

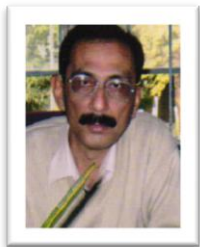
Medicinal uses of wild edible plants among the *Ao Nagas* of Mokokchung and its vicinity of Nagaland, India



Pramod Medhi,
Pandu College,
Guwahati, India



Ashish Kar
Environment & Industrial
Biotech., TERI, Guwahati



Sashin Kumar Borthakur
Gauhati University, Guwahati

The present investigation recorded 102 species of wild edible plants of *Ao Nagas* from Mokokchung and its vicinity areas of Nagaland state, India. The total recorded species belongs to be distributed in 52 families and 84 genera. Study recorded that 80 species belongs to dicots, 19 are monocots and 1 species each from Fungi, Pteridophyte and Gymnosperm. Again, the market survey revealed a total of 38 species are sold in the makeshift market of Mokokchung town; out of which 27 species from forest, 4 species from *Jhum* field and 7 species from homestead garden were collected for sale. Local market rates of the wild edibles ranges from Rs.5/- to 50/- per bundle/piece/packet/unit, depending on the plants or plant parts sold. All the recorded plant species are also used otherwise as medicine by the local *Ao Naga* people of the study area.

Keywords: Wild edible plants; *Ao Nagas*; Local market survey; Mokokchung district; Nagaland.

Introduction

Wild plants as food have been formed an integral part of the culture and tradition of many indigenous communities of the world. It constitutes an essential component in the diet and food security of many tribal communities, particularly living inside the forest or in its vicinity. They collect and consume a wide variety of wild plants and/or plant parts as well as edible mushrooms for sustenance in and around their habitat.

Out of the Earth's estimated half million plant species, about 3000 species have been used as agricultural crops and of this only 150 species have been cultivated on a large scale (Mohammed *et al.*, 2008). Also more than 85-90% of world's caloric intake is contributed by 12 crops only (Misra *et al.*, 2008). Millions of people in many developing countries still depend on wild plant resources to meet their food requirements especially during food crisis (FAO, 2004; Balemie and Kebebew, 2006) and plays a vital role in the food security of many rural communities. However, there has been an increasing interest in studying these wild food plants and their conservation and development for sustainable use can be noticed from different parts of the globe.

Several interesting works have been carried out by the workers like Rao and Jamir (1990) on ethnobotany of *Ao* and *Angami Nagas* of the Nagaland; Jamir (1995) on wild edible fruits in Nagaland State; Jamir (1996) on wild edible in Nagaland State; Takatemjen *et al.* (2009) wild edible fruits of Wokha district of Nagaland; wild edible fruits and vegetables of Nagaland Mozhui *et al.* (2011) on wild edible fruits used by the tribals of Dimapur district; Rongsensashi *et al.* (2013) on wild edible fruits of Fakim Wildlife Sanctuary, Nagaland; Deb *et al.* (2013) on survey and documentation of underutilized crops of Mokokchung, Wokha and Zunheboto districts of Nagaland.

Scrutiny of literature revealed that scanty and sporadic works have been carried out on wild edible plants of *Ao Nagas* of Mokokchung district and their local market value. Therefore, present investigation has been carried out with an objective to document the wild edible plant resources of *Ao Nagas* and also those sold in the *Mokokchung market* of Mokokchung district of Nagaland along with prevailing market prices.

The *Ao Naga* food

Rice is the staple food for the *Nagas*. A typical Naga dish consists of a meat, boiled vegetable, rice and chutney with pungent chillies. Different species of garlic and ginger including leaves are generally used in

Asian Resonance

cooking with meat. Frog meat with local herbs is another favourite dish of the *Nagas* (Majumadar, 2011).

Ao Nagas cuisine also mostly consists of wild vegetable, meat, fish, rice, fermented food etc. They cook vegetables and meats together and are basically boiled. The main drink is rice beer, which is prepared with vegetable ingredients. Moreover, the fermented tender bamboo shoot cooked with fish and pork and soybeans. The fish, pork, soybeans and other meat hunted from wild are the major source of protein supplements in their diet, which may be fermented, either smoked or sun dried.

The *Ao Naga* cuisine is characteristically the non-vegetarian food cooked by boiling instead of frying them. They are of a unique taste, enhanced by the flavour of the local herbal ingredients. Pork meat is the most popular one and cooked with fermented bamboo shoots. Since the cuisine is spicy in nature, seasonings occupy an important place in the preparation of food items. Chilies, ginger and various local herbs and leaves are an integral part of their cuisine and are used in most of the dishes.

