ECRONICON OPEN ACCESS

EC NUTRITION
Mini Review

Food Sustainability Using Insect as Source of Protein: An Insight

Navneet Singh Deora*

Innovation Scientist, Guiltfree Industries, Mumbai, India

***Corresponding Author**: Navneet Singh Deora, Innovation Scientist, Guiltfree Industries, Mumbai India.

Received: June 21, 2019; **Published:** August 28, 2019

Abstract

The current article talks about the potential of Insects as source of Food from the perspective of sustainability. Insects holds immense contribution in meeting towards future food security. With growing population, protein supply looks inadequate and can be linked to anthropogenic impacts like loss of biodiversity, acceleration in Nitrogen cycle and carbon Cycle due to climatic changes. In this light, insects are undeniably useful for food, feed, and other purposes. With continuous progress towards the diet transition as well as awareness of consumers towards sustainability, insect proteins seem to be a growing Industry. However, an integrated, multidisciplinary approach including all stakeholders remains a prerequisite so as to progress towards evolution of Inspect protein for Human consumption.

Keywords: *Food Sustainability; Insect; Protein*

Introduction

Insects have been eaten traditionally for thousands of years but the industrialization of insect rearing and processing for food is relatively new. A wide variety of insects can potentially be consumed for food, e.g. crickets, locusts, grasshoppers, caterpillars, beetles, ants, and fly larvae, Insects are a potentially rich source of protein and lipids, as well as micronutrients and minerals [1-3].

To meet the global demand of Protein, we would need alternative approaches and sources if we need to avoid further biodiversity losses and environmental degradation. In this light one of the prominent idea is to grow inspects for the mass consumption considering the high nutritional value of the Insects in terms of available protein content and their resource efficiency when converting organic matter into protein [4].

Presently, there is a transition phase where Industry are in process of shifting from low level collection and production to intensive rearing on a massive scale. However, the sustainability criteria as well as its impact of the environment has unknown. It is important for the animal scientist and Ecologist to play pivotal role in evaluation the impact of mass rearing of insect on the environment sustainability.

Why do we need insect protein?

The Earth's population is expected to exceed over 9 billion by 2050. Considering this growth rate, demand in the meat protein would continue to grow with damaging impact in terms of sustainability leading to the unsustainable environmental impacts and resources wastefulness [6].

In this aspect, Insects can provide food at low environmental cost and contribute positively to livelihoods, compared to conventional livestock system of production. Thus, alternative solutions to conventional livestock and feed sources urgently need to be developed. For this reason, insects show great potential for food and feed as an environmentally friendly choice in future food systems.

Several beneficial aspects support an increased utilization of insects as a sustainable animal protein source. Insects are often high in protein, vitamins, and minerals. They have low impact on resources and the environment by emitting less greenhouse gases, requiring less water and space and are extremely efficient at converting ingested matter into biomass compared to their vertebrate counterparts in traditional husbandry [9,10,13]. The consumption of insects, therefore, contributes positively to the environment and the human health.

Protein and amino acids content of insects

Protein quality, and thus nutritional value, is determined by amino acid composition and the digestibility of the protein fraction of food. EAAs (essential amino acids) are key parameters in food quality assessment [1,8,9]. Protein content of an insect is very important when evaluating the importance of insects in entomophagy. Globally, edible insects, especially species from the order Orthoptera (grasshoppers, crickets, and locusts), are rich in proteins and represent a valuable alternative protein source. Protein contents up to 65% (on a dry matter basis) have been reported for several grasshopper species and many species in the order Hymenoptera.

Refer to the figure 1 below for the comparative Protein range selected for the Insects as compared to other prominent protein sources. Like proteins, amino acid composition of edible insects differs widely among different species and orders. Analysis of almost a hundred edible insect species showed that the content of EAAs represents 46% - 96% of the total amount of amino acid [9]. Most of the edible insects studied have amino acid levels which are comparable to beef, egg, and soya or higher in many cases. High amino acid values have been found for isoleucine, leucine, phenylalanine, tyrosine, and glycine in all insect species (*Tenebrio molitor, Glyptotendipes testaceus* and the orthopteran species) [4].

