ye-ka-on	Moraceae	Tender leaves and fruits	Food, Medicine
16	<i>Ficus virens</i> Ait.	Nyaung-shin	Moraceae	Young shoot	Food
17	<i>Foeniculum vulgare</i> Mill.	Samon-saba	Apiaceae	Shoots, fruits and roots	Food, Medicine
18	<i>Glycine max</i> (L.) Merr.	Pe-boke	Fabaceae	Seeds	Food
19	<i>Luffa cylindrica</i> (L.) M. Roem.	Tha-but	Cucurbitaceae	Young leaves and fruit	Food
20	<i>Moringa oleifera</i> Lam.	Dan-da-lun	Moringaceae	Fruits and tender leaves	Food
21	<i>Perilla frutescens</i> (L.) Brit.	Shan-hnan	Lamiaceae	Fruit and seeds	Food
22	<i>Piper altenuatum</i> Buch-Ham.	Sayo	Piperaceae	Young branches and stem	Food
23	<i>Polygonum hydropiper</i> L.	Phet-phe	Polygonaceae	Young shoots and leaves	Food
24	<i>Sechium edule</i> (Jacq.) Sw.	Gaw-ra-kha	Cucurbitaceae	Immature fruit and young shoots	Food
25	<i>Solanum americanum</i> Mill.	Baung-laung-nyo	Solanaceae	Young shoots and leaves	Food
26	<i>Solanum pubescens</i> Willd.	Kazaw-kha	Solanaceae	Young fruit	Food
27	<i>Solanum torvum</i> Sw.	Myobyet-khayan	Solanaceae	Young fruit	Food
28	<i>Trevesia palmata</i> (Roxb. ex Lindl.) Vis.	Hpaw-bu-pin	Araliaceae	Young leaves, flowers and buds	Food
29	<i>Vicia faba</i> L.	Tayoke-pe	Fabaceae	Seeds.	Food

Identification of specimens was carried out by Hutchinson 1959; Hooker 1881-87; Backer 1965; Dassanayake 1980-2001; and Kress, 2003.

Table (3) Nutritional value of Twelve wild plants used as food by Palaung tribes

No.	Scientific name	Myanmar name	Sample	Protein %	Moisture %	Ash %	Chlorophyll a %	Total carotenoids a %
1.	<i>Ficus virens</i> Ait.	Nyaung-shin	Fresh	10.29	70.99	5.10	0.380	0.210
			Dry powder	25.11	11.55	7.50	0.078	0.038
2.	<i>Caryota urens</i> L.	Min-baw	Fresh	34.67	89.16	18.80	N	N
			Dry powder	13.43	17.49	14.85	-	N
3.	<i>Ficus hispida</i> L.	Phet-wah	Fresh	26.43	82.71	11.00	0.421	0.178
4.	<i>Polygonum hydropiper</i> L.	Phet-phe	Fresh	14.14	74.12	17.10	0.990	0.416
5.	<i>Piper attenuatum</i> Buch-Ham.	Sayo	Dry powder	9.16	8.50	9.10	0.012	0.011
6.	<i>Elsholtzia stachyodes</i> (Link.) Raizada and Saxena	Phet-hinn-hent	Fresh	27.40	81.10	10.97	1.036	0.435
7.	<i>Swertia alata</i> Royle	Shan-say-kha	Fresh	17.80	73.74	2.80	N	N
8.	<i>Fagopyrum cymosum</i> Meissn	Wet-sa	Fresh	44.63	86.13	9.70	1.086	0.517
9.	<i>Trevesia palmata</i> (Roxb. ex Lindl.) Vis.	Hpaw-bu	Fresh	40.47	75.70	9.95	0.036	0.023
10.	<i>Solanum americanum</i> Mill.	Baung-laung-nyo	Fresh	29.42	65.95	5.15	0.482	0.024
11.	<i>Bauhinia acuminata</i> L.	Swe-daw-phyu	Fresh	33.44	84.67	1.65	N	N
			Dry powder	20.85	12.61	4.95	N	N
12.	<i>Foeniculum vulgare</i> Mill.	Samon-saba	Fresh	12.59	41.28	35.40	N	N
			Dry powder	7.08	11.58	2.28	N	N

*Source : Myanmar Pharmaceutical Factory, Sagaing, Myanmar., * N, present data not reliable,* -, no data provided.

