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Original Paper

A Field Study Exploring Plant Genetic Resources in Kachin State and Chin State, Myanmar in 2017

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Summary

Here, we report a Myanmar-Japan cooperative field study exploring plant genetic resources (PGRs) mainly in northern Kachin State and southern Chin State, Myanmar in November 2017. The field study was conducted in the above-mentioned areas where small exploration missions were dispatched, even though crop diversity was expected. Crop diversity has previously been observed in hilly and mountainous areas in Sagaing Region, which border Kachin State and Chin State. There were four objectives of this field study. First, we planned to survey cultivated and useful plants by visiting villages and marketplaces in Putao district of Kachin State. We visited a large basin and the surrounding hills at altitudes of 370–530 m. The major crop in the basin was rice and various legumes, cereals, spices, herbs, medicinal plants, and vegetables were grown in cultivated fields, backyard garden, and in local marketplaces. Second,

we intended to visit local villages at higher altitudes of 900–1,540 m crossing higher passes in Mindat district of the southern Chin State and vicinity for survey. Although rice was also an important crop in those regions, its cultivation was limited to terraces in the valleys or small basins where irrigation water was available. There were small sloping cultivation fields near farmers' houses where various crops were grown, as observed in Putao district. Cultivation of elephant foot yam was recently introduced as a cash crop, which might have led to the loss of traditionally grown crops, such as foxtail millet and finger millet. The third objective was to collect PGRs for food and agriculture. We collected 245 plant samples in Putao district of Kachin State (147 samples), Mindat district of Chin State (89) and neighboring Magway Region (8), and Yangon Region (1) of Myanmar, which included legumes (46), cereals (75), spices, herbs and medicinal plants (28), various vegetables (92), and others (4). The fourth objective was to collect the vernacular names and confirm the utilization methods of the crops and useful plants from an ethnobotanical perspective. Shan, Rawang, Jinghpaw and Lisu people often used similar crop names within their respective languages in Putao district of Kachin State. Although they live close to other people in the district, they have maintained their own vernacular names for a variety of cultivated crops. Conversely, Chin people use various words for each crop among villages in Mindat district of Chin State. Consequently, we observed a diversity of cultivated and useful plants in Putao district of Kachin State and Mindat district of Chin State. These were collected as potential PGRs to be conserved at DAR Seed Bank in Myanmar and at the Genetic Resources Center of the National Agriculture and Food Research Organization (NARO), which implements the NARO Genebank Project (NARO GBP) in Japan. We observed the recent introduction of some cash crops, such as elephant foot yam and coffee trees, into the mountainous areas of Chin State, which might have led to the loss of traditionally grown crops, such as foxtail millet and finger millet. Further studies are needed on several wild and/or semi-domesticated Cucurbitaceae and Solanaceae plants used by local people both in Kachin State and Chin State for accurate taxonomic identification and analysis of diversity. It is important to consider introducing cash crops and the possible utilization of traditional cultivated and useful plants in order to develop agriculture in hilly and mountainous peripheral areas of Myanmar such as Putao and Mindat districts.

KEY WORDS: Myanmar, Kachin State, Chin State, plant genetic resources, vernacular names

Introduction

This report describes a Myanmar-Japan joint field study carried out in the hilly and mountainous areas of Myanmar in November 2017. It was established based on preceding studies in the Naga Self-Administered Zone (Naga SAZ) in Sagaing Region (Domon *et al.* 2015a, 2015b; Min San Thein *et al.* 2017; Naito *et al.* 2017), Kachin State (Kawase *et al.* 2011; Yamamoto *et al.* 2011; Watanabe *et al.* 2007) showing that people from scattered villages in the hilly and mountainous areas had been growing a diversity of traditional crops and varieties mainly in slash-and-burn cultivation fields, backyard gardens (home gardens), and in terrace cultivation fields, and had been collecting useful plants from surrounding places. The present study was planned because the Putao township of Kachin State and southern Chin State were poorly surveyed compared to Naga SAZ.

There were four basic objectives of the study. First, we targeted Putao district to survey the diversity of crop plants and useful plants. Putao district is in the northern Kachin State, which is bordered by China to the north and east and by India to the west. Second, we focused the survey on Mindat district of the

southern Chin State and vicinity. Those areas are expected to harbor crop diversity based on the results of previous intensive field studies in Sagaing Region (Domon *et al.* 2015a, 2015b; Min San Thein *et al.* 2017; Naito *et al.* 2017), which is located between Kachin State and Chin State. Third, we intended to collect plant genetic resources (PGRs) from the above-mentioned areas, which may be valuable materials for crop improvement and should be conserved in gene banks. These PGRs will be characterized and evaluated, and may serve as suitable materials for studying the genetic diversity of morphological and physiological characters as well as DNA polymorphism. Such analyses will demonstrate the magnitude of genetic diversity in each taxon and overall agro-biodiversity in a given area. Fourth, we aimed to collect the vernacular names and to determine how crops and useful plants are utilized from an ethnobotanical point of view. The diversity of crop names may serve as an indicator of ethnodiversity in the area. The collected plant materials will be analyzed in the future to compare ethnodiversity and agro-biodiversity. This would also lead to a deeper understanding of how local crop varieties of the area have been influenced by socio-economical changes caused through recent democratization in Myanmar. Such influences might also be contributed from neighboring India and/or China. In addition, crop wild relatives (CWRs) and/or semi-cultivated species were of interest during the visit, because several populations of wild *Vigna* species and wild or semi-cultivated Cucurbitaceae plants were previously identified in Naga SAZ, Kachin State, and Chin State, where a survey of those species was needed.

Methods

Putao district of northern Kachin State and Mindat district of southern Chin State in Myanmar were the main target areas of the present field study (Figs. 1 and 2). We visited Putao township and Machanbaw township in Putao district, and Mindat township and Madupi township in Mindat district. We planned the visit in November based on previous experiences in Kachin State (Watanabe *et al.* 2007; Yamamoto *et al.* 2011; Kawase *et al.* 2011) and Chin State (Uga *et al.* 2006). Access and field work in hilly and mountainous parts of Myanmar were sometimes difficult, particularly for foreign researchers due to poor transportation conditions, language barriers, and/or time-consuming entry permit procedures. A field study was performed and PGRs were collected by a group of specialists from different study fields addressing specific but interrelated objectives, and included Myanmar researchers in the Naga Self-Administered Zone (Naga SAZ) in 2016 (Naito *et al.* 2017). Therefore, a similar collaborative field research team was organized, consisting of four Japanese scientists and two Myanmar scientists financially supported by three independent funds, as indicated in Table 1. There was a consensus that all results obtained, including PGRs, would be shared as common achievements of the team, conserved in Myanmar and Japan, and be publicly accessible as appropriate.

Members of the field study team in Putao district included: Kawase (MK, team leader), Osada (TO), Ohm Mar Saw (OMS), Watanabe (KW), and Aung Phyoe Hein (APH). We joined the team in Yangon on November 3rd, flew to Putao, and visited Putao township and vicinity using two tough, locally hired 4 × 4 vehicles. The team flew to Myitkyina, visited nearby, and then flew to Mandalay and stayed at Nyaung U, where Takei (ET) and Ebana (KE) joined the team. The team visited Mindat district up to Madupi township and vicinity. MK, OMS, and KE are specialists in PGRs conservation, TO is a linguist, ET an ethnobotanist, KW a plant geneticist and biotechnologist, and APH an agricultural student enrolled at Yezin Agriculture University (YAU). OMS was appointed by the Department of Agricultural Research (DAR) and APH was nominated by coordination between YAU and DAR. Domon (ED), Min San Thein (MST),

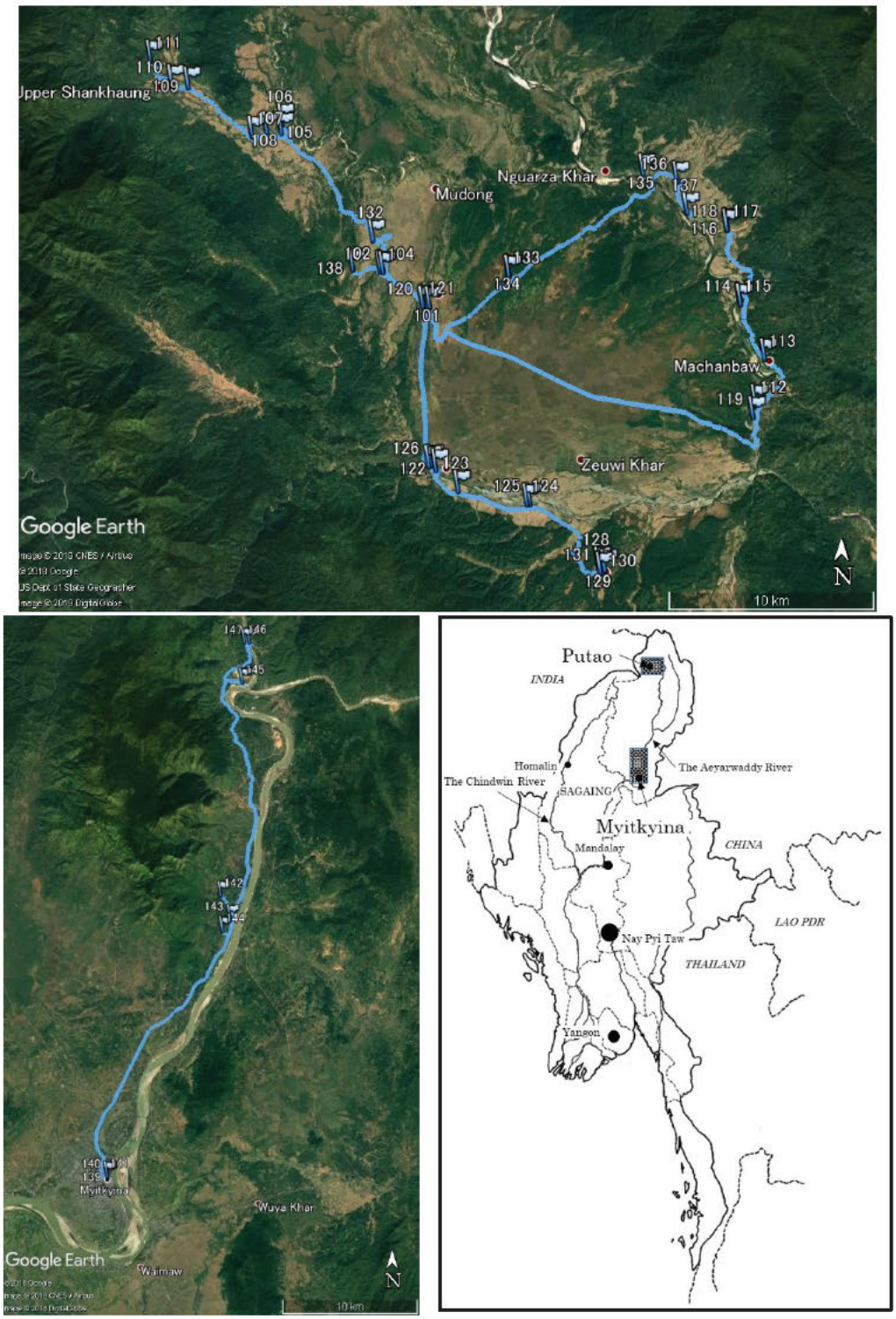

Fig 1. The surveyed route and collection sites (indicated by waypoints) in Putao district (upper) and Myitkyina district (bottom left) of Kachin State, Myanmar in November 2017. The location of Putao town and Myitkyina town are indicated on the white map at the bottom right.

OMS, and MK corresponded for coordination prior to the field trip.

We visited fields to explore standing crops or just after harvest and interviewed local people about their cultivation practices and the utilization of their produce, particularly regarding cereals, legumes, vegetables, herbs and spices. We also collected CWRs and geographical information of each site was recorded using an Oregon 650TCJ (Garmin International, Inc.) and a free application Geo Tracker version 3.3.0 (https://geo-tracker.org/) installed on a smartphone, NEXUS 6P (Google Inc.). During the field study,

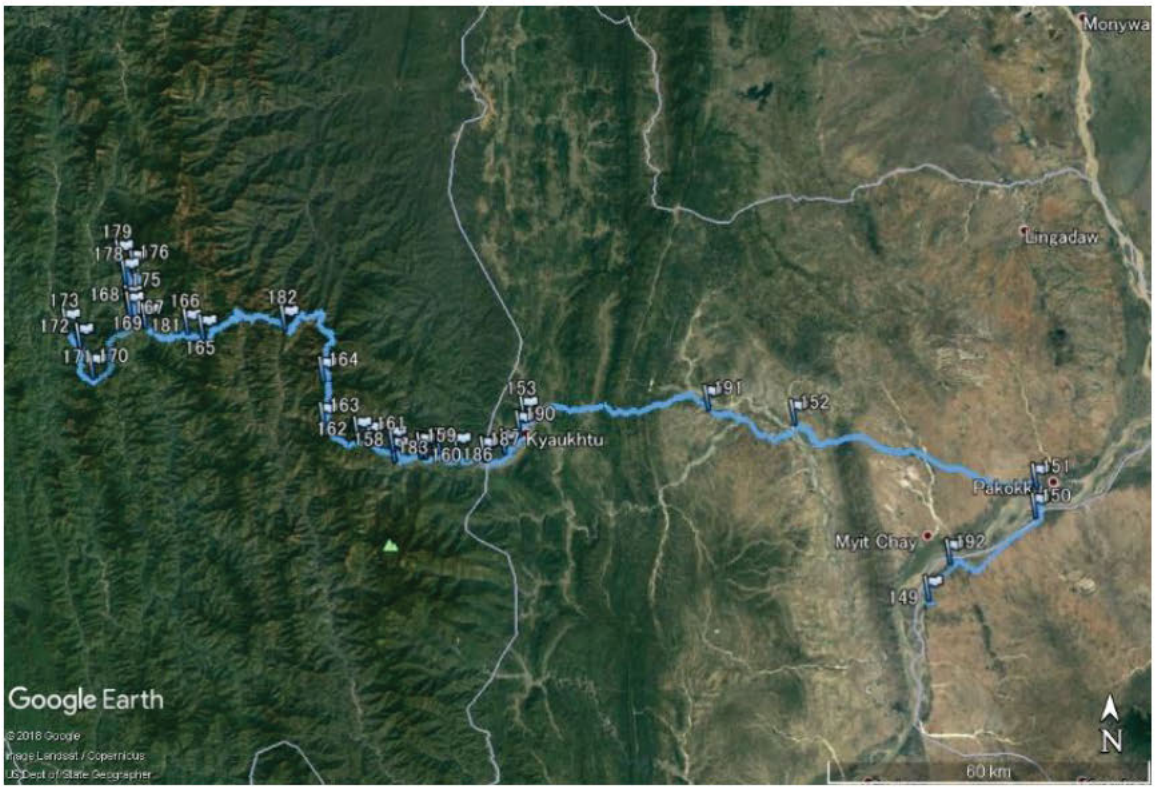

Fig. 2. The surveyed route and collection sites (indicated by waypoints) in Mindat district of Chin State and neighboring Magwe Region, Myanmar in November 2017. The location of Mindat town and Madupi town are indicated on the white map below.

we questioned local people about the crops produced and consumed there, such as rice, millets, pulses, and vegetables in accordance with the International Society of Ethnobiology (ISE) Code of Ethics (http://www.ethnobiology.net/what-we-do/core-programs/ise-ethics-program/code-of-ethics/). Photos of 73 crops were shown to local people and vernacular names were collected through interviews at 17 sites. We also collected wild species, with particular focus on *Vigna* species as well as semi-domesticated and wild cucurbitaceous plants.

