

Edible *Hymenopterans* as a food source, North East India: A review

R P Liidou^{1*}, L Khamashon², Ishwar Haobam¹

¹ Department of Zoology, Dhanamanjuri University, Thangmeiband, Imphal, Manipur, India

² Assistant Professor, Department of Zoology, Dhanamanjuri University, Thangmeiband, Imphal, Manipur, India

Corresponding Author: R P Liidou

DOI: <https://doi.org/10.66856/ijer.2026.11.2.11202>

Abstract

Entomophagy is part of the culture and practices of many Tribal community in Northeast India. Many Hymenoptera species are considered edible to humans, providing nutrition and medicinal properties. Among the Hymenopteran families, *Vespidae* remain the highest consumed family, *Vespidae*: 66%, *Apidae*: 23%, Formicidae: 5%, Ichneumonidae: 3%, Xylocopidae: 3%. A total of 35 different edible *Hymenopterans* have been identified in Northeast India. Some can be domesticated, while some are semi-domesticated. Most of the edible Vespids are semi-domesticated and used for commercial purposes. Honey bees are reared at home mainly for honey production. As Northeast India mainly comprises Tribal communities, many considered insects a delicacy. From time immemorial, they have also been using edible *Hymenopterans* to treat diverse forms of diseases. Compared to other states in Northeast India, Arunachal Pradesh, Manipur and Nagaland have higher records for consumption of *Hymenopterans*. This review article mainly focuses on the consumption of *Hymenopterans* and their distribution across different Northeast states.

Keywords: *Hymenoptera*, edible insects, *vespidae*, *apidae*

Introduction

Insects represent one of the largest groups of animals, and form a colossal, largely untapped biomass that is generally wasted rather than utilised. Insects can be very beneficial to humans, providing nutrition, medicine and a good source of protein (Ramos-Elorduy, 1997) [16]. Due to pressure on the global food system, environmental change, population increase and unsustainable farming methods, there is a need to find new forms of food sources. Edible insects appear to be one of the best alternatives as they have high nutritional value, low environmental impact and cultural acceptance (Van Huis *et al.* 2013) [20]. Entomophagy is part of the culture and practices of many tribal communities in Northeast India. They enjoy it as part of their diet and consider it a delicacy (Chakravorty *et al.*, 2011) [4]. In Manipur, the Asian giant hornet is considered a delicacy and fondly eaten by people of all ages. They can be semi-domesticated and used for commercial purposes. The anti-nutritional and nutritional values contain high protein, carbohydrates, fats and include fibres (Sheileja *et al.*, 2023) [19]. In Nagaland, various *Hymenopterans* such as *Vespa sorror* du Buysson, *Vespa mandarina* Smith, *Vespa orbata* du Buysson and *Vespa tropica* Linn are semi-domesticated, and *Apis cerana indica* Fabr is domesticated and used for commercialisation. Almost all are available in the wild, but by proper study on ecology, cultivation, domestication, management and conservation strategies, they can be produced in bulk and boost the economy and be beneficial for the environment. [Mozhui *et al.*, 2020; Keiwhuo *et al.*, 2022; Mozhui *et al.*, 2022) [13, 12, 14]. In Assam, during Bonag Bihu or Rongali Bihu, a traditional ethnic festival which is celebrated usually in April, Red ants (*Oecophylla smaragdina* Fabr) are considered important food items. Moreover, formic acid, which is produced by the ants, can be beneficial for our health by preventing the body from infectious diseases like malaria, stomach disorders and toothaches (Doley and Kakati, 2012) [8].

This review article aims to understand the entomophagy of *Hymenopterans* across Northeast India and to list the states where they are prevalent and reported. Many Ethnic Tribal communities are deeply embedded in the consumption of insects and consider them a delicacy. Some *Hymenopterans* are even semi-domesticated or domesticated for commercial purposes.

Edible *Hymenopterans* in Northeast India (Table 1)

The North East region of India comprises Manipur, Assam, Meghalaya, Nagaland, Mizoram, Sikkim, Tripura and Arunachal Pradesh. These regions are found to be biodiversity hotspots and are surrounded by foreign territories, covering an area of 262,179 sq km and consisting of more than 220 ethnic tribes, constituting about 12 per cent of the total tribal population in India (Ali and Das, 2003) [1]. Entomophagy is common among tribes of the Northeast, especially among the people of Arunachal Pradesh, Manipur, Assam, and Nagaland and to a lesser extent, Mizoram and Meghalaya (Chakravorty, 2014) [6]. A total of 35 species of edible *Hymenopterans* were identified in Northeast India (Fig. 1). Family *Vespidae* remains the highest consumed family with 66%, followed by *Apidae* 23%, Formicidae 5%, Ichneumonidae 3%, and Xylocopidae 3% (Fig. 2).

