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Utilization of less known plants, *Gnetum gnemon* L. and *Rhynchotechum ellipticum* (Dietr.)A. DC. among the Karbis, Northeast India

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Abstract

Many wild plant foods are components of local pharmacopoeia, material life and religious practices of indigenous people. Dietary utilization, cultural significance and conservation of Hanthu (*Gnetum gnemon* L.) and Mehek (*Rhynchotechum ellipticum* (Dietr.) A. DC.) among the Karbis of Northeast India is discussed. Wild food plants constitute major component of food basket of the Karbi ethnic group in Northeast India. Field study was conducted at five sites- one representing urban population and four in remote rural areas. The method included group discussions comprising of men and women of different ages on the utilization of these plants; this was followed by interview of priests and women elders particularly to document the origin of the plants and cultural significance. *G. gnemon* and *R. ellipticum* are underutilized food plants in Assam, Northeast India. These plants are common dietary components of the Karbi ethnic group. The plants are customarily used in rituals as offerings called Thekar to deities hence, are culturally significant. Folklores of hanthu and mehek touch upon their origin and religion hence, integral part of their cultural heritage. Karbis often refer themselves as Hanthu-Mehek aso (children of Hanthu and Mehek). Further ethnobotanical study of *G. gnemon* and *R. ellipticum* among other ethnic groups could reveal important information of their migration and association with other tribes. For its high fibre content, the leaves can provide many health benefits. Among the two plants, *G. gnemon* can be easily domesticated in homestead gardens.

Keywords: Karbi, *Gnetum gnemon*, *Rhynchotechum ellipticum*, Culture.

Introduction

Wild food plants constitute major component of food basket of the Karbis, an ethnic group in Northeast India. Wild edible plants are integral for family diet, nutrition, food security and health; some edible plants are gathered and consumed as substitute for staple food (i.e., rice). This latter group of plants often designated as famine foods or emergency foods. There is however, no strict delimitation between staple foods and famine foods, as the so called famine foods are also utilized during period of food adequacy. Many poor Karbi families sell wild food plants in local market to generate cash income.[1, 2] Wild plant foods are also components of local pharmacopoeia, material life and religious practices. These group of plants are gathered from varied habitats- natural forests, agricultural fields, human disturbed areas such as roadsides and wastelands, wetlands- of which forest forms the most important source of wild foods for rural households. Resource availability by all account is the main driver of utilization of wild plant foods among the Karbi ethnic group. Utilization of certain wild plant foods is integral to their socio-cultural life.

Two less-known wild food species namely Hanthu (*Gnetum gnemon* L.; family Gnetaceae) and Mehek (*Rhynchotechum ellipticum* (Dietr.) A. DC.; family Gesneriaceae) are particularly significant to the Karbis. The plants are customarily used in rituals and folklores of these plants touch upon their origin, traditional foodways and religious practices. There are not many studies on documentation of folk knowledge of and cultural implications of wild edible plants. The body of plant knowledge of global cultural groups is fast disappearing due to availability of market and counter bought foods and destruction of natural habitats. The present ethnobotanical study sought to document dietary use, cultural implications and conservation of two underutilized wild foods *Gnetum gnemon* L. and *Rhynchotechum ellipticum* (Dietr.) A. DC.

***Gnetum gnemon* L. (Gnetaceae)**

Gnetum gnemon L. (family Gnetaceae), rated as least concern by IUCN, is an important agroforesty species in Southeast Asia and Melanesia.[3] It is native from Assam (Northeast India) eastward through Malesia and Fiji. *G. gnemon* is a shade tolerant, slender evergreen tree, growing up to 15m tall. Usually branching in whorls from the base and deeply rooted with a strong tap root system; the trunk is most recognizable with regular swollen rings around the girth, marking the position of old branches. Leaves are broad (10-20 cm), opposite, dark green, shiny, elliptic with netted veins. The plant is dioecious; the male strobilus has many pairs of cup-shaped bracts arranged in whorls that bear many microsporangia, while the female strobilus bears many ovules or seeds.[4] Fruits are ellipsoid, usually in clusters, 1-3.5cm long and half as wide, turning yellow to orange-red then purple at maturity. *G. gnemon* exists in several varieties, such as the tree form (var. gnemon) and the shrub forms (vars. Brunonianum, griffithii and tenerum).[5] In Assam *G. gnemon* grows wild as understory shrub; it has not been exploited as agroforestry plant.