Table 1. Itinerary of the field study in Kachin State and Chin States of Myanmar in November 2017

day	YY/MM/DD	date	route	KAKEN 16H05778	KAKEN 25257416	PGRAsia
1	2017/11/02	THU	gather at YANGON	MK, TO, OMS	KW, APH	
2	2017/11/03	FRI	YANGON - PUTAO	MK, TO, OMS	KW, APH	
3	2017/11/04	SAT	around PUTAO	MK, TO, OMS	KW, APH	
4	2017/11/05	SUN	around PUTAO	MK, TO, OMS	KW, APH	
5	2017/11/06	MON	around PUTAO	MK, TO, OMS	KW, APH	
6	2017/11/07	TUE	around PUTAO	MK, TO, OMS	KW, APH	
7	2017/11/08	WED	PUTAO - MYITKYINA	MK, TO, OMS	KW, APH	
8	2017/11/09	THU	around MYITKYINA	MK, TO, OMS	KW, APH	
9	2017/11/10	FRI	MYITKYINA - MANDALAY MANDALAY - NYAUNG U gather at NYAUNG U	MK, TO, OMS, ET	KW, APH	KE
10	2017/11/11	SAT	NYAUNG U - PAKKOKU - MINDAT	MK, TO, OMS, ET	KW, APH	KE
11	2017/11/12	SUN	MINDAT - MADUPI	MK, TO, OMS, ET	KW, APH	KE
12	2017/11/13	MON	around MADUPI	MK, TO, OMS, ET	KW, APH	KE
13	2017/11/14	TUE	around MADUPI	MK, TO, OMS, ET	KW, APH	KE
14	2017/11/15	WED	MADUPI - MINDAT	MK, TO, OMS, ET	KW, APH	KE
15	2017/11/16	THU	MINDAT - CHAUK - NYAUNG U	MK, TO, OMS, ET	KW, APH	KE
16	2017/11/17	FRI	NYAUNG U - YEZIN	MK, TO, OMS, ET	KW, APH	KE
17	2017/11/18	SAT	YEZIN	MK, TO, ET	KW	KE
18	2017/11/19	SUN	YEZIN	MK, TO, ET	KW	KE
19	2017/11/20	MON	YEZIN - YANGON	MK, TO, ET	KW	KE
20	2017/11/21	TUE	YANGON	MK, TO, ET	KW	KE
21	2017/11/22	WED	around YANGON / BAGO	MK, ET		KE

Note:
KAKEN 16H05778: Grant-in-Aid Program for Overseas Academic Survey of Basic Research (KAKEN) Type B No. 16H05778
KAKEN 25257416: Grant-in-Aid Program for Overseas Academic Survey of Basic Research (KAKEN) Type A No. 25257416
PGRAsia: PGRAsia Project, an international joint research project on plant genetic resources between NARO and gene banks of Asian countries.

MK (Makoto Kawase), TO (Toshiki Osada), OMS (Ohm Mar Saw), ET (Emiko Takei), KW (Kazuo Watanabe), APH (Aung Pyoe Hein), and KE (Kaworu Ebana) were members of the field study team. ED (Eiji Domon) and MST (Min San Thein) served as focal points of official correspondences for the team.

Results and Discussions

We visited the target areas around the harvest season of rice and collected local crop varieties as well as wild plant PGRs from the fields. These were dried after harvest or stored in farmers' houses, huts on the slash-and-barn cultivation fields, or even along the roadside. Relevant information on geographical

information, cultivation practices, characteristics, and usage were obtained. We surveyed and collected plant materials in Putao, Machanbaw, and Myitkyina townships of Kachin State (Fig. 1), followed by Mindat and Madupi townships of Chin State, and Saw and Chouk townships of Magway Region, which neighbor Chin State, in time for harvest (Fig. 2). Additionally, we surveyed the road between Yangon and Bago, including Hlegu township of Yangon Region. We recorded crop names, village names, GPS data, sources of plant materials, cultural practices, sowing and harvesting months, and topography. GPS data recorded on different devices showed almost the same longitude and latitude. Because the altitude recorded by GPS devices was not always reliable, this was estimated using Google Earth (Google Inc.) with the GPS location data at every site.

Observations at Putao district of Kachin State

Putao (waypoints [WPs] 104, 121 and 132 indicated in Fig. 1) is the principal town of Putao township located in Putao district in the northern part of Kachin State, Myanmar. It is at an altitude of approximately 450 m above sea level. Snow-covered mountains can be seen in the north from downtown Putao (Photo 1). Putao township and adjacent Machanbaw township are in a basin surrounded by mountains with an altitude 1,000 m or higher. The altitude of the visited areas varied from 370 to 530 m. Rawang, Lisu, Shan and Jinghpaw people dwell in these regions, and their Lingua franca is primarily Jinghpaw. Conversely, the Myanmar (Bama) language is also used as the official common language of Myanmar. People in those districts are general multilingual, which occasionally caused some confusion during our interviews with locals, who tried to communicate using a variety of languages. Generally, Khamti-Shan people are mostly Buddhist, Jinghpaw and Rawang people are often Christian, and Jinghpaw people are usually Christian.

We surveyed Putao township and neighboring Machanbaw township, which are flat as they are in a broad basin. Those flat areas are suited in paddy fields of Asian cultivated rice, *Oryza sativa* L. (Photo 2). For example, there are 29,000 acres (11,700 ha) of cultivated fields, of which about 16,000 (about 6,500 ha) are used for paddy fields and the remaining 13,000 (about 5,300 ha) are used mainly for slash-and-burn or shifting cultivation in Putao township (Watanabe *et al.* 2007).

Legumes such as *Vigna unguiculata* (L.) Walpers Group Sesquipdalis E. Westphal, *V. unguiculata* Group Unguiculata E. Westphal, *V. umbellata* (Thunb.) H. Ohwi et Ohashi, *Vicia faba* L., and *Pisum sativum* L., as well as local vegetables such as *Brassica juncea* (L.) Czern Group Cerua, *Cucumis sativus* L., *Cucurbita maxima* L., *C. moschata* L., *Momordica charantia* L., *Luffa acutangula* (L.) Roxb., *Beninzasa hispida* L., *Abelmoschus esculenta* (L.) Moench, and *Colocasia esculenta* (L.) Schott, are often grown in dry fields and private gardens. A variety of spices, herbs and medicinal plants are used widely: *Capsicum annuum* L., *Coriandrum sativum* L., *Curcuma longa* L., *C. zedoaria* (Christm.) Roscoe, *Ocimum basilcum* L., *Perilla frutescens* (L.) Britton var. *frutescens*, *Zanthoxylum armartum* DC. and *Zingiber officinale* Roscoe are common. Particularly, *O. basilcum* L. and *C. annuum* L. are very popular. Those plants are also popular in the mountainous areas of Naga SAZ (Domon *et al.* 2015a; Min San Thein *et al.* 2017; Naito *et al.* 2017).

Putao town marketplace is full of local vegetables and fruits harvested from villages surrounding the town (Photos 3-6). For example, ridged cucumber (*Luffa acutangula* [L.] Roxb.), edible fern (probably *Diplazium esculentum* [Retz.] Sw.), Asiatic pennywort (*Centella asiatica* [L.] Urban), basil plants (*O. basilcum* L., and *Elsholtzia blanda* [Bentham] Bentham), small chestnut (*Castanea* sp., probably *C. mollissima* Blume; Photo 6), Indian leek (*Allium tuberosum* Rottler ex Spreng.), nightshade (*Solanum*

violaceum Ortega, *S. virginianum* L., etc.), banana (*Musa* spp.) bud, banana leaf for wrapping material, taros (*Colocasia* spp.), chayote (*Sechium edule* [Jacq.] Sw.), wild edged gourd (*Gymnopetalum chinense* [Loureiro] Merrill.), roselle (*Hibiscus sabdariffa* L.), hooker chives (*Allium hookeri* Thwaites), radish (*Raphanus raphanistrum* subsp. *sativus* [L.] Domin), and water spinach (*Ipomoea aquatica* Forssk.), as well as global crops including eggplant, *Citrus* spp., sugarcane (*Saccharum officinarum* L.), garlic (*Allium sativum* L.), mustard (*Brassica* spp.) leaf, banana fruits, shallots (*Allium cepa* var. *aggregatum* G. Don and some other *Allium* spp.), various bean sprouts, cucumber (*Cucumis sativus* L.), ginger (*Zingiber officinale* Roscoe), pumpkin (*Cucurbita maxima* Duchesne), ash gourd (*Benincasa hispida* [Thunb.] Cogn.), tomato (*Solanum lycopersicum* L.), chili pepper (*Capsicum annuum* L.), and cowpea (*V. unguiculata* [L.] Walpers Group Unguiculata E. Westphal).

We visited a slash-and-burn cultivation field in Upper Shan Khang, Putao township (WPs 110 and 111), where rice (*O. sativa*) and maize (*Zea mays* L.) had been just harvested (Photos 7 and 8).

After Putao district, we visited Myitkyina district. As Myitkyina town is the capital of Kachin State, goods are traded from other places in Myanmar as well as from other countries such as China and Thailand. There is a large marketplace downtown, where large quantities of diverse vegetables were observed; however, the variation was similar to that found in Putao district.

Observations at Mindat district in the southern Chin State and vicinity

Mindat district, including Mindat and Madupi townships, is in the Chin Hills, which connect the Naga hills in the North and the Rakhine mountains in the South. Mindat town (WP 157), at an altitude of about 1,400 m, is near the eastern edge of the hills. We visited several villages (WPs 158, 160 and 183) above 1,200 m in Mindat township. The altitude of most villages we visited in the Madupi township ranged from 900 to 1,540 m. Some wild plants were collected at higher altitudes (WPs 162, 163, 170 and 183) or from lower places (WPs 178 and 181) on the road connecting Mindat town and Madupi town.

Although rice is also an important crop in this region, its cultivation is limited to terraces in the valleys or small basins where irrigation water is available (Photos 9 and 10). Small sloping cultivation fields were observed near farmers' houses where white-flowered roselle (*Hibiscus sabdariffa* L.) with and without anthocyanin on stem (Photo 11), maize (*Zea mays* L.), cowpea (*Vigna unguiculata* [L.] Walpers Group Unguiculata E. Westphal), yam (*Dioscorea alata* L.), banana (*Musa* spp.), taro (*Colocasia* spp.), sorghum (*Sorghum bicolor* [L.] Moench), and pumpkin (*Cucurbita maxima* L.). Chayote (*Sechium edule* [Jacq.] Sw.) were usually grown on a trellis, a tree and a cliff (Photo 12). Spine gourd (*Momordica dioica* Roxb. ex Willd.; Photo 13) is rare and was found on a hedge surrounding a house. Some cash crops, such as elephant foot yam (*Amorphophallus paeoniifolius* [Dennst.] Nicolson) and coffee (*Coffea arabica* L.) have been introduced in those areas. Notably, the expansion of elephant foot yam cultivation might have led to the loss of traditionally grown crops (Photos 14 and 15). When MK visited Mindat township and Madupi township in 2005, foxtail millet (*Setaria italica* [L.] P. Beauv.) and finger millet (*Eleusine coracana* [L.] Gaert.) were widely cultivated for cooking and brewing, respectively (Uga *et al.* 2006). Those millets were not observed in the fields, they were provided by Department of Agriculture (DOA) Mindat Office. A villager from Tuiship village, Madupi township reported that alcohol drink habit was eliminated following a discipline policy introduced together with Christianity and the Baptist Church in the 1940's. Recent cultivation of cash crops, such as elephant foot yam and coffee, may have almost replaced traditional cultivation of those millets.

We visited the marketplaces of Mindat town and Madupi town, which included local vegetables and fruits produced by nearby villages (Photos 16 and 17). Most vegetables sold at the marketplaces were similar to those observed at Putao. In addition, nearly matured fruits of Balsam apple (*Momordica balsamina* L.; Photo 18) and young fruits of ivy gourd (*Coccinia grandis* [L.] Voigt.; Photo 19) were sold there. Young fruit of wild cucumber (*Cucumis hystrix* Chkr.) were found in the marketplace at Madupi town. As the saleswoman advised that this species is observed in "*taung-ya*" or slash-and-burn cultivation fields in the mountain, we assumed that it is semi-domesticated, or that both a true wild taxon and a domesticated taxon exist.

Collected plant genetic resources

In total, 245 plant samples were collected in Putao district of Kachin State (147 samples), Mindat district of Chin State (89), neighboring Magway Region (8), and Yangon Region (1) of Myanmar, which included legume (46), cereals (75), spices, herbs and medicinal plants (28), various vegetables (92), and others (4) (Table 2). Among these, 33 samples were tentatively considered as wild plants. Most sampled were CWRs. *Vigna angularis* (Willd.) Ohwi et H. Ohashi var. *nipponensis* (Ohwi) Ohwi et H. Ohashi, *V. hirtella* Ridley, and *V. tenuicaulis* N. Tomooka et N. Maxted were collected as valuable CWRs. Some "wild" Cucurbitaceae species are not true wild taxa, since they are sometimes sown and grown for food; for example, *Coccinia grandis* (L.) Voigt., *Gymnopetalum chinense* (Loureiro) Merrill, *Momordica balsamina* L., and *M. dioica* Roxb.

The collected materials were divided into two subsets; one was to be conserved in the Seed Bank of the Plant Biotechnology, Plant Genetic Resources, and Plant Protection Division (PBPGRPPD), DAR, MoALI, located at Yezin, Nay Pyi Taw, Myanmar for further research and crop improvement, and another set was transferred via a Standard Material Transfer Agreement (SMTA) for the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) of the United Nations (UN) Food and Agriculture Organization (FAO) and a phytosanitary certificate issued by the Plant Quarantine Office of DOA, Yangon, Myanmar to Japan to be conserved in the Genetic Resources Center, NARO at Tsukuba, Japan. All plant materials were inspected by the Plant Quarantine Inspectors at Narita Airport. Rice seeds were introduced to Japan with a Special Permit issued by the Minister of Agriculture, Forestry, and Fisheries, Japan.

Vernacular names of crops in surveyed areas

Printed photos of the 73 crops used during previous trips were shown to local people in the surveyed areas, enquiries were made about which crops were grown, and their vernacular names at the site were collected. As no information on their phonetic systems was provided, the results might represent primary records of vernacular names, which should be corrected by succeeding researchers or by local people. When a writing system was available that used the Roman alphabet, we asked the local people to write the crop names directly.

