

A Market Survey of Commercial Crop and Utilized Plants in Xiengkhouang and Houaphan Provinces in Northern Laos, 2014

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Summary

A field survey was conducted from 16th October to 1st November, 2014 in remote minority living areas of northern Laos to investigate the crop status of cultivation and distribution at markets and farming area as a part of Grant-in-Aid for Overseas Scientific Research (Program code No. 25257416, Program Leader: Prof.Dr. Kazuo Watanabe, University of Tsukuba) of Japan Society for the Promotion of Sciences. In this survey, we visited the markets and farmers' fields in Xiengkhouang and Houaphan Provinces of northern Laos and observed distribution and cultivation of local landraces and improved varieties.

In the market, few native landraces such as eggplant and cucumber were still observed whereas foreign vegetables such as cabbage, chayote and so on were frequently seen to be sold regardless of the market size. In addition to the wild plant including a bamboo shoot and the potherb, hunted wild small birds and animals could also be found in markets and along roadside at individual stores. The conventional food use was continued as well as an investigation in last year. The vegetable seeds of improved varieties were sold in the small markets of towns and villages which were mainly imported from China, Thailand and Japan and this substitution from landraces to improved varieties is matter of major concern in these villages and town. It is necessary to continue the future research around the northern Laos where traditional food is used and traditional farming such as slash-and-burn is still conducted.

Introduction

In Southeast Asia's mountainous areas the development is delayed because of its steep environment and due to this, diverse ecosystem and diverse residential ethnicity is considerably high in these area. Although the variety of the crops cultivated there is also high, but the environment is changing rapidly in

recent years.

Laos is a region that where the diversity of crops has been maintained relatively higher, however in recent years, development and modernization even in remote areas due to the influence of neighboring countries and the domestic economy. The effect of these changes can also be seen on the crops (Kawase *et al.* 2012). So far in Laos, several field investigations and collections for plant genetic resources have been carried out (Sakata *et al.*, 2008; Saito *et al.*, 2009; Matsunaga *et al.*, 2010; Okuizumi *et al.*, 2012; Kawase *et al.*, 2012) however, information with respect to the cultivation and distribution of all vegetable crops of the area is still limited.

Thus, following the market survey of the last year in Myanmar, Laos and Thailand (Yamamoto *et al.*; in press), a field survey was conducted from 16th October to 1st November in 2014 to investigate the status of cultivation and distribution of crops at markets and farm villages in remote minority living areas in Xiengkhouang and Houaphan Provinces in northern Laos which share the border with Vietnam. The survey team also collected rice and cereal germplasms at farmers' fields and reported them separately.

This survey was planned and performed as a part of Grant-in-Aid for Overseas Scientific Research (Program code No. 25257416, Program Leader: Prof. Dr. Kazuo Watanabe, Tsukuba University) of Japan Society for the Promotion of Sciences.

Methods

The survey team members were Dr. Hisato Okuizumi and Dr. Shin-ichi Yamamoto, Genetic Resources Center, National Institute of Agrobiological Sciences (NIAS), Japan and Mr. Koukham Vilayheuang, Graduate School of Life and Environmental Sciences, University of Tsukuba, Japan and The Agriculture Research Center, National Agriculture and Forestry Research Institute (NAFRI), Vientiane, Laos. We joined at Vientiane on 15th October, 2014 and departed for Xiengkhouang on 16th October and returned to Vientiane on 1st November, 2014. A rental car was used for the field survey and germplasm collection. The itinerary of this survey and visited site are shown in Table 1 and Fig. 1.

The vegetables and herbs sold at markets in those areas was major focus of this survey because it was thought that influence of the external economy was much stronger for vegetables than rice and cereals. We interviewed vegetable vendors at the markets and farmers at the farmer's field to collect information about the vegetables and herbs grown and consumed in those areas and took photographs of those crops for the record.

Results and Discussions

Vegetables and potherbs observed in the markets were listed in Table 2. Many kinds of vegetables were recognized in the market of Phonsavan and Sam Neua which were the center of Xiengkhouang and Houaphan Province, respectively (Photos 1 and 2). Varieties and amount of vegetables sold in small town market were much less than those markets in the city (Photo 3).