***Rhynchotechum ellipticum* (Dietr.) A. DC. (Gesneriaceae)**

Rhynchotechum ellipticum (Dietr.) A.DC. (family Gesneriaceae) is an erect herb, 1-2m high with thickish stems. Leaves opposite and dentate at margin, subglabrous, base cuneate, whitish beneath, tawny above, silkily wooly, calyx lobes linear, pinkish; flowers rose-purple, in umbellate cymes in the lower axils, berry 6mm diameter.[6]

Wild edible plants (plants usually neither cultivated nor domesticated) are consumed throughout the world. According to FAO (Food and Agricultural Organisation) report, more than one billion people are using wild plants as their diet.[7] Many studies have found wild edible plants potential source of nutrition while in many cases are more nutritious than conventionally eaten crops.[8] Besides potential source of food, wild edible plants can contribute to food security through domestication of promising species.[9] Ethnobotanical study for the Karbis has been initiated by Jain and Borthakur.[10,11] Several reports from Northeast India have substantiated importance of wild edible plants among different cultures.[12-18] However, these studies have emphasized on food and medicinal utility and little discussion has been presented on cultural values of wild edible plants. Ethnobotanical account and cultural implications of *G. gnemon* and *R. ellipticum* among the Karbis has not been reported earlier hence, the present study.

Material and Methods

Study area and people

Field study for the present report was initiated in 2007 among the Karbis in Karbi Anglong district, Assam. Karbis belong to mongoloid race and linguistically Tibeto-Burman particularly Kuki-Chin sub group of languages. They are said to have been migrated from the Kuki-Chin area in and around the Chindwin River valley in Western Myanmar.[19] They are basically agrarian; rice is the staple food. Wild plants are regularly consumed as part of their diet and as source of nutrition, minerals etc. *G.gnemon* and *R. ellipticum* are important wild foods and also integral to their religious practices and so considered culturally significant.

We adopted the methods and techniques of Rao (1989) for the present study.[20] Five sites were selected, one in Diphu town area (representing urban population) and four in remote areas namely Dokmoka, Hamren, Tharvesuti and Kro kengdang (representing rural population). The rural study sites were located in forest or fringe areas and not properly connected by roads with urban area. First, group discussions were arranged with the assistance of village heads in all the study sites and participants (men and women of different age groups) were interviewed about the utilization of *G. gnemon* and *R. ellipticum*. We put three basic questions to all informants- familiarity with the plants, uses and cultural significance. The informants belonged to different occupational groups like agriculturist, grocers, housewives and students. Secondly, we interviewed priests and women elders from all study sites particularly to document folk origin of the plants and

cultural significance. Similar study was conducted among the Boro, Dimasa, Tiwa and Garo ethnic groups. We also visited local markets to study local dietary utility and economic potentials of *G. gnemon* and *R. ellipticum*. We participated in rituals where the above plants are used to have personal observations. Both the plants were collected from natural habitat (i.e., forest) and identified with the help of available literatures.[5, 6] The plants are processed and made into voucher specimen and deposited in the Department of Life Science and Bioinformatics, Assam University- Diphu Campus, Diphu for future reference.[21]

Result and Discussion

Gnetum gnemon (Fig. 1) and *Rhynchotechum ellipticum* (Fig. 2) are underutilized food plants in Assam, Northeast India. These plants are regularly consumed as food by the Karbis and its utilization is still vibrant among the people. All informants from Karbi community responded positive to knowing the plants, utility and cultural values; only a few youths from Diphu (urban area) responded ignorant about ritualistic use. Boro, Tiwa and Garo ethnic groups also knew the plants and consumed them as food but do not have cultural values in their societies. Informants from Dimasa ethnic group did not provide positive response about the plants but neither consumed nor have cultural uses. *Gnetum gnemon* (Hanthu) and *Rhynchotechum ellipticum* (Mehek) are culturally significant to the Karbis; these plants are customarily used in rituals. The plants are offered to traditional deities and this practice is locally referred as Thekar. The latter forms integral part of rituals whose non observance makes the same incomplete.

Figure 1: *Gnetum gnemon* from natural habitat

Figure 2: *Rhynchotechum ellipticum* with flowers

Very often the Karbis associate their origin and culture with hanthu (*G. gnemon*) and mehek (*R. ellipticum*) by referring themselves as Hanthu-Mehek aso which literally means 'children of Hanthu and Mehek'. It is difficult to explain how and when the Karbis came to be associated with *Gnetum gnemon* and *Rhynchotechum ellipticum*; studies among other ethnic groups could reveal important information of their migration and association with other tribes. For its high fiber content, the leaves may provide many health benefits. Cultural uses of these underutilized plants can still be continued and their germplasms conserved; *Rhynchotechum ellipticum* demands specific conditions for growth but *Gnetum gnemon* can be easily domesticated in homestead gardens hence, potential candidate for agroforestry.

