

Edible Insects - A Solution for Food Security “*Eating Bugs is Way Better than Doing Drugs*”

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Article History

Received: 13.05.2022

Revised: 24.05.2022

Accepted: 29.05.2022

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INTRODUCTION

Since time immemorial, insects have been used as food, i.e. before humans had tools to hunt or farm, insects may have been an important part of their diet. Evidence suggests that evolutionary precursors of *Homo sapiens* were also entomophagous. Insect eating is a process in which humans harvest the eggs, larvae, pupae and adults of certain insect species from forests or other suitable habitat to eat. It is also known as Entomophagy. Entomophagy, the consumption of insects, is rooted in human evolutionary history. Insects have played an important part in the history of human nutrition in Africa, Europe, Asia, and Latin America. Over 1900 species of insects are known worldwide to be part of human diets. Some important groups include grasshoppers, caterpillars, beetle grubs, winged termites, bees, worms, ant broods, cicadas, and a variety of aquatic insects. It is interesting to know that more than two billion people consume insects on a regular basis, and insect eating provides a significant proportion of the animal proteins consumed in some regions. Because entomophagy is widely practiced, and because it compares favorably with nutrient and environmental aspects of conventional livestock rearing, it has the potential to contribute substantially to reducing undernutrition among an expanding global population.

ENTOMOPHAGY IN INDIA

Though it is known and most of the observation claims that medicine is food and food is medicine; however, insects that are taken as food is considered and a consolidated inventory on what is known to date on the edible insects from various parts of India.

Edible insects from North East India:

Thakur reported that the cinnamon bug, Ochrophyta (*Udanga montona* (Distant) Heteroptera; Pentatomidae) is fried in oil and consumed in Assam, Mizoram Manipur and Tripura.

A total of 40 different species of insects are consumed by ethnic tribes of Karbi Anglong and Dhemaji district of Assam and most common among them are 5 different varieties of silkworms pupae and the tribe, Karbis Rengma and the Nagas are found to be the highest number of insect (32 insect species) consumers. Paul and Dey mentioned termites from Meghalaya served as a source of protein and carbohydrate. While, in Manipur, a total of 41 insect species belonging to 8 orders under 24 families and 36 genera are recorded as food items. The order Hemiptera has the maximum number of edible species (10) and the least number (1) in Dictyoptera and Isoptera. Meitei, Tarao, Tangkhul, Chothe and Thadou tribes consume a higher number of species (28-30) in comparison to other ethnic groups in Manipur. Meyer-Rochow and Changkija identified and provided vernacular names of at least 42 species of insects used as food by AoNagas in Nagaland. Their list included 11 species of Orthoptera, 9 species each of Coleoptera and Lepidoptera, 8 species of Hemiptera and the rest distributed amongst the remaining insect orders with Mantodea and Odonata taking a leading role. An edible pentatomid bug (*Ochrophora montana*) had earlier been mentioned by SaChangki as a delicacy for inhabitants of the Mizo Hills in Northeast India. Meyer-Rochow expanded this list to over 60 edible species, mentioning some food insects of the Meiteis of Manipur and the Khasi of Meghalaya also. Out of the 102 species of edible insects in Arunachal, 40 belonged to the order Coleoptera; 26 to

Orthoptera; 12 to Hymenoptera; 8 to Hemiptera; 5 to Homoptera; 3 to Ephemeroptera; 4 to Odonata; 2 to Plecoptera; 3 to Dictyoptera; 2 to Isoptera; and 3 to Diptera. The research has shown that Arunachal tribes consume comparatively greater numbers of Orthopterans than do other insect-consuming tribes in India. In another study a consolidated list of edible insects used in the eastern part of Arunachal Pradesh (N.E. India) by Wangcho (Wancho) and Nocte tribes of the Tirap District and the Shingpo, Tangsa, Deori and Chakma of the Changlang District was reported. At least 51 insect species, belonging to 9 orders were considered as edible. The largest number of edible species belonged to Coleoptera (14), followed by 10 each of Orthoptera and Hymenoptera, 9 of the Hemiptera, 3 Lepidoptera, 2 Isoptera and one each of Ephemeroptera, Odonata and Mantodea. A total of about 255 species of edible insects so far recorded from different parts of India. Among the ethnic people of India, the tribes of Arunachal Pradesh outreaches in terms of number of edible insects taken as food, a total of about 158 species, this is followed by in Manipur, Assam and Nagaland (16 to 40 insect species) and to a lesser extent in Meghalaya. Isoptera, the termites are preferred by the tribes throughout India. Preference given to insect species utilized as food by ethnic people of India depends on the insect's palatability, availability, and nutritional value as well as on local traditions and customs.