As shown in Table 3, Shan, Rawang, Jinghpaw and Lisu people often used similar words for each crop within their languages in Putao district of Kachin State. Although these people live close to each other, they have maintained their own vernacular names for a variety of cultivated crops. Conversely, Chin people use various words for each crop in the Mindat district of Chin State. Interestingly, Shan people in Putao district and Shan (Thailai Shan) people in Hommalin township, Hkamti district, Sagaing Region use similar words for crops. Notably, vernacular names such as "chinbaung ni" are used for roselle (*Hibiscus*

Table 2. A summary of the plant materials collected in Myanmar in 2017

cultivated / wild		Latin name	No of materials collected			
			Kachin	Chin	Yangon	subtotal
legumes	cultivated	*Glycine max* (L) Merrill	1			1
(46)	(37)	*Lablab purpurea* (L) Sweet	1			1
		Phaseolus vulgaris L	2	2		4
		Pisum sativum L	2			2
		Psophocarpus tetragonolobus	1			1
		Vicia faba L	2			2
		Vigna umbellata (Thunb) H Ohwi et Ohashi	2	2		4
		Vigna unguiculata (L) Walpers Group Unguiculata E Westphal	6	7		13
		Vigna unguiculata (L) Walpers Group Sesquipdalis E Westphal	9			9
	wild (CWR)	*Vigna angularis* (Willd) Ohwi et H Ohashi var *nipponensis* (Ohwi) Ohwi et H Ohashi		2		2
	(9)	*Vigna hirtella* Ridley		2		2
		Vigna tenuicaulis N Tomooka et N Maxted		3		3
		Pueraria phaseolodes (Roxb) Benth	2			2
cereals	cultivated	*Coix lacryma-jobi* L var *ma-yuen* (Rom Caill) Stapf ex Hook f	1	1		2
(75)	(73)	*Eleusine coracana* Gaertn		2		2
		Oryza sativa L	10	21		31
		Setaria italica (L) P Beauv	2	2		4
		Sorghum bicolor (L) Moench		1		1
		Zea mays L	20	13		33
	wild (CWR) (2)	*Coix lacryma-jobi* L var. *lacryma-jobi* L	1	1		2
spices, herbs,	cultibated	*Capsicum annuum* L	7	2		9
medicinal plants	(27)	*Coriandrum sativum* L	3			3
(28)		*Curcuma longa* L	3			3
		Curcuma zedoaria (Christm) Roscoe	1			1
		Ocimum basilcum L	3			3
		Perilla frutescens (L) Britton var *frutescens*		2		2
		Zanthoxylum armartum DC	3			3
		Zingiber officinale Roscoe	2	1		3
	wild (CWR) (1)	*Zingiber barbatum* Wall	1			1
vegetables	cultivated	*Abelmoschus esculentus* (L) Moench	2			2
(92)	(75)	*Alocasia macrorrhizos* (L) G Don	1			1
		Amorphophallus paeoniifolius (Dennst) Nicolson		3		3
		Benincasa hispida (Thunb) Cogn	2	1		3
		Brassica juncea (L) Czern Group Cerua	11	2		13
		Chenopodium bengalense (Lamarck) Steudel		1		1
		Colocasia esculenta (L) Schott	2	2		4
		Cucumis melo L	1			1
		Cucumis sativus L	10	4		14
		Cucurbita maxima L	9	3		12
		Cucurbita moschata L	2			2
		Hibiscus sabdariffa L		1		1
		Luffa acutangula (L) Roxb	3			3
		Luffa cylindrica (L) Roem	1			1
		Momordica charantia L	4	1		5
		Raphanus raphanistrum L ssp *sativus* (L) G Beck	1			1
		Sesamum indicum L	1			1
		Solanum aethiopicum L	1	2		3
		Solanum melongena L		2		2
		Trichosanthes cucumerina L	2			2
	wild (CWR)	*Coccinia grandis* (L) Voigt*		1		1
	(17)	*Colocasia esculenta* (L) Schott			1	1
		Gymnopetalum chinense (Loureiro) Merrill*	3	1		4
		Momordica balsamina L *		4		4
		Momordica dioica Roxb *		1		1
		Solanum violaceum Ortega		1		1
		Solanum virginianum L	1			1
		Solanum torvum Swartz	1			1
		Trichosanthes tricuspidata Lour		1		1
		Trichosanthes sp		2		2
others	wild	*Hosta* sp	1			1
(4)	(4)	*Hedychium* sp	1			1
		Rhyncanthus sp	2			2
Total			147	97	1	245

Note:
Scientific names are ordered alphabetically.
* Spontaneous and sometimes sown by people for food.
** Including a few samples from neighboring Magwe Region

Table 3. A summary of several major crops compared between ethnic groups in Kachin and Chin States

Latin name	Common Bama (Myanmar) name	Kachin State				Chin State	cf Hommalin, Sagaing Region*
		Shan (3 villages)	Rawang (4 villages)	Jinghpaw (2 villages)	Lisu (3 villages)	Chin (5 villages)	Shan (3 villages)
Oryza sativa L	saba	khauk khauk pu khauk pe	am abu apu pu	mam mum	za tza	thanghu chaan chang sang	khauk khauk pet khauk poat khauk pel khaud khaud pet
Zea mays L	pyoung bu	khauk pha	la gong la gung tam bang	ngawng hkainu	usha	punpho vakum vikym vaikum sangkuem	khauk pha khaud pha kra phan san
Setaria italica (L) P Beauv	sat	vang khauk han mar	sak sap atza	sagyi shagi	swet tswet	than hulo sangtyn sangtul vuilawn	
Glycine max (L) Merrill	pebouk	thao nout thao nou thao naung	dung de dang de ano naw ci	nawhpu galasi	ano beli anu beli	sham bai sam phai cam phai	thou nau thou hae tha panoat
Phaseolus vulgaris L	bo sa pe	thao sait sao thai khai nou thao nga mu	pa da no anaw	sha pre	ano thao tho anu nou jwe	pe song pe bo sa pe	thao sou chin-kur you sagri pe
Vigna umbellata (Thunb) Ohwi et Ohashi	chin pe taung ya pe	thao sa poun tho phak	sha rang akang ano	shapre yi sha pre	ano du ba anu sha la	be tha be chik mai dawn mai cik ka cik	thou akhan thou na khaud chinapare
Vigna unguiculata (L) Walpers	pe lun	thao nga mu thao sai su thao sai sae	do ju namga anoyang	naw kyu naw kyu si	ano anu the shi	mavrui mai dawn mi dawl	thao sai yaugh tho youk la za pe
Sesamum indicum L	hnan	nga nga mom	shin nam sha nam nang ben sha mam	zin nam chying nam	uba nyu	khie tipe ta pleh ta pert za pae	ngar nga pur nga prak
Musa spp	hnget pyaw	kwei gwe	chung mu jung mu	la n gu si	ya ma thu ya ma to	pain shi hom hin ding kil ding ki ding kay thaih	ma kowei mart khowei mauk kwe
Coriandrum sativum L	nannan	pa gyi paki	pan zi ban zi ban zi ko	pan zi hpak kyi	muk chu no mo tsu nu phuki	song sing saung sing sawng sing mang sing nan nan	gyi hom kyi hong hyi hom
Colocasia esculenta (L) Schott	pein u	phu phuk	gwe gwei gwi guiw	nai nai hpaw	hpi bi bit	bai bal bar	hoo phouk hue phoke muang
Dioscorea spp	myauk u	mant mann kai pauk	achi chi aki ki	nai n khun	muji mazi golo	har plum phym balha	mang man hue man
Hibiscus sabdariffa L	chinbaung ni	chin baung chin baung ni kim pwon nayan	chin baung chin bonung ma cha lap	chin baung ni	chin baung yar jdu ya ju	twit hen moithu maipu toem al	chin baung chin paun
Capsicum annuum L	ngayok	imphat in pet ma phit	ma zang	ma tsap ma jap	la zurk la zu lazet	mishi san pho ruuk taih ruth rut thaih	ma fid ma phe mart ma phet
Solanum melongena L	khayan	mahya ma chu sep ma khyu	ziba zi pa ci	sa pa ci shaba si	zu ba su zu bar su si bar su	bu bun pan dou pen tuk pen touh thaih tam poe thaih	ma khu ma khae mai ma khoe
Cucurbita spp.	hpayon	upa im pa ma pa	akhum akum kum akum puk	wa kum hkum khyengi si	ahpu ar phu aphu	nmai phut phou phouh phoeh thaih	ma phak kham ma part khom ma ma pak khan
Momordica charantia L	kyet hin khar	ma yat khum ma ya khom	kam ka shi kam ka ma hu (kyet hin khar)	gokasi sagasi	kakaci khakhasu khakhasa	akka tha jan ka cang kha an ca rah	ma hkun kat ma khon khap mau khun khaud

Note:
* Extracted from previous studies in Hommalin township, Hkamti district, Sagaing Region (Min San Thein *et al.* 2017; Naito *et al.* 2017) for comparison

sabdariffa L.), with the exception of Chin people. “Chinbaung ni” is used widely in Myanmar. Detailed data on vernacular names collected in the present field survey, together with those obtained during previous visits are being compiled and will be reported elsewhere.

Potential crop genetic diversity in Kachin State and Chin State

As preliminary studies revealed people of scattered villages in the hilly and mountainous areas of Myanmar such as Naga SAZ of Sagaing Region, a diversity of traditional crops was also suggested in the present field study, and some potentially valuable PGRs were collected in Putao district of Kachin State and Mindat district of Chin State. The plant materials collected will be characterized and evaluated in the DAR Seed Bank and the Genetic Resources Center, NARO in cooperation.

Like the Japanese climate, both Kachin State and Chin State have cold winters and hot summers. Genetic diversity may mean that crops harbor useful genes for crop improvement. We were unable to survey the high mountain areas surrounding Putao township because a written permit for entry was delayed. New roads have also been constructed in Chin State, which connect the eastern slope and the western slope of the Chin Hills. Goods and people can be easily transferred in both directions across the Chin Hills. Such socio-economic impacts will inevitably force agricultural change. This may benefit farmers, who will also lose traditional crop diversity. Therefore, slash-and-burn cultivation fields in both areas are expected to harbor large amounts of agro-biodiversity, and ethnodiversity needs to be systematically surveyed as soon as possible. This is because traditional crops are being replaced by newly introduced cash crops, as seen with elephant foot yam in Mindat district.

We observed several wild and/or semi-domesticated Cucurbitaceae plants e.g., *Coccinia grandis* (L.) Voigt., *Gymnopetalum chinense* (Loureiro) Merrill, *Momordica balsamina* L., and *Momordica dioica* Roxb., and Solanaceae plants e.g., *Solanum violaceum* Ortega, *Solanum virginianum* L., and *Solanum torvum* Swartz. were used by local people in Kachin State and Chin State. Further studies are needed for accurate taxonomical identification and analysis of diversity.

During the field study, the provision of higher education and of necessary support to promote appropriate technology were considered important. Utilization of their own crop varieties and traditionally useful plants might generate new produce acceptable by urbanized people in Yangon, Mandalay, or by foreign consumers, if those traditional crops are reappraised together with the introduction of new crops as appropriate for agricultural production to overcome obstacles such as the availability of arable lands, shortage of information and knowledge, limited investment, and fewer educated and trained people.

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ミャンマー Kachin 州および Chin 州における植物遺伝資源の探索収集現地研究 , 2017 年

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和文摘要

本報告は，2017 年 11 月にミャンマーのカチン北部およびチン州南部で日本とミャンマーが共同で実施した植物遺伝資源に関するフィールド研究の報告である．本フィールド研究は隣接するザガイン地方域における先行研究による知見に基づいて，作物の多様性が期待されるが探索があまりなされていない上記の地域を対象に計画，実行された．4 つの目的があった．第一に，カチン州のプタオ県（district）の村や市場を訪れ，栽培された有用植物を調査する．私たちは標高 370 ~ 530 m の広い盆地と周辺の丘陵部を訪れ, 主要な作物は盆地のイネであるが, 畑, バックヤードガーデン，地元の市場などでさまざまなマメ類，穀類，スパイス，ハーブ，薬草や野菜を確認した．第二に，私たちはチン州南部のミンダッ県及びその近傍の 900 ~ 1,540 m のより高い標高の村々をさらに高い峠を越えながら訪問し調査することを計画した．イネはここでも重要な作物であったが，その栽培は灌漑用水が利用できる谷または小さな盆地のテラスに限られていた．プタオ県と同様に様々な作物が農家の近くの小さな傾斜畑に栽培されていた．近年，新しい換金作物であるコンニャク等の栽培がチン州に導入されアワやシコクビエなど伝統的作物が失われているようある．第三の目的は農業食糧遺伝資源を収集することであった．ミャンマーのカチン州プタオ県で 147 点，チン州ミンダッ地区で 89 点，近接するマグエ地方域で 8 点，ヤンゴン地方域で 1 点の計 245 点を収集した．それにはマメ科植物（46 点），穀類（75 点），スパイス・ハーブ・薬草（28 点），野菜（92 点），その他（4 点）が含まれていた．四番目の目的は，民族植物学的視点から，作物や有用植物の方名（現地語での呼称）と利用方法を収集することであった．作物の名前に関しては，カチン州プタオ県のシャン人，ラワン人，ジンポー人，リス人は異なる村でもそれぞれの言語内では共通性のある作物名を使用する．彼らは地区内で互いに近くに住んでいるにもかかわらず，様々な栽培作物の呼称は独自の方名を維持している．一方，チン人は，チン州のミンダッ地区の調査で各作物について村ごとにある程度異なる呼称を使用している．本研究の結果, 私たちはカチン州プタオ県とチン州ミンダット県に多様な栽培植物や有用植物を観察し，それらをミャンマーの農業研究局のシードバンクとわが国の農業生物資源ジーンバンクに保存される植物遺伝資源として収集した．近年チン州の山岳地帯にコンニャクやコーヒーノキなどの換

金作物の導入を確認した．これによって伝統的に栽培されていたアワやシコクビエのような伝統作物が失われた可能性がある．カチン州とチン州の地元住民が利用している野生ないしは半栽培のウリ科植物やナス科植物は，専門家による正確な分類学的同定や多様性分析などさらに研究が必要である．プタオ県やミンダッ県のようなミャンマー周縁部の丘陵・山間地域の農業を発展させるためには，現金作物の導入だけでなく，伝統的な栽培された有用植物の活用の検討も重要と思われる．

Table 4. Plant materials collected in Kachin and Chin States of Myanmar in 2017

Sr No *	JP No **	Scientific name	English name	Date MM/dd	Village name or near-by/township (T/S)	Township	GPS waypoint	Latitude			Longitude			Altitude	Source	Type of sample	Status of plant sampled
								º	′	″	º	′	″	m			
001	267853	*Capsicum annuus* L.	chili pepper	11/04	Putao, Putao T/S	Putao	104	27	20	30	97	24	6	446	marketplace	seed	landrace
002	267854	*Gymnopetalum chinense* (Loureiro) Merrill	wild egded gourd	11/04	Putao, Putao T/S	Putao	104	27	20	30	97	24	6	446	marketplace	seed	landrace
003	267855	*Zanthoxylum armartum* DC	Chinese pepper	11/04	Manzay, Putao, Putao T/S	Putao	106	27	24	26	97	21	4	411	farmland	seed	landrace
004	267856	*Brassica juncea* (L) Czern Group Cerua	mustard	11/04	Manzay, Putao, Putao T/S	Putao	106	27	24	26	97	21	4	411	farmer's storage	seed	landrace
005	267857	*Brassica juncea* (L) Czern Group Cerua	mustard	11/04	Manzay, Putao, Putao T/S	Putao	106	27	24	26	97	21	4	411	farmer's storage	seed	landrace
006	267858	*Brassica juncea* (L) Czern Group Cerua	mustard	11/04	Manzay, Putao, Putao T/S	Putao	106	27	24	26	97	21	4	411	farmer's storage	seed	landrace
007	267859	*Cucumis sativus* L	cucumbar	11/04	Manzay, Putao, Putao T/S	Putao	106	27	24	26	97	21	4	411	farmer's storage	seed	landrace
008	267860	*Cucurbita moschata* L	butternut pumpkin	11/04	Manzay, Putao, Putao T/S	Putao	106	27	24	26	97	21	4	411	farmer's storage	seed	landrace
009	267861	*Phaseolus vulgaris* L	common bean	11/04	Manzay, Putao, Putao T/S	Putao	106	27	24	26	97	21	4	411	farmer's storage	seed	landrace
010	267862	*Coriandrum sativum* L	coriandar	11/04	Manzay, Putao, Putao T/S	Putao	106	27	24	26	97	21	4	411	farmer's storage	seed	landrace
011	267863	*Pisum sativum* L	common pea	11/04	Manzay, Putao, Putao T/S	Putao	106	27	24	26	97	21	4	411	farmer's storage	seed	landrace
012	267864	*Vicia faba* L	faba bean	11/04	Manzay, Putao, Putao T/S	Putao	106	27	24	26	97	21	4	411	farmer's storage	seed	landrace
013	267865	*Cucumis sativus* L	cucumbar	11/04	Manzay, Putao, Putao T/S	Putao	106	27	24	26	97	21	4	411	farmer's storage	seed	landrace
014	267866	*Zea mays* L	maize, corn	11/04	Shan Gong, Putao, Putao T/S	Putao	107	27	24	6	97	20	11	415	farmer's storage	seed	landrace
015	267867	*Zea mays* L	maize, corn	11/04	Shan Gong, Putao, Putao T/S	Putao	107	27	24	6	97	20	11	415	farmer's storage	seed	landrace
016	267868	*Cucumis sativus* L	cucumbar	11/04	Shan Gong, Putao, Putao T/S	Putao	107	27	24	6	97	20	11	415	farmer's storage	seed	landrace
017	267869	*Coix lacryma-jobi* L var *lacryma-jobi* L	wild Job's tears	11/04	near Upper Shan Khang, Putao T/S	Putao	108	27	24	14	97	20	38	415	wild	seed	wild
018	267870	*Solanum virginianum* L	yellow fruit nightshade	11/04	Upper Shan Khang, Putao T/S	Putao	110	27	25	28	97	17	46	455	wild	seed	wild
019	267871	*Oryza sativa* L	rice	11/04	Upper Shan Khang, Putao T/S	Putao	111	27	26	8	97	17	7	523	farmland	seed	landrace
020	267872	*Zea mays* L	maize, corn	11/04	Upper Shan Khang, Putao T/S	Putao	111	27	26	8	97	17	7	523	farmland	seed	landrace
021	267873	*Vigna umbellata* (Thunb) Ohwi et Ohashi	rice bean	11/04	Upper Shan Khang, Putao T/S	Putao	111	27	26	8	97	17	7	523	farmland	seed	landrace
022	267874	*Solanum torvum* Swartz ?	devil's fiq	11/04	Upper Shan Khang, Putao T/S	Putao	111	27	26	8	97	17	7	523	wild	seed	wild
023	267875	*Setaria italica* (L) P Beauv	foxtail millet	11/04	Upper Shan Khang, Putao T/S	Putao	110	27	25	28	97	17	46	455	farmer's storage	seed	landrace
024	267876	*Oryza sativa* L	rice	11/04	near Upper Shan Khang, Putao T/S	Putao	108	27	24	14	97	20	38	415	farmland	seed	landrace
026	267877	*Oryza sativa* L	rice	11/04	near Upper Shan Khang, Putao T/S	Putao	108	27	24	14	97	20	38	415	farmland	seed	landrace
027	267878	*Cucurbita maxima* L	pumpkin	11/04	Upper Shan Khang, Putao T/S	Putao	110	27	25	28	97	17	46	455	farmer's storage	seed	landrace
028	267879	*Zea mays* L	maize, corn	11/05	In Bu Baw, Machanbaw T/S	Machanbaw	113	27	18	12	97	35	9	393	farmer's storage	seed	landrace
029	267880	*Abelmoschus esculentus* (L) Moench	okra	11/05	In Bu Baw, Machanbaw T/S	Machanbaw	113	27	18	12	97	35	9	393	farmer's storage	seed	landrace
030	267881	*Vigna unguiculata* (L) Walpers Group Unguiculata E Westphal	cowpea	11/05	In Bu Baw, Machanbaw T/S	Machanbaw	113	27	18	12	97	35	9	393	farmer's storage	seed	landrace
031	267882	*Cucurbita moschata* L	butternut pumpkin	11/05	In Bu Baw, Machanbaw T/S	Machanbaw	113	27	18	12	97	35	9	393	farmer's storage	seed	landrace
032	267883	*Momordica charantia* L	bitter gourd	11/05	In Bu Baw, Machanbaw T/S	Machanbaw	113	27	18	12	97	35	9	393	farmer's storage	seed	landrace
033	267884	*Zea mays* L	maize, corn	11/05	N Wai Baw, Machanbaw T/S	Machanbaw	114	27	19	39	97	34	44	406	farmer's storage	seed	landrace
034	267885	*Zea mays* L	maize, corn	11/05	N Wai Baw, Machanbaw T/S	Machanbaw	114	27	19	39	97	34	44	406	farmer's storage	seed	landrace
035	267886	*Zea mays* L	maize, corn	11/05	N Wai Baw, Machanbaw T/S	Machanbaw	114	27	19	39	97	34	44	406	farmer's storage	seed	landrace

