

Wild vegetables sold in local markets in the Mokokchung district of Nagaland, India

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[Received 15.09.2015; Revised 07.12.2015; Accepted 13.12.2015; Published 31.12.2015]

Abstract

The paper deals with 51 species of wild edible plants sold as vegetables in the markets of Mokokchung district, Nagaland by the *Ao Naga* tribe. The report includes the scientific name, local name, mode of use and market price of the recorded plants. The paper also discussed the prospects of marketing such vegetables in the region and suggested for further research, documentation and cultivation of the vegetables so as to generate a continuous source of livelihood for the people.

Key words: Mokokchung, *Ao Naga* tribe, Wild vegetables, Market price

INTRODUCTION

The state of Nagaland is situated in the North Eastern region of India, and covers an area of 16,579 sq km at an altitude ranging between 194 to 3048 m above mean sea level with the highest peak in Saramati, located at Kiphire district bordering Myanmar (Prakash 2006). Nagaland harbours rich biodiversity as it has a rich variety of flora and fauna due to its thick and virgin forest cover (Nayak 2013). Mokokchung district, the territory of the *Ao Naga* tribe lies between 26.12° and 26.45° North Latitude and 94.18° and 94.50° East Longitude respectively. The region is mostly mountainous except those bordering the Assam valley.

Due to their close association with forests, the *Aos* have developed a unique bond with the plants around them. This can be visible in the richness and variety of plants they consume in their daily diet. Vegetables play a significant role in their food habits. An abundance of vegetables grow naturally in their surrounding forests which also contribute to the daily sustenance of the local vendors in earning their livelihood through these forest products (Tiwari *et al.* 2010).

The survey on wild edible vegetables in different parts of North-eastern India has been conducted by various workers including Jain & Borthakur (1980), Hajra & Chakraborty (1981), Arora (1990), Maikuri (1991), Kumar (2003), Kar (2004), Chetri (2006), Gajurel *et al.* (2006), Sanwal *et al.* (2007), Kumar & Kumari (2007), Kayang (2007), Kar & Borthakur (2008), Mao *et al.* (2009), Koushik & Datta (2009), Salam *et al.* (2010), Mohanty (2010) and Medhi & Borthakur (2012a, 2012b, 2013).

However, with the exception of a paper (Changkija & Kumar 1996), which highlights the ethnobotanical aspect and usage of certain plants by the people of the district of

Mokokchung, there is no proper record of such studies from this district. The present work recorded the wild edible vegetables sold in the local markets of Mokokchung district of Nagaland in the NE India.

MATERIALS AND METHODS

The field survey was undertaken for two years during 2014 – 2015. The selection of local markets was done on the basis of availability and demand of wild vegetables in abundance in different villages (viz. Changki, Ungma, Khensa, Longjang, Aliba, Chungtia, etc.) of Mokokchung. The quantities of the vegetables being sold in that area were surveyed and plant specimens along with requisite information were collected. The information on the uses and price of the vegetables were recorded and verified carefully from local vendors, vegetable dealers, village head, and other local informants. The collected plants were made into herbarium specimens following the standard techniques (Jain & Rao 1977). Specimens were identified with the help of local floras (Hooker 1872 – 1897; Kanjilal *et al.* 1934 – 1940) and were matched with the pre-identified specimens in the departmental herbarium. The voucher specimens were then deposited in the Herbarium of the Department of Botany, Nagaland University for future reference.

ENUMERATION AND RESULT

Botanical names of recorded and identified plants are arranged alphabetically in Table 1 along with their family and local names followed by useful parts. Mode of use, market value and availability of the plants different villages of the district are also mentioned in the table.

Table 1: List of wild edible vegetables marketed in the village markets in the Mokokchung district of Nagaland

Plant Name/ Family/ Exsicattae	Ao name	Part(s) sold	Mode of use	Market price in per unit	Market locality
<i>Allium chinense</i> G. Don [Liliaceae]; LS – 22	<i>Tejangla-siing</i>	Bulb	Used in chutney and as fry	50 per kg	Changki, Khensa, Longjang, Mokokchung town
<i>Allium hookeri</i> Thwaites [Liliaceae]; LS – 03	<i>Repchi</i>	Leaves	Made into chutney	10 per bundle (200 – 250 gm)	Aliba, Changki, Khensa, Mokokchung town
<i>Allium sativum</i> Linnaeus [Liliaceae]; LS – 25	<i>Lasiing</i>	Bulb	Boiled with meat; also made into chutney	20 per kg	Changki, Chungtia-yimsen, Mokokchung town
<i>Alpinia galanga</i> Willdenow [Zingiberaceae]; LS – 41	<i>Totoo</i>	Tender shoots	Eaten boiled	20 per bundle (±1 kg)	Changki, Longtho
<i>Amaranthus tricolor</i> Linnaeus [Amaranthaceae]; LS – 56	<i>Rhua</i>	Leaves	Eaten in chutney	10 per bundle (500 – 800 gm)	Aliba, Mokokchung town
<i>Artocarpus heterophyllus</i> Lamarck [Moraceae]; LS – 07	<i>Anak-piong</i>	Seeds	Roasted and made into chutney	15 per kg	Longtho, Mokokchung town
<i>Bambusa tulda</i> Roxburgh [Poaceae]; LS – 67	<i>Longmi</i>	Tender shoots	Boiled and eaten	20 per kg	Aliba, Changki, Mokokchung town
<i>Bauhinia purpurea</i> Linnaeus [Leguminosae : Caesalpinioideae]; LS – 70	<i>Weipent-ong</i>	Flowers	boiled with pork	10 per bundle (500 – 800 gm)	Changki, Chungtia

