

A Field Study to Explore Plant Genetic Resources in the Sagaing Region of Myanmar in 2015

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Summary

This is a report of a Myanmar-Japan cooperative field study exploring plant genetic resources in the northern Sagaing Region of Myanmar in November 2015. The study was conducted as part of the Grant-in-Aid Program (KAKEN) for Overseas Academic Survey of Basic Research Type A titled “Utilization and Conservation of Endangered Plant Genetic Resources and Associated Traditional Knowledge and Evaluation of Influence from Local Development Activities and International Economy in Remote Area of Minorities Dwelling” (Program code No. 25257416, Program Leader: Prof. Dr. Kazuo Watanabe, Tsukuba University). The field study was based on previous works (Domon *et al.* 2015a, 2015b) conducted in Hkamti and Lahe townships, which indicated that the people in the scattered villages in the hilly and mountainous areas maintained a diversity of traditional crops and varieties, mainly in slash-and-burn cultivation fields and backyard gardens. The objectives of the field study were to confirm the crop diversity in the areas and explore more plant genetic resources, as well as to gather relevant information including the surrounding areas. The main target areas were Lahe township and neighboring Layshee township, which are two of the three townships in the Naga Self-Administered Zone. We interviewed village people and collected plant genetic resources together with location data and information about plant species vernacular names, agricultural practices and food preparation or other uses. Slash-and-burn cultivation

was commonly practiced on mountain slopes where rice, other cereals, food legume, roots and tuber crops, various vegetables and miscellaneous herbs and spices are planted in mixed cropping. On the other hand, terraced-rice farming is commonly practiced using mountain stream water for irrigation in Layshee township, while slash-and-burn cultivation was of the secondary importance there. We collected 82 samples of plant genetic resources for food and agriculture, which included rice (46 samples), wild azuki bean (4), chili pepper (3), perilla (3), rice bean (3), tree spinach (3), foxtail millet (2), Job's tears (2), cowpea (2), soybean (2), Chinese peppers (2), amaranth (1), brown mustard (1), cucumber (1), black seed squash (1), lablab bean (1), basil (1), Italian parsley (1), common bean (1), sesame (1), and sorghum (1). The collected plant materials were divided into two subsets - one to be conserved at the Seed Bank of Myanmar while the other will be maintained at NIAS Genetic Resources Center (NIAS GRC, now NARO GRC) in Japan, after transfer there in accordance with national and international legislation and operative procedures.

KEY WORDS: Sagain Region, Myanmar, Agro-biodiversity, Naga people, Vernacular names

Introduction

This is the report of a Myanmar-Japan joint field study planned on the basis of the earlier works in Hkamti and Lahe townships (Domon *et al.* 2015a, 2015b), which indicated that the people in scattered villages in the hilly and mountainous areas maintained a diversity of traditional crops and varieties, mainly in slash-and-burn cultivation fields and backyard gardens (home gardens). Those works reported abundant species mixed-cropped on steep slash-and-burn cultivation fields. Each crop was often called different vernacular names even in adjacent villages, whereby a linguistic diversity might be also suggested. Some villages near Lahe could not be accessed due to traffic conditions. The present field study was aimed at confirming the crop diversity in the target areas and at exploring more plant genetic resources as well as gathering relevant information, since the crop species and villages surveyed in the previous works were limited. The main target areas were Lahe township and neighboring Layshee township, which are two of the three townships in the Naga Self-Administered Zone (Naga SAZ).

The joint field study team interviewed village people and collected plant genetic resources together with location data and information about vernacular names, agricultural practices and food preparation or other uses, and collected plant genetic resources for food and agriculture.

The field study was conducted under the “Memorandum of Understanding for Collaborative Research Project on Genetic Resources for Food and Agriculture” between the Department of Agricultural Research (DAR), Ministry of Agriculture and Irrigation (MOAI), Myanmar and the National Institute of Agrobiological Sciences (NIAS), Japan, which was signed by both parties in 2014. The research was conducted as part of a Grant-in-Aid Program (KAKEN) for Overseas Academic Survey of Basic Research Type A titled “Utilization and Conservation of Endangered Plant Genetic Resources and Associated Traditional Knowledge and Evaluation of Influence from Local Development Activities and International Economy in Remote Area of Minorities Dwelling” (Program code No. 25257416, Program Leader: Prof. Dr. Kazuo Watanabe, Tsukuba University) granted by the Japan Society for the Promotion of Science (JSPS) under the jurisdiction of the Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan.

Methods

A Myanmar-Japan cooperative field study in the northern Sagaing Region was planned based on discussions by Kawase (MK), Min San Thein (MST) and Watanabe (KW), and Domon (ED), who acted as a liaison and coordinated preparatory negotiations and arrangements between NIAS Genetic Resources Center (NIAS GRC, now NARO GRC) and DAR. The field-study team consisted in a Myanmar research officer (MST) appointed by DAR and two Japanese researchers (MK and KW). The team flew to Hkamti (also written as Khamti or Kanti) on November 10, 2015; there, it explored Hkamti town and the vicinity, went eastward along the border between Hkamti township and Lahe township using a hired 4x4 vehicle. The team stayed at Payu (Pay U, Pa Yu, Payo or else) village and went back halfway and turned northward to Lahe town and its vicinity in Lahe township (Table 1, Fig. 1). The exploration areas in Hkamti and Lahe townships had been planned wider, but were similar to or even narrower than in 2014, due to poor road conditions. Therefore, we finished exploring Lahe township, came down from Lahe town to Hkamti town on November 13, went on the Chindwin river down to Htamanthi (Tamanthi or Tamananthe) by boat, and then moved to Layshee (Layshi or Leshi) town on November 14. We visited several mountainous villages in Layshee township including Somra (Sum Ma Rar) using another 4x4 vehicle. During the field study, rainfalls were scarcely experienced, as the rainy season was over.

During the journey, the team asked local people along the exploration route about crops produced and consumed at each site, such as rice, millets, pulses, and vegetables. The procedures were 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/>). The photographs of 73 crops were shown to local people to collect vernacular names through an interview at each site.