Table 4. (Continued).

Sr No *	JP No **	Local plant name "local variety name"	Cultural practices	Sowing month	Harvest month	Other observations/notes	Topography	Site	Stoniness	Soil texture	Drainage	Farmer Name	Glutinous
001	267853	chin aww											
002	267854	kyet kawe											
003	267855	matkat	backyard			Shan people	plain level						
004	267856	pat kat khaw	slash-and-burn cultivation, backyard	Sep		Shan people, leaf vegetables, seed for oil, leaves available for 3 months	plain level						
005	267857	pat kat hot num	slash-and-burn cultivation, backyard	Sep		Shan people, leaf vegetables, leaves available for 6 months	plain level						
006	267858	pat kat hot num	slash-and-burn cultivation, backyard	Sep		Shan people, leaf vegetables, leaves available for 6 months, different from 005	plain level						
007	267859	thayan	backyard	Jan	Apr, May	Shan people	plain level						
008	267860	inpat	backyard	Nov	Apr, May	Shan people	plain level						
009	267861	Thao nga mue	slash-and-burn cultivation, backyard, ordinary field (anywhere)			Shan people,both young pod and seed are used	plain level						
010	267862	pa ggy	backyard			sown after rainy season	plain level						
011	267863	thao kan pha	backyard	Oct-Dec		vines and leaves for soup	plain level						
012	267864	thao muo	backyard			sown after rainy season,forsoup, fry, steam and boil	plain level						
013	267865	thayan	backyard				plain level	(level)	(low)	(clay)	(moderate)		
014	267866	lakong	slash-and-burn cultivation, backyard	Feb	may	boil with rice, boil, and steam	plain level	(level)	(low)	(clay)	(moderate)		
015	267867	lakong	slash-and-burn cultivation, backyard	Feb	may	boil with rice, boil, and steam	plain level	(level)	(low)	(clay)	(moderate)		
016	267868	tvng gwa (tang kwa)	slash-and-burn cultivation	May	Nov		plain level	(level)	(low)	(clay)	(moderate)		
			backyard	Feb	May								
017	267869					roadside bush near a paddy field	plain level	level	low	clay	moderate		
018	267870					roadside bush	plain level	level	low	clay	moderate		
019	267871	mayan	slash-and-burn cultivation	Apr	Oct		mountainous	slope	none	clay	good		glutinous
020	267872		slash-and-burn cultivation	Apr	Oct		mountainous	slope	none	clay	good		
021	267873	shu kang, a gang	slash-and-burn cultivation	May-Jul	Oct-Dec		mountainous	slope	none	clay	good		
022	267874	may hain					mountainous	slope	none	clay	good		
023	267875	saø, sap	slash-and-burn cultivation	May	Oct	After threshed mix with rice and cock,	plain level	(level)	(low)	(clay)	(moderate)		
024	267876	am "am hen"	irrigated, trnsplanted	Jun	Nov	transplanted in July	plain level	level	low	clay	moderate		
026	267877	am "am kholone"	irrigated, trnsplanted	Jun	Nov	transplanted in July	plain level	level	low	clay	moderate		
027	267878	vkøm [akum]	slash-and-burn cultivation, backyard	Oct	Mar	Both leaf and fruit for vegetables	plain level	(level)	(low)	(clay)	(moderate)		
028	267879	kai nu	backyard	Feb	May, Jun	a little bit sticky, Jing Hpaw people	hilly	level	low	clay	moderate		
029	267880	yong pati	slash-and-burn cultivation	Jan, Feb	Jun	Jinghpaw people	hilly	level	low	clay	moderate	Mr N Bven Zaw Awng	
030	267881	shapre, no ju	slash-and-burn cultivation	Apr, May	Jul, Aug	semi-long young pod for soup & fry, matured seed is boiled	hilly	level	low	clay	moderate	Mr N Bven Zaw Awng	
			backyard	Jan, Feb	Jun, Jul								
031	267882	hwag kom si	slash-and-burn cultivation	Apr, May	Jul, Aug		hilly	level	low	clay	moderate	Mr N Bven Zaw Awng	
			backyard	Jan, Feb	Jun, Jul	sawn together with ash							
032	267883	ga ka si	slash-and-burn cultivation	Apr, May	Jul, Aug		hilly	level	low	clay	moderate	Mr N Bven Zaw Awng	
			backyard	Jan, Feb	Jun, Jul								
033	267884	hkai nu "tsap la hkai nu"	slash-and-burn cultivation	May-Jun	Sep, Oct	blckish purple, sawn depending on weather	hilly					Ms Roi Tawng, Ms Nang Tawng	
034	267885	hkai nu "hkai nu"	backyard	Feb	May		hilly					Ms Roi Tawng, Ms Nang Tawng	
035	267886	hkai nu "hkai nu"	slash-and-burn cultivation	May-Jun	Sep, Oct		hilly					Ms Roi Tawng, Ms Nang Tawng	

Table 4. (Continued).

Sr No *	JP No **	Scientific name	English name	Date MM/dd	Village name or near-by/township (T/S)	Township	GPS waypoint	Latitude			Longitude			Altitude	Source	Type of sample	Status of plant sampled
								º	′	″	º	′	″	m			
036	267887	*Cucumis sativus* L	cucumbar	11/05	N Wai Baw, Machanbaw T/S	Machanbaw	114	27	19	39	97	34	44	406	farmer's storage	seed	landrace
037	267888	*Oryza sativa* L	rice	11/05	N Wai Baw, Machanbaw T/S	Machanbaw	114	27	19	39	97	34	44	406	farmer's storage	seed	landrace
038	267889	*Oryza sativa* L	rice	11/05	N Wai Baw, Machanbaw T/S	Machanbaw	114	27	19	39	97	34	44	406	farmer's storage	seed	landrace
039	267890	*Oryza sativa* L	rice	11/05	N Wai Baw, Machanbaw T/S	Machanbaw	114	27	19	39	97	34	44	406	farmer's storage	seed	landrace
040	267891	*Oryza sativa* L	rice	11/05	N Wai Baw, Machanbaw T/S	Machanbaw	114	27	19	39	97	34	44	406	farmer's storage	seed	landrace
041	267892	*Vigna unguiculata* (L) Walpers Group Sesquipdalis E Westphal	yard-long bean	11/05	N Wai Baw, Machanbaw T/S	Machanbaw	114	27	19	39	97	34	44	406	farmer's storage	seed	landrace
042	267893	*Vigna unguiculata* (L) Walpers Group Sesquipdalis E Westphal	yard-long bean	11/05	N Wai Baw, Machanbaw T/S	Machanbaw	114	27	19	39	97	34	44	406	farmer's storage	seed	landrace
043	267894	*Cucurbita maxima* L	pumpkin	11/05	N Wai Baw, Machanbaw T/S	Machanbaw	114	27	19	39	97	34	44	406	farmer's storage	seed	landrace
044	267895	*Zea mays* L	maize, corn	11/05	Nam Kam, Machanbaw T/S	Machanbaw	116	27	21	37	97	34	21	407	farmer's storage	seed	landrace
045	267896	*Zea mays* L	maize, corn	11/05	Nam Kam, Machanbaw T/S	Machanbaw	116	27	21	37	97	34	21	407	farmer's storage	seed	landrace
046	267897	*Zea mays* L	maize, corn	11/05	Nam Kam, Machanbaw T/S	Machanbaw	116	27	21	37	97	34	21	407	farmer's storage	seed	landrace
047	267898	*Abelmoschus esculentum* (L) Moench	okra	11/05	Nam Kam, Machanbaw T/S	Machanbaw	116	27	21	37	97	34	21	407	farmer's storage	seed	landrace
048	267899	*Glycine max* (L) Merrill	soybean	11/05	Nam Kam, Machanbaw T/S	Machanbaw	116	27	21	37	97	34	21	407	farmer's storage	seed	landrace
049a	267900	*Vigna unguiculata* (L) Walpers Group Sesquipdalis E Westphal	yard-long bean	11/05	Nam Kam, Machanbaw T/S	Machanbaw	116	27	21	37	97	34	21	407	farmer's storage	seed	landrace
049b	267901	*Vigna unguiculata* (L) Walpers Group Sesquipdalis E Westphal	yard-long bean	11/05	Nam Kam, Machanbaw T/S	Machanbaw	116	27	21	37	97	34	21	407	farmer's storage	seed	landrace
050	267902	*Vigna unguiculata* (L) Walpers Group Unguiculata E Westphal	cowpea	11/05	Nam Kam, Machanbaw T/S	Machanbaw	116	27	21	37	97	34	21	407	farmer's storage	seed	landrace
051	267903	*Oryza sativa* L	rice	11/05	Nam Kam, Machanbaw T/S	Machanbaw	116	27	21	37	97	34	21	407	farmer's storage	seed	landrace
052	267904	*Zingiber officinale* Roscoe	ginger	11/05	Nam Kam, Machanbaw T/S	Machanbaw	116	27	21	37	97	34	21	407	farmer's storage	rhizome	landrace
053	267905	*Cucurbita maxima* L	pumpkin	11/05	Nam Kam, Machanbaw T/S	Machanbaw	116	27	21	37	97	34	21	407	farmer's storage	seed	landrace
054	267906	*Benincasa hispida* (Thunb) Cogn	ash gourd	11/05	Nam Kam, Machanbaw T/S	Machanbaw	116	27	21	37	97	34	21	407	farmer's storage	seed	landrace
055	267907	*Brassica juncea* (L) Czern Group Cerua?	mustard	11/05	Nam Kam, Machanbaw T/S	Machanbaw	116	27	21	37	97	34	21	407	farmer's storage	seed	landrace
056	267908	*Brassica juncea* (L) Czern Group Cerua	mustard	11/05	Nam Kam, Machanbaw T/S	Machanbaw	116	27	21	37	97	34	21	407	farmer's storage	seed	landrace
057	267909	*Curcuma longa* L	turmeric	11/05	Nam Kam, Machanbaw T/S	Machanbaw	116	27	21	37	97	34	21	407	backyard	rhizome	landrace
058	267910	*Colocasia esculenta* (L) Schott	taro	11/05	Nam Kam, Machanbaw T/S	Machanbaw	116	27	21	37	97	34	21	407	farmer's storage	rhizome	landrace
059	267911	*Alocasia macrorrhizos* (L) G Don	giant taro	11/05	Nam Kam, Machanbaw T/S	Machanbaw	116	27	21	37	97	34	21	407	farmer's storage	rhizome	landrace
060	267912	*Cucumis sativus* L	cucumbar	11/05	Machanbaw, Machanbaw T/S	Machanbaw	118	27	21	38	97	34	22	407	farmer's storage	seed	landrace
061	267913	*Capsicum annuum* L	chili pepper	11/05	Machanbaw, Machanbaw T/S	Machanbaw	118	27	21	38	97	34	22	407	farmer's storage	seed	landrace

Table 4. (Continued).

