

## Edible forest insects, an overlooked protein supply

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*Worldwide, over 1 400 insect species are reportedly eaten as human food; most are harvested from natural forests.*

Many people, and some forest managers, consider insects mainly as pests. However, insects have many beneficial roles, such as facilitating pollination, seed dispersal, soil texture improvement and litter decomposition. They provide products such as honey, beeswax and dyes. Some insects are also used for medicinal purposes (see Box). Moreover, many insects are important as food – an excellent source of protein, carbohydrates and vitamins – for humans and domestic animals alike. The amino acid composition of most food insects compares favourably with the reference standard recommended by FAO and the World Health Organization (WHO) (Bukkens, 2005).

Insects contribute significantly to people's food security and livelihoods in many developing countries, mainly in Africa and Asia, but they are also eaten in some parts of Latin America and in some developed countries (e.g. Japan). Insects can be a regular, seasonal or

occasional part of the diet, not usually because people have no meat to eat, but because they consider insects a delicacy. The most commonly eaten insects are grasshoppers, termite eggs, beetle and honey-bee larvae, silkworms and caterpillars. Other insects used as human foods include scorpions, crickets, locusts, wasps, cicadas, leaf-cutter ants, dragonflies and giant water bugs.

Insects are mainly consumed in tropical countries, where insect species are larger, species diversity is higher and insects are available year round. In cold and temperate regions, insect populations are decimated by the first winter cold – which probably explains why consumption of insects was not generally part of the survival strategies of the early peoples that colonized the cold and temperate regions of Europe, and may explain the usual European cultural aversion to entomophagy (consumption of insects by humans).

### Insects in medicine

**Insects don't only nourish; they also heal. Ants belonging to the genera *Atta* and *Camponotus* (carpenter ants), for example, were used in ancient times (as reported, for example, in early Hindu writings) to stitch wounds (International Biotherapy Society, 2000), and the practice is still used in traditional healing in sub-Saharan Africa. Individual ants are placed so that their powerful jaws close on the edges of the skin and draw them together. The head is then cut off, and the jaws remain firmly attached until the wound is healed.**

**A biotherapy adopted today by some practitioners in the United States, Western Europe and the Near East, known by military doctors before the advent of antibiotics, is the use of live maggots – primarily blowflies (family Calliphoridae) – to clean and disinfect heavily infected wounds. The maggots dissolve dead tissue by secreting digestive juices and then ingest the liquefied tissue and bacteria (Handwerk, 2003).**

**In the Himalayan highlands of Bhutan, Nepal and Tibet, the parasitic fungus *Cordyceps sinensis* grows in caterpillars, consuming and killing its hosts. The mummified caterpillars are collected and used in Tibetan traditional medicine; they are sold in China as a power booster at an average retail price of US\$5 000 per kilogram of air-dried insects.**



*These Bhutanese highlanders have collected and are selling caterpillars infected by the fungus *Cordyceps sinensis**

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Dried caterpillars for sale in a Kinshasa market, Democratic Republic of the Congo

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Insects consumed by humans are almost always gathered from the wild, often in forests. The collectors (mostly women and children) know how and where to choose insects that feed on non-noxious plants and are untainted by insecticide. Insects are gathered for subsistence, for sale at local markets and sometimes for export.

In Central Africa, a region rich in forests and wildlife, large amounts of insects are consumed, including the caterpillar *Imbrasia* sp., which feeds on the leaves of the sapele tree (*Entandrophragma cylindricum*) (Vantomme, Göhler and N'Deckere-Ziangba, 2004). A study by FAO (2004) revealed that in urban Bangui, Central African Republic, edible insects contributed up to one-third of the protein intake in the rainy season when supplies of bushmeat and fish declined, and that dried *Imbrasia* caterpillars were sold in Bangui for up to US\$14 per kilogram, making them a major source of cash for rural women. Caterpillars of the mopane emperor moth, *Imbrasia belina*, are also a popular food in southern Africa (Knell, no date). In dry-zone Africa, locusts are a common food.

Transborder trade in edible insects is common among some Southeast Asian countries such as the Lao People's Democratic

Republic, Thailand and Viet Nam (Johnson, 2010). Export figures are rarely available, but an enquiry of trade in non-wood forest products between Central Africa and Europe (Tabuna, 2000) showed that France and Belgium annually import about 5 and 3 tonnes, respectively, of dried *Imbrasia* caterpillars from the Democratic Republic of the Congo (valued at an average price of US\$13.8 per kilogram in Belgium).

In addition to (or because of) their importance as food, edible insects may also have a favourable impact on the conservation of forest and woodland. Holden (1991) observed a reduced frequency of bushfires in caterpillar harvesting areas in Zambia, as the villagers sought to protect the sustainability of the insect populations. Food security planners and forest managers would gain from a greater awareness of how the value of edible insects in rural economies affects – and is in turn affected by – local natural resource management strategies, including application of fire, pesticide use and conservation of indigenous trees as host species for edible insects.

Insect harvesting, processing and sale are labour-intensive activities requiring no major capital investment or landownership, and as such are within reach of poor people, espe-

cially women and children, enabling them to achieve substantial cash gains.

Insects are reared as pet food but rarely farmed for human consumption, and little is known about how to realize the full potential of insects as a food crop. Exceptions include Cambodia, China, the Lao People's Democratic Republic and especially Thailand, where 15 000 households are engaged rearing insects for use as food (Raloff, 2008). Thai farmers who raise crickets full time can take in about US\$900 per month, while part-time farming can bring an extra US\$90 to \$120 per month – not insignificant in a region where per capita gross domestic product is about US\$1 000 (IRIN, 2008). Farmers sell the insects to local markets, but increasingly they are also grinding them up for use as a protein supplement in animal feed.

The contribution of insects in the food chain is rarely included in the national food security programmes of those countries where entomophagy is widespread, even though the contribution of insects to overall protein supplies has long been known (e.g. Asibey and Child, 1990). Edible insects are also largely ignored in discussion fora on wildlife management or on strategies to address the consequences of a reduced supply of bushmeat for the diets of forest-dependent people. Including the contribution of edible insects in national-level food security programmes may help to supply the growing demand for protein for humans and for livestock, and particularly help safeguard the food security of forest-dependent people.



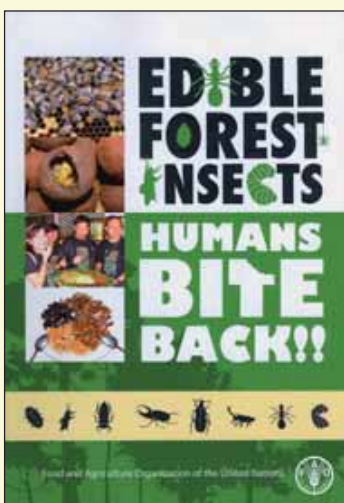
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## Humans bite back

The new publication *Edible forest insects: humans bite back!* (FAO Regional Office for Asia and the Pacific, 2010) presents the complete proceedings of a workshop by the same name, organized in Chiang Mai, Thailand, in February 2008. It includes chapters on all aspects of entomophagy – social, environmental and economic – including the management, collection, harvest, processing, marketing and consumption of insects, their nutritional value and income-related issues. While the emphasis is on examples from Asia and the Pacific, information is included from other regions of the world as well. This well illustrated publication highlights the potential of edible insects as a current and future food source, documents their contribution to rural livelihoods and explores linkages between edible forest insects and forest management.



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