



Short Review Paper

Locust as source of food and feed

Shashi Meena

Department of Zoology, University of Rajasthan, Jaipur -302004, Rajasthan, India
drshashimeena15@gmail.com

Available online at: www.isca.in, www.isca.me

Received 8th September 2020, revised 15th February 2021, accepted 20th March 2021

Abstract

Acridid grasshopper and locust constitute a major group of insect having potential role in agriculture as a pest. Outbreak of locust annually harms crops and devastating for live hood. In the scenario of global food crisis massive locust swarms may be used as food and feed products for human and farm animals. Increasing human population, larger pressure on the environment and more demand for nutrients and energy are predicting for near future. Several studies have described significance of locusts in respect of nutritional value and preferred as edible source. Cultivation or farming of locusts needs less modern tools and techniques and very easy to produce locally by workers. In the future to meet out increasing demand of nutritional food, locust farming may be seen as great scope in sustainable food processing and production at commercial level.

Keywords: Acridid grasshopper and locust, locust swarms, edible source, nutritional food.

Introduction

Locusts are short-horned grasshoppers belonging to family Acrididae and order Orthoptera. These insects form massive swarms that expand across the area demolishing crops and serious threat to agricultural and great crisis of economies and livelihoods¹. They acquire generally solitary phase, but they quickly reproduce in definite ecological conditions and convert into swarms phase. During drought, solitary grasshoppers are forced together in the dense vegetation. This triggers secretion of serotonin hormone that induces locusts more gregarious and encourages rapid movements and more diverse appetite. Therefore, environmental condition when changed to moist soil and green vegetation they begin to reproduce rapidly and attain crowding phase and thus shift from solitary lifestyle to a group lifestyle called the gregarious phase. This phase is recognized by change in color and body shape². Crowd of locusts have harmed human societies since ancient time and they all cause havoc today. Massive locusts attack can be seen across the world but mainly occurs in South Asia, region of the Middle East and Africa. Apart from of their disturbing hazard to the agriculture and forestry, the acridid species are important source of nutritional constituents^{3,4}. Locusts are considered fit for human consumption and regarded for their rich content of protein, carbohydrate, dry matter, fiber, minerals and vitamins⁵. Since long in many developing countries such as in Africa, Thailand and North East India locusts have been greatly considered an eaten material in abundant⁶. In vast area of the world insects are taken in the human food, with no exceptions such as parts of Europe and North America⁷. Edible insects contain rich contents of protein, fat, minerals and vitamins^{8,9} and are also found tasty and delicious dietary item. The world

population would reach to more than 9.5 billion by 2050, requiring a larger productivity from existing agro-ecosystems¹⁰. Therefore, alternative food supply source is needed for future perspective.

There are many reasons to consider locusts as food as they are abundant and can be collected in large numbers very easily by local people. The progress of aquaculture practices since the 2000s, in the Africa and the Asia locusts and grasshoppers had been using as feeding material for catfish and tilapia as the alternative sources of protein. Furthermore, rearing of the locust is easy, involving no special need. Insects have a comparatively sustainable rearing system needed less land, limit emission of greenhouse gases and also ammonia in comparison of conventional livestock¹¹. Owing to these facts, insects farming as an effective substitute to usual livestock production and food supply⁶.

Use of locusts as food and feed

Locust and grasshoppers have been eaten in most of the parts of Africa, for long centuries and still today. The dead locusts are available in huge amount due to great locust outbreaks, they are a rich possible feed for livestock, particularly for poultry. That could have supplementary source as food during times of national calamity¹². From a nutritional viewpoint, locusts and grasshoppers are described as an excellent source of protein and essential nutrients such as fatty acids and minerals. Currently, grasshopper and locusts are rearing, for dietary purposes to human and feed to live stock in several countries of the world. Although, insects are regard as disgusting food by most Western countries, but locusts are considered as important food source in many other countries¹³.

According to FAO (Food and Agriculture Organization) dry weight of desert locust, *Schistocerca gregaria* have about 62% of proteins and 17% as fats and with the remainder as inorganic constituents (Si, Fe, Cu, Mn, K, Ca, Na, Mg, Ni, P, Ti, S). The amount of saturated and unsaturated fatty acids in percentages is observed to be 44% and 54%, respectively. Fatty acids such as palmitic, oleic and linolenic acids are abundant where satisfactory amount of iodine, iron, phosphorus, thiamine, niacin, riboflavin, as well as traces of calcium, selenium and magnesium also contained. However, studies revealed that the in locusts have high cholesterol content as 286 milligrams per 100 grams, in comparison to found in meat or poultry of the same amount¹⁴. Locusts are one of the species of insect considered edible and are prepared in several ways such as dried, smoked and meshed. Locust is only the insect group considers kosher involving different color locust species of locust - red, yellow, spotted grey, and white. In Middle East, as in Israel, consumption of gregarious locusts is a tradition. In Madagascar, locust are collected and used to eat and feed for animals during locust swarm outbreaks¹⁵.