Sr No *	JP No **	Local plant name "local variety name"	Cultural practices	Sowing month	Harvest month	Other observations/notes	Topography	Site	Stoniness	Soil texture	Drainage	Farmer Name	Glutinous
036	267887	gun kin si	slash-and-burn cultivation, backyard	May-Jun	Sep, Oct		hilly					Ms Roi Tawng, Ms Nang Tawng	
037	267888	mam "ga wa mam"	slash-and-burn cultivation	Apr, May	Oct	They said that it was found in a bamboo about 10 years ago	hilly					Ms Roi Tawng, Ms Nang Tawng	
038	267889	mam "ta nai mam"	slash-and-burn cultivation	Apr, May	Oct	soft rice They said that it was introdused from Ta Nai	hilly					Ms Roi Tawng, Ms Nang Tawng	
039	267890	mam "n bo mam"	slash-and-burn cultivation	Apr, May	Oct	white rice	hilly					Ms Roi Tawng, Ms Nang Tawng	glutinous
040	267891	mam "n bo jang"	slash-and-burn cultivation	Apr, May	Oct	blackish purple rice	hilly					Ms Roi Tawng, Ms Nang Tawng	glutinous
041	267892	shapre	slash-and-burn cultivation	Jan, Feb	May		hilly					Ms Roi Tawng, Ms Nang Tawng	
			backyard	May	Oct								
042	267893	shapre	slash-and-burn cultivation	Jan, Feb	May	a little late compared with 041	hilly					Ms Roi Tawng, Ms Nang Tawng	
			backyard	May	Oct								
043	267894	wa hkum bak	slash-and-burn cultivation, backyard	Dec, Jan		harvest 3-4 months after sawing young shoots & fruits for vegetables	hilly					Ms Roi Tawng, Ms Nang Tawng	
044	267895	la gung	backyard	Feb	May, Jun		hilly						
045	267896	la sung	backyard	Feb	May, Jun		hilly						
046	267897	la sung	slash-and-burn cultivation	Apr, May	Aug	popcorn, boil for food	hilly						
047	267898	yonepati	slash-and-burn cultivation, backyard	Apr	Jun-Aug	fry, soup and boil as vegetables	hilly						
048	267899	naw ci	plant on rice seedling bed after transplanting of rice	Jun	Oct	roasted, pounded powder mixed with honey as energy food, or fermeted	hilly						
049a	267900	naw yan	slash-and-burn cultivation, yard long type, two type, A: black, B: brown	Apr, May	Oct	young shoots for vegetables, boil seeds	hilly						
			ordinary field	Jun, Jul	Oct								
049b	267901	naw yan	slash-and-burn cultivation, yard long type, two type, A: black, B: brown	Apr, May	Oct	young shoots for vegetables, boil seeds	hilly						
			ordinary field	Jun, Jul	Oct								
050	267902	hang nok	slash-and-burn cultivation	Apr, May	Aug, Sep	shrt pod type	hilly						
051	267903	vm [am] "vm se [am se]"	slash-and-burn cultivation	Apr, May	Sep		hilly						
052	267904	long zeng	slash-and-burn cultivation	Apr, May	Oct, Nov		hilly						
053	267905	vkøm puk [akum puk]	slash-and-burn cultivation, backyard	Apr, May	Aug, Sep		hilly						
054	267906	vkøm svr [akum sar]	slash-and-burn cultivation, backyard	Apr, May	Oct		hilly						
055	267907	sau ma nga, manga nam wan	slash-and-burn cultivation, backyard, ordinary field	Sep, Oct	March (seed)	leaf for vegetable	hilly						
056	267908	a mang nga	backyard, ordinary field	Oct	March (seed)	leaf for vegetable	hilly						
057	267909	sa nung	backyard				hilly						
058	267910	gwi dvkaq [gwi dakaq]	slash-and-burn cultivation, backyard				hilly						
059	267911	gwi	slash-and-burn cultivation, backyard				hilly						
060	267912	ah bu	slash-and-burn cultivation	Apr, May	Aug-Oct	vegetables Lisu people	hilly						
061	267913	lazuk	slash-and-burn cultivation, backyard	Mar-May		small fruit Lisu people	hilly						

Table 4. (Continued).

Sr No *	JP No **	Scientific name	English name	Date MM/dd	Village name or near-by/township (T/S)	Township	GPS waypoint	Latitude			Longitude			Altitude	Source	Type of sample	Status of plant sampled
								º	′	″	º	′	″	m			
062	267914	*Capsicum annuum* L	chili pepper	11/05	Machanbaw, Machanbaw T/S	Machanbaw	118	27	21	38	97	34	22	407	farmer's storage	seed	landrace
063	267915	*Vigna unguiculata* (L) Walpers Group Unguiculata E Westphal	cowpea	11/05	Machanbaw, Machanbaw T/S	Machanbaw	118	27	21	38	97	34	22	407	farmer's storage	seed	landrace
064	267916	*Vigna unguiculata* (L) Walpers dGroup Unguiculata E Westphal	cowpea	11/05	Machanbaw, Machanbaw T/S	Machanbaw	118	27	21	38	97	34	22	407	farmer's storage	seed	landrace
065	267917	*Zea mays* L	maize, corn	11/05	Machanbaw, Machanbaw T/S	Machanbaw	118	27	21	38	97	34	22	407	farmer's storage	seed	landrace
066a	267918	*Zea mays* L	maize, corn	11/05	Machanbaw, Machanbaw T/S	Machanbaw	118	27	21	38	97	34	22	407	farmer's storage	seed	landrace
066b	267919	*Zea mays* L	maize, corn	11/05	Machanbaw, Machanbaw T/S	Machanbaw	118	27	21	38	97	34	22	407	farmer's storage	seed	landrace
067	267920	*Colocasia esculenta* (L) Schott	taro	11/05	Machanbaw, Machanbaw T/S	Machanbaw	118	27	21	38	97	34	22	407	farmer's storage	seed	landrace
068	267921	*Benincasa hispida* (Thunb) Cogn	ash gourd	11/05	Machanbaw, Machanbaw T/S	Machanbaw	118	27	21	38	97	34	22	407	farmer's storage	seed	landrace
069	267922	*Cucurbita maxima* L	pumpkin	11/05	Machanbaw, Machanbaw T/S	Machanbaw	118	27	21	38	97	34	22	407	farmer's storage	seed	landrace
070	267923	*Curcuma longa* L	turmeric	11/05	Machanbaw, Machanbaw T/S	Machanbaw	118	27	21	38	97	34	22	407	farmer's storage	rhizome	landrace
071	267924	*Capsicum annuum* L	chili pepper	11/05	Machanbaw, Machanbaw T/S	Machanbaw	118	27	21	38	97	34	22	407	farmer's storage	seed	landrace
072a	267925	*Capsicum annuum* L	chili pepper	11/06	Putao, Putao T/S	Putao	121	27	19	36	97	25	19	458	village market	seed	landrace
072b	267926	*Capsicum annuum* L	chili pepper	11/06	Putao, Putao T/S	Putao	121	27	19	36	97	25	19	458	village market	seed	landrace
073	267927	*Zanthoxylum armartum* DC	Chinese pepper	11/06	Putao, Putao T/S	Putao	121	27	19	36	97	25	19	458	village market	seed	landrace
074	267928	*Luffa cylindrica* (L) Roem	sponge gourd	11/06	Mulashidi, Putao T/S	Putao	122	27	15	18	97	25	41	472	backyard	seed	landrace
075	267929	*Brassica juncea* (L) Czern Group Cerua	mustard	11/06	Mueladi, Putao T/S	Putao	123	27	14	44	97	26	20	457	farmer's storage	seed	landrace
076	267930	*Cucurbita maxima* L	pumpkin	11/06	Mueladi, Putao T/S	Putao	123	27	14	44	97	26	20	457	farmer's storage	seed	landrace
077	267931	*Zingiber officinale* Roscoe	ginger	11/06	Mueladi, Putao T/S	Putao	123	27	14	44	97	26	20	457	backyard	rhizome	landrace
078	267932	*Vigna unguiculata* (L) Walpers Group Sesquipdalis E Westphal	yard-long bean	11/06	Mueladi, Putao T/S	Putao	123	27	14	44	97	26	20	457	farmland	seed	landrace
079	267933	*Brassica juncea* (L) Czern Group Cerua	mustard	11/06	Lanno, Putao T/S	Putao	124	27	14	24	97	28	22	440	farmer's storage	seed	landrace
080	267934	*Momordica charantia* L	bitter gourd	11/06	Lanno, Putao T/S	Putao	125	27	14	24	97	28	27	439	farmer's storage	seed	landrace
081	267935	*Cucumis sativus* L	cucumbar	11/06	Lanno, Putao T/S	Putao	125	27	14	24	97	28	27	439	farmer's storage	seed	landrace
082	267936	*Ocimum basilcum* L	basil	11/06	Mulashidi, Putao T/S	Putao	127	27	15	24	97	25	33	474	backyard	seed	landrace
083	267937	*Cucurbita maxima* L	pumpkin	11/06	Pha Mar, Putao T/S	Putao	130	27	12	40	97	30	40	445	farmer's storage	seed	landrace
084	267938	*Cucumis sativus* L	cucumbar	11/06	Pha Mar, Putao T/S	Putao	130	27	12	40	97	30	40	445	farmer's storage	seed	landrace
085	267939	*Zea mays* L	maize, corn	11/06	Pha Mar, Putao T/S	Putao	130	27	12	40	97	30	40	445	farmer's storage	seed	landrace
086	267940	*Zea mays* L	maize, corn	11/06	Pha Mar, Putao T/S	Putao	130	27	12	40	97	30	40	445	farmer's storage	seed	landrace
087	267941	*Zea mays* L	maize, corn	11/06	Pha Mar, Putao T/S	Putao	130	27	12	40	97	30	40	445	farmer's storage	seed	landrace
088	267942	*Zea mays* L	maize, corn	11/06	Pha Mar, Putao T/S	Putao	130	27	12	40	97	30	40	445	farmer's storage	seed	landrace
089	267943	*Zea mays* L	maize, corn	11/06	Pha Mar, Putao T/S	Putao	130	27	12	40	97	30	40	445	farmer's storage	seed	landrace
090	267944	*Cucumis sativus* L.	cucumbar	11/06	Pha Mar, Putao T/S	Putao	131	27	12	36	97	30	32	448	farmer's storage	seed	landrace
091	267945	*Cucumis melo* L	melon	11/06	Pha Mar, Putao T/S	Putao	131	27	12	36	97	30	32	448	farmer's storage	seed	landrace

Table 4. (Continued).

Sr No *	JP No **	Local plant name "local variety name"	Cultural practices	Sowing month	Harvest month	Other observations/notes	Topography	Site	Stoniness	Soil texture	Drainage	Farmer Name	Glutinous
062	267914	lazuk	slash-and-burn cultivation, backyard	Mar-May		bigger fruit Lisu people	hilly						
063	267915	anu	slash-and-burn cultivation	Mar-May	Aug-Dec		hilly						
064	267916	anu lo	slash-and-burn cultivation, backyard	Feb	May-Jul	early type	hilly						
065	267917	u sha	slash-and-burn cultivation	Apr, May	Sep, Oct	popcorn, boil or bake for food	hilly						
066a	267918	u sha	slash-and-burn cultivation	Apr, May	Sep, Oct	yellow popcorn, boil or bake for food	hilly						
066b	267919	u sha	slash-and-burn cultivation	Apr, May	Sep, Oct	white popcorn, boil or bake for food	hilly						
067	267920	hpi	slash-and-burn cultivation, backyard	Apr, May	Oct, Nov		hilly						
068	267921	vkømsha [akumsha]	slash-and-burn cultivation	Apr, May	Oct, Nov		hilly						
069	267922	ahpu	slash-and-burn cultivation, backyard	Apr, May	Oct, Nov		hilly						
070	267923	sa nun	backyard	Mar	Nov, Dec	orange root inside	hilly	level	low	clay	moderate		
071	267924	mugo la zurk	slash-and-burn cultivation, backyard	Feb, Mar	Jun, Jul		hilly						
072a	267925	sein oo dee	slash-and-burn cultivation			A: small fruit, B: round and big fruit	plain level						
072b	267926	sein oo dee	slash-and-burn cultivation			A: small fruit, B: round and big fruit	plain level						
073	267927	machan si (Jingpaw), azap si (Ruwang)					plain level						
074	267928	alusashi	backyard			Lisu people	plain level	level	medium	sandy clay	moderate		
075	267929	u chyie	slash-and-burn cultivation, backyard	Oct, Nov	Jan, Feb	white mohyin Lisu people	hilly	(level)	(medium)	(clay)	(moderate)	Ms Anna	
076	267930	a phu	slash-and-burn cultivation, backyard	Apr, May	Jul, Aug	Lisu people	hilly	(level)	(medium)	(clay)	(moderate)	Ms Anna	
077	267931	chophi	slash-and-burn cultivation, backyard	Feb, Mar	Nov	Lisu people	hilly	(level)	(medium)	(clay)	(moderate)	Ms Anna	
078	267932	anno	slash-and-burn cultivation	Jan	Jun	Lisu people	hilly	(level)	(medium)	(clay)	(moderate)	Ms Anna	
			backyard	Nov	Jan, Feb								
079	267933	bakat	ordinary field	Nov	Mar	Sawn at anytime before rainy season for leaf Sawn in Nov for seed Brown mustard and white mustard are admixed Kamti Shan people	hilly						
080	267934	ma yan	slash-and-burn cultivation, backyard	May, Jun	Jul, Aug (fruit) Oct (seed)	Kamti Shan people	hlly	(level)	(medium)	(clay)	(moderate)		
081	267935	thayan	slash-and-burn cultivation, backyard	Feb, Mar	Jun	Kamti Shan people	hlly	(level)	(medium)	(clay)	(moderate)		
082	267936	madzunu	backyard			Lisu people	hilly	level	medium	clay	moderate		
083	267937	aphu	slash-and-burn cultivation, backyard	Feb-May		can be sawn at anytime harvest 3 months after sawing Jingpaw people	hilly	level	medium	clay	moderate		
084	267938	apu	slash-and-burn cultivation, backyard	Feb-May		can be sawn at anytime harvest 3 months after sawing Jingpaw people	hilly	level	medium	clay	moderate		
085	267939	o sha	slash-and-burn cultivation, backyard			Jingpaw people	hilly	level	medium	clay	moderate		
086	267940	o sha	slash-and-burn cultivation, backyard			Jingpaw people	hilly	level	medium	clay	moderate		
087	267941	o sha	slash-and-burn cultivation, backyard			Jingpaw people	hilly	level	medium	clay	moderate		
088	267942	o sha	slash-and-burn cultivation, backyard			Jingpaw people	hilly	level	medium	clay	moderate		
089	267943	o sha	slash-and-burn cultivation, backyard			Jingpaw people	hilly	level	medium	clay	moderate		
090	267944	kom kim	slash-and-burn cultivation, backyard	Apr, May	Aug, Sep (fruit) Nov (seed)	another farmer than those who provided 083-089 Jingpaw people	hilly	level	medium	clay	moderate	Ms Khum Ra	
091	267945	kom kim ka	slash-and-burn cultivation, backyard	Apr, May	Aug, Sep (fruit) Nov (seed)	the same farmer who provided 090 Jingpaw people	hilly	level	medium	clay	moderate	Ms Khum Ra	

Table 4. (Continued).