In the market, foreign vegetables such as cabbage, chayote and so on were found to be sold regardless of the market scale but native landraces were still observed there such as eggplant and cucumber (Photos 4 and 5). Young shoots of vine vegetables of Cucurbitaceae family such as squash and chayote have been used as a vegetable. Shoots of passion fruit were also frequently used as a vegetable regardless of its strong bitterness. In this area, people tend to prefer the bitterness, such as beef "Laap" (spicy minced meat salad) was also cooked very bitter. It is possible that before the introduction of the pepper in this area, the

Table 1. Itinerary of the field study in 2014

Date	Day	Itinerary	Stay
16-Oct-14	Thu	Vientiane to Xiengkhouang	Phonsavan
17-Oct-14	Fri	With in Xiengkhouang	Phonsavan
18-Oct-14	Sat	Xiengkhouang (Phonsavan district) – Houaphan (Sam Neua district)	Sam Neua
19-Oct-14	Sun	Houaphan (Viengxai district)	Viengxai
20-Oct-14	Mon	Houaphan (Sam Neua district – Sop Bao district – Et district)	Muang Et
21-Oct-14	Tue	Houaphan (Et district - Sam Neua district)	Sam Neua
22-Oct-14	Wed	Houaphan (Sam Neua district – Sam Tai district)	Sam Tai
23-Oct-14	Thu	Houaphan (Sam Tai district– Viengxai district)	Viengxai
24-Oct-14	Fri	Houaphan (Viengxai district– Houameuang district)	Sam Neua
25-Oct-14	Sat	Houaphan (Houameuang district– Viengthong (Hiem) district)	Sam Neua
26-Oct-14	Sun	Houaphan (Viengthongdistrict) –Xiengkhouang (Kham district)	Muang Kham
27-Oct-14	Mon	Xiengkhouang (Kham district– Nonghet district– Phonsavan district)	Phonsavan
28-Oct-14	Tue	Xiengkhouang (Phonsavan district)	Phonsavan
29-Oct-14	Wed	Xiengkhouang (Phonsavan district– Kham district)	Phonsavan
30-Oct-14	Thu	Xiengkhouang (Phonsavan district– Mok)	Phonsavan
31-Oct-14	Fri	Xiengkhouang (Phonsavan district– Khoun District)	Phonsavan
1-Nov-14	Sat	Xiengkhouang (Phonsavan district) – Vientiane	Vientiane

