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A study on the prevalence of entomophagy among the Koch-Rajbongshis of North Salmara subdivision of Bongaigaon district

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Abstract

Edible insects are a natural renewable resource that serves as food to many ethnic groups in North East India. The present study was conducted to record the status of entomophagy among the Koch-Rajbongshis of North Salmara subdivision of Bongaigaon district, Assam. It was found that 17 species of insects belonging to 6 orders such as Hymenoptera, Lepidoptera, Hemiptera, Coleoptera, Orthoptera and Isoptera of class insecta are consumed by the Koch Rajbonghsi community. Some are consumed raw, fried, or roasted. Nutritional value of the consumed insects was also determined and it was found that they were loaded with nutrients particularly in proteins, recommending their utilization as good nutritional supplements of balanced diet. The study thus underlines the potentials of edible insects research and its conservation strategy and the need for documentation of traditional rearing, cultivation and sustainable use of edible insects.

Keywords: edible insects, entomophagy, Koch-Rajbongshi, nutritional value, proteins.

1. Introduction:

Insects have played an important role in the history of human nutrition in Asia, Africa and Latin America (Bodenheimer, 1951). The consumption of insects as food is as old as the history of mankind. Although insects form a small part of the bulk of the diet, they are important in compensating for the general deficiency in animal proteins, fats and calories that occurs among marginal societies (Narzari and Sarmah, 2015). Edible insects contains high quality proteins, carbohydrates, fats, minerals and vitamins (Ene, 1963; Ashiru, 1988; De Foliart, 1989;De Foliart, 1992) and as such they serve as a very important food source in many developing countries.

Globally, the most commonly consumed insects are beetles (Coleoptera) constituting 31% of the total consumable insects followed by caterpillars (Lepidoptera) (18%) as well as bees, wasps, and ants (Hymenoptera) (14%). Other insects that are consumed are grasshoppers, locusts and crickets (Orthoptera) (13%), cicadas, leafhoppers, planthoppers, scale insects and true bugs (Hemiptera) (10%), termites (Isoptera) (3%), dragonflies (Odonata) (3%), flies (Diptera) (2%), and other orders (5%) (Thakur *et. al.,* 2017). Social and religious practices have a strong influence on entomophagy and insects are usually consumed in numerous locales of the world amid festivities (Cerritos, 2009).

The UN projected the world population to reach 9.6 billion people in 2050 (United Nations, Department of Economic and Social Affairs, Population Division, 2013) which will require increased food and feed outputs. Edible insects are traditionally consumed in many parts of the world (DeFoliart, 1999) and are considered as having potential to contribute to the world's food security (Van Huis, 2013).

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Insects are considered food with satisfactory energy and protein content, good amino acid and fatty acid profiles and high contents of a variety of micronutrients such as iron, magnesium, copper, manganese, phosphorous, zinc, selenium and the vitamins riboflavin, pantothenic acid, biotin and in some cases folic acid (Rumpold and Schluter, 2013). Besides its importance as food, edible insects are suspected to have an impact on livelihood and social conditions of many rural people. Gathering and farming of insects can be done with a minimal input of technical or capital resources which gives also the poorest members of society a possibility to generate income (FAO Regional Office for Asia & the Pacific, 2010). So, entomophagy is becoming popular worldwide, particularly among the poor populace as an alternative protein source as well as source for income generation. In India too entomophagy is in practice, particularly among the tribal populace. The N.E. States of India record the highest insect consumption. Our study group, the Koch-Rajbongshi of North-Salmara Sub-Division(Bongaigaon District,Assam) are known to consume insects from the ancient times.

Koch–Rajbongshi community (also known as Koch-rajbongshi and Koch Bihari) is an indigenous community of Koch Bihar origin found in parts of present-day Nepal; the Indian states of Assam, West Bengal, and Meghalaya; and Kishanganj in the state of Bihar and certain parts of Bhutan. Some of the important groups of insects consumed by the Rajbongshis include various caterpillars, grasshoppers, beetle grubs,winged termites, ant and bee broods, cicadas and a variety of aquatic insects. They are consumed in various forms: cooked, roasted, fried, raw or mixed with other ingredients depending upon the type of insects. The present study may be considered as the first of its kind to document the edible insects of Koch-Rajbongshi Community of Bongaigaon district of Assam as no literature could be found yet on this aspect.

2.Materials and method

2.1. Study area: The present study was conducted at three villages under North Salmara Sub-division in Bongaigaon district of Lower Assam. The three villages namely Sidolsati, Kakaijana and Amtola are inhabited by the Koch-Rajbongshi people. As the Koch-Rajbonshis have a rich culture of consumption of insects, these areas were chosen for the convenience of the study.

2.2. Survey: The survey was conducted in the above mentioned villages from March 2018 to May 2018 through interviews, field studies and also through structured questionnaires (Narzari *et al*, 2015) regarding their seasonal availability, cooking procedure, parts consumed etc.

