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A PRELIMINARY STUDY ON CERTAIN COMMON EDIBLE INSECTS OF MANIPUR

KHAIDEM ALKA[1], R. K. RADHA KRISHORE SINGH[2]*, O. GOJENDRO SINGH[2], TH. RUHINI DEVI[2] K. KHAMBA SINGH[3] and L. INAKHUNBI DEVI[4]

[1]*Institutional Biotech Hub, Manipur College, Imphal (Manipur)*
[2]*Department of Zoology, Manipur College, Imphal (Manipur)*
[3]*Department of Biochemistry, Manipur College, Imphal (Manipur)*
[4]*Department of Botany, Manipur College, Imphal (Manipur)*

ABSTRACT : A study on the occurrence and consumption of edible insects by the ethnic groups of Manipur, Northeast India was carried out through systematic field and literature surveys. As many as 46 species, belonging to 39 genera, 26 families and 9 orders served as an important source of nutritional food item for many tribal communities. Details about the collected species from different habitats along with the mode of consumption were also provided. Insects are rich in proteins and other nutrients beneficial for human health. Further research and study are necessary on the usage of insects as food as well as for other beneficial purposes like therapeutics.

Key words : *Insects, Common edible, Manipur, Tribal communities.*

INTRODUCTION

Insects have served as a food source for people for tens of thousands of years all over the planet. Consumption of insects as food by human is an age old process. Archaeological evidence tells us that entomophagy has been practised since mankind first made an appearance on this planet (Ekpo,2011). Insects were undoubtedly an important source of nutrition for early human ancestors in Africa, Asia and Latin America (Srivastava *et al.*,2009). An estimated 2000 insect species are consumed around the world and people do not just eat insects, they relish them as delicacies (Fromme,1995). Insects are an inexpensive substitute for meat in many developing countries (Srivastava *et al.*,2009). In India many tribal communities particularly of the North-East states regularly consume insects. Some renowned works on edible insects have been conducted in states like Arunachal Pradesh (Chakravorty *et al.*,2011; Singh & Chakravorty,2008 and Ronglang and Ahmed,2010), Assam (Doley and Kalita,2011) and Manipur (Shantibala *et al.*,2012).

Manipur lies in 23° 83'N-25° 68'N latitude and 93° 2' E-94° 78'E in the North Eastern India. With a total area of 22327 sq/km, the forest cover forms about 77% of the total geographical area. This makes the state an abode to a rich diversity of both flora and fauna. It is inhabited by as many as 30 different tribes. The Meitei which constitute more than 50% of the total population are the major ethnic community of the state. A majority of the tribes occupy the hilly regions and as such there is a close dependence with nature which also includes collection and consumption of insects from the forests. Many species of insects have served as traditional foods among indigenous people (De Foliart,1995). The people of the hilly region and rural inhabitants consume insects for nutrition as well as for taste. The edible insects are immensely important for the villages to serve as a source of additional nutrients particularly fats and protein (Kato and Gopi,2009). Compared to most other kinds of animal food, insects are a well balanced source of nutrients. They are high in protein and contain much less fat than red meat, such as beef (Lawal *et al.*, 2010). Insects are the cheapest source of animal protein in Manipur as many of the people cannot afford fish or animal flesh (Gope and Prasad,1983). Among the Meitei community, *Lethocerus indicus* is very popular. Other commonly consumed edible insects include *Gryllotalpa gryllotalpa*, *Oxya hyla*, *Oryctes rhinoceros*, aquatic insects like *Hydrophilus* sp., *Cybister* sp. and bee brood varieties. Traditional consumption involves eating the insects raw, fried, roasted or as a spicy paste with chilli. Many of these insects are also used for therapeutic purposes. Common household pest, cockroach (*Periplaneta americana*) have very high protein content and a traditional medicine uses it, to treat bed-wetting in children. Though entomophagy seems to be so apparent, it is a fact that the incidence has greatly declined among the younger generations. Hence the present study attempts to properly document the knowledge and practices of the ethnic people and systematically arrange the commonly consumed edible insects of Manipur.