The team visited several slash-and-burn cultivation fields for collecting crops grown in the fields or

Table 1. Itinerary of the field study in the Sagaing Region in November 2015

No.	Date	Day	Route, places & activity	transporter	Stay
1	2015/11/8	SUN	Japanese members arrive at Yangon	flight	Yangon
2	2015/11/9	MON	Yangon - Mandalay Myanmar and Japanese members join	flight	Mandalay
3	2015/11/10	TUE	Mandalay - Hkamti	boat	Hkamti
4	2015/11/11	WED	Hkamti - Payu	vehicle	Payu
5	2015/11/12	THU	Payu - Lahe	vehicle	Lahe
6	2015/11/13	FRI	Lahe - Hkamti	vehicle	Hkamti
7	2015/11/14	SAT	Hkamti - HtamanthiI - Layshee	boat/vehicle	Layshee
8	2015/11/15	SUN	around Layshee	vehicle	Layshee
9	2015/11/16	MON	Layshee - Somra	vehicle	Somra
10	2015/11/17	TUE	Somra - Nga Chan - Layshee	vehicle	Layshee
11	2015/11/18	WED	around Layshee	vehicle	Layshee
12	2015/11/19	THU	Layshee - Htamanthi - Hommalin	vehicle/boat	Hommalin
13	2015/11/20	FRI	around Hommalin	car	Hommalin
14	2015/11/21	SAT	Hommalin - Mandalay - Yezin	flight/car	Yezin
15	2015/11/22	SUN	investigate & pack collection	car	Yezin
16	2015/11/23	MON	investigate & pack collection courtesy visit to DAR DG, DOA DG	car	Yezin
17	2015/11/24	TUE	Yezin – Yangon, plant quarantine	car	Yangon
18	2015/11/25	WED	plant quarantine, visit JICA Office	car	Yangon
19	2015/11/26	THU	report making, leave Yangon -	car/flight	
20	2015/11/27	TUE	arrive at Japan		

Note:

DAR: Department of Agricultural Research

DOA: Department of Agriculture

just after harvest and interviewed farmers about their cultivation practices and utilization of their produce. Cereals, legumes, vegetables, as well as herbs and spices were our main concern.

Collected materials were transferred to Seed Bank, Biotechnology, Plant Genetic Resources and Plant Protection Division (BPGRPPD), DAR, MOAI, at Yezin, Myanmar. Each sample was tentatively designated, cleaned and divided into two subsets - one for conservation at the Myanmar Seed Bank and another for NIAS GRC under the Standard Material Transfer Agreement (SMTA) of International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) of the United Nations Food and Agriculture Organization (FAO), and relevant plant quarantine processes in both countries.

Results and Discussions

The observation at Payu village and around Lahe town

Located about 1,200 m above sea level, Payu village is rather isolated from Hkamti town and from Lahe town, due to poor road conditions. Christian Naga (Khamniu Ngan Naga) people are predominant in the village. Public school teachers and Buddhist monks were dispatched from other places of Myanmar.

Slash-and-burn cultivation is widely practiced on large plots by farmers of Payu and adjacent villages. Their slash-and-burn cultivation fields were often, from 30 minutes to one-hour or more walking distance from their villages. One or more work huts are always built on each plot. The fields are cooperatively managed by Payu farmers. For example, we visited a plot (WP008) cultivated by some families living about 30-minute on foot from the village and we observed that the family that included children after school was transporting harvested goods in the afternoon (Photograph 1). In addition to rice (*Oryza sativa* L.) which was their staple food, other cereals were planted on the same plot, such as maize (*Zea mays* L.), pearl millet (*Pennisetum glaucum* (L.) R. Br.), Job's tears (*Coix lacryma-jobi* L. var. *mayuen* (Rom. Caill.) Stapf) and sorghum (*Sorghum bicolor* (L.) Moench); food legumes, like rice bean (*Vigna umbellata* (Thunb.) Ohwi et Ohashi), soybean (*Glycine max* (L.) Merrill), and lablab bean (*Lablab purpureus* (L.) Sweet); vegetables, such as brown mustard (*Brassica juncea* (L.) Czern.), eggplant (*Solanum melongena* L.), okra (*Abelmoschus esculentus* (L.) Moench), pumpkin (*Cucurbita moschata* Duchesne ex Poir.), and tree-spinach (*Chenopodium* sp.); root and tuber crops such as taros (*Colocasia esculenta* (L.) Schott and *Xanthosoma sagittifolium* (L.) Schott), cassava (*Manihot esculenta* Crants), ginger (*Zingiber officinale* Roscoe), and yams (*Dioscorea* spp.); fruit trees such as papaya (*Carica papaya* L.) and banana (*Musa* spp.), and herbs and spices, such as chili pepper (*Capsicum annuum* L.), perilla (*Perilla frutescens* (L.) Britton var. *frutescens*), basil (*Ocimum basilicum* L.) and *Elsholtzia blanda* (Benth) Benth (Photograph 2). The taxonomic treatment of tree spinach has been confusing. It might be *Chenopodium bengalense* (Lam.) Spielm. ex Steud, or *C. giganteum* D. Don, or *C. formosanum* Koidz; thus, a more detailed study is required to ascertain the identity of this accession. Local people informed us that the seed was used for brewing, while the leaves were used as vegetables.

U Kwe aged 80, the hereditary chieftain (called sawbwa) of Payu village and his daughter, taught us about crop names and cultivation practices. He remembered that Imperial Japanese Army soldiers visited the village during World War II being driven back probably from the Imphal Campaign. In those days, Naga people dwelled both, in Myanmar and India, claiming autonomous territory; some had educational experiences in India. They told us that there were about 100 families which comprised a population of over 500, who were growing crops by slash-and-burn farming and several vegetables and fruit trees in home gardens. Other villagers told us that they used a plot of a slash-and-burn field only once about every 17

years.

One-year cultivation followed by a long fallow in the slash-and-burn farmed areas is supported by the observation by two of the three team members (MST and MK) who had visited the same site near Pa Sang (Pa Saung or Pa Chaung) in 2014. The field where several crops had been mixed-cropped in 2014 became an abandoned slope field covered with wild grasses and shrubs in 2015 (Photograph 3).

We visited only a few neighboring villages around Lahe town at an altitude near 1,000 m above sea level. We recorded crop names at Mon Htwe village, near Lahe town, but we could not survey remoter villages due to road closure by fallen trees and other poor road conditions; therefore, we concluded the survey in Lahe township one day earlier and decided to move to Layshee.

The observation in Layshee township

We visited Layshee town located at around 1,300 m above sea level (Photograph 4). Layshee is the capital of Layshee township. According to the Township Office of Department of Agriculture (DOA), MOAI, there are more than 17,000 people of the tribes Thankul Naga, Makuri Naga, Para Naga and others, who were mostly engaged in agriculture in the township. Thankul Naga and Makuri Naga people are mostly Christian, although some Para Naga people are Buddhists.