Anishi is prepared from edible *Colocasia* leaves wrapped by banana leaves and kept aside till colour becomes yellow, then made into paste for preparing cake by adding chilly, ginger and salt, and are allowed to dry keeping over the fire place/hearth. Then, the cakes are cooked with dried pork, called *Anishi*, a typical *Ao naga* delicacy (Mao and Odyuo, 2007)

Again, the *Nagas* believe that certain meats can cure human diseases viz., dog meat can cure pneumonia and even the physical injuries can be healed by the bee/wasp larvae, snails and frog meat, etc. Even, they believe that a venomous snake bite can be treated by consuming a fluid of few live earthworms. Due to such beliefs in the curative and medicinal power of the meat of various animals and insects, the popularity of such items has remained the same over the ages.

Materials and methods

Study area and field survey

Mokokchung district of Nagaland state, India is bounded by the state of Assam to its north, and four districts of Nagaland state, viz., Wokha to its west, Tuensang and Longleng to its east, and Zunheboto to its south. The district lies between 26.32° 19' 0" N longitude and 94.52° 31' 0" E latitude. The district covers an area of 1,615 km². The temperature ranges from 4° to 30°C and average annual rainfall is 2000mm (Anonymous, 2012). Total population of the district is 193,171 (2011 population Census) and density 120/km² (310/sq mi) (Anonymous, 2011).

A total of 83.53% and 8.14% have been occupied by forest area cover out of total geographical area of the district and the state respectively. Two types of forests are found in the district viz., *Northern Tropical Semi Evergreen Forests*: found in the foothills of Assam-Nagaland border area and mostly dominated by the deciduous plant species and less evergreen plant species. *Northern Sub-tropical broad leaved wet hill*

forests: is found in the hill areas between 500 to 1800m above msl., mainly characterized by semi-deciduous trees. The soil type of the district is mainly of alluvial, non laterite red and forest soil.

Mokokchung town (also district headquarter) is located in between 26°20'N to 26.33°N latitude and 94°32' E to 94.53°E longitude and at 26.33; 94.53 the elevation of 1,325 m (4,347 ft) above msl. Mokokchung district is predominantly inhabited by the *Ao Nagas* and the Mokokchung town is the heart and cultural center of the *Ao Naga* people. The town is economically and politically the most important urban centre in northern Nagaland.

The present ethnobotanical investigation covered the recording of wild edible plants sold in the daily makeshift market of Mokokchung town and also the *Ao Naga* dwelling vicinity areas surrounding the town. The surveyed *Ao Naga* villages nearby Mokokchung town were viz., Changki, Chuchuyimpang, Mokokchung, Khensa and Ungma villages, etc. (Anonymous, 2012)

The ethnobotanical field survey was carried out during the month of April-2012 to January-2013. During the survey, data on local name, parts used available season, source of collection, mode of uses and medicinal uses were collected and recorded.



Map showing study area

Map-1: Map showing the location of Mokokchung town.

Informant selection and interview

Interview of the local informants on the use of local flora on wild edible plants and fruits was conducted following the method of Jain & Rao (1977). A total of 54 elders (34 male and 20 female) from 5 different villages and Mokokchung market were included in the present study. The age of the informants ranges from 21-78 years. Most of the selected informants belong to those families who have a strong connection with traditional agriculture for their day-to-day needs. In most cases selection of informants were based on recommendations made by local community members on those elders who were more knowledgeable about the use of local plants including traditional or folk medicine. *Ao Naga* names

Asian Resonance

of the recorded plants were checked and verified with the reference of Changkija *et al.* (2010).

Plant collection and identification

During field surveys, along with the documentation, the voucher specimens were also collected from different villages and field numbers were also been allotted to those collected specimens. Then, herbarium specimens were prepared following standard procedure by Jain and Rao (1977). The collected plants were identified and confirmed after consulting the Gauhati University Herbarium (GUBH). The identified voucher specimens were deposited at the Gauhati University Herbarium (GUBH) for future reference.

Results and Discussion:

The present study revealed the rich wild edible plant diversity and traditional knowledge on the uses of wild edible plant resources by the Ao Naga community from Mokokchung town and its vicinity areas of Nagaland.