Table (4) Determination of water soluble Carbohydrate as glucose

No.	Scientific Name	Plant parts	Myanamar Name	Weight of sample (g)	Absorbance	Weight of Carbohydrate (μg)	Carbohydrate (%)
1.	<i>Bauhinia acuminata</i> L.	Flowers and buds	Swe-daw-phyu	0.3020	0.427	41.732	13.82
2.	<i>Elsholtzia stachyodes</i> (Link.) Raizada and Saxena	Young leaves	Phet-hinn-hent	0.3008	0.100	9.8405	3.27
3.	<i>Ficus hispida</i> L.	Young leaves	Phet-wah	0.3020	0.091	8.9450	2.96
4.	<i>Polygonum hydropiper</i> L.	Young leaves	Phet-phe	0.3024	0.081	7.9100	2.62
5.	<i>Caryota urens</i> L.	Pith of the stem	Min-baw	0.3009	0.334	32.743	10.88
6.	<i>Foeniculum vulgare</i> Mill.	Roots	Samon-saba	0.3017	0.685	65.766	21.80
7.	<i>Ficus virens</i> Ait.	Young leaves	Nyaung-shin	0.3016	0.050	4.9273	1.63
8.	<i>Fagopyrum cymosum</i> Meissn	Young leaves and shoots	Wet-sa	0.3041	0.208	20.395	6.71
9.	<i>Solanum americanum</i> Mill.	Young leaves and shoots	Baung-laung-nyo	0.3010	0.183	17.962	5.97
10.	<i>Trevesia palmata</i> (Roxb. ex Lindl.) Vis.	Flowers and buds	Hpaw-bu	0.3010	0.234	23.001	7.64
11.	<i>Swertia alata</i> Royle	Young leaves and shoots	Shan-say-kha	0.3008	0.077	8.3094	2.76
12.	<i>Piper attenuatum</i> Buch-Ham.	young branch and stems	Sayo	0.3012	0.136	13.356	4.43

* Source : Myanmar Pharmaceutical Factory, Sagaing ,Myanmar



Buds of *Bauhinia acuminata* L.



Pith of the stem of *Caryota urens* L.



Habit of *Elsholtzia stachyodes*
(Link.) Raizoda and Saxena



Leaves of *Eryngium foetidum* L.



Young shoot of
Fagopyrum cymosum Meissn



Young leaves of
Ficus hispida L.



Young leaves of
Ficus virens Ait.



Tap roots of
Foeniculum vulgare Mill.



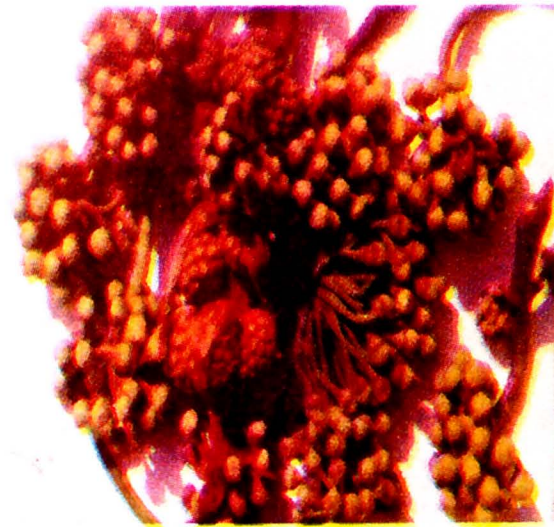
Young branches of
Piper altenuatum Buch-Ham.



Habit of *Polygonum hydropiper* L.



Habit of *Solanum americanum*
Mill.



Fruit of *Trevesia palmata* (Roxb.
ex Lindl.) Vis.

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