

Edible Insects and Insect-eating Habit in Northeast Thailand

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Abstract Edible insects in Khon Kaen and other provinces of Northeast Thailand are surveyed. A total of 126 species of edible insects were collected, and 30 families in 8 orders were identified. Of these the beetles are the largest group of edible insects. Insect-eating habit of local people in 19 provinces of Northeast Thailand was observed by using a questionnaire survey. Thirty-two species of edible insects are particularly preferred. Taste is the main reason for eating insects. Most edible insects are cooked before eating. Local people's preference is different between North Thailand and Northeast Thailand.

Introduction

Insects have long been used as nutritious food in many places, such as Africa, Central and South Americas and Asia (HOLT, 1885; SOMNASANG *et al.*, 1986; JONJOUBSONG, 1993). In Thailand, insect-eating has been practised for a long time and throughout the country (WARAASSAWAPATI *et al.*, 1975; PITUG & PRAJOUBMUA, 1992; anonym, 1993). Apart from traditional knowledge of local people, there has been very little scientific works on edible insects in Thailand. UTSUNOMIYA and MASUMOTO (1999) have reported that over 150 species of edible beetles are eaten in Northern Thailand. However, only 50 species of edible insects have been recorded in Northeast Thailand (WATANABE & SATRAWAHA, 1984), even though it is known that insect-eating is one of the symbolic features of the Northeast people's liveliness (PITUG, 1986). A wide range of insects at various stages of their life cycle can be consumed. Local wisdom is the main way for the villagers to quickly determine which insects are edible. Highly developed skills have been transmitted from generation to generation (SUNGPUAG & PUWASATIEN, 1983). This understanding has, however, gradually declined with socio-economic and dietary habit changes. Therefore, it is urgent to study the customs of eating insects by gathering recollection of older people still available at present but at a risk of being lost altogether.

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Materials and Method

1) Edible insect specimens were monthly collected from January to December 1999 from three villages of Muang District, Khon Kaen Province (Ban Song Pluey, Ban Non Ruang and Ban Tapra). Sampling was made by using insect nets, light traps and digging apparatuses. Samples were collected for dry mounting as museum specimens. The insect specimens were determined by the first author at the insect museum of Khon Kaen University, the last author at Otsuma Women's University, and several Japanese, Thai and Austrian specialists in each taxonomic part.

2) Nine hundred and fifty sets of questionnaires concerning insect-eating habit were distributed in 19 provinces of Northeast Thailand through offices of Agricultural Extension at the provincial and district levels. The Water Operation and Maintenance Office of Lum-Domnoi Dam, and the Royal Irrigation Department and the Cooperative Office of Muang District, Mahasarakham Province assisted with the data collection. Five hundred and twenty-six of them were answered by local people. The data were analyzed using the percentile and ranking methods on consumption of favorite insects. The top ten of the preferred edible insects were further analyzed based on the quantity per each month.

Results

A. *Edible insects from field collecting*

Edible insects from Northeast Thailand were monitored in every month through the year of 1999 at the villages (Ban Song Pluey, Ban Non Ruang and Ban Tapra). One hundred and twenty-six species of 30 families in 8 orders were collected. The largest group of edible insects, 73 species, belongs to the order Coleoptera. The second largest group is the order Orthoptera with 23 species (Table 1).

B. *Edible insects from the questionnaire survey*

1) Favorite edible insects.

Giant water bug was the most popular edible insect for the Northeast people, eaten by 99.1%. Predaceous diving beetles and water scavenger beetles and immature ants were eaten by the people in high percentage. Thirty-two kinds of edible insects above 50% were listed as favorite edible insects (Table 2).

2) Occurrence of edible insects.

About 46% of edible insects was found from the beginning of rainy season (May). During this season a wide range of species of edible insects were found. Then, number of edible insects gradually decreased from the end of the rainy season to the dry season (August–March). Only 6% of edible insects was found during the dry season (Fig. 1