Entomophagy from South and Central parts of India:

A perusal of the literature has revealed scanty and fragmentary information about edible insects in India. Yet, as early as 1813, Forbes had mentioned that termites are eaten by local tribes in Mysore and the Karnataka region. Das analyzed the locust *Schistocerca gregaria* for use both as human food and fertilizer in India and he has concluded that locusts were high in crude protein and fat. Roy and Rao conducted a dietary investigation of the Muria tribes in Madhya Pradesh. The two authors found that consumption of insect larvae known as chin kara as well as certain species of ants recorded in connection with various other food items. Rajan had reported that the tribe, 'Irumbars' in the North Arcot district of Tamilnadu,

and tribes in Karnataka, the winged termites, commonly called as Eesal are consumed as food. He has also noted that in some villages of Karnataka, the queen termite is collected and fed raw to weak children. Similar is the case in Odisha where termites are eaten alone or together with rice. Other than this, so far, there is no report about the other insects as food consumed by them. While in Kerala at least five species of insects (bees, ant and termite) were reported as food by Wilsanand and Yesodharan. Insects as an item of food for Negrito tribes of the Indian Andaman Islands were reported by Sharief Kavita covering management skills of the Nicobar Shompen Islanders in connection with native honey bees' use. Srivastava gave a brief overview of insect prospecting in India.



Why should we consume insects

Hunger and malnutrition is a serious problem in the ever-expanding human population. With the high rate at which the world population is growing, the world food supply should grow at the same rate, if not faster. Therefore, the search for new food sources including the identification and development of localized ethnic ones continues. Insects are the most abundant and most diverse multicellular organisms on planet earth and are thought to account for about 80% of all species. Numerous crops rely on them for pollination, and their importance extends into their other agricultural and human health benefits. Over 1900 species of insects are known to be part of human diets, more than 2 billion people

consume insects on a regular basis, and insect eating provides a significant proportion of the animal protein consumed in some regions. In fact, in many developing countries and among various cultures scattered throughout the world, insects remain a vital and preferred food and an essential source of protein, fat, minerals, and vitamins. This is because some edible insects have been shown to have nutritional value that can be compared with meat and fish, while others have a higher proportion of proteins, fat, and energy value. This has become especially important as the need for alternative protein sources increases due to rapid urbanization in developing countries and the shifts in the composition of global food

demand. Among the most important orders of insects consumed in the world are the Coleoptera, Hymenoptera, Isoptera, Lepidoptera, Odonata, and Orthoptera, and they are highly priced. Notable examples of these are the locusts, termites, worms, grasshoppers, caterpillars, palm weevils, and beetle grubs, among others. Although insects were mainly recognized as pests affecting humans, plants, and animal health, insects

play an essential role in minimizing food insecurity in addition to provide ecosystem services (such as pollination, waste degradation, and biological control). Insects also represent an important food source for a wide variety of animal species. Van Huis et al. outlined the important role of insects in assuring food and feed security. Below is a list of pictures showing the various edible insects consumed around the world.



Beneficial roles of insects for humans

Besides serving as sources of food, edible insects provide humans with a variety of other valuable products. A huge variety of insect species are known to have remarkable commercial and pharmaceutical values. For example, bees and silkworms have been shown to produce massive tons of honey and

silk, respectively. These products can be sold in the local as well as in the international markets while silkworms produce more than 90,000 tons of silk. Also carmine, a red dye produced by scale insects of the order Hemiptera, is used to color foods, textiles, and pharmaceuticals. Resilin, a rubberlike protein that enables insects to jump, has been used in

medicine to repair arteries because of its elastic properties. In addition to this, other products produced by edible insects such as honey, propolis, royal jelly, and venom have

been used in treating traumatic and infected wounds and properties. Furthermore, insect products have also been used in engineering methods in the production of biomaterials.



FIG. a) CARMINE BUGS . b) SILKWORM . c) HONEYBEE

CONCLUSION

The way forward Sustainably meeting global food demands is one of humanity's greatest challenges and has attracted considerable attention in the past few conclusions. There is general consensus on agriculture's positive contribution to food security through its role in increasing availability of affordable food and the incomes of the poor. Within the context of sustainable diet, the use of insects as food and feed has a significant role to play in assuring food security and improving livelihood of the African people. Edible insects are rich in protein and amino acids, especially essential amino acids which are necessary for the human body. They can also supply unsaturated fatty acids, minerals, vitamins, and carbohydrates, which have an excellent nutritive value. They are also of valuable importance medically, commercially, and ecologically. These edible insects should therefore be taken into consideration for a world in which human nutrition has been a huge problem. Recent studies have identified four important

challenges that must be addressed in order to tap the huge potentials that edible insects offer for enhancing food and feed security. To begin with, more work on the nutritional values of edible insects is needed in order to establish insects as food. Also, insect farming should be compared with livestock farming in order to determine which one of them is more environmentally damaging or environmentally friendly. Furthermore, there should be a further clarification on the socioeconomic importance of edible insects in enhancing food security. Lastly, a clear comprehensive legal framework at (inter)national levels is needed to pave the way for more investment, leading to the full development of production and international trade in insect products as food and feed sources.

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