Chakravorty *et al.* (2011) [4] reported that the Galo and Nyishi tribes of Arunachal consume 15 Hymenoptera species, belonging to *Vespidae*, *Apidae*, Xylocopidae, and Formicidae, and found that twelve species have Therapeutic properties. A study of six different tribes of Eastern Arunachal Pradesh by Chakravorty *et al.* (2013) [3] recorded 10 Edible hymenopteran species. The Tangsha and Wangcho Tribes of Arunachal commonly consumed *Apis cerana indica* Fabr, *Oecophylla smaragdina* Fabr (Gogoi *et al.*, 2022) [10]. Adi and Apatani tribes consumed 10 hymenopteran species: some commonly consumed by these tribes are *Apis mellifera* Linn, *Apis cerana indica* Fabr, *Xylocopa* sp., *Polistes* sp., *Eumenes* sp., *Vespa orientalis*,

and *Vespa* sp. (Chakravorty *et al.*, 2019) [5]. Raza *et al.* (2020) [17] analyse antioxidant properties of edible insects, including those *Hymenopterans* like weaver ants and black ants.

Edible *Hymenopterans* comprise about 24% of the total edible insects consumed by the people of Nagaland. *Apis dorsata laboriosa* Smith, *Apis dorsata dorsata* Fabr, *Apis cerana indica* Fabr, *Lophotrigona canifrons* Smith, *Lepidotrigona arcifera* Cockerell and *Apis florea* Fabr are usually consumed in this region. *Apis cerana indica* can be easily available and domesticated compared to other species. Honey has therapeutic properties for the treatment of cold, conjunctivitis, cough, diarrhoea, and pneumonia. Many vespid wasps, such as *Vespa mandarinia* Smith, *Vespa tropica* Linn and *Vespa soror* du Buysson, are also consumed by the Nagas. Among them, *Vespa mandarinia* Smith is the most used species and has a high market value (Mozhui *et al.*, 2020) [13]. Chakravorty *et al.* (2016) [2] reported that the Violet carpenter bee and weaver ant are either eaten raw or boiled, or prepared as chutney.

Moridhal Panchayat in Demaji district of Assam, used weaver ants, yellowjacket wasps, Potter wasps and honey bees for whooping cough and asthma (Dutta *et al.*, 2016) [9]. The Bodo tribe of Assam consumed five *Hymenopteran* species; some species are even consumed raw. They are *Vespa affinis continentalis* Bequaer, *Oecophylla smaragdina* Fabr, *Parapolybia varia* Fabr and *Polistes*

olivaceus De Geer (Narzari and Sarmah, 2015) [15]. Sharma 2018 [18] found that various tribes from Dimoria, Assam, use *Hymenopteran* insects to treat cold, cough, chicken pox, ulcer, paralysis, bone fracture and asthma.

The Poumai and Mao Naga tribes of Manipur use edible insects for medicinal purposes. Both tribes consume about 20 *Hymenopteran* species, which is the highest compared to other *Insect* orders that are eaten in this region (Kapesa *et al.*, 2020) [11]. Tangkhul Naga, Poumai and the Mao Naga tribes of Manipur, from time immemorial, have traditionally used insects as food and believe they treat wounds, jaundice, sore throat and body ache (Devi *et al.*, 2022) [7]. *Vespa magnifica* is fondly eaten by people of Manipur and is found to have high antioxidant properties (Sheileja *et al.*, 2023) [19].

Seasonal Availability

Some species under the family *Vespidae* are available from May to November, while some are available from September to February (Mozhui *et al.*, 2020) [13]. *Polistes* and *Eumenes* are available from November to February. Unlike *Apis cerana indica* Fabr, which prevails throughout the year, most *Apidae* species are available from September to May. *Formicidae*, *Xylocopidae* and *Ichneumonidae* are available from May to July (Mozhui *et al.*, 2020) [13], November to March, and October to December (Chakravorty *et al.*, 2011) [4], respectively.