Sr No *	JP No **	Scientific name	English name	Date MM/dd	Village name or near-by/township (T/S)	Township	GPS waypoint	Latitude			Longitude			Altitude	Source	Type of sample	Status of plant sampled
								º	′	″	º	′	″	m			
092	267946	*Momordica charantia* L	bitter gourd	11/06	Pha Mar, Putao T/S	Putao	131	27	12	36	97	30	32	448	farmer's storage	seed	landrace
093	267947	*Trichosanthes cucumerina* L	snake gourd	11/06	Pha Mar, Putao T/S	Putao	131	27	12	36	97	30	32	448	farmer's storage	seed	landrace
094	267948	*Luffa acutangula* (L) Roxb	ridged gourd	11/06	Pha Mar, Putao T/S	Putao	131	27	12	36	97	30	32	448	farmer's storage	seed	landrace
095	267949	*Solanum aethiopicum* L	bitter tomato	11/06	Pha Mar, Putao T/S	Putao	131	27	12	36	97	30	32	448	farmer's storage	seed	landrace
096	267950	*Vigna unguiculata* (L) Walpers Group Sesquipdalis E Westphal	yard-long bean	11/06	Pha Mar, Putao T/S	Putao	131	27	12	36	97	30	32	448	farmer's storage	seed	landrace
097	267951	*Vigna unguiculata* (L) Walpers Group Unguiculata E Westphal	cowpea	11/06	Pha Mar, Putao T/S	Putao	131	27	12	36	97	30	32	448	farmer's storage	seed	landrace
098	267952	*Gymnopetalum chinense* (Loureiro) Merrill	wild edged cucumbar	11/06	Pha Mar, Putao T/S	Putao	131	27	12	36	97	30	32	448	farmer's storage	seed	landrace
099	267953	*Brassica juncea* (L) Czern Group Cerua	mustard	11/06	Putao, Putao T/S	Putao	132	27	21	21	97	23	48	415	farmer's storage	seed	landrace
100	267954	*Luffa acutangula* (L) Roxb	ridged sponge gourd	11/06	Putao, Putao T/S	Putao	132	27	21	21	97	23	48	415	farmer's storage	seed	landrace
101	267955	*Trichosanthes cucumerina* L	snakegourd	11/06	Putao, Putao T/S	Putao	132	27	21	21	97	23	48	415	farmer's storage	seed	landrace
102	267956	*Momordica charantia* L	bitter gourd	11/06	Putao, Putao T/S	Putao	132	27	21	21	97	23	48	415	farmer's storage	seed	landrace
103	267957	*Ocimum basilcum* L	basil	11/06	Putao, Putao T/S	Putao	132	27	21	21	97	23	48	415	backyard	seed	landrace
104	267958	*Cucurbita maxima* L	pumpkin	11/06	Putao, Putao T/S	Putao	132	27	21	21	97	23	48	415	farmer's storage	seed	landrace
105	267959	*Cucumis sativus L.*	cucumbar	11/06	Putao, Putao T/S	Putao	104	27	20	30	97	24	6	446	marketplace	seed	landrace
106	267960	*Vigna unguiculata* (L) Walpers Group Sesquipdalis E Westphal	yard-long bean	11/07	Svr Køm Dvm [Sa KhumDam], Machanbaw	Machanbaw	134	27	20	25	97	27	52	443	farmer's storage	seed	landrace
107	267961	*Cucurbita maxima* L	pumpkin	11/07	Svr Køm Dvm [Sa KhumDam], Machanbaw	Machanbaw	134	27	20	25	97	27	52	443	farmer's storage	seed	landrace
108	267962	*Zea mays* L	maize, corn	11/07	Svr Køm Dvm [Sa KhumDam], Machanbaw	Machanbaw	134	27	20	25	97	27	52	443	farmer's storage	seed	landrace
109	267963	*Coriandrum sativum* L	coriander	11/07	Svr Køm Dvm [Sa KhumDam], Machanbaw	Machanbaw	134	27	20	25	97	27	52	443	farmer's storage	seed	landrace
110	267964	*Brassica juncea* (L) Czern Group Cerua	mustard	11/07	Kaung Hmu Lon, Machanbaw	Machanbaw	135	27	23	5	97	31	52	401	farmer's storage	seed	landrace
111	267965	*Brassica juncea* (L) Czern Group Cerua	mustard	11/07	Kaung Hmu Lon, Machanbaw	Machanbaw	135	27	23	5	97	31	52	401	farmer's storage	seed	landrace
112	267966	*Pisum sativum* L	common pea	11/07	Kaung Hmu Lon, Machanbaw	Machanbaw	135	27	23	5	97	31	52	401	farmer's storage	seed	landrace
113	267967	*Coriandrum sativum* L	coriander	11/07	Kaung Hmu Lon, Machanbaw	Machanbaw	135	27	23	5	97	31	52	401	farmer's storage	seed	landrace
114	267968	*Raphanus raphanistrum* L ssp *sativus* (L) G Beck	radish	11/07	Kaung Hmu Lon, Machanbaw	Machanbaw	135	27	23	5	97	31	52	401	farmer's storage	seed	landrace
115	267969	*Vicia faba* L	faba bean	11/07	Kaung Hmu Lon, Machanbaw	Machanbaw	135	27	23	5	97	31	52	401	farmer's storage	seed	landrace
116	267970	*Vigna unguiculata* (L) Walpers Group Sesquipdalis E Westphal	yard-long bean	11/07	Kaung Hmu Lon, Machanbaw	Machanbaw	135	27	23	5	97	31	52	401	farmer's storage	seed	landrace
117	267971	*Coix lacryma-jobi* L var *ma-yuen* (Rom Caill) Stapf ex Hook f	Job's tears	11/07	Kam Kyo, Machanbaw	Machanbaw	136	27	22	53	97	32	52	403	backyard	seed	landrace
118	267972	*Phaseolus vulgaris* L	common bean	11/07	Man Ku, Machanbaw	Machanbaw	137	27	22	4	97	33	10	400	farmer's storage	seed	landrace
119	267973	*Cucurbita maxima* L	pumpkin	11/07	Man Ku, Machanbaw	Machanbaw	137	27	22	4	97	33	10	400	farmer's storage	seed	landrace
120	267974	*Cucumis sativus* L	cucumbar	11/07	Man Ku, Machanbaw	Machanbaw	137	27	22	4	97	33	10	400	farmer's storage	seed	landrace
121	267975	*Brassica juncea* (L) Czern Group Cerua	mustard	11/07	Man Ku, Machanbaw	Machanbaw	137	27	22	4	97	33	10	400	farmer's storage	seed	landrace

Table 4. (Continued).

Sr No *	JP No **	Local plant name "local variety name"	Cultural practices	Sowing month	Harvest month	Other observations/notes	Topography	Site	Stoniness	Soil texture	Drainage	Farmer Name	Glutinous
092	267946	chara ha si	slash-and-burn cultivation, backyard	Apr, May	Aug, Sep (fruit) Nov (seed)	the same farmer who provided 090 Jingpaw people	hilly	level	medium	clay	moderate	Ms Khum Ra	
093	267947	koms sap si	slash-and-burn cultivation, backyard	Apr, May	Aug, Sep (fruit) Nov (seed)	the same farmer who provided 090 Jingpaw people	hilly	level	medium	clay	moderate	Ms Khum Ra	
094	267948	ka ta li si	slash-and-burn cultivation	Apr, May	Aug, Sep (fruit) Nov (seed)	the same farmer who provided 090 Jingpaw people	hilly	level	medium	clay	moderate	Ms Khum Ra	
095	267949	sha basi	slash-and-burn cultivation, backyard	Mar-May	Oct, Nov	the same farmer who provided 090 Jingpaw people	hilly	level	medium	clay	moderate	Ms Khum Ra	
096	267950	no kyu si	backyard			the same farmer who provided 090 Jingpaw people	hilly	level	medium	clay	moderate	Ms Khum Ra	
097	267951	no kyu si	slash-and-burn cultivation			the same farmer who provided 090 Jingpaw people	hilly	(level)	(medium)	(clay)	(moderate)	Ms Khum Ra	
098	267952	katan si	slash-and-burn cultivation			the same farmer who provided 090 Jingpaw people Spontaneous occurring but sometimes sown in slash-and-burn cultivation	hilly	(level)	(medium)	(clay)	(moderate)	Ms Khum Ra	
099	267953	pakat	backyard	Oct, Nov	Dec	leaves are harvested Dec and later, seeds are harvested in Mar/Apr Shan people	plain level	level	low	clay	moderate		
100	267954	maloi ngin	backyard	Jan	Sep	Shan people	plain level	level	low	clay	moderate		
101	267955	ma yan	backyard	Feb	Jul	Shan people	plain level	level	low	clay	moderate		
102	267956	maya khom	backyard	Feb	Jul	Shan people	plain level	level	low	clay	moderate		
103	267957	basim kim	backyard	Apr		It take 2 years to grow Shan people	plain level	level	low	clay	moderate		
104	267958	in ba	slash-and-burn cultivation, backyard	Nov	Jun (fruit) Aug (seed)	orange color outside & inside	plain level	level	low	clay	moderate		
105	267959	aphu				produced at Upper ShanKhaung							
106	267960	thaw gju	slash-and-burn cultivation, backyard	Feb	Oct	Rvwang people	plain level	level	low	clay	moderate		
107	267961	a khum	slash-and-burn cultivation, backyard	May	Jun	seed is called a khum ye Rvwang people	plain level	level	low	clay	moderate		
108	267962	lv gong [la gong]	slash-and-burn cultivation, backyard	Feb	Jun	Rvwang people	plain level	(level)	(low)	(clay)	(moderate)		
109	267963	bvnzi [banzi]	backyard	Nov	Dec (seed)	leaves can be harvested one month after sawing Rvwang people	plain level	level	low	clay	moderate		
110	267964	pakat	slash-and-burn cultivation, backyard	Nov	Apr	mixture of 6-month mustard and white mustard Shan people	plain level	level	none	clay	moderate		
111	267965	pakat kau	slash-and-burn cultivation, backyard	Nov	Mar	early white variety amaranth seeds mized Shan people	plain level	level	none	clay	moderate		
112	267966	tho kham pan	slash-and-burn cultivation, backyard	Nov	Apr	Shan people	plain level	level	none	clay	moderate		
113	267967	paky	backyard	Oct	May (seed)	Shan people	plain level	level	none	clay	moderate		
114	267968	pakat kin ho	slash-and-burn cultivation, backyard	Oct, Nov	April	Shan people	plain level	level	none	clay	moderate		
115	267969	tho mon	backyard	Nov	Jun	Shan people	plain level	level	none	clay	moderate		
116	267970	tho sai su	backyard	Mar	Aug	Shan people	plain level	level	none	clay	moderate		
117	267971	paka	backyard	Jul	Nov	Lisu people	plain level	level	none	clay	moderate		
118	267972	thu kwan	backyard	Oct	Feb	Shan people	plain level	level	low	clay	moderate		
119	267973		slash-and-burn cultivation, backyard	Oct, Nov	Apr, May	Shan people	plain level	level	low	clay	moderate		
120	267974	thayan	slash-and-burn cultivation, backyard	Oct, Nov	May	Shan people	plain level	level	low	clay	moderate		
121	267975	pakat	slash-and-burn cultivation, backyard			Shan people	plain level	level	low	clay	moderate		

Table 4. (Continued).

Sr No *	JP No **	Scientific name	English name	Date MM/dd	Village name or near-by/township (T/S)	Township	GPS waypoint	Latitude			Longitude			Altitude	Source	Type of sample	Status of plant sampled
								º	′	″	º	′	″	m			
122	267976	*Oryza sativa* L	rice	11/07	Ma Chon Wa, Putao T/S	Putao	138	27	20	34	97	23	12	427	farmer's storage	seed	landrace
123	267977	*Oryza sativa* L	rice	11/07	Ma Chon Wa, Putao T/S	Putao	138	27	20	34	97	23	12	427	farmer's storage	seed	landrace
124	267978	*Zea mays* L	maize, corn	11/07	Ma Chon Wa, Putao T/S	Putao	138	27	20	34	97	23	12	427	farmer's storage	seed	landrace
125	267979	*Curcuma zedoaria* (Christm) Roscoe	zedoary	11/07	Ma Chon Wa, Putao T/S	Putao	138	27	20	34	97	23	12	427	farmer's storage	rhizome	landrace
126	267980	*Pueraria phaseolodes* (Roxb) Benth	wild legume	11/07	near Putao, Putao T/S	Putao	near 138	27	20	30	97	23	16	424	wild	seed	wild
127	267981	*Pueraria phaseolodes* (Roxb) Benth	wild legume	11/07	near Putao, Putao T/S	Putao	near 138	27	20	40	97	23	33	424	wild	seed	wild
128	267982	*Curcuma longa* L	turmeric	11/07	Tone Li Thu, Putao, Putao T/S	Putao	102	27	20	30	97	24	2	446	farmer's storage	rhizome	landrace
129	267983	*Zingiber barbatum* Wall		11/07	Tone Li Thu, Putao, Putao T/S	Putao	102	27	20	30	97	24	2	446	farmer's storage	rhizome	landrace
130	267984	*Hosta* sp		11/07	Tone Li Thu, Putao, Putao T/S	Putao	102	27	20	30	97	24	2	446	farmer's storage	rhizome	landrace
132	267985	*Zanthoxylum armartum* DC	Chinese pepper	11/08	Putao, Putao T/S	Putao	104	27	20	30	97	24	6	446	village market	seed	landrace
133	267986	*Rhyncanthus* sp		11/09	Myitkyina, Myitkyina T S	Myitkyina	139	25	22	59	97	24	8	143	marketplace	rhizome	
134	267987	*Sesamum indicum* L	sesame	11/09	Myitkyina, Myitkyina T S	Myitkyina	139	25	22	59	97	24	8	143	marketplace	seed	
135	267988	*Vigna umbellata* (Thunb) Ohwi et Ohashi	rice bean	11/09	Myitkyina, Myitkyina T S	Myitkyina	139	25	22	59	97	24	8	143	marketplace	seed	
136	267989	*Capsicum annuum* L	chili pepper	11/09	Alam near Myitkyina, Myitkyina T S	Myitkyina	142	25	34	15	97	29	8	161	NGO storage	seed	landrace
137	267990	*Luffa acutangula* (L) Roxb	ridged gourd	11/09	Alam near Myitkyina, Myitkyina T S	Myitkyina	144	25	32	50	97	29	13	152	farmer's storage	seed	landrace
138	267991	*Psophocarpus tetragonolobus* (L) D C	yam bean	11/09	Gwae Taw, Myitkyina T S	Myitkyina	144	25	32	50	97	29	13	152	farmer's storage	seed	landrace
139	267992	*Vigna unguiculata* (L) Walpers Group Sesquipdalis E Westphal	yard-long bean	11/09	Gwae Taw, Myitkyina T S	Myitkyina	144	25	32	50	97	29	13	152	farmer's storage	seed	landrace
140	267993	*Vigna unguiculata* (L) Walpers Group Unguiculata E Westphal	cowpea	11/09	Gwae Taw, Myitkyina T S	Myitkyina	144	25	32	50	97	29	13	152	farmer's storage	seed	landrace
141	267994	*Lablab purpurea* (L) Sweet	lablab bean	11/09	Gwae Taw, Myitkyina T S	Myitkyina	144	25	32	50	97	29	13	152	farmer's storage	seed	landrace
142	267995	*Setaria italica* (L) P Beauv	foxtail millet	11/09	Gwae Taw, Myitkyina T S	Myitkyina	144	25	32	50	97	29	13	152	farmer's storage	seed	landrace
143	267996	*Ocimum basilcum* L	basil	11/09	Gwae Taw, Myitkyina T S	Myitkyina	144	25	32	50	97	29	13	152	farmer's storage	seed	landrace
144	267997	*Rhycanthus* sp		11/10	Myitkyina, Myitkyina T S	Myitkyina	139	25	22	59	97	24	8	142	marketplace	rhizome	landrace
145	267998	*Gymnopetalum chinense* (Loureiro) Merrill	wild edged gourd	11/10	Myitkyina, Myitkyina T S	Myitkyina	139	25	22	59	97	24	8	142	marketplace	seed	
146	267999	*Perilla frutescens* (L) Britton var frutescens	perilla	11/11	Pon Oho, Mindat, Mindat T/S	Mindat	158	21	21	54	93	54	50	1,263	farmer's storage	seed	landrace
147	268000	*Phaseolus vulgaris* L	common bean	11/11	Pon Oho, Mindat, Mindat T/S	Mindat	158	21	21	54	93	54	50	1,263	farmer's storage	seed	landrace
148	268001	*Vigna unguiculata* (L) Walpers Group Unguiculata E Westphal	cowpea	11/11	Pon Oho, Mindat, Mindat T/S	Mindat	158	21	21	54	93	54	50	1,263	farmer's storage	seed	landrace
149	268002	*Vigna umbellata* (Thunb) Ohwi et Ohashi	rice bean	11/11	Pon Oho, Mindat, Mindat T/S	Mindat	158	21	21	54	93	54	50	1,263	farmer's storage	seed	landrace
150	268003	*Setaria italica* (L) P Beauv	foxtail millet	11/11	Pon Oho, Mindat, Mindat T/S	Mindat	158	21	21	54	93	54	50	1,263	farmer's storage	seed	landrace
151	268004	*Eleusine coracana* Gaertn	finger millet	11/11	Pon Oho, Mindat, Mindat T/S	Mindat	158	21	21	54	93	54	50	1,263	farmer's storage	seed	landrace
152	268005	*Zea mays* L	maize, corn	11/11	Pon Oho, Mindat, Mindat T/S	Mindat	158	21	21	54	93	54	50	1,263	farmer's storage	seed	landrace
153	268006	*Coccinia grandis* (L) Voigt	pointed guard	11/12	Mindat, Mindat T S	Mindat	160	21	22	17	93	58	11	1,440	village market		
154	268007	*Momordica balsamina* L	bitter guard	11/12	Mindat, Mindat T S	Mindat	160	21	22	17	93	58	11	1,440	village market		
155	268008	*Trichosanthes* sp	wild gourd	11/12	Mindat T/S	Mindat	161	21	23	30	93	52	22	1,950	wild	seed	wild
156	268009	*Trichosanthes* sp	wild gourd	11/12	Mindat T/S	Mindat	162	21	23	55	93	51	3	2,280	wild	fruit	wild
157	268010	*Hedychium* sp		11/12	Mindat T/S	Mindat	163	21	25	17	93	47	27	2,360	wild	plant, fruit, both	wild

Table 4. (Continued).