We observed that slash-and-burn cultivation of various crops is commonly practiced in the Layshee township, similar to the mountainous areas we visited in Hkamti and Lahe townships. As was seen in a field (Photograph 5), rice was the major crop in the slash-and-burn fields, on which tree spinach, maize, sorghum, Job's tears, soybean, common bean (*Phaseolus vulgaris* L.), sword bean (*Canavalia gladiata* (Jacq.) DC.), pigeon pea (*Cajanus cajan* (L.) Millsp.), pumpkin, ash gourd (*Benincasa hispida* (Thunb.) Cogn), eggplant, cockscomb (*Celosia argentea* L.), cassava, yams, roselle (*Hibiscus sabdariffa* L.), kenaf (*Hibiscus cannabinus* L.), sugarcane (*Saccharum officinarum* L.), edible canna (*Canna edulis* Ker Gawl., synonym *C. indica* L.), sesame (*Sesamum indicum* L.), perilla, ginger, chili pepper, and other useful plants were grown together. Fruit trees, such as avocado (*Persea americana* Mill.), peach (*Prunus persica* L.), mango (*Mangifera indica* L.), jackfruit (*Artocarpus heterophyllus* Lam.), banana (*Musa* spp., three types), and sweet orange (*Citrus x sinensis* (L.) Osbeck) were also grown near the fields.

U Sea Pe, a school teacher at Kuki village told us that farmers usually cut down trees and shrubs in the beginning of February, burn the dried trees and shrubs in end of March and sow crop seeds in mid-April. The same plot was used every eight years, which was shorter than in the case of Payu fields, but long enough for vegetation to recover. Depending on the geographical conditions, farmers cultivate crops on terraces or on slash-and-burn fields. Compared with Lahe township, which was characterized by steep slopes used for shifting slash-and-burn farming, Layshee township had more gentle slopes suited for rice terraces and water sources from the mountains. We found some stretches of grassland without wood on the hills near Somra town in the Layshee township. The topsoil on such rocky hills might be too thin to cultivate or harbor woods needed for slash-and-burn farming.

On the other hand, we were surprised by U San War, Township Manager of DOA, who informed us that, in all, there were 51 acres of terrace-rice farming and lowland fields in the township, since almost no irrigated paddy fields were found around Payu and Lahe. On the way from Layshee town toward Somra town, we saw many rice terraces where rice plants had been already harvested (Photograph 6). The rice terraces were called “hlay ga htit” and were irrigated with water from mountain streams. For example, U Thein Win, U Soe Maung, U De Be and others at Pan Sat village (WP040) told us that there were about

300 households with over 1,600 people of Tannkhul Naga, mostly Christians. They told us that rice was sown in mid-February in nurseries and then seedlings were transplanted onto the terraces at the end of May. They did not do slash-and-burn farming with mixed cropping in the mountains, but grew vegetables in the fields near their houses instead. They said that they grew more than ten cultivars of non-glutinous rice and four of glutinous rice.

Somra town is near the border with Nagaland State, India, at an altitude of over 1,900 m above sea level (Photograph 7). Local people on both sides of the border often trade across the border, which is confirmed by the presence of several Indian Mahindra 4x4 vehicles having Assam, Manipur and Nagaland license plates. Some villages near Somra grow rice on many terraces and vegetables and other crops in fields near their houses.

Some other observation

We visited local markets at Hkamti town and Hommalin town, where a wide variety of vegetables were traded. Fresh vegetables were available, particularly early in the morning. No such market places were seen in Lahe, Layshee or Somra towns, where there were small shops. In addition to popular vegetables like cucumber (*Cucumis sativus* L.), the local community actively used chayote (*Sechium edule* (Jacq.) Sw.), mustards (*Brassica* spp.), coriander (*Coriandrum sativum* L.), cabbage (*Brassica oleracea* L. var. *capitata* L.), carrot (*Daucus carota* L.), radish (*Raphanus sativus* L. var. *longipinnatus* L.H. Biley), pumpkins (*Cucurbita* spp.), cauliflower (*Brassica oleracea* L. var. *botrytis* L.), and so on, besides small cucurbitaceous fruits frequently seen. For example, wild edged cucumber (*Gymnopetalum chinense* (Loureiro) Merrill) (Photograph 8, left), balsam apple (*Momordica balsamina* L.) (Photograph 8, right), and ivy gourd (*Coccinia grandis* (L.) Voigt) (Photograph 9) might be taken as new genetic resources. Black seed squash (*Cucurbita ficifolia* Bouché) was seen in Shwe Pyi Aye village (WP039, Photograph 10) and in Lay Yun village (WP042).

On the contrary, common practices of slash-and-burn farming and mixed cropping in the surveyed areas showed certain similarity, but also differences with respect to fields surveyed in Kachin State, where many root and tuber crops are frequently cultivated in mixed cropping in the fields and traded in local markets (Watanabe *et al.* 2006). The similarity was that many starchy root and tuber crops, such as sweet potato, potato, taros, and cassava occur in both cultivation schemes. However, we saw yams and cultivated Zingiberaceae species, but not so abundantly, compared to Kachin State. Especially Naga people did not use turmeric, ginger, or galangal so much; consequently, they did not maintain a wide genetic variation of those crops. Some species that we had seen often in the slash-and-burn cultivation fields and local markets in Kachin State, such as *Rhynchanthus* spp. called “chou zin” were not found in the present field study in the Sagaing Region.

There were several populations of wild azuki bean (*Vigna angularis* (Willd.) Ohwi et Ohashi var. *nipponensis* (Ohwi) Ohwi et H. Ohashi) or related wild *Vigna* species often on the roadsides in Lahe (Photograph 11) and Layshee townships. Wild perennial buckwheat, *Fagopyrum cymosum* (Trevir.) Meissn., was widely distributed in both townships. Those miscellaneous vegetables and crop wild relatives were not the primary targets of the present study, but should be explored by specialists.

Vernacular names of crops in Layshee townships and vicinity

Printed photographs of 73 crops collected during the previous field surveys were shown to local

people at eight villages in Layshee township, two at Lahe township and one at Hommalin town, in order to make sure which crop was grown, and to collect vernacular names at the site (Table 2). Since we were not linguists nor trained in phonetics, and since we could only spend a short time interviewing village people, surely our records will reveal many mistakes in hearing or documentation. Thus, results on vernacular names should be considered as preliminary records, which can be progressively corrected by subsequent studies. MK and MST recorded crops names in the same village (Payu) both, in 2014 and this time, which were not so different, and then covered a wider range of crops.