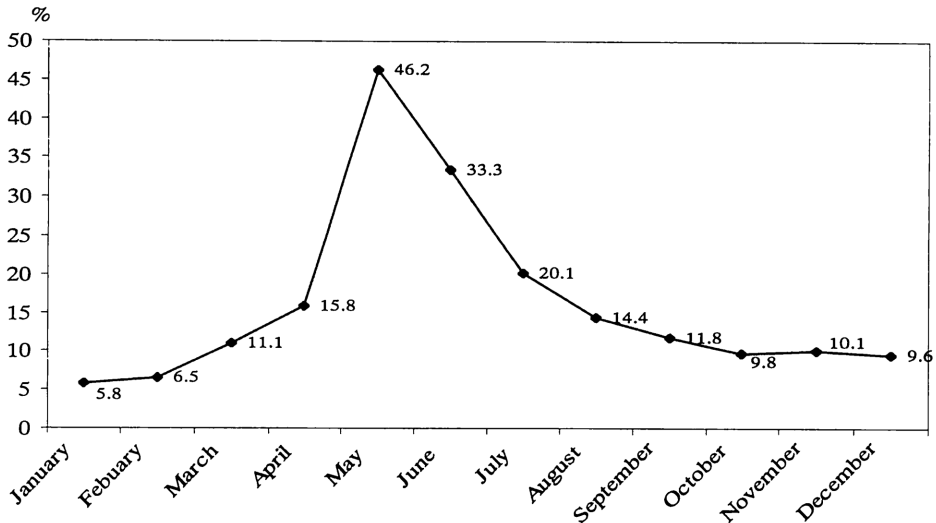


Fig. 1. Occurrence of edible insects from Northeast Thailand.

and Table 3).

3) Preparation and cooking of edible insects.

Various ways of cooking edible insects were observed among the local people in Northeast as shown in Table 4. Most edible insects were cooked before eating. Only about 7% of edible insects were eaten raw without any preparation: giant water bugs, adults and immatures of water beetles, ants, bees, grasshopper, wasp, cicadas, June beetles, metallic beetles and dung beetles.

4) Reasons for eating insects

Approximately 3/4 of the people eat insects for the reason of "tasty". Some kinds of insects such as giant water bug were used for seasoning and were also used as snacks with alcohol drinking. Other reasons for eating insects for the Northeast people are also shown in Table 5.

Conclusion

Edible insect data from the field survey through the year of 1999 have shown that 126 species are eaten in Northeast Thailand. Beetles (Coleoptera) at least constitute the largest group of edible insects consumed.

The questionnaire survey showed that a total of 32 species of insects are eaten by more than 50% of the local people, and the three of them, giant water bugs, predaceous diving beetles together with water scavenger beetles and immature ants, are the most popular. Various edible insect species can be found mainly during the rainy season (May–July) and the number of them gradually decreases during the dry season (August–March).

Table 1. Edible Insects from Northeast Thailand.