Sr No *	JP No **	Local plant name "local variety name"	Cultural practices	Sowing month	Harvest month	Other observations/notes	Topography	Site	Stoniness	Soil texture	Drainage	Farmer Name	Glutinous
122	267976	"e dn [e pu]"	irrigated, trnsplanted	Jun	Nov	transplanted in July white, soft, good for the elders Lisu people	undulating	level	low	clay	moderate		
123	267977	"z si si[ze si si]"	irrigated, trnsplanted	Jun	Nov	transplanted in July red, hard Lisu people	undulating	level	low	clay	moderate		
124	267978	o sha	backyard	Jan, Feb	Apr		undulating	level	low	clay	moderate		
125	267979	ma hin nyi ji	backyard			all year around slice, dry and make powder for stomack medicine	undulating	level	low	clay	moderate		
126	267980					on a cliff at a river bank, no mature seed	plain level	slope	medium	clay	moderate		
127	267981					at an edge of a paddy field	plain level	level	low	clay	moderate		
128	267982	sa nun	slash-and-burn cultivation			provided by a driver, U Maung Soe	plain level						
129	267983	mate thalin	slash-and-burn cultivation			provided by a driver, U Maung Soe	plain level						
130	267984	pan u	slash-and-burn cultivation			slash-and-burn cultivation							
132	267985					from Zi Yar Dan village near snow mountains							
133	267986												
134	267987												
135	267988												
136	267989	ma chap	slash-and-burn cultivation	May, Jun		harvested all year around from Sumprabon Mr N-gum Tu Ja							
137	267990	sum ring si	slash-and-burn cultivation, backyard	Mar, Apr			hilly	level	none	clay	good		
138	267991	naw gyaawn si	slash-and-burn cultivation, backyard	May, Jun	Oct		hilly	slope	medium	sandy clay	good		
139	267992	naw kyu si	slash-and-burn cultivation	May			hilly						
140	267993	naw kyu si	backyard	Nov		pods availble from Feb black seed	hilly	slope	medium	sandy clay	good		
141	267994	naw lap si	backyard	Nov		pods availble all year around	hilly	slope	medium	sandy clay	good		
142	267995	sha gi	slash-and-burn cultivation	May, Jun	Nov		hilly						
143	267996	shing tawn pan	slash-and-burn cultivation, backyard	Jun,	Nov, Dec	harvested all year around	hilly	slope	medium	clay	good		
144	267997		slash-and-burn cultivation										
145	267998					Myityina market							
146	267999	khwo kie	shifting	Apr, May	Dec, Jan	not tall	mountainous	slope	medium	clay	moderate		
147	268000	gep paw	shifting	Apr, May	Jan, Feb	boil three time	mountainous	slope	medium	clay	moderate		
148	268001	ml wi	shifting, backyard	Apr, May	Dec, Jan	only seed eaten	mountainous	slope	medium	clay	moderate		
149	268002	be tha	shifting	Apr, May	Dec, Jan	seed are eaten	mountainous	slope	medium	clay	moderate		
150	268003	than	shifting	Apr, May	Sep, Oct	dehusk, only mix with rice cake, non sticky, sticky one exist,brewary	mountainous	slope	medium	clay	moderate		
151	268004	than shen	shifting	Apr, May	Dec	dehusk by block, mix with beef porriage, cake	mountainous	slope	medium	clay	moderate		
152	268005	pun pho	shifting	Apr, May	Sep, Oct		mountainous	slope	medium	clay	moderate		
153	268006												
154	268007												
155	268008					road side	mountainous						
156	268009					road side clift	mountainous						
157	268010												

Table 4. (Continued).

Sr No *	JP No **	Scientific name	English name	Date MM/dd	Village name or near-by/township (T/S)	Township	GPS waypoint	Latitude			Longitude			Altitude	Source	Type of sample	Status of plant sampled
								º	′	″	º	′	″	m			
158	268011	*Amorphophallus paeoniifolius* (Dennst) Nicolson		11/13	Tuiship, Madupi T/S	Madupi	170	21	30	2	93	22	34	1,540	farmer's storage	both	landrace
159	268012	*Vigna unguiculata* (L) Walpers	cowpea	11/13	Va Lang Pi, Madupi T/S	Madupi	171	21	32	56	93	21	2	1,093	farmer's storage	seed	landrace
160	268013	*Vigna unguiculata* (L) Walpers	cowpea	11/13	Va Lang Pi, Madupi T/S	Madupi	171	21	32	56	93	21	2	1,093	farmer's storage	seed	landrace
161	268014	*Zea mays* L	maize, corn	11/13	Va Lang Pi, Madupi T/S	Madupi	171	21	32	56	93	21	2	1,093	farmer's storage	seed	landrace
162	268015	*Zea mays* L	maize, corn	11/13	Va Lang Pi, Madupi T/S	Madupi	171	21	32	56	93	21	2	1,093	farmer's storage	seed	landrace
163	268016	*Zea mays* L	maize, corn	11/13	Va Lang Pi, Madupi T/S	Madupi	171	21	32	56	93	21	2	1,093	farmer's storage	seed	landrace
164	268017	*Solanum aethiopicum* L		11/13	Va Lang Pi, Madupi T/S	Madupi	171	21	32	56	93	21	2	1,093	backyard	fruit	landrace
165	268018	*Vigna unguiculata* (L) Walpers Group Unguiculata E Westphal	cowpea	11/13	Va Lang Pi, Madupi T/S	Madupi	171	21	32	56	93	21	2	1,093	farmer's storage	seed	landrace
166	268019	*Benincasa hispada* (Thunb) Cogn	ash guard	11/13	Va Lang Pi, Madupi T/S	Madupi	171	21	32	56	93	21	2	1,093	farmer's storage	fruit	landrace
167	268020	*Cucurbita maxima* L	pumpkin	11/13	Va Lang Pi, Madupi T/S	Madupi	171	21	32	56	93	21	2	1,093	farmer's storage	fruit	landrace
168	268021	*Sorghum bicolor* (L) Moench	sorghum	11/13	Va Lang Pi, Madupi T/S	Madupi	171	21	32	56	93	21	2	1,093	farmer's storage	seed	landrace
169	268022	*Oryza sativa* L	rice	11/13	Va Lang Pi, Madupi T/S	Madupi	171	21	32	56	93	21	2	1,093	farmer's storage	seed	landrace
170	268023	*Oryza sativa* L	rice	11/13	Va Lang Pi, Madupi T/S	Madupi	171	21	32	56	93	21	2	1,093	farmer's storage	seed	landrace
171	268024	*Brassica juncea* (L) Czern Group Cerua	mustard	11/13	Va Lang Pi, Madupi T/S	Madupi	171	21	32	56	93	21	2	1,093	farmer's storage	seed	landrace
172	268025	*Cucumis sativus* L	cucumbar	11/13	Kala, Madupi T/S	Madupi	173	21	34	28	93	19	33	950	farmer's storage	seed	landrace
173	268026	*Cucumis sativus* L	cucumbar	11/14	near the guesthouse, Madupi T/S	Madupi	174	21	36	42	93	26	18	1,166	village market	fruit	landrace
174	268027	*Gymnopetalum chinense* (Loureiro) Merrill	wild edged cucumber	11/14	near the guesthouse, Madupi T/S	Madupi	174	21	36	42	93	26	18	1,166	village market	fruit	
175	268028	*Momordica dioica* Roxb		11/14	near the guesthouse, Madupi T/S	Madupi	174	21	36	42	93	26	18	1,166	village market	fruit	
176	268029	*Zingiber officinale* Roscoe	ginger	11/14	near the guesthouse, Madupi T/S	Madupi	174	21	36	42	93	26	18	1,166	village market	fruit	
177	268030	*Oryza sativa* L	rice	11/14	Pan Aeng, Madupi T/S	Madupi	176	21	40	24	93	26	44	903	farmland	seed	landrace
178	268031	*Vigna tenuicaulis* N Tomooka et N Maxted	wild bean	11/14	Pan Aeng, Madupi T/S	Madupi	176	21	40	24	93	26	44	903	wild	seed	wild
179	268032	*Oryza sativa* L	rice	11/14	Pan Aeng, Madupi T/S	Madupi	177	21	40	26	93	26	45	906	farmland	seed	landrace
180	268033	*Vigna unguiculata* (L) Walpers Group Unguiculata E Westphal	cowpea	11/14	Pan Aeng, Madupi T/S	Madupi	177	21	40	26	93	26	45	906	farmland	seed	landrace
181	268034	*Zea mays* L	maize, corn	11/14	Pan Aeng, Madupi T/S	Madupi	177	21	40	26	93	26	45	906	farmer's storage	seed	landrace
182	268035	*Zea mays* L	maize, corn	11/14	Pan Aeng, Madupi T/S	Madupi	177	21	40	26	93	26	45	906	farmer's storage	seed	landrace
183	268036	*Cucurbita maxima* L	pumpkin	11/14	Pan Aeng, Madupi T/S	Madupi	177	21	40	26	93	26	45	906	farmer's storage	seed	landrace
184	268037	*Oryza sativa* L	rice	11/14	Pan Aeng, Madupi T/S	Madupi	177	21	40	26	93	26	45	906	farmland	seed	landrace
185	268038	*Oryza sativa* L	rice	11/14	Pan Aeng, Madupi T/S	Madupi	177	21	40	26	93	26	45	906	farmland	seed	landrace
186	268039	*Oryza sativa* L	rice	11/14	Pan Aeng, Madupi T/S	Madupi	177	21	40	26	93	26	45	906	farmland	seed	landrace
187	268040	*Oryza sativa* L	rice	11/14	Pan Aeng, Madupi T/S	Madupi	177	21	40	26	93	26	45	906	farmland	seed	landrace
188	268041	*Vigna tenuicaulis* N Tomooka et N Maxted	wild bean	11/14	Pan Aeng, Madupi T/S	Madupi	178	21	40	11	93	26	45	880	wild		wild
189	268042	*Vigna angularis* (Willd) Ohwi et H Ohashi var *nipponensis* (Ohwi) Ohwi et H Ohashi	wild azuki bean	11/14	Pan Aeng, Madupi T/S	Madupi	178	21	40	11	93	26	45	880	wild	seed	wild
190	268043	*Zea mays* L	maize, corn	11/14	Pha Neng, Madupi T/S	Madupi	175	21	39	31	93	25	55	1,228	farmer's storage	seed	landrace
191	268044	*Vigna unguiculata* (L) Walpers	cowpea	11/14	Pha Neng, Madupi T/S	Madupi	175	21	39	31	93	25	55	1,228	farmer's storage	seed	landrace
192	268045	*Brassica juncea (L.) Czern Group Cerua*	mustard	11/14	Pha Neng, Madupi T/S	Madupi	175	21	39	31	93	25	55	1,228	farmer's storage	seed	landrace

Table 4. (Continued).

Sr No *	JP No **	Local plant name "local variety name"	Cultural practices	Sowing month	Harvest month	Other observations/notes	Topography	Site	Stoniness	Soil texture	Drainage	Farmer Name	Glutinous
158	268011		shifting, backyard	May, Jun	Nov	4 years ago most eaten	mountainous	slope	medium	loam	good		
159	268012	mai dung	shifting, backyard	Apr, May	Nov	fresh pod harvest in Sep, seed color black	mountainous	slope	medium	clay	good		
160	268013	mai dung	shifting, backyard	Apr, May	Nov	fresh pod harvest in Sep, late mature 2 weeks later than No 159, reddish brown seeds	mountainous	slope	medium	clay	good		
161	268014	vai kym	shifting, backyard	May	Nov	pop corn, damaged corn for pig, yellow color, latest cultivar among three type:No; 161/162/163 ,	mountainous	slope	medium	clay	good		
162	268015	vai kym	shifting, backyard	May	Jul	pop corn, damaged corn for pig, black seed, earliest cuitivar among three type:No;161/162/163	mountainous	slope	medium	clay	good		
163	268016	vai kym	shifting, backyard	May	Sep	pop corn, damaged corn for pig, yellow color, sweet and sticky	mountainous	slope	medium	clay	good		
164	268017	cang thulk thai	shifting	Apr, May	Sep	fried fruits	mountainous	slope	medium	clay	good		
165	268018	mai dung	shifting, backyard	Apr, May	Sep	fresh pod, reddish brown color, like No: 165	mountainous	slope	medium	clay	good		
166	268019	an mai	shifting, backyard	Apr, May	Oct, Nov		mountainous	slope	medium	clay	good		
167	268020	phouh	shifting, backyard	Apr, May	Nov	boil and fried, orange color, intercropping with various kind of crops	mountainous	slope	medium	clay	good		
168	268021		shifting	Apr, May	Sep, Nov	stem for sugar, seeds for pop corn and soup	mountainous	slope	medium	clay	good		
169	268022	sen pa	shifting	Apr, May	Nov	not sticky							
170	268023	sen thar	shifting	Apr, May	Nov	mix hull color individuals were identified but not separated select the good place for cultivation (higher place and good moisture), separately cultivated from not sticky rice							
171	268024	aung me	shifting	Apr	after June	eat leaves and flower	mountainous	slope	medium	clay	good		
172	268025		shifting	Mar, Apr	Nov								
173	268026					market							
174	268027					market							
175	268028					market							
176	268029					market							
177	268030	pi nal	terraced	Apr	Nov	transplant in july		level	low	clay	moderate		
178	268031					roadside	mountainous	slope	medium	clay	good		
179	268032	cang swat	terraced	May	Nov	transplant in May, sticky		level	low	clay	moderate		
180	268033						mountainous	slope	medium	clay	good		
181	268034	vai kym	backyard	Mar	Jun	early type	mountainous	level	medium	clay	good		
182	268035	vai hnong	backyard	Mar	Nov	late type	mountainous	level	medium	clay	good		
183	268036	phoe thaih	backyard	Mar	Jul, Aug	leaves and fruits, orange color	mountainous	level	low	clay	good		
184	268037	pi nal mi buet	terraced	Jul 15	Nov	little aromatic		level	low	clay	good		
185	268038	tham hrim	terraced	Jul 7	Nov	transplant in late July, good eating quality		level	low	clay	good		
186	268039	cang swat	terraced	Jul 13	Nov			level	low	clay	good		
187	268040	paw	terraced	Jul 13	Nov	long culm		level	low	clay	good		
188	268041					near the bridge							
189	268042					near the paddy field	mountainous	level	none	clay	moderate		
190	268043	gon ho	backyard	Jun	Aug	small panicle, yellow seed	mountainous	level	low	clay	good		
191	268044	mi dawn	backyard	Jun	Nov	black seed color	mountainous	level	low	clay	good		
192	268045	atha mar	backyard	Nov	Dec	leaves and flowers are used for boil and pickles	mountainous	level	low	clay	good		

Table 4. (Continued).