Many crop names used in Naga villages in the mountains of Layshee township were often rather unique and were largely variable from village to village, except for some crops for which the names were loanwords from Myanmar (Bama) language. Some similarity was sometimes observed between villages belonging to the same tribes. For example, similar vernacular names of crops were used by Para Naga informants at Layshee Quarter 2 (WP029), Layshee Myoma Quarter (WP035) and Pein Nel Kone (WP054 and 055), which were near each other. On the other hand, Tan Khul Naga informants at Pan Sat and Nga Chan villages did not show much similarity. We also interviewed Kuki Chin people at Yan Nway village in Layshee township and Tailai Shan people at Hommalin town.

A large diversity of vernacular names suggested that a more precise survey of names should be done, particularly in Layshee township. Through interviews on crops names, villagers were very kind to tell us not only the crop names, but cultivation practices, uses, characteristics of different varieties, and so on, and we learned about their agriculture and ways of life.

Plant genetic resources collected

The team visited the Sagaing Region shortly after harvest season and could collect plant genetic resources grown on the cultivation fields, dried after harvest, stored in the hut or farm houses together with information on cultivation practices and usages. In some highland and colder areas like Somra town, an earlier visit for about a month might have been better to see standing crops and harvest, but the muddy conditions of the road could be a much more serious limitation during the rainy season. The field study team collected 82 samples of plant genetic resources for food and agriculture, which included of rice (46 samples), chili pepper (3), perilla (3), rice bean (3), foxtail millet (2), Job's tears (2), cowpea (2), soybean (2), Chinese peppers (2), amaranth (1), brown mustard (1), cucumber (1), black seed squash (1), lablab bean (1), basil (1), Italian parsley (1), common bean (1), sesame (1), and sorghum (1), as listed in Table 3. As for crop wild relatives, there were several populations of wild *Vigna* species and four samples of wild azuki bean (*Vigna angularis* var. *nipponensis*) that we collected.

The collected materials were divided into two subsets; one to be conserved in the Seed Bank, BGRPPD, DAR, MOAI, located at Yezin, Nay Pyi Taw, Myanmar for further research and crop improvement, while the other was transferred with a SMTA and a phytosanitary certificate issued by the Plant Quarantine Office of DOA, Yangon, Myanmar to Japan, to be conserved in the NIAS GRC in Tsukuba, Japan.

Potential crop genetic diversity in northern Sagaing Region

The present survey demonstrated that, as indicated by two previous works (Domon *et al.* 2015a, 2015b) conducted in Hkamti and Lahe townships, the people in scattered villages in the hilly and mountainous areas maintained a diversity of traditional crops and varieties mainly in slash-and-burn

cultivation fields and backyard gardens also in Layshee township.

Flash reports of general election votes counted were broadcasted every day when we visited the areas. Most people were excited by the news that Ms Aung San Suu Kyi's National League for Democracy (NLD) won a landslide victory that exceeded all expectations. Assembly members elected from Lahe and Layshee townships were drastically changed. People expected a renewed thrust for the development of these areas. Their life and agriculture will be changed quickly according with changes in the political situation, which might accelerate the loss of traditional crops and varieties. We would like to recommend that the field study to explore and collect plant genetic resources and their information should be carried out as soon as possible, particularly in the villages of Layshee township. The present achievement also suggests that miscellaneous vegetables, such as cucurbitaceous species and some crop wild relatives need to be explored by specialists.

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ミャンマー Sagaing 地方域における植物遺伝資源の 探索収集, 2015 年

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和文摘要

本報は、科学研究費基盤 (A) 海外学術調査「辺境少数民族地帯での植物利用及び伝統知の遺存と地域発展活動や国際経済の影響評価」(研究課題番号 25257416 研究代表者 筑波大学 渡邊和男) の調査の一環として、2015 年 11 月にミャンマーのザガイン地方域、とくにナガ人居住山地を対象に実施した植物遺伝資源に関する共同現地調査隊の報告である。今までにおこなったザガイン地方域カムティ郡区およびラヘー郡区での現地調査や観察の結果、伝統的農作物・品種の多様性が示唆され、今回はカムティ郡区およびラヘー郡区での多様性の再確認、できれば調査していない同郡区の山村、ならびに隣接するレイシー郡区を対象に選んだ。本調査隊は山村を訪問し、地理情報、地方名、農作業法、調理法等の利用法とともに植物遺伝資源を収集した。カムティ郡区およびラヘー郡区の山地の傾斜地では焼畑が共通して営まれ、主要食用作物であるイネとともに、モロコシ、ハトムギ、トウモロコシ、シコクビエ、フジマメ、タケアズキ (ツルアズキ)、ササゲ、ダイズ、キャッサバ、シャロット、トマト、エゴマ、トウガラシ、ローゼル、ニガウリ、ヘチマ、カボチャ、サトイモ類、ヤマイモ類、アカザ類、バジル類、カラシナ、バナナ、ショウガ等が様々な形で混植され栽培されていた。パユー村での聞き取りでは、焼畑は村で管理し、数家族がひとつの焼畑を営んでおり、およそ 17 年に一度の頻度で利用する。また、野菜類の一部や果樹は家屋の周辺にも栽培されていた。しかし、2014 年の調査以上の範囲は道路状況等により困難と判断し予定より一日早くレイシー郡区に移動した。レイシー郡区はレイシー町近傍などに焼畑も営まれているが、なだらかな傾斜と山からの湧水を利用した棚田が多く営まれていた。同郡区のレイシー町からインド国境に近いソムラ町までの一帯を調査したが、一部は木が生えず表土が岩山に薄く乗った状況で草原となっていて焼畑に適していない場所あり、そのような場所は農業に利用されていなかった。焼畑と棚田の頻度は山村の立地条件で異なっていた。クキ村での聞き取りでは 8 年に一度同じ地点を焼畑に使うということで、パユー村よりは短い、焼畑として 1 年間利用した後は長い休耕期間を置き植生の回復を図ることは共通していた。現地調査の結果、82 点の遺伝資源を収集した。作物としてはイネ 46 点、トウガラシ類 3 点、エゴマ 3 点、タケアズキ (ツルアズキ) 3 点、アカザ類 3 点、アワ 2 点、ハトムギ 2 点、ササゲ 2 点、ダイズ 2 点、サンショウ類 2 点、アマランサス 1 点、カラシナ 1 点、キュウリ 1 点、クロタネカボチャ 1 点、ハナマメ 1 点、イタリアンパセリ 1 点、インゲンマメ 1 点、ゴマ 1 点、モロコシ (ソルガム) 1 点、バジル 1 点、作物近縁野生種としてヤブツルアズキ 4 点を収集し、これらはミャンマーと日本の両国のジーンバンクで保存されることとなった。日本への導入は、食料・農業植物遺伝資源条約

