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Edible Insects Around the World: A Cultural, Nutritional and Sustainable Perspective

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Introduction:

The growing global population, coupled with increasing pressure on agricultural resources, has intensified the search for sustainable and nutritious food alternatives. Among the emerging solutions, edible insects have gained considerable attention due to their nutritional richness and environmental advantages. Although insect consumption is often viewed with hesitation in Europe and North America, entomophagy has been practiced for centuries across Asia, Africa, Latin America, and Oceania **(Kelemu *et al.*, 2015)**. More than two billion people worldwide regularly consume insects as part of their traditional diets, utilizing species such as crickets, grasshoppers, termites, beetles, and silkworm pupae **(Van Huis, 2013)**. These insects not only contribute to cultural food traditions but also support food security and rural livelihoods in many regions.

Recent scientific research has highlighted the potential of edible insects as a sustainable source of high-quality protein, essential amino acids, healthy fats, vitamins, and minerals **(Rumpold and Schlüter, 2013)**. Compared with conventional livestock production, insect farming requires less land, water, and feed while producing lower greenhouse gas emissions, making it an environmentally responsible alternative **(Kelemu *et al.*, 2015)**. As concerns over climate change, resource depletion, and food insecurity continue to rise, insects are increasingly being recognized as a viable component of future food systems **(Gautam *et al.*, 2025)**. Their integration into sustainable agriculture could enhance nutritional security, promote circular bio economies, and contribute to resilient food production systems capable of meeting future global demands.

An Ancient Practice with a Modern Name

Although the term “entomophagy” sounds like a recent scientific coinage, the behaviour it describes is ancient.

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Archaeological evidence suggests insects have featured in human diets for thousands of years, long before the domestication of cattle, sheep, or chickens **(Gautam *et al.*, 2025)**. More than 1,900 insect species have been documented as edible somewhere in the world, spanning beetles, caterpillars, bees, wasps, ants, grasshoppers, locusts, crickets, termites, and true bugs **(Kelemu *et al.*, 2015)**. The Food and Agriculture Organization of the United Nations has noted that insect consumption remains common across large parts of Asia, Africa, Latin America, and Oceania, even as the practice has largely vanished from Western diets, where it is frequently met with discomfort or disgust **(Jankowski *et al.*, 2025)**.

This East-West divide is not really about taste or nutrition — it is about culture, history, and the stories societies tell themselves about what counts as "food." Understanding why insects remain a delicacy in one region and a source of revulsion in another requires looking closely at the cultural threads woven through different culinary traditions.

A World Tour of Insect Cuisines

➪ **Southeast Asia: Street Food Staples**

In Thailand, Laos, Cambodia, and Vietnam, fried crickets, silkworm pupae, grasshoppers, and giant water bugs are everyday snacks sold from carts and market stalls. The FAO has highlighted Thailand in particular as a place where crispy fried locusts and beetles are popular, everyday fare rather than novelty items **(Kelemu *et al.*, 2015)**. Cricket farming has become a genuine cottage industry in Thailand, with small-scale farmers raising crickets in simple concrete or mesh pens as a reliable cash crop that requires far less land and water than conventional livestock **(Halloran *et al.*, 2017)**.

➪ **Sub-Saharan Africa: Mopane Worms and Termites**

Across southern and central Africa, the mopane worm — the caterpillar of the emperor moth — is a seasonal delicacy harvested in large quantities, dried, and sold in markets as a protein-rich staple, particularly in Zimbabwe, Botswana, and South Africa **(Kelemu *et al.*, 2015)**. In West and Central Africa, termites and palm weevil larvae are gathered and consumed, often providing critical nutrition during lean agricultural seasons. Studies from the Democratic Republic of Congo and Nigeria describe how edible caterpillars and larvae have historically served as an important buffer against food insecurity in rural households **(Van Huis, 2013)**.

➪ **Mexico and Latin America: Chapulines and Escamoles**

In Oaxaca, Mexico, the chapulines (grasshoppers toasted with garlic, lime, and

chili) are sold by the kilogram in markets and served in tacos and tlayudas, representing a culinary tradition that predates the Spanish conquest. Escamoles — the larvae of certain ant species, sometimes called "insect caviar" — are considered a delicacy reserved for special occasions in central Mexico **(Ramos-Elorduy, 2009)**. These foods are not relics of poverty but are often premium-priced items appearing in upscale restaurants, illustrating how the same ingredient can occupy very different positions on the social ladder depending on context.