Order	Name	Name
Coleoptera		Dytiscidae
	<i>Copelatus</i> sp.	<i>Eretes sticticus</i> (LINNÉ)
	<i>Cybister tripunctatus asiaticus</i> SHARP	<i>Hydaticus rhantoides</i> SHARP
	<i>Cybister rugosus</i> (MACLEAY)	<i>Laccophilus pulicarius</i> SHARP
	<i>Cybister limbatus</i> FABRICIUS	<i>Rhantaticus congestus</i> KLUG
		Hydrophilidae
	<i>Hydrobiomorpha spinicollis</i> (ESCHSCHOLTZ)	<i>Sternolophus rufipes</i> (FABRICIUS)
	<i>Hydrophilus bilineatus</i> REDTENBACHER	
		Scarabaeidae
	<i>Aphodius (Pharaphodius) crenatus</i> HAROLD	<i>Onthophagus tragoides</i> BOUCOMONT
	<i>Aphodius (Pharaphodius) marginellus</i> (FABRICIUS)	<i>Onthophagus tragus</i> (FABRICIUS)
	<i>Aphodius (Pharaphodius) putearius</i> REITTER	<i>Onthophagus tricornis</i> (WIEDEMANN)
	<i>Catharsius birmanensis</i> LANSBERGE	<i>Onthophagus trituber</i> (WIEDEMANN)
	<i>Catharsius molossus</i> (LINNÉ)	<i>Adoretus</i> sp. 1
	<i>Copris</i> (s. str.) <i>carinicus</i> GILLET	<i>Adoretus</i> sp. 2
	<i>Copris</i> (s. str.) <i>nevinsoni</i> WATERHOUSE	<i>Agestrata orichalca</i> (LINNÉ)
	<i>Copris (Microcopris) reflexus</i> FABRICIUS	<i>Anomala anguliceps</i> ARROW
	<i>Copris (Paracopris) punctulatus</i> WIEDEMANN	<i>Anomala antiqua</i> GYLLENHAL
	<i>Copris (Paracopris)</i> sp.	<i>Anomala chacites</i> SHARP
	<i>Gymnopleurus melanarius</i> HAROLD	<i>Anomala cupripes</i> HOPE
	<i>Heliocorpus bucephalus</i> (FABRICIUS)	<i>Chaetadoretus cribratus</i> WHITE
	<i>Liatongus (Paraliatongus) rhadamistus</i> (FABRICIUS)	<i>Heteronychus lioderes</i> REDTENBACHER
	<i>Onitis niger</i> LANSBERGE	<i>Holotrichia</i> sp. 1
	<i>Onitis subopacus</i> ARROW	<i>Holotrichia</i> sp. 2
	<i>Onthophagus avocetta</i> ARROW	<i>Maladera</i> sp.
	<i>Onthophagus bonasus</i> (FABRICIUS)	<i>Oryctes rhinoceros</i> (LINNÉ)
	<i>Onthophagus khonmiinitnoi</i> MASUMOTO	<i>Pachnessa</i> sp.
	<i>Onthophagus orientalis</i> HAROLD	<i>Protaetia</i> sp.
	<i>Onthophagus papulatus</i> BOUCOMONT	<i>Sophrops abscensus</i> BRENSKE
<i>Onthophagus sagittarius</i> (FABRICIUS)	<i>Sophrops bituberculatus</i> (MOSER)	
<i>Onthophagus seniculus</i> (FABRICIUS)	<i>Xylotrupes gideon</i> (LINNÉ)	
	Buprestidae	
<i>Sternocera aequisignata</i> SAUNDERS	<i>Sternocera ruficornis</i> SAUNDERS	
	Cerambycidae	
<i>Aeolesthes</i> sp.	<i>Plocaederus obesus</i> GAHAM	
<i>Apriona germai</i> HOPE	<i>Plocaederus ruficornis</i> NEWMAN	
<i>Dorysthenes buqueti</i> (GUÉRIN)		
	Curculionidae	
<i>Arrhines hirtus</i> FAUST	<i>Hyopmeces squamosus</i> (FABRICIUS)	
<i>Arrhines</i> sp. 1	<i>Pollendera atomaria</i> MOTSCHULSKY	
<i>Arrhines</i> sp. 2	<i>Rhynchophorus ferrugineus</i> (OLIVIER)	
<i>Astycus gestvoi</i> MARSHALL	<i>Sepiomus aurivilliusi</i> FAUST	
<i>Cnaphoscapus decoratus</i> FAUST	<i>Tanymeces</i> sp.	
Genus sp. near <i>Deiradorrhinus</i>		

Table 1 (Continued).

Order	Name	Name
Odonata		Aeschnidae
	<i>Aeschna</i> sp.	
		Coenagrionidae
	<i>Ceriagrion</i> sp.	
		Corduliidae
	<i>Epophtalmia vittigera bellicosa</i> LIEFTINCK	
		Libellulidae
	<i>Rhyothemis</i> sp.	
Orthoptera		Acrididae
	<i>Acrida cinerea</i> (THUNBERG)	<i>Locusta migratoria</i> (LINNÉ)
	<i>Acrida</i> sp.	<i>Oxya</i> sp.
	<i>Chondacris rosea</i> (DE GEER)	<i>Patanga japonica</i> (BOLIVAR)
	<i>Cyrtacanthacris tatarica</i> (LINNÉ)	<i>Trilophidia annulata</i> (THUNBERG)
		Gryllidae
	<i>Acheta testacea</i> WALKER	<i>Brachytrupes portentosus</i> (LICHTENSTEIN)
	<i>Acheta confirmata</i> WALKER	<i>Gryllus bimaculatus</i> DE GEER
	<i>Modicogryllus confirmatus</i> (WALKER)	Gen. et sp. indet.
	<i>Teleogryllus testaceus</i> (WALKER)	
		Gryllotalpidae
	<i>Gryllotalpa africana microphtalma</i> CHOPARD	
		Mantidae
	<i>Tenodera ariddifolia sinensis</i> SAUSSURE	
		Tetrigidae
	<i>Euparatettix</i> sp.	
		Tettigoniidae
	<i>Conocephalus maculatus</i> (LE GUILLOU)	<i>Pseudophyllus titan</i> WHITE
	<i>Conocephalus</i> sp.	<i>Onomachus</i> sp.
	<i>Euconocephalus incertus</i> (WALKER)	
Isoptera		Termitidae
<i>Macrotermes gilvus</i> (HAGEN)		
Hemiptera		Belostomatidae
	<i>Lethocerus indicus</i> (LEPELETIER et SERVILLE)	<i>Diplonychus</i> sp.
		Coreidae
	<i>Anoplocnemis phasiana</i> (FABRICIUS)	<i>Homoeocerus</i> sp.
		Gerridae
	<i>Cylindrostethus scrutator</i> (KIRKALDY)	
		Nepidae
	<i>Ranatra longipes thai</i> LANSBURY	<i>Laccotrephes ruber</i> (LINNÉ)
	<i>Ranatra variipes</i> STÅL	

Table 1 (Continued).