2.3. Collection and Identification: The specimens were collected with the help of local informants who were mostly the local inhabitants and were skilled in the collection work. The insects were collected from various wild habitats, fresh water bodies, paddy fields, vegetable gardens, grasslands and from the local markets. Collected insects were preserved following standard methods (Ghosh and Sengupta, 1982) and transferred to the laboratory of Zoology Department, B. Borooah College. Local names were collected from the villagers whereas English and Scientific names were obtained from the taxonomic literature and photographs.

2.4. Determination of nutrient content: Nutrient contents were analyzed in the laboratory of Zoology Department, B. Borooah College and also in the Bio Tech Hub of the same institution. Protein estimation of the collected insects was done by following the methodology of Lowry *et al*.

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(1951).Carbohydrate estimation was done by Van Handel (1985) method.Total lipid was extracted from the whole insect as per method of Folch *etal.* (1957).

3.Result:

3.1. Diversity of species: Edible insects' collection and information data revealed that 16 species of insects belonging to 6 order and 12 family were consumed by the Koch Rajbonghsi community. Out of these, six species belong to order Hymenoptera, five to Orthoptera, two to Coleoptera and one each to Lepidoptera, Hemiptera and Isoptera respectively (Table-1). The insects collected by the community are consumed raw, fried, or roasted. Besides eating, rural people of the district sell these insects in the village markets to generate income. During the survey, pupa and larva of *Philosomia ricini*, adult *Tarbinskiellus portentosus,* adult *Lethocercus indicus* and honey from *Apis indica* were found to be available in the village market at different cost. It has been observed that the pupa and unspining larva of *Philosomia ricini*are were sold at the local market @ Rs. 90/250gm and honey of *Apis indica* @ Rs. 150-200/750 ml.

Table 1: Diversity of edible insects consumed by the Koch-Rajbongshis

Sl No.	Scientific Name	Local Name	English Name	Order	Family	Stage of Consumption	Mode of Consumption
1	*Philosomia ricini*	Eri	Eri silkworm	Lepidoptera	Saturniidae	Pupa/ Larva	Fried/ Smoked
2	*Heiroglyphus bannian*	Kukti	Rice field grasshopper	Orthoptera	Acrididae	Adult	Fried/ Smoked
3	*Oecophyla smaragdina*	Amua	Red ant	Hymenoptera	Formicidae	Pupa/ Larva	Fried
4	*Lethocercus indicus*	Japoi Poka	Giant Water bug	Hemiptera	Belostomidae	Adult	Fried
5	*Hydrocercus ricksecker*i	Kori poka	Diving Beetle	Coleoptera	Dystiscidae	Adult	Fried
6	*Vespula vulgaris*	Borla	Common Wasp	Hymenoptera	Vespidae	Pupa /Larva	Fried
7	*Vespa affinis*	Bherul	Vespa bicolor	Hymenoptera	Vespidae	Pupa/ Larva	Fried
8	*Apis dorsata*	Bor mou	Indian Rock Bee	Hymenoptera	Apidae	Pupa/ Larva	Fried
9	*Apis florea*	Makhi mou	Dwarf Honey Bee	Hymenoptera	Apidae	Pupa/ Larva	Fried
10	*Acheta domestica*	Wisingra	House cricket	Orthoptera	Gryllidae	Adult	Fried/ Smoked

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11	*Leucopholis lepidophora*	Tamul poka	White Grub	Coleoptera	Melolonthidae	Larva	Fried
12	*Gryllotalpa africana*	Ghuguri	Mole cricket	Orthoptera	Gryllotalpidae	Adult	Fried/ Smoked
13	*Odontotermes obesus*	Wipoka	Termite ant	Isoptera	Termitidae	Larva	Fried
14	*Apis indica*	Mou	Honey Bee	Hymenoptera	Apidae	Larva	Fried
15	*Schistocera gregaria*	Phoring	Desert Locust	Orthoptera	Acrididae	Adult	Fried/ Smoked
16	*Tarbinskiellus portentosus*	Dangor wisingra	Cricket	Orthoptera	Gryllidae	Adult	Fried/ Smoked

3.2 Nutritional value:

The proximate composition of 9 listed insect has been shown in Table 2. The result of the analysis is recorded on fresh weight basis.