の定型の素材移転契約を結び、双方の国内手続きにのっとなって実施した。今回の調査の結果、ザ
ガイン地方域の山地には多様な作物の地方品種が残存している一方、現在急速に進んでいる社会
経済的な変革によって農業生物多様性が滅失することが危惧され、この地域の作物遺伝資源を可
及的速やかに収集し研究すべきであると結論した。また、今回の観察結果からさまざまなウリ科
遺伝資源や作物野生近縁種に関しては専門家による調査が急務である。

Table 2 Summary of interviews on traditional crops in the Sagaing Region of Myanmar in 2015

			dd/mm/yyyy	11/11/2015	12/11/2015	14/11/2015	15/11/2015	15/11/2015	16/11/2015	16/11/2015	17/11/2015	18/11/2015	21/11/2015	
			Village	PAYU	MON HTWE	YAN NWAY	LAYSHEE QUARTER No 2	LAYSHEE MYOMA QUARTER	KUKI	PAN SAT	NGA CHAN	PEIN NEL KONE (SO SU TE NDA)	HOMMALIN	
			Township, Region	HKAMTI, Sagaing	LAHE, Sagaing	LAYSHEE, Sagaing	LAYSHEE, Sagaing	LAYSHEE, Sagaing	LAYSHEE, Sagaing	LAYSHEE, Sagaing	LAYSHEE, Sagaing	LAYSHEE, Sagaing	LAYSHEE, Sagaing	HOMMALIN, Sagaing
			map location (waypoint)	WP007	WP017	WP023	WP029	WP035	WP038	WP040	WP049	WP054/WP055	WP060	
			latitude (N)	26°00'07.4"	26°11'22.2"	25°22'52.4"	25°27'04.7"	25°26'56.5"	25°22'32.4"	25°25'33.0"	25°18'30.0"	25°28'49.1"	24°51'52.1"	
			longitude (E)	95°24'19.0"	95°29'56.9"	95°11'27.9"	94°57'25.2"	94°57'52.6"	94°49'07.7"	94°44'37.7"	94°41'15.6"	94°58'02.3"	94°54'32.7"	
			altitude (m)	1,238	1,165	208	1,340	1,194	1,551	1,707	1,576	1,016	130	
No	crop name in Myanmar	crop name in English	Latin name											
1	saba dehusked: san cooked: htamin	rice	<i>Oryza sativa</i> L	tsi cultivar names: zoniya zo theik za liang zo sin nieu zo kop nieu na ma shieu leo zo tso	zo, tzot, zot cultivar names: sai liang pa kang san fan zo but to zo zo gan zot	zang	ayar (ajar)	a jar morro (glutinous variety)	ther	thar cultivar names: fu pra tha an jak tha a pawn ta poh tha we ri ka rain poh si hwei ra mang lha ka theng poh a wa ra ka dei ne po ri (waxy) son ra (waxy) anno krebo (waxy) anno zu (waxy) killi (waxy)	dat tsu cultivar names: a zuwu tsu ga than ga than ga khwei pa ka than mizak pa ka ma ngak pa ga than mizok pa pa ga rei pa ma khue tsu yajo tsu ga ngee mizak pa a yaw tzu mizak pa	ajya (aya) cultivar names: ka la so ta bu sha sha la may jah ka le jah jah	khaud, khaud pet	
2	pyoung bu	maize	<i>Zea mays</i> L	chon ngan	palam	kwe bu	lat se yi (lat se ji)	lat se ji	bothar	pachiu	khong tzei	lat se zhi	khaud pha	
3	gjoun	common wheat	<i>Triticum aestivum</i> (L.) Thell ssp <i>vulgare</i> (Vill.) Mackey	-	-	-	-	gjone	-	-	-	-	gjone	
4	gjoun	durum wheat	<i>Triticum turgidum</i> (L.) Thell ssp <i>turgidum</i> conv <i>durum</i> (Defs.) Mackey	-	-	-	-	-	-	-	-	-	-	
5	mu yaw saba	barley	<i>Hordeum vulgare</i> L	-	-	-	-	-	-	-	-	-	-	
6	hnan sa pyoung	sorghum	<i>Sorghum bicolor</i> (L.) Moench	ma zam, ma lam	-	kempu	-	lat lu (no cultivation)	sit ther, sit ther pe	maroh thuh shatei	tzu tzu pat	ah le qia	-	
7	kala sat	peral millet	<i>Pennisetum glaucum</i> (L.) R Br (syn <i>P. americanum</i> (L.) Leeke)	kala chinyap	netkon	-	-	-	sit ther	-	-	teh	-	
8	sat ni	finger millet	<i>Eleusine coracana</i> (L.) Gaertn	omkae chinyap	-	-	-	-	-	-	tamu	-	-	
9	sat	foxtail millet	<i>Setaria italica</i> (L.) P Beauv	chinyap	liem	-	te (no cultivation)	shat zue (no cultivation now)	sit ther	da maa	tamu	teh	-	
10		barnyard millet	<i>Echinochloa</i> sp	-	-	-	-	-	-	-	-	-	-	
11		kodo millet	<i>Paspalum scrobiculatum</i> L	-	-	-	-	-	-	-	-	-	-	
12		yellow foxtail millet	<i>Setaria pumila</i> (Poir.) Roem & Schult	-	-	-	-	-	-	-	-	-	-	
13	lu	common millet	<i>Panicum miliaceum</i> L	homi	-	-	-	-	-	-	-	-	-	
14	kala lu	little millet	<i>Panicum sumatrense</i> Roth ex Roem et Schult	-	-	-	-	-	-	-	-	-	-	
15		korne	<i>Brachiaria ramosa</i> (L.) Stapf	-	-	-	-	-	-	-	-	-	-	
16	pe bouk	soybean	<i>Glycine max</i> (L.) Merrill	chiu tep, chieu tep	kashiu teik	bat tu	so tah (so ta)	sothar	maru	reng ti	mara tzei	swa thra	thou hae	
17	bo sa pe	common bean	<i>Phaseolus vulgaris</i> L	kyan lone	kashiu kyan	-	-	mashi thar	kou the	muh tei ga yak poh	niet tun tzei	ma she thra	sagri pe	