Sr No *	JP No **	Scientific name	English name	Date MM/dd	Village name or near-by/township (T/S)	Township	GPS waypoint	Latitude			Longitude			Altitude	Source	Type of sample	Status of plant sampled
								º	′	″	º	′	″	m			
193	268046	*Momordica charantia* L	bitter guard	11/14	Pha Neng, Madupi T/S	Madupi	175	21	39	31	93	25	55	1,228	backyard	seed	landrace
194	268047	*Oryza sativa* L	rice	11/14	Nga Leang, , Madupi T/S	Madupi	179	21	41	18	93	25	18	1,304	farmer's storage	seed	landrace
195	268048	*Oryza sativa* L	rice	11/14	Nga Leang, , Madupi T/S	Madupi	179	21	41	18	93	25	18	1,304	farmer's storage	seed	landrace
196	268049	*Oryza sativa* L	rice	11/14	Nga Leang, , Madupi T/S	Madupi	179	21	41	18	93	25	18	1,304	farmer's storage	seed	landrace
197	268050	*Oryza sativa* L	rice	11/14	Nga Leang, , Madupi T/S	Madupi	179	21	41	18	93	25	18	1,304	farmer's storage	seed	landrace
198	268051	*Oryza sativa* L	rice	11/14	Nga Leang, , Madupi T/S	Madupi	179	21	41	18	93	25	18	1,304	farmer's storage	seed	landrace
199	268052	*Zea mays* L	maize, corn	11/14	Nga Leang, , Madupi T/S	Madupi	179	21	41	18	93	25	18	1,304	farmer's storage	seed	landrace
200	268053	*Zea mays* L	maize, corn	11/14	Nga Leang, , Madupi T/S	Madupi	179	21	41	18	93	25	18	1,304	farmer's storage	seed	landrace
201	268054	*Zea mays* L	maize, corn	11/14	Nga Leang, , Madupi T/S	Madupi	179	21	41	18	93	25	18	1,304	farmer's storage	seed	landrace
202	268055	*Zea mays* L	maize, corn	11/14	Nga Leang, , Madupi T/S	Madupi	179	21	41	18	93	25	18	1,304	farmer's storage	seed	landrace
203	268056	*Solanum melongena* L	egg plant	11/14	Nga Leang, , Madupi T/S	Madupi	179	21	41	18	93	25	18	1,304	farmer's storage	seed	landrace
204	268057	*Cucumis sativus L.*	cucumbar	11/14	Nga Leang, , Madupi T/S	Madupi	179	21	41	18	93	25	18	1,304	farmer's storage	seed	landrace
205	268058	*Hibiscus sabdariffa* L	roselle	11/14	Nga Leang, , Madupi T/S	Madupi	179	21	41	18	93	25	18	1,304	farmer's storage	seed	landrace
206	268059	*Capsicum annuum* L	chilipepper	11/14	Nga Leang, , Madupi T/S	Madupi	179	21	41	18	93	25	18	1,304	farmer's storage	seed	landrace
207	268060	*Vigna tenuicaulis* N Tomooka et N Maxted	wild bean	11/14	Nga Leang, , Madupi T/S	Madupi	179	21	41	18	93	25	18	1,304	wild	seed	wild
208	268061	*Chenopodium bengalense* (Lamarck) Steudel (syn *C. giganteum* D Don)	tree spinach	11/14	Nga Leang, , Madupi T/S	Madupi	179	21	41	18	93	25	18	1,304	backyard	seed	landrace
209	268062	*Vigna angularis* (Willd) Ohwi et H Ohashi var *nipponensis* (Ohwi) Ohwi et H Ohashi	wild azuki bean	11/15	Madupi T/S	Madupi	181	21	35	1	93	28	1	795	wild	seed	wild
210	268063	*Coix lacryma-jobi* L var *lacryma-jobi* L	wild Job's tears	11/15	Mindat T/S	Mindat	183	21	23	2	93	54	41	1,651	wild	seed	wild
211	268064	*Vigna hirtella* Ridley	wild legume	11/16	Saw T/S, Magway	Saw	187	21	21	56	94	4	22	467	wild	seed	wild
212	268065	*Oryza sativa* L	rice	11/16	Thaung Htet, Saw T/S, Magway	Saw	188	21	21	55	94	4	31	460	farmland	seed	landrace
213	268066	*Oryza sativa* L	rice	11/16	Thaung Htet, Saw T/S, Magway	Saw	188	21	21	55	94	4	31	460	farmland	seed	landrace
214	268067	*Vigna radiata*	cowpea	11/16	Thaung Htet, Saw T/S, Magway	Saw	188	21	21	55	94	4	31	460	farmland	seed	landrace
215	268068	*Vigna hirtella* Ridley	wild legume	11/16	Thaung Htet, Saw T/S, Magway	Saw	188	21	21	55	94	4	31	460	wild	seed	wild
216	268069	*Momordica balsamina* L	balsam apple	11/16	Chauk T/S, Magway	Chouk	150	21	27	3	94	28	19	164	wild	seed	wild
217	268070	*Oryza sativa* L	rice	11/16	Chauk T/S, Magway	Chouk	150	21	27	3	94	28	19	164	farmland	seed	landrace
218	268071	*Trichosanthes tricuspidata* Lour	wild snake guard	11/16	Chauk T/S, Magway	Chouk	150	21	27	3	94	28	19	164	wild	seed	wild
219	268072	*Solanum aethiopicum* L	red eggplant	11/15	Madupi, Madupi T/S	Madupi	174	21	36	42	93	26	18	1,166	village market	seed	
220	268073	*Cucumis sativus* L	cucumbar	11/16	Mindat, Mindat T/S	Mindat	160	21	22	17	93	58	11	1,440	village market	seed	
221	268074	*Momordica balsamina* L	balsam apple	11/16	Mindat, Mindat T/S	Mindat	160	21	22	17	93	58	11	1,440	village market	seed	
222	268075	*Momordica balsamina* L	balsam apple	11/16	Mindat, Mindat T/S	Mindat	160	21	22	17	93	58	11	1,440	village market	seed	
223	268076	*Colocasia esculenta* (L) Schott	taro	11/16	Mindat, Mindat T/S	Mindat	160	21	22	17	93	58	11	1,440	village market	rhizome	landrace
224	268077	*Oryza sativa* L	rice	11/15	Mindat (from Kin Hlih), Mindat T/S	Mindat	(157)	21	22	20	93	57	40	1,397		seed	
225	268078	*Oryza sativa* L	rice	11/15	Mindat (from M'kui Mnu), Mindat T/S	Mindat	(157)	21	22	20	93	57	40	1,397		seed	
226	268079	*Oryza sativa* L	rice	11/15	Mindat (from Kyung Laong), Mindat T/S	Mindat	(157)	21	22	20	93	57	40	1,397		seed	
227	268080	*Oryza sativa* L	rice	11/15	Mindat (from Pang Acoh), Mindat T/S	Mindat	(157)	21	22	20	93	57	40	1,397		seed	

Table 4. (Continued).

Sr No *	JP No **	Local plant name "local variety name"	Cultural practices	Sowing month	Harvest month	Other observations/notes	Topography	Site	Stoniness	Soil texture	Drainage	Farmer Name	Glutinous
193	268046	azem tai	backyard	Jan	Jul,Nov	cooking	mountainous	level	low	clay	good		
194	268047	di kul	shifting	Mar	early October	sticky rice, black awn, black color pericarp, good for health							
195	268048	ka thlang	shifting	end of March	Oct, Nov	black awn, sticky							
196	268049	ca mum	shifting	Mar	Oct, Nov	black hull, black awn, white pericarp, sticky							
197	268050	mizu ca sawk	shifting	Mar	Oct, Nov	sticky rice, reddish brown hull							
198	268051	ma du cang	shifting	Mar	Oct, Nov	not sticky, high yielding, good eating quality, major variety in this village							
199	268052	ca koen	shifting	Mar	July	yellow color							
200	268053	ca caum	shifting	Mar	Oct	good eating quality, yellow and black color							
201	268054	ca nak	shifting	Mar	Oct	black color, good price							
202	268055	ca koen boek	shifting	Mar	Oct	yellow color							
203	268056	ta po thai	backyard	Mar	Jun, Jul		mountainous	level	low	clay	moderate		
204	268057	tang thai	backyard	Mar	Jul		mountainous	level	low	clay	moderate		
205	268058	na bok al	backyard	Mar	Nov	leaves can harvest in July	mountainous	level	low	clay	moderate		
206	268059	paet thai		Mar	Nov		mountainous	level	low	clay	moderate		
207	268060					near the gate of Nga Leang Baptist Charch	mountainous	level	low	clay	moderate		
208	268061	ta hai kai		Mar	Jun, Nov	cooking	mountainous	level	low	clay	moderate		
209	268062						mountainous	level	low		good		
210	268063						mountainous	level	low	loam	good		
211	268064						plain level	level	low	clay	moderate		
212	268065	nga cheik	transplanted	Jun	Nov	transplant in july, gultinous	plain level	level	low	clay	moderate		
213	268066	kauk nhyin	transplanted	Jun	Nov	transplant in july	plain level	level	low	clay	moderate		
214	268067	pen neuk		Aug	Nov		plain level	level	low	clay	moderate		
215	268068						plain level	level	low	clay	moderate		
216	268069						plain level	level	low	clay	moderate		
217	268070	ney pyi hnwe	transplanted	Jul	Nov	transplanted in August, aromatic	plain level	level	low	clay	moderate		
218	268071					uncertain species	plain level	level	low	clay	moderate		
219	268072					Madupi market, uncertain species							
220	268073					Mindat market							
221	268074					small fruits, Mindat market							
222	268075					small fruits, larger than No 221, Mindat market							
223	268076					Mindat market							
224	268077	mizo				130-day variety provided by Mindat DOA office							
225	268078	shain ta				140-day variety provided by Mindat DOA office							
226	268079	bhule				130-day variety provided by Mindat DOA office							
227	268080	ship				135-day variety provided by Mindat DOA office							

Table 4. (Continued).

Sr No *	JP No **	Scientific name	English name	Date MM/dd	Village name or near-by/township (T/S)	Township	GPS waypoint	Latitude			Longitude			Altitude	Source	Type of sample	Status of plant sampled
								º	′	″	º	′	″	m			
228	268081	*Perilla frutescens (L.) Britton var. frutescens*	perilla	11/15	Mindat (from Pang Acoh), Mindat T/S	Mindat	(157)	21	22	20	93	57	40	1,397		seed	
229	268082	*Setaria italica* (L) P Beauv	foxtail millet	11/15	Mindat (from Hle Kacong), Mindat T/S	Mindat	(157)	21	22	20	93	57	40	1,397		seed	
230	268083	*Zea mays L.*	maize, corn	11/15	Mindat (from Pang Acoh), Mindat T/S	Mindat	(157)	21	22	20	93	57	40	1,397		seed	
231	268084	*Zea mays* L	maize, corn	11/15	Mindat (from Bacung Tre), Mindat T/S	Mindat	(157)	21	22	20	93	57	40	1,397		seed	
232	268085	*Phaseolus vulgaris* L	common bean	11/15	Mindat (from Bacung Tre), Mindat T/S	Mindat	(157)	21	22	20	93	57	40	1,397		seed	
233	268086	*Vigna unguiculata (L.) Walpers*	cowpea	11/15	Mindat (from Pang Acoh), Mindat T/S	Mindat	(157)	21	22	20	93	57	40	1,397		seed	
234	268087	*Vigna umbellata* (Thunb) Ohwi et Ohashi	rice bean	11/15	Mindat (from Bacung Tre), Mindat T/S	Mindat	(157)	21	22	20	93	57	40	1,397		seed	
235	268088	*Cucurbita maxima* L	pumpkin	11/15	Mindat (from Bacung Tre), Mindat T/S	Mindat	(157)	21	22	20	93	57	40	1,397		seed	
236	268089	*Coix lacryma-jobi* L var *ma-yuen* (Rom Caill) Stapf ex Hook f	Job's tears	11/15	Mindat (from Hle Kacong), Mindat T/S	Mindat	(157)	21	22	20	93	57	40	1,397		seed	
237	268090	*Eleusine coracana Gaertn.*	finger millet	11/15	Mindat (from Hle Kacong), Mindat T/S	Mindat	(157)	21	22	20	93	57	40	1,397		seed	
238	268091	*Solanum melongena* L	egg plant	11/15	Mindat (from Ro), Mindat T/S	Mindat	(157)	21	22	20	93	57	40	1,397		seed	
239	268092	*Solanum violaceum* Ortega	indian night shade	11/15	Mindat (from Pang Acoh), Mindat T/S	Mindat	(157)	21	22	20	93	57	40	1,397		seed	
240	268093	*Capsicum annuum* L	chili pepper	11/15	Mindat (from Lailacong Thai), Mindat T/S	Mindat	(157)	21	22	20	93	57	40	1,397		seed	
241	268094	*Colocasia esculenta* (L) Schott	taro	11/15	Mindat (from Bacung Tre), Mindat T/S	Mindat	(157)	21	22	20	93	57	40	1,397		rhizome	
242	268095	*Amorphophallus paeoniifolius* (Dennst) Nicolson	elephant yam	11/15	Mindat (from Lailawng Thai), Mindat T/S	Mindat	(157)	21	22	20	93	57	40	1,397		rhizome	
243	268096	*Amorphophallus paeoniifolius* (Dennst) Nicolson	white yam	11/15	Mindat (from Ro), Mindat T/S	Mindat	(157)	21	22	20	93	57	40	1,397		fruit	
244	268097, 268098	*Colocasia esculenta* (L) Schott	wild taro	11/22	SW of Nga Moe Yeik Reservior, Phaung Gyi, Hlegu T/S, Yangon	Hlegu		17	19	54	96	11	7	20	wild	seed	

Note:

* Collection No is designated as COL/(country)/(year)/(collecting organizations)/(Sr No) for each

** JP No is a unique ID number when registered in NARO Genebank

Table 4. (Continued).

Sr No *	JP No **	Local plant name "local variety name"	Cultural practices	Sowing month	Harvest month	Other observations/notes	Topography	Site	Stoniness	Soil texture	Drainage	Farmer Name	Glutinous
228	268081	k'cho k'khi				provided by Mindat DOA office							
229	268082	htang				provided by Mindat DOA office							
230	268083	pumgho				provided by Mindat DOA office							
231	268084	pumgho				provided by Mindat DOA office							
232	268085	k'kho m7kyei				provided by Mindat DOA office							
233	268086	m'lai				provided by Mindat DOA office							
234	268087	k'bei				provided by Mindat DOA office							
235	268088	ng mai				provided by Mindat DOA office							
236	268089	pum				provided by Mindat DOA office							
237	268090	htang k'he				provided by Mindat DOA office							
238	268091	bukbun k'ha				provided by Mindat DOA office							
239	268092	khag ang k'kha				provided by Mindat DOA office							
240	268093	m'ship				provided by Mindat DOA office							
241	268094	ba				provided by Mindat DOA office							
242	268095	m'htan				provided by Mindat DOA office							
243	268096	m'htan				provided by Mindat DOA office							
244	268097, 268098	pain u yain				wild, probably diploid, in a Oryza rufipogon population in a pond near the roadside	plain level	level	low	clay	poor		

Photo 1. Snow-covered mountains can be seen in the north from the downtown of Putao township

Photo 2. There is a wide basin in Putao and Machanbaw townships of Putao district, Kachin State of Myanmar. The basin is suited for paddy rice production.

Photo 3. A variety of vegetables were seen in a marketplace of Putao township.

Photo 4. Roselle, Chinese water spinach, hooker chive, winged bean, and chayote were for sale at a marketplace in Putao township. These are popular vegetables in other areas in Myanmar.

Photo 5. Bundles of edible fern (probably *Diplazium esculentum* [Retz] Sw.) were sold at a marketplace in Putao township.

Photo 6. Unidentified small chestnut (*Castanea* sp., probably *C. mollissima* Blume) was seen at a marketplace of Putao township.

Photo 7. We visited a slash-and-burn cultivation field in Upper Shan Khang, Putao township (WPs 110 and 111), where rice had been just harvested.

Photo 8. Harvested rice, maize, and sweet potato on a slash-and-burn cultivation field in Upper Shan Khang, Putao township.

Photo 9. Rice terrace in a valley of Mindat district, Chin State.

Photo 10. Hand threshing of rice in a harvested paddy field in a valley of Mindat district, Chin State.

Photo 11. White flowered roselle plants with and without anthocyanin on stem in a small field of Mindat district, Chin State

Photo 12. Chayote was grown on a wooden trellis in Mindat district of Chin State.

Photo 13 Spine gourd is rare and was found on a hedge surrounding a house. This photo was taken in Mindat district of Chin State. This plant has also been identified in Putao district of Kachin State

Photo 14. Elephant foot yam was recently introduced into Chin State.

Photo 15. Harvested elephant foot yam corms were stored in a warehouse.

Photo 16. A variety of vegetables were displayed at a local marketplace in Mindat district of Chin State from the early morning.

Photo 17. Vegetables displayed in a local marketplace in Mindat district of Chin State were produced in adjacent villages.

Photo 18. Young and matured fruits of balsam apple at a local marketplace in Mindat district of Chin State. This is a cultivated crop closely related to bitter gourd.

Photo 19. Young fruits of ivy gourd at a local marketplace in Mindat district of Chin State. This is cultivated in Chin State and widely in other areas of Myanmar.