Order	Name	Name
		Notonectidae
	<i>Anisops barbatus</i> BROOKS	<i>Anisops bouvieri</i> KIRKALDY
		Tessaratomidae
	<i>Pygoplatys</i> sp.	<i>Tessaratoma papillosa</i> (DRURY)
	<i>Tessaratoma javanica</i> (THUNBERG)	
Homoptera		Cicadidae
	<i>Chremistica</i> sp.	<i>Orientopsaltria</i> sp.
	<i>Dundubia</i> sp.	<i>Platylomia</i> sp.
Lepidoptera		Bombycidae
	<i>Bombyx mori</i> LINNÉ	
		Hesperiidae
	<i>Erionata thrax thrax</i> (LINNÉ)	
		Pyralidae
	<i>Omphisa fuscidentalis</i> HAMPSON	
Hymenoptera		Apidae
	<i>Apis florea</i> FABRICIUS	<i>Apis dorsata</i> FABRICIUS
		Formicidae
	<i>Oecophylla smaragdina</i> (FABRICIUS)	<i>Carebara castanea</i> SMITH
		Vespidae
	<i>Vespa affinis indosinensis</i> PÉREZ	

Traditionally edible insects are cooked, grilled, deeply fried or used for making chilly paste. Some kinds are eaten raw. Tastiness is the main reason for eating insects.

So far as the beetles are concerned, species eaten in North Thailand are richer (about 100 species) than in Northeast Thailand (73 species). It might be caused from biological diversity due to the topographical complexity of the North. In the meantime, insect-eating habit is still commoner among local people in Northeast Thailand. They enjoy traditional taste and supply protein from insects.

The top favorite edible insects in the North are the dynastid beetles (imago), ants and bees, in contrast to the giant water bugs, predaceous diving beetles together with water scavenger beetles and immature ants in the Northeast. This also shows that difference of insect-eating habits between North Thailand and Northeast Thailand is deeply related to natural environment of each area, a mountaineous tropical rain forest and a plateau savanna, respectively.

Table 2. Edible insects eaten by more than 50% of people in Northeast Thailand (M.A.).

Insect common name	Answers	%
Giant water bugs	521	99.1
Predaceous diving beetles & Water scavenger beetles	495	94.1
Immature ants	493	93.7
Mole crickets	436	82.9
Winged ants	431	81.9
Worker ants	429	81.6
Common black crickets	427	81.2
Imagoes of dragonflies	410	78.0
Winged-termites	401	76.2
Giant crickets	386	73.4
Giant honey bees	385	73.2
Crawling water beetles	356	67.7
Small June beetles	343	65.2
Rice grasshoppers	342	65.0
Small long-horned grasshoppers	330	62.7
Paper wasps	325	61.8
Small honey bees	323	61.4
Cicadas	319	60.7
Back swimmers	318	60.5
Hercules beetles	316	60.1
Giant June beetles	311	59.1
Wasps	304	57.8
Common brown crickets	295	56.1
Giant dung beetles	283	53.8
Greenish June beetles	282	53.6
Buffalo dung beetles	282	53.6
White grubs	273	51.9
Patanga	271	51.5
Small brown crickets	271	51.5
Slant-faced grasshoppers	270	51.3
Metallic beetles	268	51.0
Water scorpions	267	50.8

Table 3. Edible insects occurring in each month.

Month	Insects
January	Ants, Predaceous diving beetles & Water scavenger beetles, Imagoes of dragonflies, Crickets, Mole crickets
February	Ants, Predaceous diving beetles & Water scavenger beetles, Imagoes of dragonflies, Crickets, Mole crickets
March	Ants, Predaceous diving beetles & Water scavenger beetles, Crickets, Mole crickets, Imagoes of dragonflies, Grasshoppers, Winged termites
April– October	Giant water bugs, Ants, Predaceous diving beetles & Water scavenger beetles, Crickets, Mole crickets, Imagoes of dragonflies, Giant crickets, Winged termites
November	Giant water bugs, Predaceous diving beetles & Water scavenger beetles, Crickets, Mole crickets, Imagoes of dragonflies, Winged termites, Giant crickets
December	Giant water bugs, Predaceous diving beetles & Water scavenger beetles, Crickets, Mole crickets, Imagoes of dragonflies, Giant crickets

Table 4. Various ways of cooking edible insects in Northeast Thailand.

