

Article

Edible arachnids: A short review

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Abstract

With the rapidly increasing human population, there is an urgent need to meet the challenge of providing sufficient nutrition for the people of the world. Along with edible insects, edible arachnids like spiders and scorpions can be an alternative source of proteins for humans. Although, arachnids have been consumed by humans since time immemorial, there are very few references cataloguing the consumption of arachnids. The different species of edible spiders and scorpions, their distribution, safety issues related to their consumption, and the prospect of sustainable farming of edible arachnids have been explained in this review.

Keywords alternative food sources; edible scorpion; edible spider; sustainability.

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1 Introduction

Overall population growth and increase in the shift to urban areas are together projected to add 2.5 billion to the world's population by 2050, with almost 90 percent of this growth happening in Asia and Africa (Zhang, 2008; United Nations, 2018). With the growing world population, the production of sufficient protein from livestock, poultry, and fish represents a serious challenge for the future (Zhang, 2007; Huis, 2013). A multifaceted and linked global strategy is needed to ensure sustainable and equitable food security (Godfray et al., 2010).

Presently, arthropods are increasingly being considered as mini-livestock (Voulgari-Kokota et al., 2023). Arthropods can be an excellent source of proteins for humans. Among arthropods, crustaceans such as crabs, prawns, lobsters, shrimp, etc. have been consumed by humans since time immemorial. The global crustacean market size was valued at \$16.4 billion in 2021, and is projected to reach \$25.3 billion by 2031 (Jaya and Roshan, 2022). Fellow arthropods, that is, insects and arachnids have been consumed throughout the history of humans. Still, in the western countries and in most urban areas of the world, people show revulsion towards the consumption of insects and arachnids. The primary reason people reject them as food is that they find the prospect disgusting or culturally inappropriate (Ruby and Rozin, 2019). However, if people can eat crustaceans without any concern, then in the future, they can also be encouraged to consume edible insects and arachnids.

Edible insects are among the natural resources important to life and the survival of human beings and, up to 2086 species are consumed by 3071 ethnic groups (Ramos-Elorduy, 2009).

In recent time, there has been a renewed interest in exploring the sustainability of insects as a human food source. However, edible arachnids comprising mainly of spiders and scorpions have mostly been ignored by researchers as an important source of human nutrition. They can be an alternative source of protein to improve human nutrition. A review of literature reveals that there are very few references on edible spiders and scorpions. The available literature discloses that spiders and scorpions are mostly consumed by indigenous communities in Asia, Africa, and South America.

2 Edible Spiders

Spiders are consumed in South Africa and Gambia (Bodenheimer, 1951), in Indonesia (Healy and Florey, 2003), in Thailand (Bristowe, 1932), in North-East India (Meyer-Rochov and Changkija, 1997), in Cambodia (Yen et al., 2013), and in Laos (Yhoung-Aree and Viwatpanich, 2005). Jongema (2017) has recorded 15 species of edible spiders around the world.

Tarantula spiders (Fig. 1) are known to be consumed in different parts of the world. *Cyriopagopus albostrigatus*, a species belonging to the family Theraphosidae is usually found in Myanmar, Thailand, and Cambodia and is also known as the edible spider or the Thai zebra tarantula (Zhang et al., 2019). It is fried and sold as a traditional snack in Thailand and Cambodia. It is also a popular attraction for tourists at certain places in Cambodia (Rigby, 2006). Tarantulas are also on offer as an exotic dish in Mexico City (Zepeda, 2023). The goliath birdeater (*Theraphosa blondi*) and brown huntsman spider, *Heteropoda venatoria* (Fig. 2) are part of the local cuisine in Venezuela and Paraguay (Araújo and Beserra, 2007).

Spiders of the genus *Nephila* are eaten in Madagascar (Decary, 1937) as well as New Caledonia (Bergier, 1941). The golden orb-weaving spider (*Nephila edulis*) has a plump abdomen that, after baking, tastes like pâté, while other species of *Nephila* which include *Nephila pilipes* (Fig. 3) are eaten in Thailand, served raw as well as cooked, and also in New Guinea, where they are fire-roasted (Bulmer, 1974; Meyer-Rochow, 2004; Low, 2016). Two edible species of the genus *Nephila* have been reported from Manipur, India (Kananbala et al., 2013).

3 Edible Scorpions

Scorpions are consumed by Chuave people of Papua New Guinea (Meyer-Rochow, 2004). The edible black scorpions (*Heterometrus longimanus*) are common to most parts of Thailand and Southeast Asia and are a delicacy to those who live in the north-east of Thailand and S.E. Asia region, and are one of the few species known to be edible (Anon., 2023). Scorpions are fried and consumed in Shandong region of China (Forney, 2008). A search on the internet revealed that some websites such as amazon.com, edibleinsects.com, and thailandunique.com are selling packaged edible scorpions. These packaged scorpions are advertised as farm-produced.

4 Sustainability of Edible Arachnid Farming

Most spider and scorpion species used by indigenous communities as food and in traditional medicine are not farmed but harvested from their natural habitats. Compared to raising livestock and poultry, raising edible arachnids could be as sustainable as farming edible insects, when taking into account feed efficiency, water use, required space, and greenhouse gas emissions (Oonincx and de Boer, 2012; Testa et al., 2017). However, unlike edible insect species, spiders and scorpions are by nature carnivorous and cannibalistic, and hence, it is more difficult to raise them together in large numbers for human consumption. In case, proper protocols for

farming edible arachnids are developed, their sustainable production is definitely possible and it can also provide an alternative means of livelihood and income for rural communities. As less space and water is required for raising edible arachnids, such type of farming is possible even in urban areas.



Fig. 1 A tarantula spider.



Fig. 2 *Heteropoda venatoria*.



Fig. 3 *Nephila pilipes*.

5 Safety Issues Regarding Edible Arachnids

According to Food and Agricultural Organization of the United Nations, Some key potential food safety hazards for edible insects are: biological (bacteria, virus, fungi, parasites), chemical (mycotoxins, pesticides, heavy metals, antimicrobials), and physical (FAO, 2023). The same safety risks should also apply to the consumption of edible arachnids. Safety risks of consuming arachnids may depend on the particular species, the environment they are reared in or collected from, what they eat, and the production and processing methods used (FAO, 2023). Due to the various safety risks, it is safe to assume that raw consumption of arachnids is simply not possible. Before consumption, performing appropriate food processing techniques such as washing, cleaning, urticating hair removal, boiling, roasting and frying are essential to ensure safety. During edible arachnid farming, the implementation of controlled hygienic conditions and sanitary processing techniques is also necessary. There is a necessity to promote food safety and hygiene practices in the entire value chain including during wild harvesting in order to ensure that this highly nutritious food that requires little resources to produce is availed to the consumers in a state that does not pose any health risks (Imathiu, 2020).

Overall, there are immense possibilities in the use of arachnids as a source of human nutrition and currently, researchers do need to focus on the various aspects and applications of edible arachnids.

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