A total of 102 species of wild edible plants, plant parts and fruits including 1 species of wild edible mushroom were recorded. The recorded species were arranged alphabetically (Table-1) for analysis of its taxonomic richness. Family wise recorded species were found to be distributed within 52 families (42 dicots, 7 monocots, 1 each from fungi, pteridophyte and gymnosperm) and also all the recorded species belongs to 84 generas. Out of the total species documented from the present work, it was recorded that 80 species belong to dicots, 19 are monocots and 1 each from Fungi, Pterodophyte and Gymnosperm.

The dicot families Solanaceae and Anacardiaceae had the highest number of wild edibles each recorded with 5 species; Amaranthaceae, Euphorbiaceae, Rutaceae, Rosaceae each with 4 species; Acanthaceae, Moraceae, Cucurbitaceae and Lamiaceae each with 3 species. The Monocot families Zingiberaceae, Araceae, Poaceae, Arecaceae, Liliaceae, and Dioscoreaceae were represented each with 3 species.

Again, considering the use of the plant parts the categorization of the species recorded can be done as- leaves 11; shoot 23; whole plant 6; stem bark 1; corm 1; tubers 5; root bark 1; flower 4, inflorescence 4, seed 1; kernel 2; nuts 1; fruit 33; fruiting body (fungi) 1; circinate frond 1 and 8 with more than one parts are used such as tuber & leaves; fruit & rhizome; fruit & bark; fruit & seed; shoot & calyx; tender fruit & tender shoot; shoot & fruit and leaves & fruit. Significantly, all the recorded 102 species are also used as medicinal herbs by the Ao Nagas of the study area.

Out of the total recorded 102 species, a total of 38 species were found to be sold in the Mokokchung makeshift market and are listed in the Table-2. Considering the sources of collection for marketing, 27 species from forest; 4 species from cultivated *Jhum* field and 7 species from homestead garden were recorded. Local market rates of the wild edibles ranges from Rs.5/- to 50/- per unit, depending on the plants or plant parts sold. Quantity of the sold items in the market was as bundle, piece, packet and

unit form. Fermented food products of soybean, bamboo shoots, dry fish, crab and colocasia leaves were also found to be sold in the market. Smoked meats, fish, chilly were also common items in the market. Frog, crab, eel fish and different wild birds had also been observed in the market. Though the *Allium hookeri*, *Allium porrum*, *Cyphomandra beta cea*, *Eryngium foetidum*, *Hibiscus sabdarifa*, *Manihot esculenta*, *Passiflora edulis*, *Phyllanthus acidus*, *Solanum gilo*, *Zingiber officinale*, etc. are recorded to be cultivated but included in the present study because of their uses of parts otherwise in the study area, are not of common use in other areas.

The Ao Nagas of the present study area have been using diverse plant resources since time immemorial and thus gathered rich traditional knowledge on it for their primary health care, food and shelter. But, due to various anthropogenic activities and overexploitation, these plant resources are under tremendous stress condition. Agricultural land expansion, practice of traditional shifting cultivation, forest fires and also lack of sustainable harvesting practices such as excessive extraction of some plants both for household consumption or sale in the local markets for income generation are known to be the main reason. Therefore, proper and organized documentation of local plants used and identification of potential species for prioritization of conservation through sustainable management, so that the resources and knowledge base can be preserved, managed and utilized.

Consumption of wild food plant resources formed not only an important part of the culture and tradition of Ao Nagas but also contributes a significant amount to the diet and household economy of the local people, particularly the poor and economically marginalized families, thereby generating a supplementary income to their economy.

It is also noteworthy that among the urban dweller ethnic people still there is a very high demand for the wild edibles because of their traditional food habit and life style. Multi-tier plant garden can be an effective measure not only for conservation and sustainable management of these wild vegetables and fruits but also for income generation and food security of the ethnic people. Commercialization of some of the ethnic products can be a successful venture for economic upliftment and social justice of the ethnic groups (Medhi and Borthakur, 2012).

Moreover, many of these edible plants are also reported to have medicinal value. But the nutritional values and toxic side effects of these wild edible bio-resources of the region have not yet been investigated. Therefore, some of the recorded wild edible plants may serve as baseline data for future studies on nutritional values and possible side effects. It will also be helpful to identify and priorities plants that may improve nutritional values and increase dietary diversity. Again, some of these wild edible plants may have the potential to be valuable food sources if brought into cultivation and could be part of a strategy to be used as sources of supplementary food.