Table 1: List of Edible *Hymenopterans* of Northeast India

Order	Family	Scientific name	Seasonal Availability	State
Hymenoptera	Apidae	<i>Apis cerana indica</i>	All year	AS, AR, MN, NL, TR
		<i>Apis dorsata dorsata</i>	Sept. to May	MN, NL, TR
		<i>Apis dorsata laboriosa</i>	Sept. to May	NL
		<i>Apis florea</i>	Sept. to Feb.	NL
		<i>Apis mellifera</i>	Nov. to Jan.	AR, MN
		<i>Lepidotrigona arcifera</i>	Sept. to Feb.	NL
		<i>Lophotrigona canifrons</i>	Sept. to Feb.	NL
	Formicidae	<i>Xylocopa violacea</i>	May to Oct.	NL
		<i>Oecophylla smaragdina</i>	May to July	AR, AS, MN, NL, TR
	Xylocopidae	<i>Limoptemum lindgreeni</i>		AR
		<i>Xylocopa</i> species	Nov. to Mar.	AR
	Ichneumonidae	Unidentified species	Oct. to Dec.	AR
	Vespidae	<i>Parapolybia varia</i>	May to Sept.	AS, NL
		<i>Polistes olivaceus</i>	May to Sept.	AS, NL
		<i>Polistes stigma</i>	May to Sept.	NL
		<i>Polistes species</i>	May to Sept.	NL
		<i>Provespa barthelemyi</i>	Sept. to Feb.	MN, NL
		<i>Ropalida rufoplagiata</i>	Sept. to Feb.	NL
		<i>Ropalida</i> species	Sept. to Feb.	NL
		<i>Vespa affinis indosinensis</i>	Sept. to Feb.	NL
		<i>Vespa Auraria</i>	Sept. to Feb.	NL
		<i>Vespa basalis</i>	May to Nov.	NL
		<i>Vespa bicolor</i>	May to Nov.	MN, NL
		<i>Vespa ducalis</i>	May to Nov.	NL
		<i>Vespa mandarinia</i>	Sept. to Feb.	MN, NL
		<i>Vespa tropica tropica</i>	May to Nov.	MN, NL
		<i>Vespa soror</i>	Sept. to Feb.	MN, NL
		<i>Vespula orbata</i>	May to Nov.	NL
		<i>Vespa magnifica</i>		MN, AS
		<i>Vespula flaviceps</i>		MN
		<i>Vespula</i> species	May to Nov.	NL
		<i>Vespa orientalis</i>	Nov. to Feb.	AS, AR
<i>Vespa affinis continentalis</i>		June to Oct.	AS	
<i>Eumenes</i> species		Nov. to Dec.	AS, AR	
<i>Polistes</i> species		Nov. to Feb.	AR	

*AS - Assam, AR - Arunachal Pradesh, MN -Manipur, ML -Meghalaya, NL - Nagaland, TR-Tripura



(A) *Vespa sorror* nests, (B) *Vespa magnifica* Nests, (C) *Vespa basalis* nests, (D) *Vespa Auraria* nests, (E) Roasted *Vespa auraria*, (F) Roasted *Vespa basalis*, (G) Larvae of *Vespa Auraria*, (H) Roasted *Provespa barthelemyi*, (I) *Provespa barthelemyi* Larvae, (J) *Vespa basalis* nests and larvae, (K) *Vespa sorror* adult and nests, (L) Paper wasps, (M) *Apis cerena indica* comb.

Fig 1: Edible Hymenoptera in Northeast India

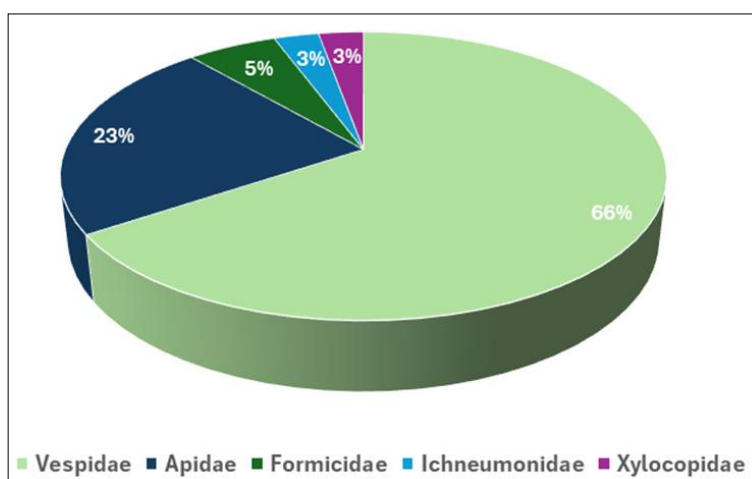


Fig 2: Percentage of Consumption of Edible Hymenopteran in Northeast India

Conclusion

The Northeast India is significantly composed of tribal communities where they relied heavily on the wild and make use of forest products for their livelihood. Edible insects provide substantial nutritional benefits that greatly enhance human health. The protein-rich edible insects, *Hymenopterans*, in the form of protein diets and the pharmaceutical industry. There is evidence of allergy in some edible insect species, so proper care should be taken in

their use as food. Despite this importance, many hymenopteran species remain unrecorded in these regions, underlining an urgent need for extensive research and exploration to uncover the potential benefits of these important insects.

Acknowledgements

We would like to thank the youths of Koide, Purul and Liyai for providing valuable photos of various edible

Hymenopterans consumed in their locality. We would like to express gratitude to the assistants and faculty, Laboratory of Entomology, Department of Zoology, Dhanamanjuri University, for their valuable support and assistance throughout the work.