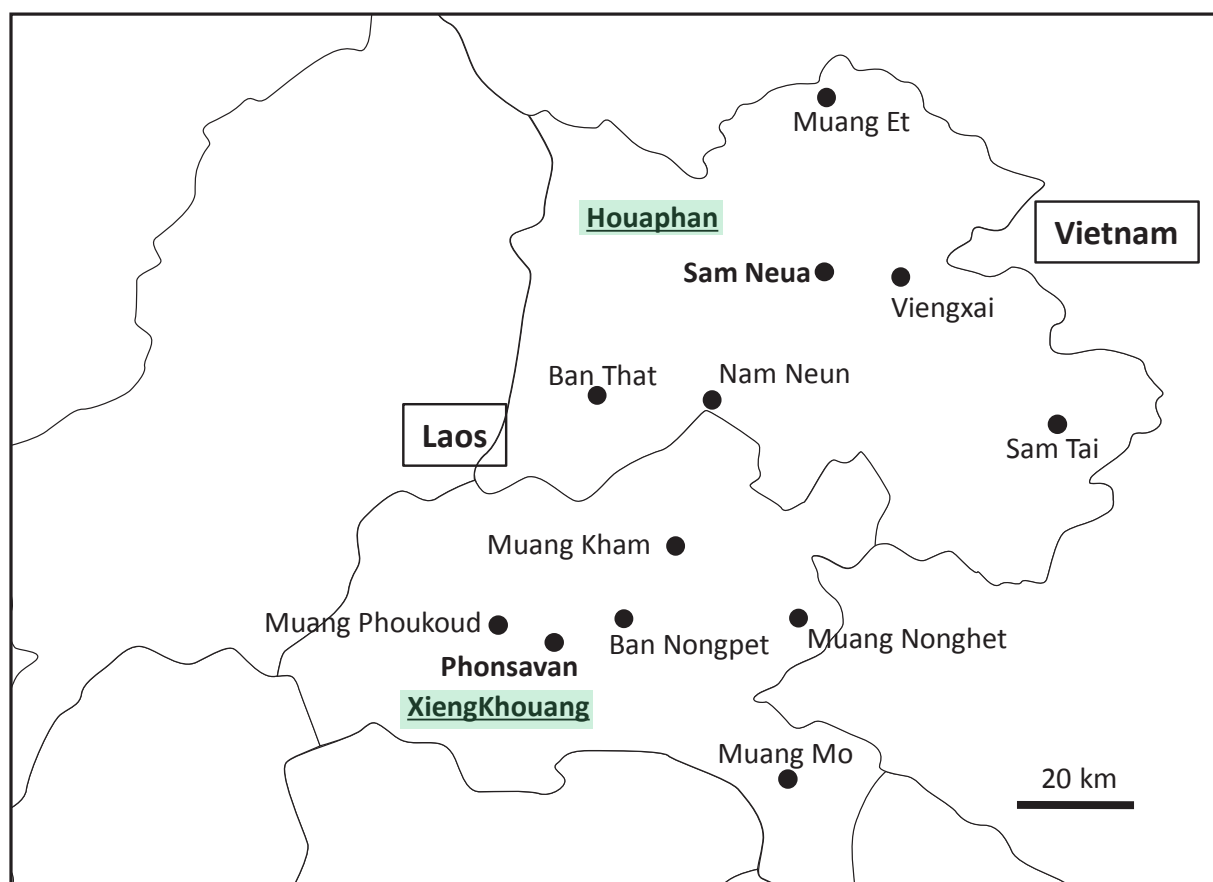


Fig. 1. Map of the markets visited in Xiengkhouang and Houaphan Provinces

bitterness was the main spice for cooking to eat plenty of rice or one of traditional medicine. In these areas private stores along roadside were direct sales point of farmer's commodities whereas, main vegetable species are not so many (Photo 6) and it was considered that they did not cultivate many items in each farmhouse. For example, mustard green, shallot, eggplant, chayote and galangal were cultivated at home garden (Photo 7) at a farmhouse visited in Pong Man village near Phonsavan and they also cultivated yard-long bean, winged bean, chili pepper and choy-sum in a garden beside their paddy field. In addition to the wild plants including a bamboo shoot and some herbs, hunted wild creatures including birds and small animals such as squirrel could be found in markets (Photo 8). Entomophagy was common in both provinces visited, same as other northern Lao provinces and northern Thailand. Many types of the katydid (Photo 9 and 10), bamboo worm (*Omphisa fuscidentalis*) and larva of hornet were seen a lot in the markets, on the other hand giant water bug which was popular in Thailand was not observed in this area. The use of small fish that were caught from water channels of rice fields was also seen and farmers told that they were not using pesticides in the fields because of those fishes. Toasted immature green rice grain ("Khao-mao" in Lao word) was also sold as a snack in markets but only for short period during harvesting season (Photo 11). Thus, the conventional food use was confirmed to continue in both provinces as reported in the last year's investigation. Moreover, rich diversity in livestock was observed and plenty of pigeon, duck, chicken, turkey, goat, dog, horse, pig, buffalo and cattle were fed in the area, especially white (albino?) buffalos were frequently found in both provinces (Photo 12).

In the current survey, we carried out investigation mainly at the towns and villages along the main highway to visit markets and farmers as many as possible. The seeds of improved varieties of vegetables produced in China, Thailand and furthermore Japan were sold (Photos 13 and 14) in the market of towns and villages which were not so big and it was concerned that substitution of improved varieties for landraces are progressing even in small villages. So, it is necessary to continue the further research around the northern Laos where traditional food use and traditional farming such as slash-and-burn still remain.