MATERIAL AND METHODS

Extensive field survey was carried out in some districts of Manipur. Hill districts being represented by Tamenglong, Senapati and Ukhrul while Bishnupur, Imphal East and Imphal West representing the valley districts. Collected samples were sorted out and preserved according to the standard methods (Ghosh and Sengupta,1982) and identified with the help of available literature and books. Additional information was gathered by distributing questionnaire with simple questions such as name of edible insects, stage of consumption, mode of consumption, seasonal availability, etc among the various age groups of the society. Personal interviews or inter-

*Corresponding author (email : radhakrishore77@yahoo.com) Received 10.01.2013 Accepted 10.04.2013

Table. 1

S.	Common Name	Local Name	Scientific name	Family	Consumption stage	Mode of consumption	Period of availability
Order : Orthoptera							
1.	Rice Grasshopper	Koujeng	*Oxya hyla Oxya hyla intricate*	Acrididae	Adult	Fried	Aug-Dec
2.	Cricket	Koujeng	*Gryllus testaceus*	Gryllidae	Adult	Fried/Roasted	June-Sep
3.	Mole cricket	Wahibi	*Gryllotalpa grylllotalpa*	Gryllotalpidae	Adult	Fried/Roasted	Mar-Jul
4.	Cricket	Harou	*Brachytrupes portentosus*	Gryllidae	Adult	Fried/Roasted	Mar-Jul
5.	Bird grasshopper	Koujeng	*Schistocerca* sp.	Acrididae	Adult	Fried/Roasted	Nov-Dec
Order : Hymenoptera							
1.	Honey Bee	Haying khoi	*Apis mellifera*	Apidae	Larva, pupa	Fried, curry	Oct-July
2.	Indian Honey Bee	Haying Khoi	*Apis cerana indica*	Apidae	Larva, pupa	Fried, curry	Throughout
3.	Giant Honey Bee	Khoiren	*Apis dorsata*	Apidae	Larva, pupa	Fried, curry	Throughout
4.	Lesser Banded Hornet	Khoibiningthou	*Vespa affinis, Vespa basalis*	Vespidae	Larva, pupa	Fried, curry	Feb-May
5.	Yellow Jacket Wasps	Una Khoi	*Vespula vulgaris*	Vespidae	Larva, pupa	Fried, curry	Nov-Feb
Order : Hemiptera							
1.	Giant water bug	Naoshek	*Lethocerus indicus*	Belostomatidae	Adult	Roasted/Chutney	Throughout
2.	Water scorpion	Hao Naoshek	*Laccotrephes rubber*	Nepidae	Adult	Roasted	Sep-March
3.	Water Scorpion	Esing Mi	*Ranatra varipes*	Nepidae	Adult	Roasted/fried	June-July
4.	Water Bug	Konjeng Kokphai	*Diplonychus rusticus*	Belostomatidae	Adult	Roasted/fried	Sept-Dec
5.	Water Boatman	Long Khajing	*Corixa punctata*	Corixidae	Adult	Fried/roasted	Sep-Feb
6.	Backswimmer	Long khajing	*Notonecta glauca*	Notonectidae	Adult	Fried/roasted	Sep-Feb
7.	Stink Bug	Ushingsha	*Tessaratoma* sp.	Tessaratomidae	Adult	Fried	April-Aug
8.	Stink Bug	Sik	*Aspongopus* sp.	Pentatomidae	Adult	Fried	Aug-Oct
9.	Paddy Stink Bug	Ushingsha	*Leptocorisa* acuta	Alydidae	Adult	Fried	Aug-Nov
10.	Squash Bug	Ushingsha	*Anoplocnemis phasina*	Coreidae	Adult	Fried	Aug-Nov
Order : Homoptera							
1.	Cicada	Harinongnang	*Pomponia linearis*	Cicadidae	Adult	Roasted	May-June
2.	Cicada	Harinongnang	*Pomponia* sp.	Cicadidae	Adult	Roasted	May-June
Order : Isoptera							
1.	Termites	Mukthrubi (winged adults)	*Reticulitermes flavipes*	Rhinotermitidae	adult	Fried	Feb-Aug
Order : Dictyoptera							
1.	Praying Mantis	Horailenbi	*Mantis religiosa*	Mantidae	Adult	Fried	Aug-Oct
Order : Coleoptera							
1.	Water Scavenger Beetles	Tharaikokpi	*Hydrophilus triangularis Hydrophilus olivaceus*	Hydrophilidae	Adult	Fried	May-July
2.	Predaceous Diving Beetle	Tengbi	*Cybister tripunctatus Cybister sugillatus*	Dytiscidae	Adult	Fried	June-July
3.	June Beetles	Langdrubi	*Phyllophaga* sp.	Scarabaeidae	Adult	Fried	May-June
4.	Palm Weevil	Shamu	*Rhynchophorus Phoenicis*	Curculionidae	Adult	Raw/Fried	Rainy season
5.	Rhino Beetle	Kangchek	*Oryctes rhinoceros*	Scarabaeidae	Larva, Adult	Fried	April-July
6.	Long horned beetle	Watin	*Anoplophora gabripennis Diastocera wallichi*	Cerambycidae	Larva	Fried	May-July
7.	Bamboo beetle	Waton Chabi	*Crytotrachelus dux*	Curculionidae	Adult	Fried	Mar-July
Order : Lepidoptera							
1.	Bamboo Borer	Watin	*Omphisa fuscidentalis*	Pyralidae	Larva	Fried	May-June
2.	Mulberry Silkworm	Kabrang Til	*Bombyx mori*	Bombycidae	Larva, Pupa	Fried	Mar-Sep
3.	Tasar Silkworm	Uyung Til	*Antheraea proylei*	Saturniidae	Larva, Pupa	Fried	May-July
4.	Eri Silkworm	Kege Til	*Samia Cynthia*	Saturniidae	Larva, Pupa	Fried	Jan-Dec
5.	Agave worm	Shahi Til	*Hypopta agavis*	Cossidae	Larva	Fried	Aug-Oct
6.	Cossid Moth	Kuizat	*Endoxyla Leucomochla*	Cossidae	Larva	Fried	Aug-Oct
Order : Odonata							
1.	Grizzled Pintail	Maikhumbi (larva)	*Acisoma panorpoides*	Libellulidae	larva	Fried	April-Jul
2.	Common Blue Skimmer	Maikhumbi (larva)	*Orthetrum glaucum*	Libellulidae (Braauer)	Larva	Fried	April-July
3.	Wandering glider	Maikhumbi (larva)	*Pantala flavescens* (Fabricius)	Libellulidae	Larva	Fried	April-July
4.	Scarlet Skimmers	Maikhumbi (larva)	*Crocothemis servilia servilia* (Drury)	Libellulidae	Larva	Fried	April-July