References

1. Ali AI, Das I. Tribal situation in north east India. *Studies of Tribes and Tribals*,2003:1(2):141–148.
2. Chakravorty J, Ghosh S, Megu K, Jung C, Meyer-Rochow VB. Nutritional and anti-nutritional composition of *Oecophylla smaragdina* (Hymenoptera: Formicidae) and *Odontotermes* sp. (Isoptera: Termitidae): Two preferred edible insects of Arunachal Pradesh, India. *Journal of Asia-Pacific Entomology*,2016:19(3):711–720.
3. Chakravorty J, Ghosh S, Meyer-Rochow VB. Comparative survey of entomophagy and entomotherapeutic practices in six tribes of Eastern Arunachal Pradesh (India). *Journal of Ethnobiology and Ethnomedicine*,2013:9(1):50.
4. Chakravorty J, Ghosh S, Meyer-Rochow VB. Practices of entomophagy and entomotherapy by members of the Nyishi and Galo tribes, two ethnic groups of the state of Arunachal Pradesh (North-East India). *Journal of Ethnobiology and Ethnomedicine*,2011:7(1):5.
5. Chakravorty J, Jugli S, Boria M, Meyer-Rochow VB. Arunachal's Adi and Apatani tribes' traditional knowledge of harvesting and using edible insects. *Journal of Insects as Food and Feed*,2019:5(2):125–136.
6. Chakravorty J. Diversity of edible insects and practices of entomophagy in India: an overview. *Journal of Biodiversity, Bioprospecting and Development*,2014:1(03):1–6.
7. Devi WD, Bonysana RK, Kapesa K, Mukherjee PK, Rajashekar Y. Ethnotherapeutic practice of entomophagy species by the ethnic community of Tangkhul, Mao and Poumai communities of Manipur, NER India. *Journal of Ethnic Foods*,2022:9(1):17.
8. Doley AK, Kalita J. Traditional uses of insect and insect products in medicine and food by the Mishing tribe of Dhemaji District, Assam, North-East India. *Social Science Researcher*,2012:1(2):11–21.
9. Dutta L, Ghosh SS, Deka P, Deka K. Terrestrial edible insects and their therapeutic value in Moridhal Panchayat of Dhemaji district, Assam, Northeast India. *International Journal of Fauna and Biological Studies*,2016:3(6):11–14.
10. Gogoi R, Chetri S, Ahmed R. Edible insects used as food by Tangsa and Wancho tribes of Changlang District, Arunachal Pradesh. *Indian Journal of Entomology*, 2022, 654–656.
11. Kapesa K, Devi WD, Bonysana RK, Rajashekar Y. Anthro-entomophagy and ethno-entomology among the ethnic Mao-Naga and Poumai-Naga tribes of Manipur, Northeast India. *Journal of Insects as Food and Feed*,2020:6(5):507–514.
12. Kiewhuo P, Mozhui L, Kakati LN, Meyer-Rochow VB. Traditional rearing techniques of the edible Asian giant hornet (*Vespa mandarinia* Smith) and its socio-economic perspective in Nagaland, India. *Journal of Insects as Food and Feed*,2022:8(3):325–336.
13. Mozhui L, Kakati LN, Kiewhuo P, Changkija S. Traditional knowledge of the utilization of edible insects in Nagaland, North-East India. *Foods*,2020:9(7):852.
14. Mozhui L, Kakati LN, Lea N. Edible insects and their food plants in Nagaland-Future prospects. *Indian Journal of Entomology*, 2022, 245–250.
15. Narzari S, Sarmah J. A study on the prevalence of entomophagy among the Bodos of Assam. *Journal of Entomology and Zoological Studies*,2015:3(2):315–320.
16. Ramos-Elorduy J. Insects: a sustainable source of food. *Ecology of Food and Nutrition*,1997:36(2-4):247–276.
17. Raza M, Jugli S, Chakravorty J. *In-vitro* Antioxidant activity in edible Insects from Arunachal Pradesh, India. *Journal of Experimental Zoology India*, 2020, 23(1).
18. Sharma S. Edible and therapeutic uses of insects among the various tribes of Dimoria Development Block of Assam, India. *Scenario Environ Res Dev*, 2018, 101–108.
19. Sheileja T, Singh KM, Shantibala T, Mishra LK, Haldhar SM. Nutritional composition and safety aspects of Asian giant hornet, *Vespa magnifica* (Hymenoptera: Vespidae): commonly consumed edible insect in Manipur, North East India. *Journal of Insects as Food and Feed*,2023:10(6):1005–1014.
20. Van Huis A, Van Itterbeeck J, Klunder H, Mertens E, Halloran A, Muir G, *et al.* Edible insects. *FAO*, 2013.