Table 2 (Continued)

			dd/mm/yyyy	11/11/2015	12/11/2015	14/11/2015	15/11/2015	15/11/2015	16/11/2015	16/11/2015	17/11/2015	18/11/2015	21/11/2015		
			Village	PAYU	MON HTWE	YAN NWAY	LAYSHEE QUARTER No 2	LAYSHEE MYOMA QUARTER	KUKI	PAN SAT	NGA CHAN	PEIN NEL KONE (SO SU TE NDA)	HOMMALIN		
			Township, Region	HKAMTI, Sagaing	LAHE, Sagaing	LAYSHEE, Sagaing	LAYSHEE, Sagaing	LAYSHEE, Sagaing	LAYSHEE, Sagaing	LAYSHEE, Sagaing	LAYSHEE, Sagaing	LAYSHEE, Sagaing	LAYSHEE, Sagaing	LAYSHEE, Sagaing	HOMMALIN, Sagaing
			map location (waypoint)	WP007	WP017	WP023	WP029	WP035	WP038	WP040	WP049	WP054/WP055	WP060		
			latitude (N)	26°00'07 4"	26°11'22 2"	25°22'52 4"	25°27'04 7"	25°26'56 5"	25°22'32 4"	25°25'33 0"	25°18'30 0"	25°28'49 1"	24°51'52 1"		
			longitude (E)	95°24'19 0"	95°29'56 9"	95°11'27 9"	94°57'25 2"	94°57'52 6"	94°49'07 7"	94°44'37 7"	94°41'15 6"	94°58'02 3"	94°54'32 7"		
altitude (m)	1,238	1,165	208	1,340	1,194	1,551	1,707	1,576	1,016	130					
No	crop name in Myanmar	crop name in English	Latin name												
18	pe di sein	mung bean	<i>Vigna radiata</i> (L.) Wilczek	-	-	-	-	-	-	-	-	-	pe di		
19	mat pe	black gram	<i>Vigna mungo</i> (L.) Hepper	-	-	-	-	-	-	tonde	-	-	thou		
20	chin pe, taung ya pe	rice bean	<i>Vigna umbellata</i> (Thunb.) Ohwi et Ohashi	chum, chuun	kashiu	be kun bwe	thar	thar re	ju thar, jutthar	dande	tze ray	thra reh	thou na khaud		
21	pe zaung ya	winged bean	<i>Psophocarpus tetragonolobus</i> (L.) DC	awoo lapon	name uncertain	be jun nei, be jun ni	po jyi pleri (po yi pleri)	thar pleri	let tho si tho	(they have)	-	po zhi be ri ri	thou ma phun		
22	pe lun	cowpea/yard-long bean	<i>Vigna unguiculata</i> (L.) Walpers	chiu kyan	name uncertain	be lowe	-	zat tu	let kyao tho	muh tei rang ga sun poh	khun tzei	za thu	la za pe		
23	kala pe	chickpea	<i>Cicer arietinum</i> L.	-	kala pe	-	-	-	-	-	-	-	-		
24	pe zin ngoun	pigeon pea	<i>Cajanus cajan</i> (L.) Millsp	-	-	-	-	allo so tha thar	kasha let thar	niih thun lonte	nithong mayon tzei	ala swa thra thra	pe sin ngoun		
25	pegyi	lablab bean	<i>Lablab purpureus</i> (L.) Sweet	lapon	la pue, lapun	-	po jyi (pau gyi)	po jyi	gat za tha	lonte	mayon tzei	po zhi	thou ma khaud		
26		moth bean	<i>Vigna aconitifolia</i> (Jacq.) Marechal	-	-	-	-	-	-	-	-	-	-		
27	pe dalet	sword bean	<i>Canavalia gladiata</i> (Jacq.) DC	asang Je kie	-	be lu	-	wat pwo	maru ju tha	noh rang tei	kri tzei	khara	-		
28	pan gjoun	buckwheat	<i>Fagopyrum esculentum</i> Moench	-	-	-	-	-	-	-	-	-	-		
29	pe wali	guar	<i>Cyamopsis tetragonoloba</i> (L.) Taub	-	-	-	-	-	-	-	-	-	-		
30	hin nu nwe	amaranth	<i>Amaranthus cruentus</i> L.*	-	-	-	-	cho pa te te	-	(they have)	hla hla mi mi	jo pha teh teh	-		
31	hin nu nwe	amaranth	<i>Amaranthus caudatus</i> L.*	-	-	-	-	-	-	-	-	-	-		
32	hin nu nwe	amaranth	<i>Amaranthus hypochondriacus</i> L.*	-	-	-	-	-	-	-	-	-	-		
33	hnan	sesame	<i>Sesamum indicum</i> L.	nyan hom	niem, nieman	-	cho	atzi	kotcho	khut chun, khut chun jaig	kha zun	jo	nga		
34	chin baung	kenaf	<i>Hibiscus cannabinus</i> L.	chin boung	chin boung	ba nai	chin baung	chin baung datoto	chin baung	chin baung	-	chin baung aphyu	chin baung		
35	chin baung ni	rosselle	<i>Hibiscus sabdariffa</i> L.	chin boung	chin boung	ba nai	chin baung	chin baung asasa	chn baung tha	chin baung	chin baung	chin baung ani	chin baung		
36	kyet hin khar	bitter melon	<i>Momordica charantia</i> L.	kyet hinga thee	makuka	zan khar	mak khar	makkha	makka si tha	chet hin khar	de jyi khakha ba tzei	mba khar	mau khun khaud		
37	pe lin mwe	snake melon	<i>Trichosanthes anguina</i> L.	gon lon thee	name uncertain	ba gui	wat le	zattu shusheo	lap po tha	polon thi	-	wed leh	mau mut yang		
38	wa u	elephant foot yam	<i>Amorphophallus</i> sp	-	-	-	-	-	puri puri tha	ku lwe thei tei	tarowu ze phu tzei	para zi ma koh koh	-		
39	hnet pyaw	banana	<i>Musa</i> spp	lu shep	"loi cho hap char loi (wild)"	"moa gan moa (wild)"	lat su, lappu lat su	"lat su lap lat su (wild)"	"hreu tha zaru chu hreu tha (wild)"	"lee thei tinoshung lee thei (wild)"	"nu tzei daran nu tzei (wild)"	"la su la pu la su (eild type)"	"mauk kwe thun (wild)"		
40	shan hnan	perilla	<i>Perilla frutescens</i> (L.) Britton var <i>frutescens</i>	nyam	nyem	they know but do not cultivate	atzi	jo	ko cho pi se be	khui tui	ka shee	a zhi	nga		
41	pan hnan	niger seed	<i>Guizotia abyssinica</i> (L. f.) Cass	-	-	-	-	-	-	-	-	-	(they know)		
42	pyi nyaung	banyan tree shoot	<i>Ficus benghalensis</i> L.	cam bi shieu	chon kun	-	thi pwe	thi ga	hru tha	kanu nuen	kazon yue	thri bwe	pahae		
43	myin khwa	Asiatic pennywort	<i>Centella asiatica</i> (L.) Urban	myin khwa ywet	tan kin	myin khwa (no cultivation)	so li li	dat sho li li	lut tutu	kha rue yen	khon ru yee	teh sho li kaka	pa nanna		
44	kyet thun meik	Chinese chive	<i>Allium tuberosum</i> Bottl ex Spreng	hauk thet	kandukum	zang nam	lo si to to	roschi ga	palo po se be	kashiu yen	soro phon yue	lo shi pa pa	hang phalaw		

