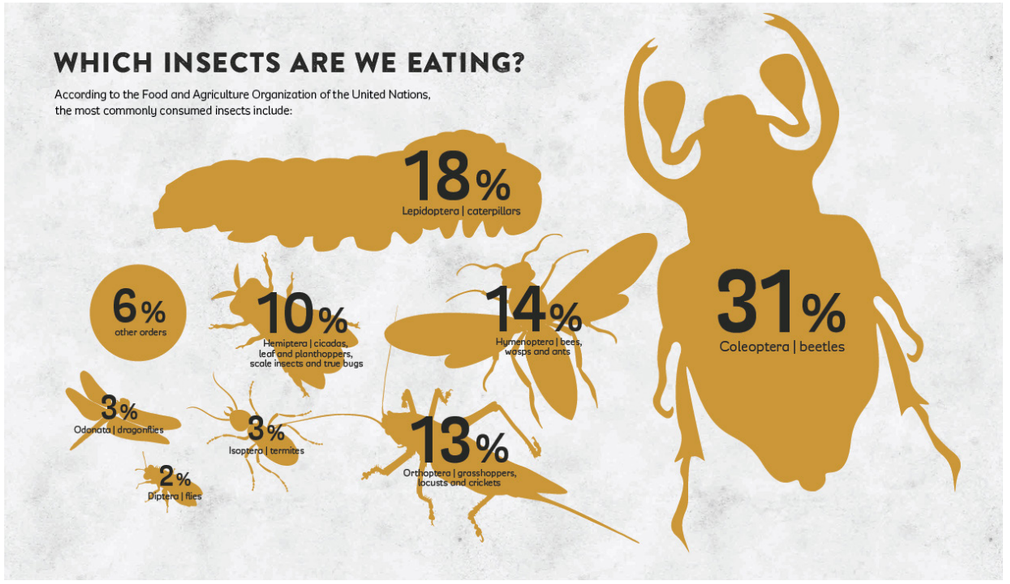
EDIBLE INSECTS FARMING– AN APPROACH FOR FOOD AND FEED SECURITY

R. Pungavi* and S. Aarthi
Ph. D Scholar, Department of Entomology, Faculty of Agriculture, Annamalai University, Chidambaram

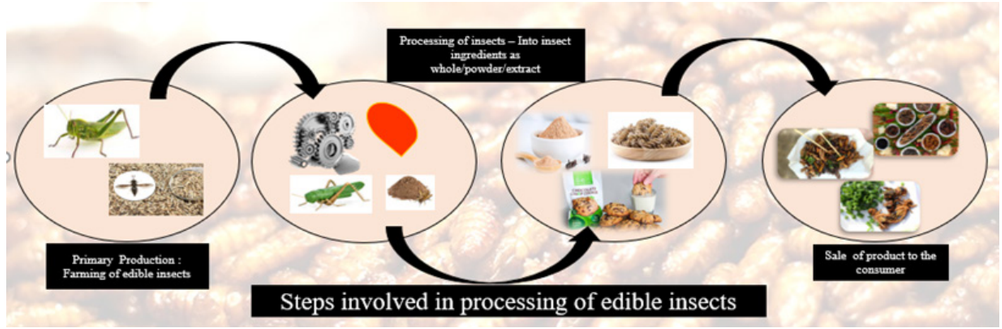
Humans eat insects, which is known as entomophagy. Entomophagy is now widespread in many parts of the world, but it is most prevalent in Asia, Africa, and Latin America. Edible bug species can provide a convenient source of protein for humans. Increased protein intake from insect consumption could improve the nutritional content of human diets dramatically. Insect eating has recently gotten a lot of press across the world. Because edible insects include high-quality protein, vitamins, and minerals, as well as economic and environmental benefits, they have the potential to become a major global future diet.