actions were arranged with members of several ethnic groups to cater to their traditional knowledge. Entomological nets were used for collecting terrestrial insects. A circular net (local name Longthrai) with mesh size 1 mm was used for collecting aquatic insects. A local tool known as Long is also effectively used for the said purpose. Certain nocturnal insects like Pomponia and Reticulitermes were captured by setting up a light trap with a collection bin whereas beating method was followed for certain beetles and bugs. Ground dwelling insects were captured by pitfall traps. The insects were collected with bare hands or using the nets from various habitats like lakes, ponds, streams, open field, underneath the ground etc. Different market places were also visited for collection of specimens. The data and information so collected were compiled and systematically arranged in the form of table.

RESULTS AND DISCUSSION

Edible insect collection data (Fig.1) revealed the occurrence of 46 species belonging to 26 families which is no means exhaustive and the list is likely to grow in length. Out of the 46 species, 10 species under 8 families belonged to the order Hemiptera (Bugs), 10 species under 5 families belonged to the order Coleoptera (Beetles and Weevils) while 6 species under 3 families belonged to Orthoptera (Grasshopper and Cricket). 6 species under 2 families of Hymenoptera (Bees and Wasps), 6 species under 4 families of Lepidoptera (Butterflies and moths), 4 species under 1 family of Odonata (Dragonflies), 2 species under 1 family of Homoptera (Cicadas) and 1 species each of Isoptera (termites) and Dictyoptera (Mantids) were recorded. The detailed list of collected edible insect species is given in Table.1. The analysis of data in terms of availability indicated the occurrence of Coleoptera between May-September while September-November was ideal for Hymenopteran collection. June-August was found to be ideal for collection of aquatic insects like *Hydrophilus* sp., *Cybister* sp., *Diplonychus rusticus* and *Dragonfly nymphs*. Some edible insects like certain bugs were found to be available throughout the year. Insects were collected mainly for self consumption but some insects were either reared or collected for commercial purpose also. The collection of edible insects is also a good source of income, especially for the women (Srivastava *et al.*,2009). The larvae and pupae of different varieties of honey bees were sold for Rs. 300-1500 hive, Silkworm larvae and pupae for Rs. 300-350 kg while Giant water bugs were available for Rs. 10-15 per insect.