Acknowledgements

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ラオス北部シェンクワン県およびフアパン県の市場における商業流通作物および有用植物の調査（2014年）

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和文摘要

科学研究費基盤 (A) 海外学術調査「辺境少数民族地帯での植物利用及び伝統知の遺存と地域発展活動や国際経済の影響評価」(研究課題番号 25257416 研究代表者筑波大学渡邊和男) の調査の一環として、ラオス人民民主共和国を平成 26 年 10 月 15 日より 11 月 3 日の日程で訪問し、少数民族居住地域にて市場や農村地域で作物の栽培及び流通状況の調査を行った。今回の調査ではラオス北部シェンクワン県、フアパン県等の少数民族居住地域にて市場や農家圃場等を訪問して在来作物や改良品種の栽培・流通状況を調査するとともに遺伝資源の収集を行った。

市場ではキャベツやハヤトウリなどの外国野菜も市場規模に関わらず販売が見られたが、ナスやキュウリなどで在来品種が認められた。また筍や香味野菜など野生の植物に限らず、小鳥や小動物など野生個体を狩猟したものが市場や道路脇の個人商店等で見られるなど昨年の調査同様、従前の食品利用が継続されていた。

今年度の調査でも、できるだけ多くの市場及び農家を訪問するため主要幹線道路沿いに調査した。規模のあまり大きくない町や村の市場でも中国やタイ、さらには日本で育成された野菜の改良品種の種子が販売されており、小規模な村でも在来品種との交代が進んでいることが懸念される。今後も伝統的な食品利用と焼畑など伝統的農法が残るラオス北部を中心として調査を継続したいと考えている。

