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RESEARCH ARTICLE

ENTOMOPHAGY AMONG THE BODOS OF UDALGURI DISTRICT, BTAD, ASSAM, INDIA

*Rabindra Hazarika and Bristina Goyari

PG Department of Zoology, Darrang College, Tezpur, Assam

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ABSTRACT

The practice of eating insects is common among the ethnic schedule tribes (plains and hills) of North eastern part of India. In Assam, this practice is more prevalent among the Bodos and Rabha tribes, the earliest immigrants in Assam. Bodos, one of the culturally rich community of Assam consumes insects as their traditional diet. The present investigation is carried out in some remote villages of Udalguri District, BTAD, Assam. Altogether 23 species of edible insects belonging order Hemiptera, Coleoptera, Hymenoptera, Orthoptera, Lepidoptera, Isoptera and Odonata comprising 21 genera and 16 families have been recorded. It is found that the Giant water bug (*Lethocerus indicus*, Hem, Belostomatidae) and the Eri silk worm larvae (*Samia ricini*, Lep, Saturniidae) are more preferred species considering their size and availability. Consumption of insects is more common during festival, for therapeutic purpose and some as the component of folk medicine. Considering the high protein content and supplements such as minerals and vitamins, the practice of entomophagy may contribute towards solving the protein shortage in this region. The indigenous knowledge gathered during present investigation is likely to prove particularly useful in carrying out further research.

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INTRODUCTION

Insects, both terrestrial and aquatic, form an important link in many food chains and the ecological services provided by them are of fundamental importance to the survival of humankind. Though human entomophagy is not popular in many westernized societies, people throughout the world have been eating insects as a regular part of their diets for millennia (Arnold *et al.* 2013). Insects can contribute to food security and be a part of solution to protein shortages by their high nutritional value and low requirements for the land and water. Food insects are chosen by members of various tribes of India according to their traditional beliefs, taste, regional and seasonal availability. Depending on the species, only certain, but sometimes all developmental stages are consumed. Preparation of the edible insects for consumption involves mainly roasting or boiling. Sometimes spices are added to enhance the taste. Practice of entomophagy is quite common among the ethnic people of North East India particularly among the tribes like Garo, Naga, Bodo, Mishing, Rabha, Kachari etc. of Arunachal Pradesh, Assam, Manipur and Nagaland and to a lesser extent by the tribes of Meghalaya and Mizoram. In Assam entomophagy is prevalent mainly among the Bodo and Rabha tribes and they are said to be the most culturally rich community of the north-western parts of the state.

The Bodos are found in almost all the areas of Assam in various configurations though they came from Tibet and settled in the lower parts of Bhutan, later got scattered to the different parts of North-East India. In Assam, they are concentrated in the district Kokrajhar, Baksa, Udalguri and Chirang forming the Bodoland Territorial Area Districts (BTAD). The 6th Schedule of the Indian constitution has conferred the Bodo community the status and prestige of a tribe. Insects are highly nutritious and healthy food source with high fat, protein, vitamin, fibre and mineral content. The traditional knowledge of entomophagy among the Bodo is rich but confined because it is only orally passed through generations (Narzary and Sarmah, 2015). Entomophagy among the Bodo tribes is a common practice and if popularized it may contribute towards solving the problem of mal nutrition in this region. Documentation of this traditional and indigenous knowledge on the use of insects as food and for therapeutic purpose is important for value addition and economic upliftment, poverty alleviation and also intellectual property protection by proper documentation (Mahapatro, 2015).

MATERIALS AND METHODS

Covering an area of 1,852.16 Sq. Km, within the geographical ambit of 26°46'0N / 27°77'0N latitude and 92°08'0E/95°15'0E longitude, Udalguri is one of the 27th district of Assam, and one of the four Bodoland Territorial Area Districts in Assam,

*Corresponding author: Rabindra Hazarika
PG Department of Zoology, Darrang College, Tezpur, Assam.