Table 2 (Continued)

			dd/mm/yyyy	11/11/2015	12/11/2015	14/11/2015	15/11/2015	15/11/2015	16/11/2015	16/11/2015	17/11/2015	18/11/2015	21/11/2015	
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			altitude (m)	1,238	1,165	208	1,340	1,194	1,551	1,707	1,576	1,016	130	
No	crop name in Myanmar	crop name in English	Latin name											
45	gyu myit	Hooker chives	<i>Allium hookeri</i> Thwaites	hauk thet	kandukum	nang na nang nem	sat lat ku	tza lokku	sho shu	kashiu yen thue	ga san yee	ze le khu	kyumi, jumi	
46	kyet thun ni	shallot	<i>Allium cepa</i> L. Aggregatum Group	hauk thet kieu	piaz	nang nam sam	lo si	roshi sasa	palo hi be	kashiu yen gagabou	soro phon mit tu bat	la shi sa sa	phalaw nain	
47	kyet thun ni	Chinese onion	<i>Allium chinense</i> G. Don	hauk thet cau	name uncertain	nang nam sam	li sho	rit sho	palo ta she be	kashiu yen gangoba	acha thun nue soro phon	ri sho	phalaw nain	
48	kyet thun phyu	garlic	<i>Allium sativum</i> L.	-	lo sun ni	zang nam kan (no cultivation)	li sho	roshi toto	palo be uwe	shi ha	soro phon kha ma ngi bat	lo shi to to	phalaw nain	
49	nan nan	coriander	<i>Coriandrum sativum</i> L.	mak gee	mikkii	pate hom	chan bzi	cham bi	tschi ha di ve	-	shi ha	jeh mpi	kyi hong	
50	shan nan nan	Chinese celery	<i>Oenanthe javanica</i> (Blume) DC	-	-	-	-	-	-	gavan yen	masala	jeh mpi	shala kyi hong	
51	kala nan nan	Mexican coriander	<i>Eryngium foetidum</i> L.	kala gohon	hiitap	-	kala chan bzi	cham bi tutu	tsu ha so ve	-	a fon yee	jeh mpi tuh tuh	kyi hong kala	
52	ney pu hin khar							-	-	-	-	-	pu khon sai	
54	ma yoo							-	malu pi da	-	-	(they know)	phaud kan shae	
55	pana pawt							-	(they know)	-	-	(they know)	pa phaung	
56	pusi nan	mint (probably corn mint)	<i>Mentha</i> spp (probably <i>M. arvensis</i>)	-	nan nan	bu si nan (no cultivation)	put tin dar	pat tin da	yu bhi ra	soh yang	pu ti nat	put tin da	pu si nan	
57	sit pok	water mimosa	<i>Neptunia oleracea</i> Lour	-	-	han hu: (no cultivation)	si poka (su po)	sit poka	-	-	mat ton yue	si vu	phala	
58	pin zein	lomba	<i>Elsholtzia blanda</i> Benth	lao san	lau tsiang	-	sho lu lu	sho ruru	kashi ya	nip pin yen	khashi yee	sho ru ru	-	
59	jum kala pinzein	basil	<i>Ocimum basilicum</i> L.	mat san	-	ma yang	cho mu la	chom mula cohm mula toto chom mula sasa	li phi ro	misson yen	khadi khashi yee	joh ma ra	eai shin	
60	khayan khazaw	Indian nightshade	<i>Solanum violaceum</i> Ortega	koko sat cho	kuku	an yan kar	khe le le	chere khakhar	ji ke tha	shee ga khra thei	ka pak tzei	khje le khar khar, chje le khar khar	mak ku se	
61	khayan gyin	cultivated nightshade	<i>Solanum torvum</i> Swartz	phun ko pyan	kuku	san an yan	khe le le	che rere	malu pi ji khe tha	khra thei	ka pak tzei	kjhe le le, chje lele	mak hain zan	
62	taung paw kan sin	Chinese pepper	<i>Zanthoxylum</i> spp	ju	ju	shin ywe	man ga la si	mat ta sa	maga tha	ma so yang	mai ye tzei	ma tra sa	kan san	
63	kyeik	Job's tears	<i>Coix lacryma-jobi</i> L. var <i>ma-yuen</i> (Rom. Caill.) Stapf	inyap	nei	-	get suh	get tzu, get tsu	kayin the	yi tha, jyi tha	ta gaum tzu	get zhu	-	
64		tree spinach	<i>Chenopodium bengalense</i> (Lam.) Spielm. ex Steud.**	opan	mae hiyam	-	taru (tarru)	taru	zoru the	kathani	za ru tzu	tra ru	-	
65	pein u	taro	<i>Colocasia esculenta</i> (L.) Schott	lyam	don	bai	phar (pfar)	phuar	ghie	da pa	da bu	va	muang	
66	myauk u	yam	<i>Dioscorea</i> spp	kala	katak	ha:	thar	thar	khe tha	ra thei	da rei tzei	thra	mang	
67	palau pinau u pin	cassava	<i>Manihot esculenta</i> Crantz	paik kiy	po sun ghi	kotkai	so tam har	so thar makhar	chorla the	chun thuh wa thei	ga tzun nya tzei	so thra ma bar	thun	