Folklore of food plants

Folk beliefs of the Karbis associate the origin of present day edible plants with the myth relating to origin of the earth. According to a popular myth, after the creation of earth by the supreme deity Hemphu, the subordinate deity Sairikpo and Mairikpo sprinkled nine fistful of seeds towards the east and another nine fistful towards the west direction of the earth. The seeds germinated and flourished into hanthu (*Gnetum gnemon*) and mehek (*Rhynchotechum ellipticum*) among other food and non-food plants. Karbi legendary warrior Thong Nokbe was said to have first consumed wild plants and later the common Karbi people followed him. The first cuisine prepared by the Karbis was said to be hanthu cooked with him (rice flour) and pholo (alkaline water). Since then this method of food preparation was continued; this cuisine in the present time is popularly referred as Kangmoi. It is said that among the many edible plants, hanthu and mehek were specially selected as foods, because these were the most common wild plant easily available in the habitat of Karbi ancestors. For historical association with these plants, the Karbis also

refer themselves as Hanthu-Mehek aso (children of Hanthu and Mehek).

Dietary use and culinary knowledge of *Gnetum gnemon* and *Rhynchotechum ellipticum*

Hanthu (*Gnetum gnemon*) and mehek (*Rhynchotechum ellipticum*) constitute among the important plants of traditional diets of the Karbis. In rural villages women group make special trip to nearby forests to collect wild foods; they always include hanthu and mehek in their collections. Skills and experience ensure collection of good and preferred variety of hanthu and mehek. Because two types of hanthu are locally recognized- Hanthu kangtu and Hanthu kang-ar. The former type has thick and glabrous leaves and cooks well and palatable; the latter type has thin but leathery leaves and do not cook well, so usually not preferred for consumption. Similarly, mehek are also of two types. Mehek Tarkong has leathery leaves with high fiber content so usually not preferred; Mehek Kangtu is preferred as the leaves are thick and cooks well and palatable. Household requirement of wild edible plants are usually collected by women though men also make some contribution. But men hardly go for this specific purpose and collect only when working in jhum fields or along forest paths while returning from jhum fields.

Most common method of consumption of hanthu and mehek is cooking with pholo (alkaline water) and dried fish. Leaves are torn into pieces manually (Fig.3), washed with water and cooked by adding pholo. Addition of manthu (dried fish) provides perfect combination for consumption- pholo soften plant tissues and provides palatability while dried fish adds aroma and taste. No specific processing is required for these foods. Any delicacy cooked with pholo is referred as kangmoi.

Figure 3: Women tearing leaves of *Gnetum gnemon* for cooking

It may be noted that hanthu and mehek are cooked and offered to local deities during rituals, then the term Hanmi-Hanmoi is used for such sacred food. Hanthu and mehek are cooked alone and sometimes with meat. It produces revered delicacies when cooked with him (rice flour) and selected plants like hen (corms of aroids), hepi (brinjal), hanthai (*Maoutia puya* (Hook. f.) Wedd.), chusot (*Lasia spinosa* (L.) Thw.) and phree kangnek (*Zingiber rubens* Roxb.). For a change of taste, nowadays hanthu and mehek are eaten fried or cooked with lentil (Lens culinaris Medikus). These plants are common foods sold in local markets (Fig. 4) and thus, provide the opportunity to supplement household income. In the family cooking is the exclusive domain of women and culinary knowledge of wild foods (*G. gnemon* and *R. ellipticum* included) is transmitted from mothers to daughters. Further, in tribal societies culinary knowledge is considered an added quality for marriage.[9] Children from poor families acquire such knowledge early in their life because due to poverty, etc they are compelled to take care of their food needs at very early age. Consumption of hanthu and mehek among other tribes is said to be influenced by the Karbis, a view shared by many elders from non-Karbi communities. Proximity with the Karbis and inter-caste marriages over the years might have passed on the culinary knowledge of these less-known plant foods to other ethnic groups.

Figure 4: A woman vendors in local market sell wild vegetables including *Gnetum gnemon* (in circle)

Pholo is alkaline water locally prepared from ash of different plant species like lobong (Musa species), nempo (*Sesamum orientale* L.) and kepho (*Dendrocalamus hamiltonii* Nees et Arn. ex Munro). The material is placed in a conical sieve called pholobisir and water is added from above; water leach through the ash and escape at the bottom which is collected in a container. The leached solution called Pholo, is highly alkaline which is used for

cooking food items. In the past Pholo was used as detergent for washing clothes and also for hair wash.