India. The district is located at a surface distance of 140 kms from Guwahati, the capital city of Assam. The district is surrounded by Bhutan and West Kameng district of Arunachal Pradesh state in the north, Sonitpur district in the east, Darrang district in the south and Baska district in the west. The district has two sub-divisions Udalguri and Bhergaon. The climatic condition of the district is humid and congenial with average annual temperature 24.2°C and average annual rainfall 2000 mm. The District is multi ethnic and multi religious in nature. Bodos form the largest ethnic group in the district. In the present investigation, 8 remote villages are selected randomly within the Udalguri subdivision, occupied mostly by Bodo tribes of the district. Extensive field survey is carried out in the selected villages during the period of March, 2016 to April, 2017 with the help of local people. The recommendations of the Village Head Man (*GaonBurha*) of each village are considered most of the time to meet the knowledgeable person. The field survey is based mainly on the interview of at least 20 local inhabitants (12 male and 8 females) aged between 35 to 70 years from the selected villages with some simple questions. The questions are prepared to get the crucial information such as vernacular names of the edible species, their seasonal availability, type of habitat, collection techniques, stages of insects consumed, mode of preparation, parts of the body mostly used, assumed therapeutic use and present status of availability in that locality. In major instances household with elderly person are selected and the information provided are recorded. During the time of interview digital photographs of different insects are also shown to the male and female members of the family to get the information regarding availability and therapeutic use of the species.

During the field survey, insects are collected with the help of local people from different habitats such as ponds and floodplain wetlands, paddy field, grassland, shrubs and trees and soil boring insects in and around the human dwellings during morning and evening hours. However, some species are also submitted by the household members from their own collections to be sold in the market. The collected insects are preserved following wet methods of preservation in 70% alcohol and carried to the taxonomy and biodiversity laboratory of Department of Zoology, Darrang College, Tezpur, Assam. Insects are firstly separated into different groups and are identified to the lowest possible taxa using either a dissection microscope or compound microscope. Taxonomic keys such as Pennak, 1978; Merritt and Cummins, 1996; Alfred & Ramakrishna, 2004; Biswas *et al*, 1995a, 1995b; Bal and Basu, 1994; Thirumalai, 2007; Srivastava and Sinha, 1995 and Mitra, 2006 are followed to identify the collected specimens to species, or at least genus level. Photos of the majority of collected insects are taken and digitalized.

RESULTS AND DISCUSSION

List of the collected edible species of insects with their taxonomic position and vernacular names are given in the Table 1. The field survey revealed in total 23 species of edible insects belonging order Hemiptera, Coleoptera, Hymenoptera, Orthoptera, Lepidoptera, Isoptera and Odonata comprising 21 genera and 16 families among the Bodos of Udalguri district, Assam. Majority of the edible species are selected on the basis of their size and seasonal prevalence.

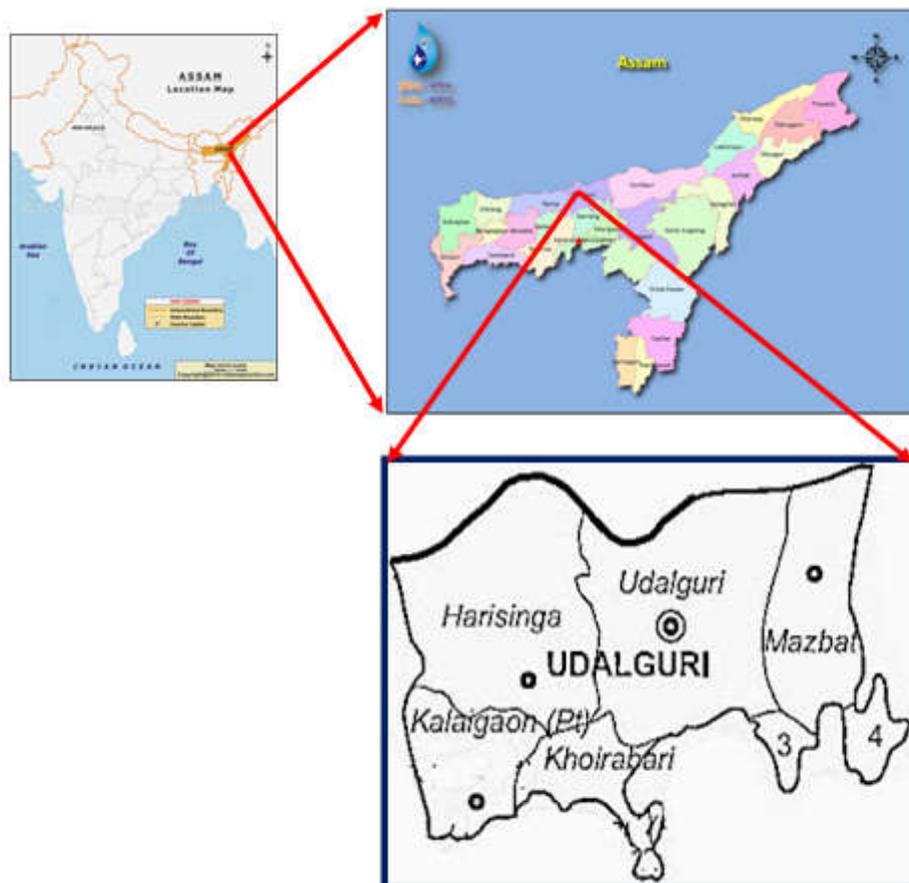


Figure 1. Location map of the study area

Order Orthoptera represents the highest number of selected species (7) followed by Hymenoptera (4) and Hemiptera (4). The species belonging to order Hemiptera and Coleoptera are aquatic adult and larval morphs found in the paddy field and flood plain wetlands of the district.

is reducing at an alarming rate in the selected localities which is a serious concern considering the conservation of the species. The order wise representatives of the species are shown in Figure-2.