Plant Name/ Family/ Exsicattae	Ao name	Part(s) sold	Mode of use	Market price in per unit	Market locality
<i>Begonia palmata</i> D. Don [Begoniaceae]; <i>LS</i> – 29	<i>Alikhaba</i>	Shoots	Eaten raw in chutney	10 per bundle (1 kg)	Changki
<i>Benincasa hispida</i> (Thunberg) Cogniaux [Cucurbitaceae]; <i>LS</i> – 45	<i>Maosü</i>	Fruits	Boiled along with chicken	10 per piece	Alichen, Changki, Longtho, Ungma
<i>Calamus erectus</i> Roxburgh [Arecaceae]; <i>LS</i> – 59	<i>Aro-tong</i>	Tender shoots	Eaten boiled and in chutney	20 per bundle (600-800 gm)	Changki
<i>Capsicum annuum</i> Linnaeus [Solanaceae]; <i>LS</i> – 09	<i>Mertsü</i>	Fruits	Used in chutney & eaten raw	25 per kg	Changki, Khensa, Ungma
<i>Carica papaya</i> Linnaeus [Caricaceae]; <i>LS</i> – 31	<i>Omita</i>	Fruits	Boiled to eat	5 per piece	Aliba, Chungtia, Longjang, Ungma
<i>Caryota urens</i> Linnaeus [Arecaceae]; <i>LS</i> – 49	<i>Asangtong</i>	Tender shoots	Eaten boiled	10 per kg	Changki, Mokokchung town
<i>Centella asiatica</i> (Linnaeus) Urban [Apiaceae]; <i>LS</i> – 62	<i>Longsoko rokla</i>	Whole plant	Taken as chutney	10 per bundle (250 – 300 gm)	Chungtia-yimsen, Khensa, Longtho
<i>Chaerophyllum villosum</i> Wallich <i>ex DC.</i> [Apiaceae]; <i>LS</i> – 64	<i>Pangpan- glen</i>	Whole plant	Eaten as chutney	20 per bundle (600 – 800 gm)	Changki, Longtho
<i>Clerodendrum colebrookianum</i> Walpers [Lamiaceae]; <i>LS</i> – 135	<i>Orematon g</i>	Tender shoots	Boiled to eat	10 per bundle (500 – 600 gm)	Aliba, Changki, Mokokchung town
<i>Colocasia esculenta</i> (Linnaeus) Schott [Araceae]; <i>LS</i> – 12	<i>Amitong</i>	Rhizom e	Taken boiled with dry fish or meat	20 per kg	Impur, Mokokchung town
<i>Crataeva nurvala</i> Buchanan- Hamilton [Capparaceae]; <i>LS</i> – 32	<i>Enkatong</i>	Fresh leaves	Eaten boiled	10 per bundle (500 – 800 gm)	Changki, longtho
<i>Cucumis sativa</i> Linnaeus [Cucurbitaceae]; <i>LS</i> – 51	<i>Matsusü</i>	Ripe fruits	Eaten boiled	50 for ten pieces	Aliba, Changki, Chungtia
<i>Dendrocalamus hookeri</i> Munro [Poaceae]; <i>LS</i> – 38	<i>Awa</i>	Tender shoots	Fermented and eaten boiled in various curries	20 per kg	Aliba, Changki, Mokokchung town
<i>Dillenia indica</i> Linnaeus [Dilleniaceae]; <i>LS</i> – 131	<i>Oojang</i>	Whole fruits	Eaten boiled with dry fish	20 per kg	Changki, Longtho
<i>Dioscorea alata</i> Linnaeus [Dioscoreaceae]; <i>LS</i> – 78	<i>Moulocha</i>	Tuber	Eaten boiled and with dry fish	10 per kg	Aliba, Chungtia, Mokokchung town
<i>Diplazium esculentum</i> Swartz [Athyriaceae]; <i>LS</i> – 15	<i>Enjen</i>	Tender leaves	Eaten as boiled and fried	20 per bundle (450 – 500 gm)	Chungtia-yimsen, Changki, Longtho
<i>Distemon indicum</i> Weddell [Urticaceae]; <i>LS</i> – 44	<i>Aok zaklo</i>	Young leaves	Eaten boiled	10 per bundle (1 kg)	Aliba, Changki
<i>Elsholtzia blanda</i> Bentham [Lamiaceae]; <i>LS</i> – 54	<i>Napa</i>	Leaves	Flavouring agent in trace amount for boil and chutney	30 per bundle (300 – 500 gm)	Khensa, Longjang, Mokokchung town
<i>Glycine max</i> (Linnaeus) Merrill [Fabaceae]; <i>LS</i> – 19	<i>Chamisü</i>	Seeds	Fermented and boiled with meat; as chutney	20 per 250 gm	Changki, Mokokchung town