Cooking ways	%	Insects
•Raw	7.3	Giant water bugs, Predaceous diving beetles & Water scavenger beetles, Ants, Imagoes of dragonflies, Crawling water beetles, Back swimmers, Water scorpions, June beetles, Grasshoppers, Metallic beetles, Dung beetles, Bees, Wasps, Cicadas, Predaceous diving beetles (immature stage)
•Cooked	92.7	Giant water bugs, Predaceous diving beetles & Water scavenger beetles, Ants, Mole crickets, Crickets, Imagoes of dragonflies, Winged termites, Giant crickets, Bees, Crawling water beetles, June beetles, Grasshoppers, Wasps, Cicadas, Back swimmers, Hercules beetles, Water scorpions, Dung beetles, Metallic beetles, Predaceous diving beetles (immature stage)
– parched	50.1	Giant water bugs, Predaceous diving beetles & Water scavenger beetles, Ants, Mole crickets, Crickets, Imagoes of dragonflies, Winged termites, Giant crickets, Bees, Crawling water beetles, June beetles, Grasshoppers, Wasps, Cicadas, Back swimmers, Hercules beetles, Water scorpions, Dung beetles, Metallic beetles, Predaceous diving beetles (immature stage)
– fried	19.0	Same as above
– curried	11.9	Predaceous diving beetles & Water scavenger beetles, Ants, Mole crickets, Crickets, Imagoes of dragonflies, Giant crickets, Bees, Crawling water beetles, June beetles, Grasshoppers, Wasps, Cicadas, Back swimmers, Hercules beetles, Water scorpions, Dung beetles, Predaceous diving beetles (immature stage)
– grilled	6.6	Giant water bugs, Bees, Predaceous diving beetles (immature stage), Wasps, Imagoes of dragonflies, Crawling water beetles, Back swimmers, Grasshoppers, Crickets, June beetles, Bees, Wasps, Water scorpions, Mole crickets, Crickets, Giant crickets, Dung beetles
– parched ground	3.8	Giant water bugs, Predaceous diving beetles & Water scavenger beetles, Mole crickets, Crickets, Giant crickets, Imagoes of dragonflies, Grasshoppers, June beetles, Winged termites (mature stage), Bees, Dung beetles, Wasps
– parched served sour	3.0	Ants, Grasshoppers, Crickets, Giant crickets, June beetles, Bees, Wasps, Imagoes of dragonflies, Dung beetles, Predaceous diving beetles (immature stage)
– steamed in leaf	2.8	Predaceous diving beetles & Water scavenger beetles, Ants, Imagoes of dragonflies, Bees, Crawling water beetles, Back swimmers, Grasshoppers, Crickets, June beetles, Bees, Wasps, Water scorpions, Mole crickets, Crickets, Giant crickets, Predaceous diving beetles (immature stage)
– steamed	1.7	Giant water bugs, Ants, Predaceous diving beetles & Water scavenger beetles, Crickets, Giant crickets, Mole crickets, Winged termites (mature stage), Bees
– miscellaneous	1.3	Giant water bugs, Ants, Grasshoppers, June beetles, Crawling water beetles, Back swimmers, Bees, Wasps

Table 5. Reasons for eating insects in Northeast Thailand (M.A.).

Reasons	Answers	%
Tasty	391	74.3
As a snack with alcohol	370	70.3
Good for snacks	312	59.3
Traditional medicine	254	48.3
As an ingredient in cooked meals	254	48.3
As a seasoning	168	31.9
Easy to find	160	30.4
No main available food	158	30.0
As main available food	120	22.8
Accessible for mass production	100	19.0
Other reasons	82	15.3

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要 約

Yupa HANBOONSONG · Arjin RATTANAPAN · 宇都宮由佳 · 益本仁雄：東北タイの食用昆虫・食虫習俗について。—— コンケンを中心とする東北タイの食用昆虫を調査した。その結果、8目30科126種の食用昆虫が確認された。このうち、コウチュウ目がもっとも多かった。一方、東北

タイ19県の住民の食虫習俗に関して質問紙を用い実態調査をおこなった。32種の食用昆虫がとくに好まれていた。味覚がよいというのが食虫習俗のおもな理由であった。また、ほとんどの食用昆虫は食べる前に調理されていた。北タイと東北タイでは住民の食用昆虫選好性に違いがみられた。

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