

Edible Insects and Their Utilization

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OUTLINE

- **Familiar edible insects in Yunnan**
- **Some examples of edible insects in Asian countries**
- **Edible insects as food**
- **Suggestions**

Familiar edible insects in Yunnan

A green-tinted photograph of a dragonfly on a leaf with water droplets. The dragonfly is perched on a stem, and its body is covered in small water droplets. The background is a soft-focus green leaf.

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

80-100Yuan/Kg



Different dishes of wasps



Steaming wasps
with bamboo shoot



Wasps 'salads',
DAI people in Dehong, Yunnan



Steaming wasps
with vegetables



Fried wasps

Cooking wasps



Partly artificial 'rearing'



Collecting wasps



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



Uncooked bamboo worm



Dendrocalamus latiflorus



larvae



Collecting

Ant eggs

Carebara lignata

33.68% protein, 55.10% fat,

3.52% carbohydrate,

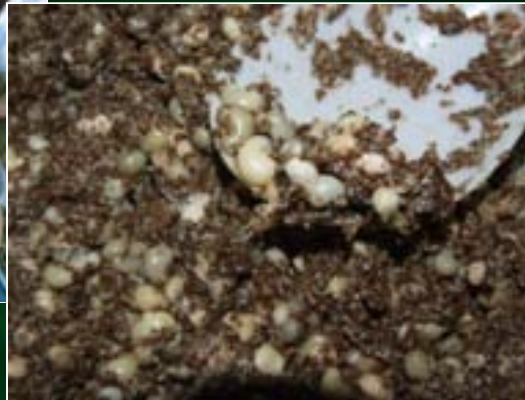
32.69% amino acids



Ant eggs dishes



Ant eggs sold
in local market,
Dehong ,Yunnan



‘ Sour’ ants
Oecophylla smaragdina
Acetic acid
to process vinegar or pickle
seasoning



‘ sour’ ants and ant eggs dish



Ants comb



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**



**Cooked pupae
of silkworm dish**

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



Cleaning



Input



Drying



Output

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



cicada



***Acanthacorydalis* sp.**





Stingbugs



grasshoppers



locusts



Oryctes rhinoceros

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

Mole crickets

Bamboo caterpillars

Grasshoppers

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 200kinds 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



Musca domestica



Tenebrio molitor

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 vitamine 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



tumble bug



Bamboo Worm



Wasps



Dung Beetle

Research Institute of Resource Insects (RIRI) of CAF



Thank you!