

## Edible Insects- An Alternative to Animal Protein

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### SUMMARY

The practice of eating the insects is practiced since long ago. Due to increase in the population the scarcity of the food resources like animal protein, carbohydrates may occur. Thus, to encounter this problem edible insects is the best and alternative source to the animal protein and potentially solve the problems related to conventional food supply chain. More than 2300 species were reported as edible insects from 18 orders, of which 7 orders were, recorded more edible insects. These insects are used as food as well as feed purpose for the poultry, fish and animals. Academics, government agencies and non- government agencies effort of reducing the negative perception of insects promotes the consumption of edible insects.

### INTRODUCTION

Several studies has suggested that world population will reach 9 billions by 2050 (Park and Yun, 2018). The increase in population leads to the doubling the food production. The problems like global warming, climate change and the environmental destructions have negative affect on food production (Dobermann et al., 2017). This leads to the scarcity of food resources. In this situation, choosing the alternate food source is to be done. Several foods have been proposed as an alternative. Among them, insects received the most attention (Patel et al., 2019). The consumption of the edible insects has been practiced years ago. The practice of eating insects is known as Entomophagy. But the rapid increase in the food production has largely eliminated insects from humans' diet (Gao et al., 2018). The demand of meat in 2050 will be 58% higher than the demand at present. For achieving the global food security, the reappearance of insects into the viable food group is necessary due to their nutritional, environmental and economic value. Insects having a good protein content and excellent production efficiency compared with other conventional food groups (Kohler et al., 2019). Despite of numerous advantages, many barriers of consuming the insects remains in insect- food development because the concept of insects is not conventional in eating habits (Murefu et al., 2019). Presently insects foods are in transitional stage, and promising new techniques involves developing new food products via combining protein in processing technology with insects (Kohler et al., 2019).

### Use of Insect as food and feed:

An interest in edible insects has increased rapidly because the Food and Agriculture Organization (FAO) has begun promoting insects as viable dietary options for human (Van huis et al., 2013). More than 2300 species were reported as edible insects from 18 orders, of which 7 orders were, recorded more edible insects. Most of the insects are harvested from nature and some are farmed in a large scale. The most common insects consumed are beetles grubs (Coleoptera- 31%), followed by Caterpillars, Pupa (Lepidoptera-18%), Grasshoppers, Locust, cricket (Orthoptera- 18%), Cicadas, Leaf hoppers, Plant hoppers (Hemiptera- 10%), termites (Isoptera- 3%), Dragonflies (Odonata- 3%), Flies (Diptera- 2%) and other orders (15%).

### Insect as Food:

Insects are traditionally consumed in the diet in many regional and national wide. Insects are consumed as a nutritious alternative to the main stream staples such as chicken, pork, meat, beef and fish due to its rich source such as protein, good fats, high calcium, iron and zinc. The edible insects have great value in supplying calories from 290-750 k cal/ 100g. Generally, adults are not consumed highly due to the presence of chitin which is indigestible and having low calories. The larvae and pupa are usually composed of high amount of proteins and fats which having high calories. Some insects are consumed in the larva form (*R. phoenicis*, *T. molitor* and *I. belina*) as their abundant fats can provide a mesmerizing flavor. The production of *T. molitor* has been industrialized because of its vitality. They can grow massively and rapidly. For orthopterans like cricket and locust usually only adults would be eaten. They are particularly easy to harvest from swarming. Pupa of Silk worm is consumed. Hence products made from insects of different stages can fit people with different needs.



Silk worm pupa

Tenebrio spp. larvae

Locust Adult

Some products are serving instantly and are commercially marketed in the tins and different packs with different trade names



Commercial products of insects

But the inexperienced consumers perceive insects as a source of fear or disgust, have strong rejection of insects as a normal food in their diet, and totally neglected their high nutritive values (Van Huis, 2016).

**Insect as feed:**

Insect based animal feeds are more attractive when considered with other standard feeds. Its high nutritional values, minimal spacing requirements and low environmental impact leads to the appealing option for animal feed. They are naturally available. The larvae and pupae are utilized as feed for cattle, pig, poultry and fish (Newton et al., 2005). The most promising insects used for the feed are black soldier flies, larvae of yellow meal worm, silkworms, grasshoppers and termites (Dobermann et al., 2017). An earlier study revealed that insect meal can increase the protein content in the broiler hens. In aquaculture housefly larvae is a complimentary source of protein. Larvae of butterflies (*Bemastistes macaria*) used for feeding African cat fish hybrid.



Feeding the Hen with black soldier flies



Fish food containing insects

## CONCLUSION

Entomophagy is the best solution for the increase in food security problem to the world due to its high nutritional content, low cost, easily available. Many countries already started consuming the insects as alternative protein source. Insects can be serving in various areas as cuisines and snacks. Various strategies needed to be developed to expand the edible insects into market. Several governments and no government agencies needed to be conducted the awareness programs on edible insects.

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