Table 2. List of crops and herbs observed in the market

	Date	10/17/2014	10/18/2014	10/19/2014	10/21/2014	10/23/2014	10/24/2014	10/25/2014	10/25/2014	10/26/2014	10/26/2014	10/26/2014	10/30/2014
	Province	Xiengkhouang	Xiengkhouang	Houaphan	Houaphan	Houaphan	Houaphan	Houaphan	Houaphan	Xiengkhouang	Xiengkhouang	Xiengkhouang	Xiengkhouang
	Village/Town	Muang Phoukoud	Phonsavan	Sam Neua	Muang Et	Xam Tai	Viengxai	Nam Neun	Ban That	Ban NonPet	Muang Kham	Muang Nonghet	Muang Mo
	Market name or type	Hetsaban / medium food market	Phonsavan/ large food market	Muang Sam 1/ large food market	town small food market	small food market	medium food market	small food market	medium food market	Sunday food market	medium food market	small food market	small food market
	Map location	LWP09	LWP12	LWP21	LWP35'	LWP50'	LWP60'	LWP71'	LWP74	LWP81	LWP80'	LWP84'	LWP119
	Latitude (N)	19.34.05.916	19.26.57.609	20.25.02.719	20.49.13.425	19.59.55.774	20.24.36.914	20.01.54.497	20.05.01.248	19.33.23.558	19.37.55.710	19.29.46.436	19.04.18.850
	Longitude (E)	103.05.05.960	103.12.58.219	104.02.58.739	104.00.21.944	104.38.25.516	104.13.35.850	103.42.59.751	103.22.11.042	103.23.08.293	103.33.25.353	103.59.10.372	103.57.29.555
	Altitude (m)	1073	1123	941	276	338	885	520	707	1159	601	1413	478
Crop Name	Latin Name												
chili pepper	<i>Capsicum annuum</i> L.	o	o	o	o	o	o	o	o	o	o	o	
tomato	<i>Solanum lycopersicum</i> L.	o	o	o	o	o	o	o	o	o	o	o	
potato	<i>Solanum tuberosum</i> L.	o	o	o	o	o	o	o	o	o	o	o	
eggplant	<i>Solanum melongena</i> L.	o	o	o	o	o	o	o	o	o	o	o	
turkey berry	<i>Solanum torvum</i> Sw.	o	o	o	o	o	o	o	o	o	o	o	
bitter tomato	<i>Solanum intergrifolium</i>	o	o	o	o	o	o	o	o	o	o	o	
chayote	<i>Sechium edule</i> (Jacq.) Sw.	o	o	o	o	o	o	o	o	o	o	o	
young shoot of Cucurbitaceae	Cucurbitaceae		squash, chayote	squash	squash	squash	angled luffa			sponge gourd	chayote		
cucumber	<i>Cucumis sativus</i> L.	o	o	o	o	o	o	o	o	o	o	o	
squash	<i>Cucurbita</i> spp.	o	o	o/花	o	o	o	o	o	o	o	o	
zucchini	<i>Cucurbita pepo</i> L. var. <i>cylindrica</i>	o	o	o	o	o	o	o	o	o	o	o	
sponge gourd	<i>Luffa aegyptiaca</i> Mill.	o	o	o	o	o	o	o	o	o	o	o	
angled luffa	<i>Luffa acutangula</i> (L.) Roxb.	o	o	o	o	o	o	o	o	o	o	o	
bitter gourd	<i>Momordica charantia</i> L.	o	o	o	o	o	o	o	o	o	o	o	
spiny bitter gourd	<i>Momordica cochinchinensis</i> (Lour.) Spreng.	o	o	o	o	o	o	o	o	o	o	o	
snake gourd	<i>Trichosanthes anguina</i> L.	o	o	o	o	o	o	o	o	o	o	o	