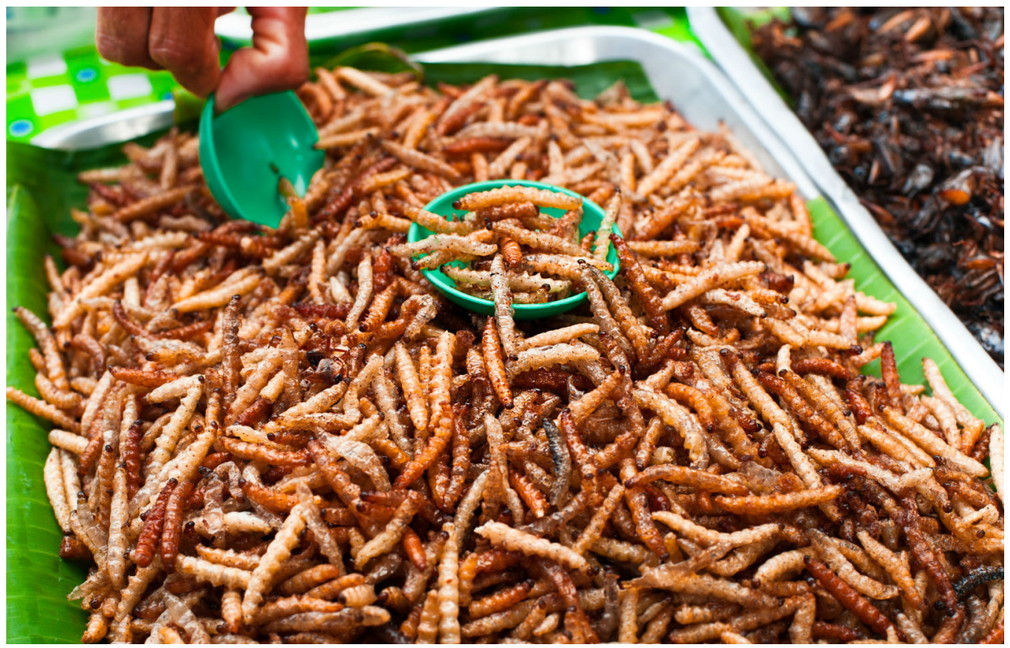


Is it possible for insects to help with food and feed security?

With the world's population expected to reach 9.7 billion by 2050, concerns are growing over whether the planet's limited resources, such as agricultural land and freshwater, will be able to meet the requirements of such a vast number of people. Alarmingly, global warming is reducing the amount of land used for food production around the world. Climate change and environmental devastation caused by industrialization have a negative impact on food productivity. Exploration of new food sources for humans, cattle, and fisheries has resulted from the need to feed a growing population. Insects have been presented as an alternate food source for people and livestock in recent years. Insect-derived food is thought to be more resource efficient than traditional cattle agriculture.

Insect farming is one of the many options for addressing food and feed security Insects are common, reproduce quickly, have high growth and feed conversion rates, and leave a little environmental footprint throughout their life cycle. They are nutrient-dense, with high protein, fat, and mineral content. They can be fed a number of waste streams, including food scraps, to grow. They can be eaten whole or ground into a powder or paste and added to other foods. Insects can theoretically be used as a feed component on a big scale, and existing businesses in many parts of the world are already working toward sustainable farming. Insects as a feedstock for aquaculture and poultry feed will undoubtedly grow in popularity over





BENEFITS OF INSECT FARMING

Nutritional benefits to human

Insects are high in proteins and minerals that are essential for human diet.

Micronutrients like copper, iron, magnesium, manganese, phosphorus, selenium, and zinc are abundant.

Edible insects provide enough calories and protein to meet human amino acid needs, are high in monounsaturated and polyunsaturated fatty acids, and are high in minerals, vitamins, and fibre.

Order	Energy (Kcal/ 100 g)	Total Protein	Essential amino acids	Total Fat	Minerals (mg/ 100 g)
Blattodea	490	68.33	5.18	25.05	61.58
Coleoptera	574	41.75	4.28	35.81	169.91
Diptera	460	48.80	4.16	21.94	237.01
Hemiptera	622	48.83	4.14	32.25	539.85
Hymenoptera	655	51.43	4.42	18.71	320.77
Isoptera	496	33.00	4.37	36.80	45.69
Lepidoptera	762	65.25	4.50	37.95	377.75
Orthoptera	427	9.17	3.95	19.92	341.19

(Tang *et al.* 2019)

Insects have always been a part of human cuisine and complement the diets of around 2 billion people. The edible insect's market is expected to increase by 47 percent between 2019 and 2026, according to the Global Market Insights research (Industry Forecasts, 2021).

ECOLOGICAL BENEFITS

When compared to cattle and beef, greenhouse gas emissions associated with the production of edible insects such as crickets, locusts, and mealworm larvae have been determined to be 100 times lower.

Insects pose a low risk of transmitting zoonotic diseases than birds and mammals.

Insect farming uses a lot less land and water than cattle ranching does.

Edible insects produce biologically active substances such as antioxidant, antimicrobial, antidiabetic, antihypertensive, antithrombotic, and immunomodulating properties.

