Edible Insects and Their Utilization

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Familiar edible insects in Yunnan

Some examples of edible insects in Asian countries

Edible insects as food

Suggestions
Familiar edible insects in Yunnan

Wasps
Bamboo worm
Ant eggs
“Sour” ants
Silkworm
*Tenebrio molitor* L.
Others
A Brief Introduction to Yunnan Province

- “the South of Clouds”
- In the southwest China
- Provincial Capital: Kunming
- Area: 394,000 km² (the 8th in China)
- Population: 45.43 million
- Ethnic Groups: 25, and 15 only live in Yunnan
- Abundant in landforms & climatic types
- the Kingdom of Plants (Over 60% in species in Yunnan) & Animals in China
- more than 600 rivers and 37 lakes
Wasps

• Larvae and pupae of wasps are most popular edible insects in summer
• More than 20 kinds, 11 species have been recorded
• High protein content, 40%-50%
Wasps with combs for sale in local markets
80-100 Yuan/Kg
Different dishes of wasps

Steaming wasps with bamboo shoot

Steaming wasps with vegetables

Fried wasps

Wasps ‘salads’, DAI people in Dehong, Yunnan
Cooking wasps

Collecting wasps

Partly artificial 'rearing'
Bamboo worms

- Most delicious edible insects in Yunnan
- Nutritious insect,
- Protein 30%, fat 60%, amino acids 29.9%

Mosaic dish of edible insects
Fried bamboo worm
A set of small dishes for rice noodles
Bamboo worm — *Chilo* spp.  
*Chilo fuscidentalis, Omphis sp.*  
Host bamboo —  
*Dendrocalamus latiflorus, Gigantochloa sp.*  
One generation per year  
60-100 Yuan/Kg
Ant eggs
*Carebara lignata*
33.68% protein, 55.10% fat, 3.52% carbohydrate, 32.69% amino acids

Ant eggs sold in local market, Dehong, Yunnan

Ant eggs dishes
‘Sour’ ants

*Oecophylla smargdina*

Acetic acid
to process vinegar or pickle

seasoning
Silkworm

- Silkworm pupae are by-products of silk production
- *Bombyx mori, Antheraea pernyi*
- Silkworm has been reared for long time
- 50% protein, 26-30% fat
- Cooked pupae, oil, protein drink, alcohol
**Tenebrio molitor L.**

- Fried larvae
- 48.9% protein, 28.8% fat, 10.7% carbohydrate
- Cooking and functional oil
- Protein powder
- Chitin
- Feedstuff
Factory to process *Tenebrio molitor* located in Shangdong, China
Other edible insects

- More than 200 kinds of edible insects
- 177 species have identified, belong to 54 families, 11 orders
- dragonflies, termites, locusts, crickets, cicada, grasshoppers, stingbugs, beetles, ants
Dragonflies

Restaurant to serve edible dragonflies and other wild vegetables in Dali, Yunnan
cicada

Acanthacorydalis sp.
Ways to use edible insects as food

• Edible insects as one kind of delicious foods coming from nature and mountain areas

Snack, dish with wine, dish before main course

• Cook methods

Deep fry, roast, fry with chicken eggs, stew, steam with chicken eggs

Cans of processed wasps and bamboo worms
Some examples of edible insects in Asian countries

- Korea

Stewing pupae of silkworm, Daejeon, Korea
Some examples of edible insects in Asian countries

• Japan
  – 55 species of edible insects in 1919
  – Grasshoppers, silkworm pupae, wasps

Shop to sell seafood and edible insects in Tokyo
Noodle restaurant to serve larvae of wasps in Tokyo

Canned larvae of wasps in Kyoto
Some examples of edible insects in Asian countries

- Thailand
  - Pupae of silkworms
  - Bamboo caterpillars
  - Grasshoppers
  - Mole crickets
  - Crickets
  - Giant water bugs
Some examples of edible insects in Asian countries

- Edible insects sold in night bazar in Chiangmai, Thailand
Some examples of edible insects in Asian countries

- Crickets mass rearing farm, Chiangmai, Thailand
Forest insects as food: Humans bite back

- A workshop focused on Asia-Pacific resources and their potential for development organized by FAO
  
  19-21 Feb. 2008 Chiangmai, Thailand

- Current status of edible insect
- Key bottlenecks to future development
- Recommended short and long terms actions
Edible insects as food

• Advantages
  – Long history of edible insects, more than 3000 years in China
  – Acceptance, Custom of eating insects still been kept in many places
  – Abundant of species for development, more than 200 kinds in China
Edible insects as food

**Advantages**

- Large populations and productivity of insects
- Mass rearing, small space, using bran as food stuff
- Nutritious, high contents of protein, amino acids, vitamins, microelements

![Raising silkworms](image1)

**Tenebrio molitor**

**Musca domestica**
Edible insects as food

• Problems
  – Acceptance, relating edible insects to dirty, in-civilization and un-development
  – Collecting from nature, influence biodiversity and eco-balance
  – Limitation of knowledge on biology of edible insects
  – Insect foods security
Edible insects as food

• Suggestions
  – Entomophagy research: identify, biology, nutritious analyze and valuation, food safety
  – Mass rearing technique of edible insects
  – Edible insect processing: protein powder. Amino acids and vitamin drinks, insect oil
  – Health foods and food supplements: reducing malnutrition, regulating immune function, anti-fatigue ……
Insects active protein capsule

Insect insulin

Insect oil

Dry ants

Chitosan capsules and insect protein capsules

Protein power from *Musca domestica* larvae