wax gourd	<i>Benincasa hispida</i>	o	o	o	o	o	o	o	o	o	o	o	
bottle gourd	<i>Lagenaria siceraria</i> var. <i>hispida</i>	o	o	o	o	o	o	o	o	o	o	o	
passionfruit shoot	<i>Passiflora</i> spp.	o	o	o	o	o	o	o	o	o	o	o	
cabbage	<i>Brassica oleracea</i> L. var. <i>capitata</i>	o	o	o	o	o	o	o	o	o	o	o	
cauliflower	<i>Brassica oleracea</i> var. <i>botrytis</i>	o	o	o	o	o	o	o	o	o	o	o	
broccoli	<i>Brassica oleracea</i> var. <i>italica</i>	o	o	o	o	o	o	o	o	o	o	o	
chinese kale	<i>Brassica oleracea</i> var. <i>alboglabra</i>	o	o	o	o	o	o	o	o	o	o	o	
bok choy	<i>Brassica rapa</i> L. (Chinensis Group)	o	o	o	o	o	o	o	o	o	o	o	
Chinese cabbage	<i>Brassica rapa</i> L. (Pekinensis Group)	o	o	o	o	o	o	o	o	o	o	o	
Chinese cab. Non-head	<i>Brassica rapa</i> L. (Pekinensis Group)	o	o	o	o	o	o	o	o	o	o	o	
choy sum	<i>Brassica rapa</i> L. (Parachinensis Group)	o	o	o	o	o	o	o	o	o	o	o	
mustard green	<i>Brassica juncea</i> (L.) Czern.	o	o	o	o	o	o	o	o	o	o	o	
lettuce	<i>Lactuca sativa</i> L. var. <i>capitata</i>	o	o	o	o	o	o	o	o	o	o	o	
stem lettuce	<i>Lactuca sativa</i> L. var. <i>angustana</i>	o	o	o	o	o	o	o	o	o	o	o	
leaf amaranth	<i>Amaranthus</i> spp.	o	o	o	o	o	o	o	o	o	o	o	
water spinach	<i>Ipomea aquatica</i> L.	o	o	o	o	o	o	o	o	o	o	o	
sweetpotato	<i>Ipomoea batatas</i> L.	o	o	o	o	o	o	o	o	o	o	o/ leaf	
taro	<i>Colocasia esculenta</i> (L.) Schott	o	o	o	o	o	o	o	o	o	o	o	
watercress	<i>Nasturtium officinale</i> W.T. Aiton	o	o	o	o	o	o	o	o	o	o	o	
garland chrysanthemum	<i>Glebionis coronaria</i> (L.) Cass. ex Spach	o	o	o	o	o	o	o	o	o	o	o	
pea shoot	<i>Pisum sativum</i> L.	o	o	o	o	o	o	o	o	o	o	o	
podded pea	<i>Pisum sativum</i> L.	o	o	o	o	o	o	o	o	o	o	o	
green bean	<i>Phaseolus vulgaris</i> L.	o	o	o	o	o	o	o	o	o	o	o	
lima bean	<i>Phaseolus lunatus</i> L.	o	o	o	o	o	o	o	o	o	o	o	
winged bean	<i>Psophocarpus tetragonolobus</i> (L.) DC.	o	o	o	o	o	o	o	o	o	o	o	
yard-long bean	<i>Vigna unguiculata</i> (L.) Walpers	o	o	o	o	o	o	o	o	o	o	o	
lablab bean	<i>Lablab purpureus</i> (L.) Sweet	o	o	o	o	o	o	o	o	o	o	o	
yam bean	<i>Pachyrhizus erosus</i> (L.) Urb.	o	o	o	o	o	o	o	o	o	o	o	
carrot	<i>Daucus carota</i> L. subsp. <i>sativus</i> (Hoffm.) Arcang.	o	o	o	o	o	o	o	o	o	o	o	
Daikon radish	<i>Raphanus sativus</i> L. var. <i>longipinnatus</i> L.H.Bailey	o	o	o	o	o	leaf	o	o	o	o	o	
ginger	<i>Zingiber officinale</i>	o	o	o	o	o	o	o	o	o	o	o	
garlic	<i>Allium sativum</i> L.	o	o/leaf/stem	o	o	o	o	o	o	o	o	o	
onion	<i>Allium cepa</i> L.	o	o	o	o	o	o	o	o	o	o	o	