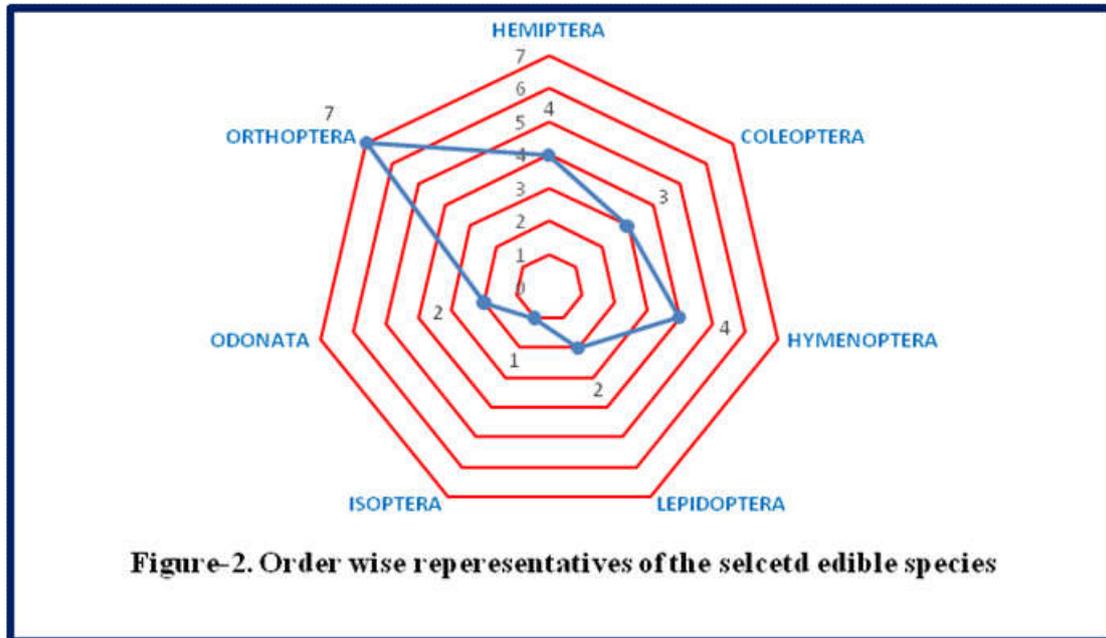


Figure-2. Order wise representatives of the selected edible species

Table 1. List of edible insects consumed by the Bodos of Udalguri district, Assam showing seasonal availability