Socio-cultural significance of Hanthu (*Gnetum gnemon*) and mehek (*Rhynchotechum ellipticum*)

Both Hanthu and Mehek are integral to religious practice of the Karbis; the plants are offered to local deities during rituals. On the occasion women tear the leaves into small pieces, washed and cooked by adding salt, pholo (alkaline water) and dried fish. This sacred dish is called Hanmi-Hanmoi and the sacred offering is called Thekar. The latter is integral part of ritual and failure to observe thekar is considered serious offence. The use of hanthu and mehek is particularly significant during Chojun, a ritual of invoking the Arnam Kethe or supreme deity of the Karbis. During this ritual some women are specially assigned to cook Hanmi-Hanmoi; this responsibility cannot be replace with male members. Further, it is mandatory to cooked leaves of hanthu or mehek with meat of the sacrificed animal. For the offering, Hanmi-Hanmoi is first distributed among male participants only (Fig. 5). The priest declares for collective incantation of the Arnam Kethe; a person takes a pair of plantain leaves and collects the offering of Hanmi-Hanmoi and rice beer from the male participants. Women associated with cooking Hanmi-Hanmoi also offer their share before the latter is finally offered to the supreme deity as thekar.

Figure 5: Third author received Hanmi-Hanmoi (inset, in circle) cooked with leaves of Gnetum gnemon during a Chojun ritual; Hanmi-Hanmoi is offered to Arnam Kethe (the supreme deity) as thekar.

It is difficult to state how and when the *Gnetum gnemon* L. (a gymnosperm) and *Rhynchotechum ellipticum* came to be associated with religious practice of the Karbis as elders and priests have failed to elaborate the matter. One probable explanation of this relationship is these plants were common foods in the habitat of Karbi ancestors and being easily accessible thought it wise to select these plants for Hanmi-Hanmoi. Because we observed that in places where hanthu and mehek are not available, other plants are cooked as Hanmi-Hanmoi for observing thekar. Elders and priests share a common view that the selection of hanthu and mehek for Hanmi-Hanmoi was attributed to abundance of these plants in the habitat of the Karbi ancestors. Another probability of this specific selection could be influenced by other culture; further investigation of this view therefore, could reveal interesting facts about migration and relations of the Karbis with other tribes.

Management and of conservation of *Gnetum gnemon* and *Rhynchotechum ellipticum*

G. gnemon and *R. ellipticum* are indispensable source of food and also integral to Karbi culture. Cultural practice of collection of these plants contributes to the management and conservation of germplasms. Selection of the plants is guided by folk knowledge that 'plants from previously collected population are more palatable than a new population'. We found the plants are collected and consumed throughout the year but one report suggests the plants are avoided during rainy season due to development of bitter principle.[11] Only shoots, not whole plant, are collected for consumption. Karbis claimed there are two benefits of regular collection of *G. gnemon* and *R. elliptichum* from the same population. First, it will enhance production of more tender shoots and thick leaves hence, more food of preferred choice for consumption, and second, regular collection prevents development of appreciable quantity of anti-nutrient factors. Users (i.e., Karbis) may not be aware of the implications of biodiversity conservation but such cultural practice contributed to conservation of some wild populations which are not disturbed, while some populations are managed by regular collection of tender shoots without cutting the plants. This cultural practice lends credence to the popular view that indigenous people can manage and conserve their forests. During collection of wild plant foods youths take practical lessons and elders of the group refine them by passing on cultural knowledge of gathering of not only *G. gnemon* and *R. elliptichum* but other wild food plants as well.

Conclusion

The present study and available reports suggest *Gnetum gnemon* and *Rhynchotechum ellipticum* are urderutilized foods; the plants are less-known being exploited by the Karbi ethnic group in Northeast India as food and in rituals. Ethnobotanical studies of the plants among other ethnic groups could reveal important information of their migration and association with other tribes. The leaves have high fiber content which can be understood from the need to add pholo (alkaline water) during cooking to soften the leaves. Fibers however, can provide many health benefits. Natural habitats of *G. gnemon* and *R. ellipticum* is rapidly diminishing due to clearing of forest cover for jhum agriculture, ginger, broom grass, rubber, tea, turmeric and other cash crops. Due to restricted distribution *G. gnemon* and *R. ellipticum* are substituted in rituals with cultivated crops like cabbage, papaya, cucurbits and brinjal. Sometimes *Baliospermum montanum* (Willd.) Muell.-Arg. (parok hanthu) is also used for ritual needs; leaves are soft and more palatable than *G. gnemon*. Cultural uses of these underutilized food plants can be continued and their germplasms conserved; *R. ellipticum* demands specific conditions for its growth but *G. gnemon* can be easily domesticated in homestead gardens and hence, potential candidate for agroforestry. Agroforestry practice with *G. gnemon* has promises to deliver multiple benefits- food supply, health, cultural identity and biodiversity conservation.

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