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Mini Review

Edible Insects as Alternative Food for Human

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Abstract

According to international institutions, a rapidly increasing population and the emergence of food shortages have led people to seek alternative food. Because meat consumption will increase many times in the future, plants, mycoproteins, seaweeds and insects that attract the most attention and interest are the alternative protein sources. The amount of protein contained in insects, along with oil, energy, mineral values, etc. the fact that it has a rich nutritional content has caused insects to come to the fore as an alternative food source. Not only in terms of nutritional value, but also the ease of production and time saving show that the sustainability of insects is higher than other traditional foods. Although edible insects are not widespread all over the world, it does not seem like a dream that they will be in the first place among alternative food sources in the future. With this review, valuable information will be given about insects as an alternative food source, and information will be shared about the sustainability of insects as a food source in the future.

Keywords: edible insects; entomophagy; insect protein; sustainable nutrition; gastronomy

Introduction

It is stated that the world population will exceed 9 billion and even 10 billion by 2050 [1]. Insects are the most abundant and diverse group of living things on earth in the animal kingdom. The number of insect species is estimated to be between 2.5 and 3.7 million [2]. In order to meet the increasing protein need, alternative food sources that consume less natural resources and do not increase the carbon emission level are needed. In this respect, it is believed that insect production on the farm will be a safer and more sustainable protein source [3]. Edible insects are an innovative food source with many advantages to help with the problem of protein and energy shortages caused by the rapid increase in the world population [4]. Although entomophagy is not widely accepted in Western European populations, it is widespread throughout the world. Humans should adapt to other animal protein sources as beef, poultry or pork farming will become unsustainable [5].

In many studies, the protein and mineral values of insects have either more nutritional value or almost the same values compared to traditional foods. According to Papastavropoulou et al. [6] investigated the moisture, ash, total energy value, proteins, amino acids, fat, fatty acid profiles, carbohydrates, dietary fiber and minerals of mealworm larvae (*Tenebrio molitor*) and crickets. These insects have been shown to have high protein content and high concentrations of various amino acids (especially essential amino acids). They have also been shown to have a balanced fatty acid profile, high in polyunsaturated, monounsaturated fatty acids and many minerals.

Compared to other animals and plants, insects are a better source of protein. Edible insects are cheaper to produce. In the beginning, edible insects were used only in animal feed. However, as more people became aware of the high protein content of insects,

they began to be widely used in various industries. Edible insects are now used in a variety of products, including food and beverages, medicines, nutraceuticals, cosmetics, pet food, and animal and poultry feed. The protein found in insects varies according to the species. Protein obtained from insects is the most suitable option. When we look at the current and future market values of edible insects, we see a rapidly increasing graph [7]. Data Bridge Market Research's Research in 2022 shows that the edible insect market is worth $145 million in 2021. It analyzes that it is expected to reach USD 892.31 million in 2029, with an annual growth rate of 25.50% in the forecast period of 2022-2029. It shows that from 2022 to 2029 the insect market will increase in the world. When Statista's 2023 data are examined, it shows that the market value of edible insects in the world is more than doubled between 2018 and 2023 [8]. In terms of volume, the edible insect market is expected to reach 3,139,035.10 tonnes by 2030, with an annual growth rate of 31.1% in the forecast period 2022-2030.

There are many studies investigating the potential for use of edible insects in the food industry [9-12]. However, the acceptance of consumers for eating edible insects is a mostly important point for both researchers and food manufacturers [13-15]. What kind of edible insects can be utilized in food products and what kind of foods enriched with these insects can be preferred by consumers have been another issue for researchers. In most studies, different formulations are tried or developed to gain the appreciation of consumers, and sensory analyzes are performed to make the evaluation [13, 16]. As it is known, edible insects have their own unique taste and aroma [14]. Different cooking methods such as boiling, roasting, blanching, baking, drying in the oven are used in order not to lose these tastes and aromas and to catch the flavors that the consumer may prefer [17, 18]. Edible insects are mostly used in energy and protein bars, which are also sold commercially in some countries, but they are also traditionally tested in bakery products, meatballs, chocolate, falafel, cookies, chips, extruded grain snacks, rice, buns, and biscuits [19]. de Oliveira et al. [20] produced protein enriched wheat bread in which flour was obtained from cinereous cockroach. Osimani et al. [11] utilized cricket powder to increase nutritional value of bread. Megido et al. [10] prepared and evaluated hamburger patties with mealworms (*Tenebrio molitor*). Adámek et al. [13] used cricket flour in energy and protein bars, where they prepared in different formulations with the addition of products such as peanut butter, cinnamon, sesame, pineapple, coconut, chocolate, cherry, etc. In this study, it was emphasized that especially the smell is one of the determining factors in preferences. These studies show that edible insects, which are pulverized, cooked with different methods, and/or combined with other food ingredients, can be used in the food industry as an alternative.

Conclusion

Although we are in the age of technology, we still have not been able to find a cure for the increasing population and the resulting starvation. The data obtained show that the population will increase more in the future, and the effects of climatic changes will be very effective in starvation. Therefore, there is a need for sustainable alternative food sources. Edible insects come first as the most striking alternative food source. Although it has not yet been accepted all over the world, it is seen that it is possible to make insect production in a healthy and effective way with developing technology and knowledge. If progress can be made in this way, there is no doubt that insects will be one of the important food sources of the future.

Conflict of Interest

The authors declare there is no conflict of interest.

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