Si No	Scientific name	Family	English Name	Local Name	Stages of Intake	Seasonal availability
Order 1: Hemiptera						
1	<i>Lethocerusindicus</i>	Belostomatidae	Giant Water Bug	Gangjema	Nymph & Adult	May-Oct
2	<i>Diplonychusrusticus</i>	Belostomatidae	Giant Water Bug	-	Nymph & Adult	May-Oct
3	<i>Laccotrepesruber</i>	Nepidae	Nepa	Lanjaigwao	Nymph & Adult	Jun-Oct
4	<i>Laccotrepesgriseus</i>	Nepidae	Nepa	Lanjaigwao	Nymph & Adult	Jun-Oct
Order 2: Coleoptera						
5	<i>Cybistertripunctatusasiaticus</i>	Dytiscidae	Diving Beetle	Chingkhouri	Larva and Adult	June-Oct
6	<i>Cybisterconvexus</i>	Dytiscidae	Diving Beetle	Chingkhouri	Larva and Adult	June-Oct
7	<i>Dytiscusmarginalis</i>	Dytiscidae	Diving Beetle	Chingkhouri	Larva and Adult	Whole year
Order 3: Hymenoptera						
8	<i>Vespa affinis</i>	Vespidae	Hornet	Handilorbere	Larva	June-Oct
9	<i>Polistisolivaceus</i>	Vespidae	Paper Wasps	Jothabere	Larva	Jun-oct
10	<i>Apisindica</i>	Apidae	Honey Bee	Mao bere	Larva and Pupae	Whole year
11	<i>Oecophyllamaragdina</i>	Formicidae	Weaver Ant	Khwjema	Larva and Pupae	Mar-Aug
Order 4: Orthoptera						
12	<i>Neotibicenlinnei</i>	Cicadidae	Cicada	Gaorema	Adult	Whole year
13	<i>Tarbinskiellusportentosus</i>	Gryllidae	Cricket	Khusanggra	Adult	Whole year
14	<i>Mecopeda elongate</i>	Tettigoniidae	Grass Hopper	Gumakhufri	Adult	May-Sep
15	<i>Mantis inornate</i>	Mantidae	Praying Mantis	GumaGangu	Adult	May-Sep
16	<i>Ruspoliabaileyi</i>	Tettigoniidae	Nsenene	GumaGwthao	Adult	Sep-Dec
17	<i>Oxyafuscovittate</i>	Arcididae	Grass Hopper	GumaDaosrijagra	Adult	Sep-dec
18	<i>Gryllotalpaaficana</i>	Gryllotalpidae	Mole Cricket	Sosroma	Adult	Whole year
Order 5: Lepidoptera						
19	<i>Bombyxmori</i>	Bombycidae	Mulberry Silkworm	Lathaemphao	Larva	Whole year
20	<i>Samiaricini</i>	Saturniidae	Eri silkworm	Lathaemphao	Larva	Whole year
Order 6: Isoptera						
21	<i>Reticulitermesspp</i>	Termitidae	Termite	Wuri	Adult	May-july
Order 7: Odonata						
22	<i>Neurothemistuliatulia</i>	Libellulidae	Dragon Fly Nymph	Garbafangtha	Larva	May-oct
23	<i>Orthetrum sabina</i>	Libellulidae	Dragon fly nymph	Jujai mala	Larva	May-oct

Most of the aquatic species are collected during fishing as a bonus. When the total fish catch is below average on a particular day, the tribal fisherman and women target the insects. It is found that, the giant water bug, *Lethocerusindicus*, Hemiptera, Belostomatidae is the most preferred one due their giant size in comparison to other species. However, in the survey it is revealed that, the species

The Bodos basically are lovers of non-veg dishes. Prevalence of entomophagy is clearly observed among the Bodo tribe of Udalguri district. They use these wide variety of insects in their traditional practice of eating. Edible insects provide satisfactory amounts of energy and protein, meet amino acid requirements for humans, high in monounsaturated and/or polyunsaturated fatty acids and are rich in micronutrients such

Photographs of Some of the Collected Edible Insects



3.A-I



3.A-II

Figure: 4. *Diplonychusrusticus*Figure: 3 A-I & 3.A-II. *Lethocerusindicus*Figure: 5. *Laccotrephesruber*Figure: 6. *Cybistertripunctatusasiaticus*(Adult and larvae)Figure: 7. Larva and Pupa *Oecophyllasmaragdina*Figure: 8. *Apisindica* (Larvae with hive)Figure: 9. Larvae of *Polistisolivaceus*Figure: 10. *Reticulitermesspp*

as copper, iron, magnesium, manganese, phosphorous, selenium and zinc, as well as riboflavin, pantothenic acid, biotin and in some cases, folic acid (Rumpold and Schluter, 2013). In the present investigation it is found that species belonging to order Orthoptera top the list among the selected species. The adult and nymph of this group is rich in protein content containing 23-65% of protein (Xiaoming *et al.* 2010). Current knowledge on edible insects in North eastern part of India is very poor.

For sustainability of the entomophagy in this region including the Bodo tribe of Udalguri district, it is essential to study the ecology of each species. Increased knowledge on factors such as peak abundance, population dynamics and life cycles is essential to counter the depletion of edible insect resources (Cerritos, 2009). The indigenous knowledge gathered during present investigation is likely to prove particularly useful in carrying out further research.

PHOTOPGRAPHS OF SOME OF THE COLLECTED EDIBLE INSECTS

Figure:11. Larva of *Samiarichini*Figure:12. Larva of *Orthetrum Sabina*Figure:13. Larva of *Neurothemistuliatulia*Figure:14. *Tarbinskiellusportentosus*Figure:15. *Neotibicenlinnei*

Figure 16. Wet preservation of collected edible species

Figure 17. Collection of edible water bugs by the Bodo woman using fishing gear (*Jekhai and Khobai*)

Issues that require urgent research in this field include identifying edible insect species, estimating populations and understanding the ecology and biology of each species and their habitats and the factors that determine their abundance (Arnold *et al.* 2013).

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