Table2: Nutritional value of some edible insects per 100 gm

Sl No	**Common Name**	**Protein** (%)	**Carbohydrate** (%)	**Fat** (%)	**Moisture Content**(%)
1	Giant Water bug	20.1	3.2	8.4	61.2
2	Diving Beetle	13.9	0.8	1.9	41
3	Red ant	12.5	2.7	3.6	16.7
4	Eri pupa	11.1	2.5	5.5	48.1
5	House cricket	13.2	5.3	6	31.4
6	Mole cricket	15.3	6.1	5.8	36.6
7	Termite	14.2	0.2	1.4	24.4
8	Cricket	14.4	5.0	5.5	35.05
9	Rice field grasshopper	13.6	2.1	3.2	15.6

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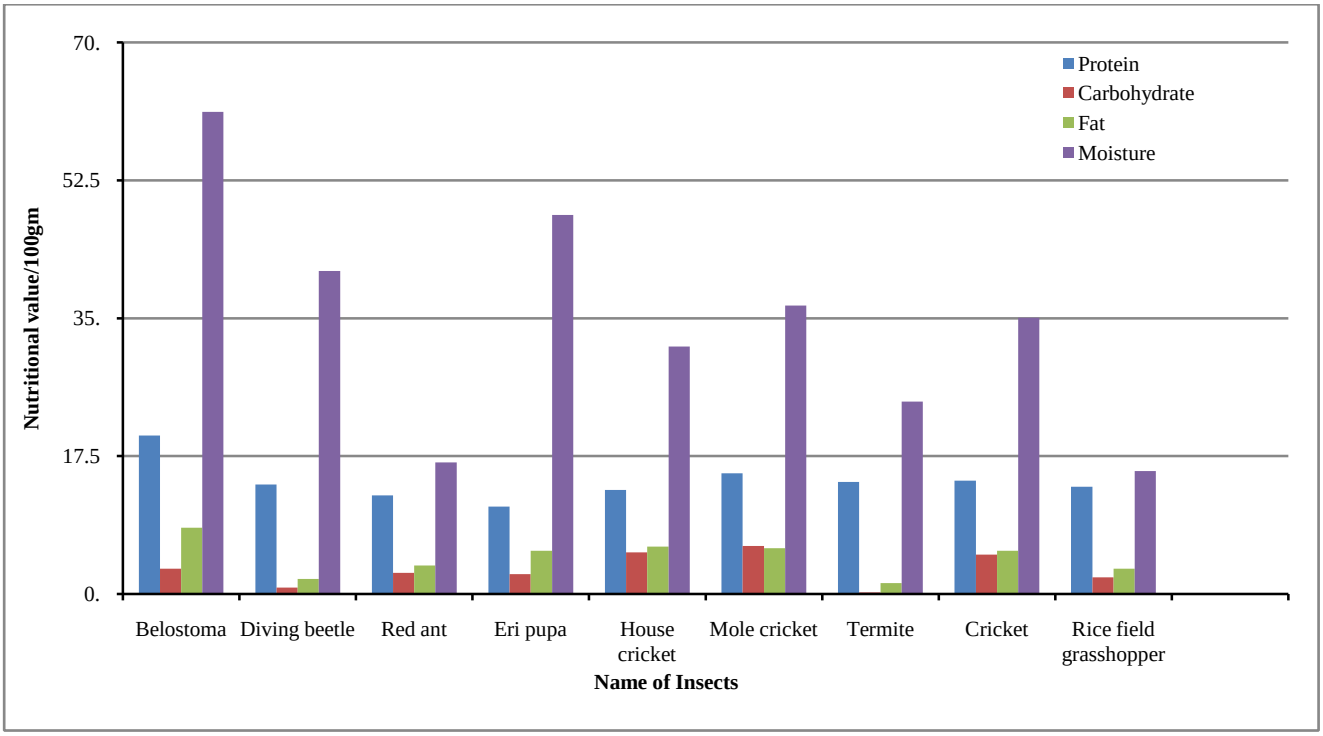

Fig 5.2 Nutritional value of different edible insects per 100 gm

Almost all the species showed protein content above 11%, however the highest amount of protein was recorded in Giant water bug (20.1%). Carbohydrate content was found to be highest in Mole cricket (6.1%) and fat in Giant water bug (8.4%). The results indicate that the protein content is higher than carbohydrate and fat which highlights the nutritional value of the insects as an alternative source of protein.

4. Discussion:

The proximate analysis of the insects which are utilized as food by the Koch-Rajbongshi Community of Bongaigaon District exhibited rich sources of many essential nutrients. The protein content of the edible insects was observed to be equivalent with that of meat and fish source and thus can be considered as a cheaper and readily available alternative to combat protein malnutrition among the poor (Kariuki and White,1991).

The carbohydrate content of these insects exists in the range of 1-5% of wet weight which conforms to the results of Xiaoming *et al.*, 2008 who worked on certain aquatic edible insects in China. Fat content of the collected insects was found to be in the range of 1.4 - 8.4 % which is comparable to the findings reported by Kourimska and Adamkova, 2016.

Our study has revealed that the wild insects which are consumed by the Koch-Rajbongsis of Bongaigaon District can possibly be used as quality food items that can provide considerable amount of nutrients necessary for health maintenance and protection from age related diseases (Hsu, 2006). Better scientific investigation on its nutrient contents will further provide reliable

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source of nutrition to the people for better health. However further research should be targeted on extensive survey of insects, search of literature, research on nutritional value of unknown species as well as socio-economic aspects (including acceptance of these foods by consumers) as it will open up new vistas for food security in the present era of constraints on edible food sources in the world.

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