- **East Asia: From Street Snacks to Fine Dining**

In South Korea, beondegi (boiled and seasoned silkworm pupae) have long been sold as a street snack and packaged for convenience stores. In China, scorpions, silkworms, and various beetle larvae are skewered and grilled at night markets, particularly in cities such as Beijing. Research comparing consumer attitudes has found that Chinese consumers tend to show notably higher acceptance of insect-based foods compared with Western consumers, which researchers attribute to greater familiarity and the embeddedness of insects within local culinary norms **(Hartmann *et al.*, 2015; Gautam *et al.*, 2025).**

- **The Western World: From Taboo to Trend**

In much of Europe, North America, and Australia, insects have historically been absent from the dinner table, viewed instead as pests or, at best, curiosities. However, this is slowly changing. In 2021, the European Union formally approved several insect species — including the house cricket (*Acheta domesticus*), yellow mealworm (*Tenebrio molitor*), migratory locust (*Locusta migratoria*), and lesser mealworm (*Alphitobius diaperinus*) — for human consumption as "novel foods," opening the door for cricket flour, protein bars, and pasta made from insect ingredients to appear on European supermarket shelves **(Jankowski *et al.*, 2025)**. Companies in the United States and Europe now market roasted crickets, cricket protein powders, and mealworm snacks explicitly as sustainable alternatives to conventional meat **(Waltner-Toews and Houle, 2017).**

The Nutritional Case for Insects

Beyond cultural fascination, the strongest argument for taking edible insects seriously comes from their nutritional profile. Depending on the species and how they are reared, insects can contain between roughly 35 and 70 percent protein by dry weight, placing them on par with, or above, many conventional meat sources **(Abbasi, 2026; Van Huis and Oonincx, 2017)**. This protein is generally of high quality, containing all the essential amino acids the human body needs, in proportions

comparable to those found in eggs, fish, and beef **(Abbasi, 2026)**.

➪ **Fats, Fibre, and Micronutrients**

Many edible insects also provide beneficial fats rich in unsaturated fatty acids, including omega-3 and omega-6 fatty acids, which support cardiovascular health **(Abbasi, 2026)**. Insects such as crickets and mealworms contain chitin in their exoskeletons, a fibrous compound that functions similarly to dietary fibre and has been studied for its prebiotic effects on gut bacteria **(Abbasi, 2026)**. On the mineral front, several insect species are notably rich sources of iron, zinc, calcium, magnesium, and B vitamins, including vitamin B12, a nutrient that is often difficult to obtain from plant-based diets alone **(Van Huis, 2013)**. For populations facing micronutrient deficiencies, particularly in parts of Africa and Asia, locally available edible insects can represent an accessible and affordable nutritional boost.

➪ **It Depends on What the Insect Eats**

An important nuance in the nutritional story is that the composition of an insect is heavily influenced by its own diet and rearing conditions. Mealworms fed on wheat bran show different protein and fat profiles than those raised on other substrates, while black soldier fly larvae reared on fruit and vegetable waste have been shown to develop higher fat content and altered fatty acid profiles compared with larvae raised on standard feed **(Gebreyes and Teka, 2025)**. This means insect farming can, in principle, be tuned to produce nutritionally optimised products — a feature that conventional livestock farming cannot replicate nearly as quickly, given the much shorter life cycles of insects.

➪ **Bioactive Compounds and Health Benefits**

Beyond basic nutrients, edible insects contain bioactive compounds such as antioxidants and antimicrobial peptides, which have drawn interest from researchers exploring their potential health benefits **(Jankowski *et al.*, 2025)**. Some studies suggest these compounds may contribute to immune support and anti-inflammatory effects, although researchers caution that more clinical research in humans is needed before strong health claims can be made **(Gautam *et al.*, 2025)**.

Why Insects Matter for the Future of Farming

The renewed interest in edible insects is not happening in a vacuum. The FAO has projected that the global population will reach roughly 9.7 billion by 2050, a scale that will require significant increases in food production at a time when arable land and freshwater are increasingly scarce **(Jankowski *et al.*, 2025)**. Against this backdrop, insects offer a strikingly efficient alternative to conventional livestock.

According to FAO data, crickets require roughly twelve times less feed than cattle, four times less than sheep, and about half as much as pigs or broiler chickens to produce an equivalent amount of protein **(van Huis *et al.*, 2022)**. Insects also require far less land and water, and many species can be reared on agricultural residues and food waste streams, contributing to circular bioeconomy models that turn waste into valuable protein **(Gebreyes and Teka, 2025)**. Housefly larvae raised on poultry manure, for instance, have been found to develop higher mineral content, including calcium and phosphorus, compared with larvae raised on plant-only substrates — turning what would otherwise be agricultural waste into a nutrient-dense feed or food ingredient **(Gebreyes and Teka, 2025)**.