Plant Name/ Family/ Exsicattae	Ao name	Part(s) sold	Mode of use	Market price in per unit	Market locality
<i>Gnetum gnemon</i> Linnaeus [Gnetaceae]; LS – 35	<i>Milemwa</i>	Tender leaves, seeds	Eaten boiled; pork cooked with leaves	20 per bundle (600 – 800 gm)	Changki, Longtho
<i>Gynura nepalensis</i> DC. [Asteraceae]; LS – 68	<i>Ensü</i>	Leaves	Eaten boiled; also in chutney	10 per bundle (450 – 500 gm)	Aliba, Chungtia, Longjang
<i>Hibiscus sabdariffa</i> Linnaeus [Malvaceae]; LS – 109	<i>Entsürep</i>	Fruits	Boiled with meat	20 per kg	Mokokchung town, ungma
<i>Houttuynia cordata</i> Thunberg [Saururaceae]; LS – 84	<i>Alimoli</i>	Leaves	Eaten as chutney	10 per bundle (450 – 500 gm)	Changki, Mokokchung town
<i>Lablab purpureus</i> Linnaeus [Leguminosae: Faboideae]; LS – 74	<i>Napakosü</i>	Seeds	Cooked with meat and dry fish	30 per kg	Aliba, Changki, Mokokchung town
<i>Lagenaria siceraria</i> (Molina) Standley [Cucurbitaceae]; LS – 91	<i>Lao</i>	Fruits	Boiled and with pork to eat	20 per piece	Longtho, Mokokchung town
<i>Lasia spinosa</i> (Linnaeus) Thwartes [Araceae]; LS – 120	<i>Thorang</i>	Whole plant	Eaten boiled	25 per bundle (±1 kg)	Changki
<i>Luffa cylindrica</i> (Linnaeus) M.J. Roemer [Cucurbitaceae]; LS – 93	<i>Poaksu</i>	Fruits	Eaten boiled	20 per bundle (5 – 7 pieces)	Aliba, Changki
<i>Lycopersicon esculentum</i> Miller [Solanaceae]; LS – 123	<i>Bengana</i>	Fruits	As chutney and almost in all curries	30 per kg	Longkhum
<i>Momordica charantia</i> Linnaeus [Cucurbitaceae]; LS – 101	<i>kerala</i>	Fruits	Eaten boiled and fried	20 per kg	Longtho, Mokokchung town
<i>Parkia timoriana</i> (A. DC.) Merrill [Leguminosae : Mimosoideae]; LS – 72	<i>Yongchak</i>	Seeds	Roasted and as chutney	30 per kg	Changki, Ungma
<i>Passiflora edulis</i> Sims [Passifloraceae]; LS – 113	<i>Entsülashi</i>	Leaves	Eaten boiled	10 per bundle (500 gm)	Aliba, Chungtia
<i>Phaseolus aureus</i> Roxburgh [Fabaceae]; LS – 128	<i>Chami</i>	Seeds	Eaten boiled	20 per kg	Aliba, Longjang
<i>Punica granatum</i> Linnaeus [Lythraceae]; LS – 99	<i>Taliim</i>	Leaves	Eaten boiled	10 per bundle (500 – 800 gm)	Longtho
<i>Psophocarpus tetragonolobus</i> DC. [Leguminosae: Faboideae]; LS – 115	<i>Dei-jaala chami</i>	Fresh fruits	Eaten as salad and chutney	Rs. 25 per kg	Changki, Ungma
<i>Rhynchosyche ellipticum</i> A. DC. [Gesneriaceae]; LS – 103	<i>Zopatong</i>	Leaves	Eaten raw in chutney or boiled with pork	10 per bundle (600 – 800 gm)	Changki, Longtho
<i>Rhus semialata</i> Murray [Anacardiaceae]; LS – 96	<i>Thangma</i>	Fruits	Crushed and boiled and in mushroom curry	50 per kg	Aliba, Changki, Mokokchung town
<i>Sechium edule</i> (Jacquin) Swartz [Cucurbitaceae]; LS – 122	<i>Squash</i>	Fruits	Eaten boiled and fried	10 per kg	Changki, Ungma
<i>Solanum indicum</i> Linnaeus [Solanaceae]; LS – 85	<i>Longkoks u tasola</i>	Fruits	Eaten boiled with dry fish	20 per kg	Aliba, Changki
<i>Solanum melongena</i> Linnaeus [Solanaceae]; LS – 89	<i>Bendosu</i>	Fruits	Boiled with dry fish and meat; also fried	20 per kg	Aliba, Mokokchung town