In India new ways must be promoted to make safe the country's food supply. In this regard, farming of locusts at commercial level would have identified as additional source of nutrition and feed. Moreover, locust epidemic causing potential harm to the agriculture production system and the sustained lack of nutritional diversity at large scale alternate food sources should be identified. In India, farming of orthopteran insects at large scale has been observed such as *Oxya fascovittata*, *Syothosternum presiniferum* and *Oxya hyla*. Farming of the house cricket, *Acheta domestica* is easy and can be run on large variety of organic materials producing 6 to 7 generations per year¹⁶.

Conclusion

Locusts are useful in terms of their sustainable food production and nutritional value. Farming of locusts is significantly required less amounts of feed, water and area in comparison to other livestock. Additionally, good viable source of rich nutritional compositions in terms of proteins, fibers, fatty acids, vitamins and minerals for both humans and animals in future perspective. Therefore, possible efforts should be raised to developed sustainable food industry to enable potential use of insects.

References

1. Meena, S. (2018). Biology of acridid grasshopper, *Chrotogonus trachypterus* Blanchard -A review. *Research Review International Journal of Multidisciplinary*, 3(12), 719-721.
2. Imms, A.D. (1948). A general text book of Entomology. Methuen & Co. Ltd.; London, 884 pp.
3. Itterbeeck, J.V. et al, (2019). Diversity and Use of Edible Grasshoppers, Locusts, Crickets and Katydid (Orthoptera) in Madagascar. *Foods*, 8, 666; doi: 10.3390/foods8120666
4. Itterbeeck J.V. (2020). Locusts are an excellent source of protein, but eating them is no longer a good idea. <https://scroll.in/article/963065/locusts-are-an-excellent-source-of-protein-but-eating-them-is-no-longer-a-good-idea>, Accessed 27 May 2020.
5. Chakravorty, J. (2014). Diversity of Edible Insects and Practices of Entomophagy in India: An Overview. *Journal of Biodiversity, Bioprosperty Development*, I(3).
6. Van Huis, A., Van Itterbeeck, J., Klunder, H., Mertens, E., Halloran, A., Muir, G., & Vantomme, P. (2013). Edible insects: future prospects for food and feed security (No. 171). *Food and agriculture organization of the United Nations* (FAO).
7. FAO (2013). Edible insects: Future prospects for food and feed security. *Forestry paper*, 171, 1- 154.
8. Rurnpold, B.A. and Schluter, O.K. (2013). Nutritional composition and safety aspects of edible insects. *Molecular Nutrition and Food Research*, 57, 802-823.
9. Makkar, H.P.S., Tran, G., Heuzé, V. and Ankers, P. (2014). State-of-the-art on use of insects as animal feed. *Animal Feed Science and technology*, 197, I-33.
10. FAO, I. (2017). WFP. The State of Food Insecurity in the World 2015. Meeting the 2015 International Hunger Targets: Taking Stock of Uneven Progress. Rome, Italy: FAO; 2015. Accessed 15 Jan 2017.
11. Ooninx, D. G., Van Itterbeeck, J., Heetkamp, M. J., Van Den Brand, H., Van Loon, J. J., & Van Huis, A. (2010). An exploration on greenhouse gas and ammonia production by insect species suitable for animal or human consumption. *PloS one*, 5(12), e14445.
12. Piesse, M. (2020). Indian Food Security is Unlikely to be threatened by Locust Outbreak. Research Manager, Global Food and Water Crises Research Programme.
13. Mitsuhashi, J. (2016) Edible Insects of the World, 1st ed.; CRC Press: Boca Raton, FL, USA, p. 296.
14. Cerritos, R. and Cano-Santana, Z. (2008). Harvesting grasshoppers *Sphenarium purpurascens* in Mexico for human consumption: A comparison with insecticidal control for managing pest outbreaks. *Crop Protection*, 27, 473-480.
15. Aiking H and I de Boer (2019). Protein and sustainability- the potential of insects. *Journal of Insects Food and Feed*, 5(1), 3-7.
16. Das JK (2019). Diversity of edible insects consumed by ethnic tribes in Baksa District of Assam, India. *Intentional Journal of Scientific Development and Research*, 4(7), 301-309.