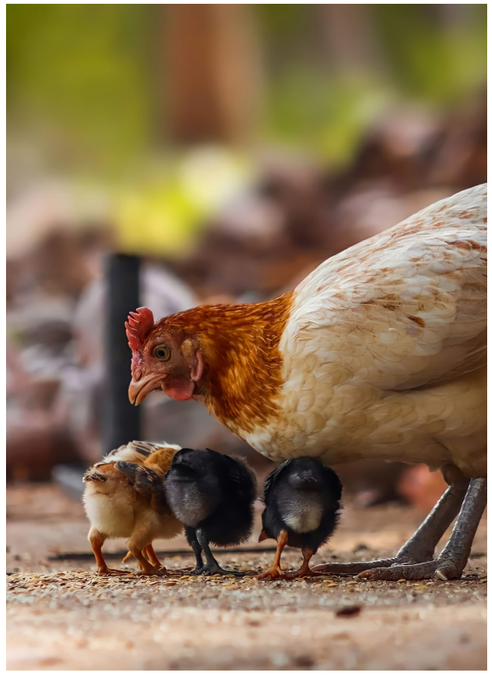
INSECT AS BIODIESEL FEEDSTOCK

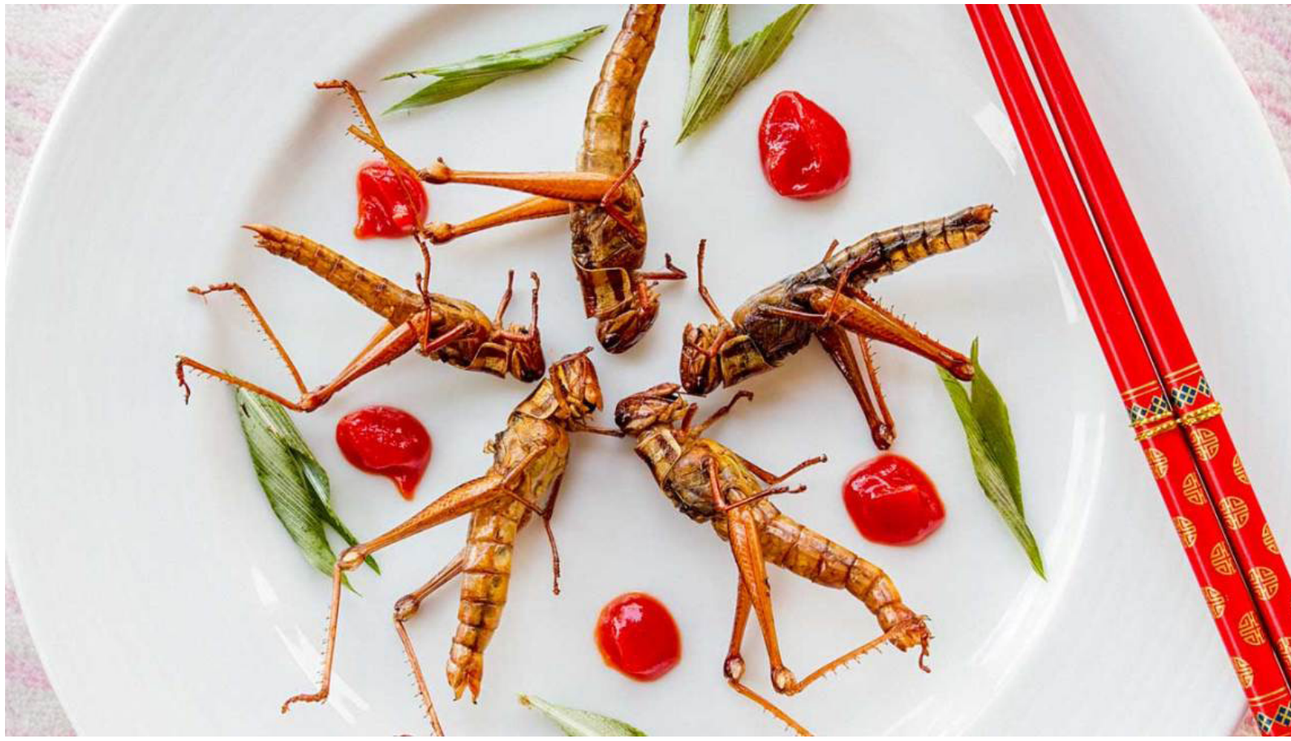
This high-fat insect might be used as a biodiesel feedstock, allowing for the manufacturing of a wide range of bio-based products.

Insect-based biorefinery produced 8.50 g of insect biomass with a waste dry mass reduction rate of 51.32 percent, yielding 1.95 g crude grease and 1.76 g biodiesel from larval biomass (yellow mealworm and black soldier fly). The rate of conversion of free fatty acids in crude grease to biodiesel was 90%.

ALTERNATIVE FEED TO LIVESTOCK

Insect meal has been shown to be palatable to chickens, pigs, fish, and ruminants, and insects can replace 25–100% of soymeal or fishmeal, depending on the animal species. Insect meal obtained from the most regularly used species in the manufacturing of animal feed includes between 55 and 76 percent crude protein and nutritionally important amino acids Crickets have a feed-to-meat conversion rate that is around twice that of chickens and 4–12 times that of pigs and cattle. Yellow meal worm efficiency of conversion of ingested food (ECI) ranges from 53 to 73 percent, but other species' ECI is only about 40 percent. Insects can convert 2 kg of feed into 1 kg of insect mass on average, but calves need 8 kg of feed to gain 1 kg of body weight. Black soldier fly caused a 54.9 percent rise in the giant freshwater prawn's average daily weight growth, as well as a 32 percent drop in its FCR.





CONCLUSION

Insects provide excellent sources of many vital nutrients. Edible insects could help address the growing need for animal-based protein in the future. Furthermore, the food industry's sustainability could be increased by using food wastes as new substrates or dietary components in large-scale procedures that rear edible insects for human consumption and animal feed. This bioconversion could also help to mitigate climate change and the negative effects of food and feed production on the environment. To date, insect flours and other forms of edible insects are not readily available in the marketplace. Most edible insect products are produced abroad and imported into the foreign nations. Future research should focus on heavy metal content and sustainable rearing practices.