The global market for edible insects reflects this growing momentum. One recent estimate placed the global edible insect market at approximately USD 3.2 billion in 2023, projecting growth to around USD 9.8 billion by 2030, with Europe currently holding the largest market share due to regulatory approvals and shifting consumer attitudes toward sustainable protein **(Jankowski *et al.*, 2025)**.

Barriers on the Road to the Mainstream Plate

⇨ **The Disgust Factor**

Perhaps the single biggest obstacle to wider adoption of edible insects in Western markets is psychological rather than nutritional. Cultural conditioning plays an enormous role in determining what is perceived as food versus what is perceived as repulsive, and these reactions are deeply ingrained from childhood **(Gautam *et al.*, 2025)**. Researchers note that simply presenting insects in unrecognisable forms — such as cricket flour baked into bread or protein bars, rather than whole, visibly recognisable insects — significantly increases consumer willingness to try these products **(Hartmann *et al.*, 2015; Gautam *et al.*, 2025)**.

⇨ **Food Safety and Allergy Considerations**

Food safety is another area requiring careful attention. A narrative review focused on the European context notes that edible insects may be linked to a meaningful share of food allergies in populations where insect consumption is already common, with studies from Asia suggesting insects may account for a notable percentage of food allergy cases and a portion of severe, food-induced allergic reactions **(Jankowski *et al.*, 2025)**. This is largely because some proteins in insects, particularly tropomyosin, share structural similarities with allergens found in shellfish and dust mites, meaning individuals with shellfish allergies may also react to insect-based foods.

Beyond allergies, food safety researchers emphasise the importance of proper processing, storage, and hygiene standards throughout the insect supply chain, since improperly handled insects can harbour bacteria, parasites, or heavy metals absorbed from their rearing substrate **(Nowakowski *et al.*, 2022; Imathiu, 2020)**.

➪ **Regulation: A Patchwork Still Taking Shape**

Regulatory frameworks for edible insects remain inconsistent across the globe. While the European Union has approved a small list of specific species for human consumption under its novel food regulations, other regions are still developing comprehensive standards covering production, labelling, and safety testing **(Jankowski *et al.*, 2025)**. This regulatory patchwork creates uncertainty for entrepreneurs and farmers looking to scale up insect farming operations, even as consumer interest grows.

Reframing the Conversation: Tradition Meets Innovation

Perhaps the most useful way to think about edible insects is not as a strange new food trend, but as the rediscovery of a tradition that much of the world never abandoned. The two billion people who already include insects in their diets are not experimenting — they are continuing practices passed down through generations, practices that happen to align remarkably well with what modern nutrition science and environmental research now recommend **(Kelemu *et al.*, 2015**).

For agricultural communities, particularly smallholder farmers, insect farming presents a genuinely accessible opportunity. It requires comparatively low start-up costs, minimal land, and can often be integrated alongside existing farming activities, turning crop residues or food waste into a marketable protein source **(Gebreyes and Teka, 2025)**. In regions where insect-eating traditions are already strong, formalising and scaling up these practices through better farming techniques, food safety training, and market access could strengthen both nutrition and rural incomes simultaneously.

At the same time, some caution is warranted. Researchers studying the much-cited "two billion people eat insects" figure have pointed out that it is genuinely difficult to define precisely who counts as a regular insect consumer, and that the original estimate may be on the higher side **(van Huis *et al.*, 2022).** This does not undermine the broader picture — that entomophagy is widespread, culturally significant, and nutritionally relevant — but it is a useful reminder that figures circulating widely in popular media deserve a critical eye.

Conclusion

Edible insects sit at a fascinating intersection of ancient culinary heritage and cutting-edge food science. From the bustling night markets of Bangkok to the chili-dusted chapulines of Oaxaca, from the mopane worm harvests of southern Africa to the cricket protein bars now appearing in European supermarkets, insects tell a story of remarkable nutritional value, deep cultural roots, and significant potential for more sustainable agriculture **(Jankowski *et al.*, 2025)**.

Whether the rest of the world eventually embraces insects as a mainstream protein source, or whether they remain a regional staple for the communities that have always valued them, one thing is clear: the conversation around edible insects is no longer just about novelty. It is about nutrition security, environmental sustainability, and respect for food traditions that have sustained billions of people for thousands of years — traditions that the rest of the world may have a great deal to learn from.

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