Table 2 (Continued).

	Date	10/17/2014	10/18/2014	10/19/2014	10/21/2014	10/23/2014	10/24/2014	10/25/2014	10/25/2014	10/26/2014	10/26/2014	10/26/2014	10/30/2014
	Province	Xiengkhouang	Xiengkhouang	Houaphan	Houaphan	Houaphan	Houaphan	Houaphan	Houaphan	Xiengkhouang	Xiengkhouang	Xiengkhouang	Xiengkhouang
	Village/Town	Muang Phoukoud	Phonsavan	Sam Neua	Muang Et	Xam Tai	Viengxai	Nam Neun	Ban That	Ban NonPet	Muang Kham	Muang Nonghet	Muang Mo
	Market name or type	Hetsaban / medium food market	Phonsavan/ large food market	Muang Sam 1/ large food market	town small food market	small food market	medium food market	small food market	medium food market	Sunday food market	medium food market	small food market	small food market
	Map location	LWP09	LWP12	LWP21	LWP35'	LWP50'	LWP60'	LWP71'	LWP74	LWP81	LWP80'	LWP84'	LWP119
	Latitude (N)	19.34.05.916	19.26.57.609	20.25.02.719	20.49.13.425	19.59.55.774	20.24.36.914	20.01.54.497	20.05.01.248	19.33.23.558	19.37.55.710	19.29.46.436	19.04.18.850
	Longitude (E)	103.05.05.960	103.12.58.219	104.02.58.739	104.00.21.944	104.38.25.516	104.13.35.850	103.42.59.751	103.22.11.042	103.23.08.293	103.33.25.353	103.59.10.372	103.57.29.555
Altitude (m)	1073	1123	941	276	338	885	520	707	1159	601	1413	478	
Crop Name	Latin Name												
shallot	<i>Allium oschaninii</i> B.Fedtsch.	o	o		o		o	o	o		o	o	
young shallot	<i>Allium oschaninii</i> B.Fedtsch.	o	o	o		o		o	o	o		o	
chinese chives	<i>Allium tuberosum</i> Rottler ex Spreng.		o										
rosselle leaf	<i>Hibiscus sabdariffa</i> L.		o		o		o			o			
banana flower	<i>Musa</i> spp.		o	o	o			o		o			
hummingbird flower	<i>Sesbania grandiflora</i>		o		o				o				
dok kae	<i>Markhamia stipulata</i>		o	o	o				o	o			
dok nam panya	<i>Caesalpinia mimosoides</i> Lam				o					o			
Indian pennywort	<i>Centella asiatica</i> (L.) Urban		o		o				o	o			
Thai sweet basil	<i>Ocimum basilicum</i> var. <i>thyrsiflora</i>		o										
holy basil	<i>Ocimum tenuiflorum</i> L.												
coriandar	<i>Coriandrum sativum</i> L.	o	o	o	o	o	o	o	o	o	o	o	
long coriandar	<i>Eryngium foetidum</i> L.			o	o	o			o	o			
dill	<i>Anethum graveolens</i> L.		o		o		o		o	o			
mint	<i>Mentha spicata</i> L.		o	o	o		o			o			
celery	<i>Apium graveolens</i> L. var. <i>dulce</i> (Mill.) DC.		o										
mountain pepper	<i>Zanthoxylum</i> spp.		o	o	o	o	o			o			
pak kaat	<i>Acmella paniculata</i> (Wall. ex DC.) R.K.Jansen				o								
heartleaf	<i>Houttuynia cordata</i> Thunb.		o	o						o			
pak pai	Porigonaceae			o									
wild betel leaves	<i>Piper sarmentosum</i>		o	o	o								
lemon grass	<i>Cymbopogon schoenanthus</i> (L.) Spreng	o	o	o	o	o	o	o	o	o	o	o	
galangal	<i>Alpinia officinarum</i>		o	o	o							o	
climbing wattle	<i>Senegalia pennata</i>		o	o									
kaffir lime leaf	<i>Citrus hystrix</i>		o									o	
rattan shoot	<i>Calamus</i> spp.		o										
midnight horror	<i>Oroxylum indicum</i> (L.) Benth. ex Kurz			o									
yanang	<i>Tiliacora triandra</i> (Colebr.) Diels		o										
bamboo shoot	Bambuseae	o	o		o	o		o	o	o	o	o	
Mekong weed	<i>Cladophora</i> spp.				o			o	o	o			
others		tree shoot	green rice, husk tomato, lotus root, welsh onion, sweet pepper, Indian spinach, melon, Okinawan spinach, Perilla, makomotake (<i>Zizania</i>), water chestnut (<i>Eleocharis</i>), <i>Parkia speciosa</i>	<i>Solanum violaceum</i> , green papaya, sugarcane, cassava root and leaves, tamarind, mak kork	<i>Marsilea crenata</i> , fern shoot, young corn, unidentified herb	green rice	<i>Monochoria korsakowii</i> , unidentified herb		unidentified herb	<i>Solanum</i> spp., green papaya, sugarcane, sunflower, makomotake (<i>Zizania</i>), unknown yellow fruit, some unidentified herbs		asparagus	green papaya, melon



Photo 1. Vegetables sold in Phonsavan market



Photo 2. Vegetables sold in Muang Sam 1 market in Sam Neua



Photo 3. Vegetables sold in town market in Muang Et



Photo 4. Eggplants sold in the market in Sam Tai in Houaphan



Photo 5. Cucumber sold in the Sunday market in Ban (village) Nongpet, Xiengkouang



Photo 6. Vegetables sold in a roadside store



Photo 7. Vegetables cultivated in home garden of farmhouse in Pong Man village



Photo 8. Hunted wild creatures sold in Phonsavan market



Photo 9. Mixed katydids sold in the town market in Nam Neun, Houaphan



Photo 10. Cooked katydids at the restaurant in Sopbao, Houaphan



Photo 11. Toasted immature rice (Khao-mao) sold in Phonsavan market



Photo 12. White (albino) buffalo in Muang Phoukoud, Xiengkouang



Photo 13. Imported seeds sold in Hetsaban market, Muang Phoukoud, Xiengkouang



Photo 14. Imported seeds sold in a town market, Muang Nohghet, Xiengkouang