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Entomophagy

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Abstract

Edible insects have always been a part of human diets, but in some societies there is a degree of distaste for their consumption. Due to the increasing population and the less food availability, insects had drawn attention as an alternate source of food. Insects are high source of proteins, fats and other essential nutrients. Insects are cheap, sustainable and viable source of nutrients. Insects play valuable roles in sustaining nature and human life by giving diversifying diets and improve food security.

Introduction

Entomophagy is the technical term for eating insects. The scientific term describing the practice of eating insects by humans is anthro-entomophagy. In the present world, across the globe, approximately 2.5 billion people take more than 1900 species of insects as an essential part of their diet. This practice of eating insects is still common in many countries. The earliest citing of entomophagy can be found in biblical literature; nevertheless, eating insects was, and still is, taboo in many westernized societies (Huis *et al.*, 2013).

Importance of Insects as Food

The dilemma of food security and lack of essential nutrients are two fundamental reasons that draw the world's attention towards insects as an alternative source of nutrients. Insect provide us with better quality proteins, low-fat contents as well as essential micronutrients with a high and quick source of energy than any other conventional source of food. Insect farming has been adopted by many people of different regions at domestic and commercial level because of its low input and high output (Naseem *et al.*, 2020).

A recent number of 2111 of edible insect species along with entomophilous regions was recognized. According to the Food and Agriculture Organization of the United Nations (UN), insects that are edible "contain high quality protein, vitamins and amino acids for humans.

Edible Insects

According to literature, approximately, 250 species of edible insects were recorded from Africa, in Thailand 50 palatable species of *Meimuna*, *Allonemobius*, *Cotinis* genus were recorded, 348 appetizing species documented in Mexico, 187 species in China a few of which are *Bombyx mori*, *Antheraea pernyi*, *Tenebrio molitor*, *Apis cerana*, *Locusta migratoria*, *Odontotermes formosanus* and *Anax parthenope*, 55 tempting species in Japan and a few of which *Oxya yezoensis*, *Oxya japonica*, *Vespa lewisii* and *Bombyx* are consumed, while from India 60 species of edible insects were recorded.

Due to high nutritive value and as a part of natural diets, insects are also used as animal feed. The commercial insects which are used as feed are yellow mealworm, black soldier fly larvae, termites and grasshoppers. These insects replace the expensive feed, for example, house fly used as a protein source for fish. Broiler diet that contains 20, 27 and 30% soybean could be replaced by 0, 5, and 9% yellow mealworms.

Linnaeus had explained the taste of a Red palm weevil grub as "Larvae assate in deliciis habentur" [fried larvae are delicious] – *Rynchophorous spp.* in the 1758 work *Systema Naturae*.

Termites

In the Western world, termites are generally synonymous with pests and are renowned for their capacity to devour wood. Yet termites are considered a delicacy in many parts of the world. They are consumed both as main and side dishes, or simply eaten as snack foods after they have been de-winged, fried and sun-dried. Edible termites, which typically belong to a family of macrotermites (*Macrotermitinae*), generally consist of the winged form that swarm from termite hills shortly after the first rains begin at the end of the dry season.

Table 1: Number and percentage of edible insect orders (Naseem *et al.*, 2020)

Order	Insects	Percentage
Coleoptera	Beetles	32.38
Lepidoptera	Caterpillars	17.79
Hymenoptera	Bees, Wasp	15.77
Orthoptera	Grasshopper, Locusts, Crickets	13.66
Hemiptera	Cicadas, Leafhoppers, Plant hoppers	11.65
Isoptera	Termites	2.90
Diptera	Flies	1.82
Blattodea	Cockroaches	1.82
Others		2.21

Many kinds of beetles include aquatic beetles, wood boring larvae. There are more than 78 species of edible beetle species in the family *Dytiscidae*, *Gyrinidae* and *Hydrophilidae*. The most popular edible beetle in the tropics is the grub of red palm weevil. In Netherlands the larvae of the meal worm species (*Tenebrionidae*) was widely consumed.

Nutritive Value

FAO (Food and Agriculture Organization) has recognized the potential of insects to meet the energy demands (WHO/FAO, 2003) Insects deliver a high source of protein, vitamins, nutrients, and fats. Several published data reveal the importance of insects as food and feed. With overwhelming growth in population, food scientists are looking for alternative sources of dietary proteins. Many suggestions have been

proposed in this regard like the use of yeast, microscopic fungi, and microalgae as a substitute of proteins but none of them proved to be far better than insect proteins. Many insects contain abundant stores of lysine, an amino acid deficient in the diets of many people who depend heavily on grain.

Advantages

- Commercial production of insects is very easy and industrial sectors should take up a Research and Development to enhance the rearing techniques and to access the nutritional value of insects.
- Insects require less space and they are good sources of protein.
- They reproduce at a faster rate (A single queen termite can lay 6000-7000 egg per day).
- Entomophagous insects produce less toxic gases/ greenhouse gasses than the livestock and poultry and environment friendly.

Conclusion

Insects also have less effect in environment than conventional cattle rearing. The food conversion ratio is very high in insects than poultry and livestock. And also they are rich sources of protein and helps in maintaining a sustainable environment by occupying minimum space, releasing less greenhouse gases. Standardization of Mass rearing of insects and rearing facility is still wanting in the field. Consuming insects is an appreciable approach that is feasible, time consuming, low cost, and highly nutritive. Since knowledge about the nutritional status of insects is still lacking among the people and lower acceptability of insects leads them unexplored. Insects are healthy food and the commercial production of edible insects will help to meet the increasing food demand. The misconceptions and the myths about eating insects should be broken down and every scientist should contribute positively to the development of the edible insects sector. Thus Entomophagy is a viable, sustainable, cheaper and highly nutritive tool in the race of food security.

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