Asian Resonance

Acknowledgements: Authors are thankful to the local informants and the village community and also the vendors of Mokokchung market for sharing their knowledge on medicinal uses of wild edible plants among the *Ao Nagas* of the study area.

References:

1. Anonymous, 2011. District Census 2011. (www.census2011.co.in), Retrieved on 2011-09-30.
2. Anonymous, 2012. Mokokchung District, National Informatics Center (www.mokokchung.nic.in). Retrieved on 2011-09-30.
3. Balemie, K. and Kebebew, F. (2006), Ethnobotanical study of wild edible plants in Derashe and Kucha Districts, South Ethiopia. *J. Ethnobiol. Ethnomed.*, Vol. 2, No. 53, doi: 10.1186/1746-4269-2-53.
4. Changkija, S., Ajungla, L., Rongsenshashi and Mozhui R. (2010), Medicinal and Aromatic plants of Nagaland, Medicinal Plants Development Agency, Govt. of Nagaland, pp.1-451.
5. Deb, C.R., Jamir, N.S. & Ozukum, S. (2013) A study on the survey and documentation of underutilized crops of three districts (Mokokchung, Wokha and Zunheboto) of Nagaland, India, *Journal of Global Biosciences*, Vol. 2, No.3, pp 67-70.
6. Food and Agriculture Organization of the United Nations (FAO) (2004), Annual Report: The state of food insecurity in the world, Monitoring the progress towards the world food summit and millennium development goals, Rome.
7. Jain, S.K. and Rao, R.R. (1977), A hand book of field and herbarium methods, Today's and Tomorrow's Publ., New Delhi, India.
8. Jamir, N. S. (1995), Study of the wild edible fruits in Nagaland State, India, *J. Non Timber For. Prod.*, Vol. 2, No. 1/2, pp 79-82.
9. Jamir, N.S. (1996). Study of the wild edible fruits in Nagaland state, India. *Journal of Non-TimberForest Products*, Vol. 2, No. 1&2, pp 79-82.
10. Mao, A.A. and Odyuo, N. (2007), Traditional fermented foods of the Naga tribes of India, *Indian j. Trad. Knowl.*, Vol. 6, No.1, pp 37-41.
11. Mazumdar, P. (2011), The Nagas eat anything that moves. DNA News, Dimapur, India.
12. Medhi, P. and Borthakur, S.K. (2012), Phytoresources from North Cachar Hills of Assam-III: Edible plants sold at Haflong market. *Indian J. Nat. Prod. Resour.*, Vol. 3, No.1, pp 84-109.
13. Misra, S., Maikhuri, R.K., Kala, C.P., Rao, K.S., Saxena, K.G. (2008), Wild leafy vegetables: A study of their subsistence dietetic support to the inhabitants of Nanda Devi Biosphere Reserve, India. *J. Ethnobiol. Ethnomed.*, Vol. 4, No. 15. doi:10.1186/1746-4269-4-15.
14. Mohammed, S.A.S., Rana, M.J., Jehan, H.A.S., Wafa, A.E., Fatemah, A.K., Kifayah, H.Q., Isra, S.K., Israa, M.S., Asee, I.A.M., Buthainah, A.I., Hanan, M.H., Rasha, B.K., Samiah, M.A., Ghadah, M.S., Muna, A.A., Maha, M.H.A., Nehaya, A.S., Hebah, K.A. and Hanadi, A.N. (2008), Traditional knowledge of wild edible plants used in Palestine (Northern West Bank): A comparative study, *J. Ethnobiol. Ethnomed.* Vol. 4, No. 13, doi: 10.1186/1746-4269-4-13.
15. Mozhui, R., Rongsenshashi, Limasenla and Changkija, S. (2011), Wild edible fruits used by the tribals of Dimapur district of Nagaland, India, *Pleone*, Vol. 5, No. 1, pp 56-64.
16. Rao, R.R. and Jamir, N.S. (1990), Ethnobotany of the *Ao and Angami Nagas* of Nagaland, *J. econ. Taxon. Bot.*, Vol. 3, No.3, pp 593-604.
17. Rongsenshashi, Mozhui, R., Changkija, S. and Limasenla (2013), Wild Edible Fruits of Fakim Wildlife Sanctuary, Nagaland, North-east India, *Indian Forester*, Vol. 139, No.5, pp 16-19.
18. Takatemjen, Jamir, N.S. and Deb, M. (2009), Wild edible fruits of Wokha district of Nagaland, India, *Pleione*, Vol. 3, No. 1, pp 59-62.