Plant Name/ Family/ Exsicatae	Ao name	Part(s) sold	Mode of use	Market price in per unit	Market locality
<i>Zanthoxylum oxyphyllum</i> Edgewarth [Rutaceae]; LS – 105	Monga	Leaves	Boiled with dry fish and meat	20 per bundle (500 – 800 gm)	Ahangki, Longtho
<i>Zanthoxylum rhetsa</i> (Roxburgh) DC. [Rutaceae]; LS – 81	Mongret	Dried fruits	As flavouring agent in meat	30 per kg	Changki
<i>Zea mays</i> Linnaeus [Poaceae]; LS – 111	Ajangtang ba	Cypsela	Eaten boiled	20 per bundle (6 – 8 pieces)	Changki, Chungtia, Mokokchung town
<i>Zingiber officinale</i> Roscoe [Zingiberaceae]; LS – 77	Sungmok	Rhizome	Flavouring agent in curries and chutney	20 per kg	Aliba, Chungtia, Longjang

DISCUSSION

In the survey, 51 species of wild edible vegetables were recorded from different local markets of Mokokchung district. Out of these, 49 species belonged to Angiosperm including 13 species of monocotyledons, 36 species of dicotyledons, and one species each of Gymnosperms and Pteridophytes. Of the 51 species of vegetables, part of the plants used and sold as vegetables by the locals are recorded as: 2 rhizomes, 2 bulbs, 13 leaves, 7 shoots, 17 fruits, 1 flower, 3 whole plants, 6 seeds and 1 tuber. For some plants, more than one part is used as vegetable – viz, *Gnetum gnemon* (Leaves and seeds). Market prices of the vegetables were collected from those local markets where the selling of vegetables is highly productive and renowned (viz, Changki, Chungtia, Mokokchung town, Aliba, Longjang, etc.). The price of these vegetables does not remain constant as it fluctuates from season to season depending on the climate and availability. The demand for wild edible vegetables is high as the town dwellers still prefer the traditional ethnic cuisine for their daily food habit (Medhi & Borthakur 2012a). The vegetable vendors earn enough to sustain their families' livelihood from the selling of these edible vegetables – Rs. 1 lakh to 2.5 lakhs for a season (Sashimatsung *et al.* 2013). A significant observation among the local vendors was that, the folks selling these vegetables comprised mostly of women-folk whereby they gather the vegetables by themselves and sell their own vegetables brought from the forests.

In spite of the advancement in technology, it is pleasantly surprising that the local vendors sell these edibles without any treatment or contamination with inorganic or chemical supplements. Thus, there is immense potential and possibilities to market these wild edible vegetables even outside of the state as pure uncontaminated vegetables. Of the edible vegetables sold, the most marketed ones among the locals were *Cucumis sativa*, *Diplazium esculentum*, *Gnetum gnemon* and *Parkia timoriana*. A grave concern regarding the selling of these vegetables is that, the quantity of wild edible vegetables sold in the market is declining every season as the forest cover is shrinking at a rapid rate due to modernisation, road development, human invasion, etc. Thus, there is urgent need to better monitor and manage these commodities judiciously in a proper way by executing effective measures for the conservation of these plants.

CONCLUSION

The vegetables found in natural habitat offer a wide range of earning potential for the locals for their livelihood. There is enough demand of these vegetables by the inhabitants that one can make a living by marketing these vegetables because of their daily food habit and life

style. One significant reason behind the high demand is the purity and un-adulterated nature of the vegetables as the raw ones being sold are free from pesticides and other chemical products. It is also quite noteworthy that these vegetable have medicinal value which keep the locals healthy and energetic in a community mainly consisting of farmers. Thus, further phytochemical analysis of these species can provide many interesting and valuable insights for nutritional source in future.

The present investigation is only a segment of actual vegetable plants found in Mokokchung district of Nagaland. Further detailed survey will aid in better exploration and management of these useful resources where there is urgent need to conjure up some strategic models to keep a constant flow of these commodities and also to develop scopes for improving the yield without compromising on the purity of these vegetables far from any side-effects.

Acknowledgements

The authors are thankful to the vegetable vendors, village councils and to all other informants for providing the information and also for helping out in the field work. They are also thankful to Mr. Shantanu Dey for assisting in identifying the collected specimens.

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