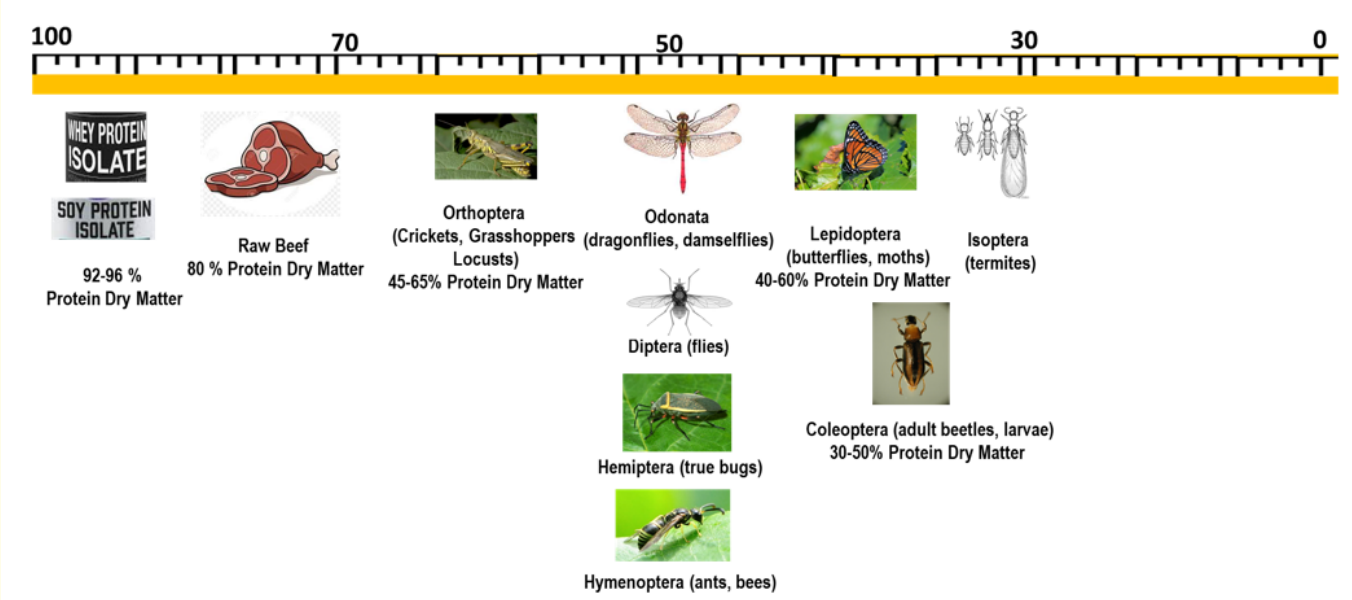

Figure 1: *Protein range of selected insects adapted from [1].*

Conclusion

Insect proteins present unknown opportunities which is needed to be explored. However, we need to understand the risk associated to allergens, contaminants, and toxins before we embark the journey towards mass scale production. Blending different sources of proteins

to produce functional and/or nutritional synergies should be explored in future. With the advent of societal and technological change, the fundamentals of protein chemistry, biophysics, and human nutrition remain the best platform for responsible food innovation.

Bibliography

1. Loveday Simon M. "Food Proteins: Technological, Nutritional, and Sustainability Attributes of Traditional and Emerging Proteins". *Annual Review of Food Science and Technology* 10 (2019): 311-339.
2. Smetana Sergiy., *et al*. "Sustainability of insect use for feed and food: Life Cycle Assessment perspective". *Journal of Cleaner Production* 137 (2016): 741-751.
3. Aiking H and J de Boer. "Protein and sustainability-the potential of insects". *Journal of Insects as Food and Feed* 5.1 (2019): 3-7.
4. Salter Andrew M. "Insect Protein: A Sustainable and Healthy Alternative to Animal Protein?" *The Journal of Nutrition* 149.4 (2019): 545-546.
5. Tschirner Martin and Werner Kloas. "Increasing the sustainability of aquaculture systems: insects as alternative protein source for fish diets". *GAIA-Ecological Perspectives for Science and Society* 26.4 (2017): 332-340.
6. El Bilali Hamid., *et al*. "Food and nutrition security and sustainability transitions in food systems". *Food and Energy Security* 8.2 (2019): e00154.
7. Tripathi Abhishek D., *et al*. "Estimates for World Population and Global Food Availability for Global Health". The Role of Functional Food Security in Global Health. Academic Press (2019): 3-24.
8. Sosa Daylan., *et al*. "Potential of insect-derived ingredients for food applications". Insect physiology and ecology. IntechOpen (2017).
9. Rumpold Birgit A and Oliver K Schlüter. "Nutritional composition and safety aspects of edible insects". *Molecular Nutrition and Food Research* 57.5 (2013): 802-823.
10. Belluco Simone., *et al*. "Edible insects in a food safety and nutritional perspective: a critical review". *Comprehensive Reviews in Food Science and Food Safety* 12.3 (2013): 296-313.
11. Bukkens Sandra GF. "The nutritional value of edible insects". *Ecology of Food and Nutrition* 36.2-4 (1997): 287-319.
12. Rumpold Birgit A and Oliver K Schlüter. "Potential and challenges of insects as an innovative source for food and feed production". *Innovative Food Science and Emerging Technologies* 17 (2013): 1-11.
13. Lamsal Buddhi., *et al*. "Applications of Insect-Derived Protein Ingredients in Food and Feed Industry". *Journal of the American Oil Chemists' Society* 96.2 (2019): 105-123.

Volume 14 Issue 9 September 2019