Majority of the ethnic groups consume both the immature as well as mature stages of insects. Immature forms of Hymenopterans (eggs, larva and pupa) are consumed by almost all the tribes of Manipur. The bee brood which is widely consumed is mainly procured from the bee hives built on the forest trees and are often hunted down by the native tribes for their own consumption as well as for sale in the local market. Larvae and pupae of silk moths which are the by-products of the silk industry are actually relished by many ethnic groups. Edible insects in general and silkworm pupae in particular, are low in price, taste good and are high in protein content and nutritional value (Sirimungkararat *et al.*,2010). Among the silkworm varieties the Eri silkworm was found to be more popular with the people. Due to its high protein content, Eri food has excellent potential as a protein source and security food for schoolchildren and people in rural areas (Sirimungkararat *et al.*,2010). Many aquatic Hemipterans, Coleopterans and the aquatic larvae of many Odonates are also an important food item. The aquatic Odonata larvae are more preferred against their flying adults. Fishing on the streams, lakes and ponds is an important activity for the people inhabiting the surrounding water bodies. This yield quite a handful of these insects. All over Asia, the giant water bug gathered by farmers at night near water sources is roasted whole and eaten as a delicacy (Srivastava *et al.*,2009). Inspite of its unpleasant odour, Stink bugs are also widely consumed by different tribes. *Aspongopus* (local name Sik) consumed by the Anal tribes of Chandel district were also consumed in a similar manner by the tribes of Tamenglong district. Larvae, pupae and or adults of some Coleoptera are also used as food. Wood-boring grubs of *Anoplophora gabripennis* and *Diastocera wallichi* are very fleshy and palatable and hence consumed in this stage. These insects are usually preferred fried. During the cultivation period of paddy crops grasshoppers are usually abundant on the paddy fields and as such are collected for consumption also. According to a study conducted by Ritter (1990), grasshoppers are a popular food source in Mexico especially when fried prior to eating.

In a study conducted by Singh *et al.* (2007), 40 species of Coleoptera were consumed by the indigenous people of Arunachal Pradesh and just 4 species were found to be similar with the present finding. In a similar study conducted by Singh and Chakravorty (2008), 26 species of edible Orthoptera were reported to be consumed by the ethnic tribes of Arunachal Pradesh and out of 26 species only 3 species were consumed in Manipur. Doley *et al.* (2011) reported 14 different species of edible insects to be consumed by the ethnic tribes of Dhemaji district of Assam and 8 species were similar with present investigation. Though the number of edible insect species available in Manipur is lesser than some states. It is evident that the practice of entomophagy is common for many ethnic groups and diverse section of the people of Manipur.

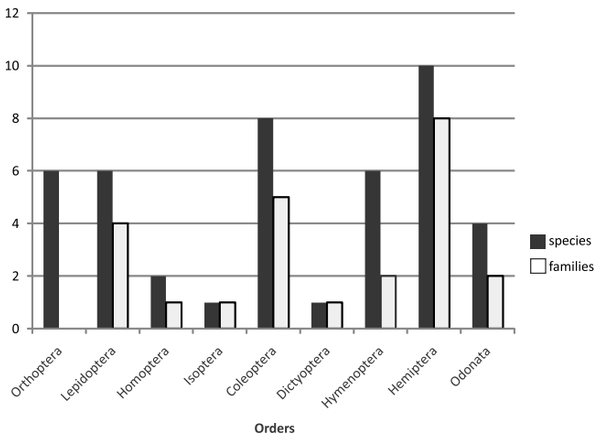

Fig. 1 Species and families of common edible insects of Manipur.

The scientific investigation on its chemical contents will further provide reliable source of nutrition to the people for better health, because of their nutritive value and ubiquitous presence, insects present a potential food source for human (Kato *et al.*,2009).

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