Table 2 (Continued)

			dd/mm/yyyy	11/11/2015	12/11/2015	14/11/2015	15/11/2015	15/11/2015	16/11/2015	16/11/2015	17/11/2015	18/11/2015	21/11/2015	
			Village	PAYU	MON HTWE	YAN NWAY	LAYSHEE QUARTER No 2	LAYSHEE MYOMA QUARTER	KUKI	PAN SAT	NGA CHAN	PEIN NEL KONE (SO SU TE NDA)	HOMMALIN	
			Township, Region	HKAMTI, Sagaing	LAHE, Sagaing	LAYSHEE, Sagaing	LAYSHEE, Sagaing	LAYSHEE, Sagaing	LAYSHEE, Sagaing	LAYSHEE, Sagaing	LAYSHEE, Sagaing	LAYSHEE, Sagaing	LAYSHEE, Sagaing	HOMMALIN, Sagaing
			map location (waypoint)	WP007	WP017	WP023	WP029	WP035	WP038	WP040	WP049	WP054/WP055	WP060	
			latitude (N)	26°00'07.4"	26°11'22.2"	25°22'52.4"	25°27'04.7"	25°26'56.5"	25°22'32.4"	25°25'33.0"	25°18'30.0"	25°28'49.1"	24°51'52.1"	
			longitude (E)	95°24'19.0"	95°29'56.9"	95°11'27.9"	94°57'25.2"	94°57'52.6"	94°49'07.7"	94°44'37.7"	94°41'15.6"	94°58'02.3"	94°54'32.7"	
			altitude (m)	1,238	1,165	208	1,340	1,194	1,551	1,707	1,576	1,016	130	
No	crop name in Myanmar	crop name in English	Latin name											
68	ngayok	chilli pepper	<i>Capsicum annuum</i> L.	paik hiu	pei zi	mai za gat, mai za (shwe lan bo)	asa sa tatutu (shwe lan bo)	atza tzar atza tzar tutu (shwe lan bo)	mat tuo thar thu mat tuo thar (shwe lan bo)	ka hun thei ka ma sun thei (shwe lan bo)	ga tzun tzei barun tzei ga tzun tzei (shwe lan bo)	a tsa tsa	ma fid	
69	khayan gyin	tomato	<i>Solanum lycopersicon</i> L.	ko he zep	pin gana	-	chin bu se	chin bu asse	khayan chin	ma thu thei	ku tu tzei ka chie ba	jin bu seh	ma khae son, ma pu taung u	
70	khayan	egg plant	<i>Solanum melongena</i> L.	ko pyan	son ku	da dei	chin bu	chin bu khakhar	lat sho thar	ka san thei	la san tzei	jin bu	ma khae	
71	hpayon	pumpkin	<i>Cucurbita</i> spp	thwi zemp	ze zamp	mai	kyan bo	kyambo	zuo thar	man thei	a ma tzei	kya bu	ma ma pak khan	
72	kyauk hpayon	ash gourd	<i>Benincasa hispida</i> (Thunb.) Cogn	thwi jeg nieu	ze zamp	mai pun	kyan bo gyi (kyan bo zii)	kyambo gyi	zuo thar thu	man thei kaswen poh	a ma tzei zang	kyan bu G, kyan bu gyi	ma ma pak mon	
73	bu	bottle gourd	<i>Lagenaria siceraria</i> (Molina) Standl	myine	lao	um tam	ma rel	mare	ro gu thar	vak ther	ka le tzei	ma reh	nam thau mok	
note				KHIAMNIU NGAN NAGA tribe U San Kyi, U Kwe, U Kwe's daughter <i>et al</i>	U Lam	Kiki Chin tribe U Tan Kho Pawn	Para Naga tribe	Para Naga tribe	Kuka Naga tribe U Sea Pe	Tan Khul Naga tribe U thein Win, U Soe Mang, U De Be <i>et al</i>	Tan Khul Naga tribe U Rei Sing <i>et al</i>	Para Naga tribe U Khaw Re Ke, U Sa Le Mu, <i>et al</i>	Tailai Shan tribe Daw Su Su Htwe, Daw Khin Taung, <i>et al</i> by hearing at HOMMALIN airport GPS data shows HOMMALIN Town	

**Amaranthus cruentas*, *A. caudatus*, and *A. hypochondriacs* might be often confused with each other and/or with other species like *Celosia argentea*

***Chenopodium giganteum* D Don or *C. formosanum* Koidz

Table 3 List of plant materials collected in the Sagaing Region of Myanmar in 2015

Sr No *	JP No	local plant name "local variety name"	English name	Scientific name	Date MM/dd	VILLAGE NAME and/or nearest TOWN/VILLAGE			Latitude			Longitude			Altitude m	Source	Status	Status of plant sampled	Cultural practices	Sowing month	Harvest month	Topography	Site	Stoniness	Soil texture	Drainage	Farmer Name	glutinous	other observations	waypoint		
						°	'	"	°	'	"	°	'	"																		
1	254763	bo sar pe	common bean	<i>Phaseolus vulgaris</i>	11/10	HKAMTI town, HKAMTI Township	26	00	05	7	N	95	41	33	3	E	146	market place	landrace	seed									a seed shop at Hkamti Zee, a market place	WP01		
2	254764	pe tauk shay	cowpea	<i>Vigna unguiculata</i>	11/10	HKAMTI town, HKAMTI Township	26	00	05	7	N	95	41	33	3	E	146	market place	landrace	seed									a seed shop at Hkamti Zee, a market place	WP01		
3	254765	mon hnyin	mustard	<i>Brassica juncea</i>	11/10	HKAMTI town, HKAMTI Township	26	00	05	7	N	95	41	33	3	E	146	market place	landrace	seed									a seed shop at Hkamti Zee, a market place	WP01		
4	254766	niem ham	sesame	<i>Sesamum indicum</i>	11/11	KYAW YWET, HKAMTI Township	26	00	03	8	N	95	28	13	3	E	1,008	farmland	landrace	seed	shifting	May	mid-Nov	mountainous	slope	low	clay	good			WP005	
5	254767	"pashiu sa lu sho"	chili pepper	<i>Capsicum annum</i>	11/11	KYAW YWET, HKAMTI Township	26	00	03	8	N	95	28	13	3	E	1,008	farmland	landrace	seed	shifting	May	Nov	mountainous	slope	low	clay	good		short (5 cm) fruit, orange color	WP005	
6	254768	"pashiu so"	chili pepper	<i>Capsicum annum</i>	11/11	KYAW YWET, HKAMTI Township	26	00	03	8	N	95	28	13	3	E	1,008	farmland	landrace	seed	shifting	May	Nov	mountainous	slope	low	clay	good		long (10cm) fruit, orange color	WP005	
7	254769	tsi "gjon nai"	rice	<i>Oryza sativa</i>	11/11	KYAW YWET, HKAMTI Township	26	00	03	8	N	95	28	13	3	E	1,008	farmland	landrace	seed	shifting	May	mid-Nov	mountainous	slope	low	clay	good		non-glutinous		WP005
8	254770	inya	job's tears	<i>Coix lacryma-jobi</i> var <i>mayuen</i>	11/11	PAYU, HKAMTI Township	26	00	30	6	N	95	23	20	5	E	1,078	farmland	landrace	seed	shifting	May	Nov	mountainous	slope	low	clay	good	U San Kyi	cook together with rice to make <i>aye mu</i> for pigs Khamnu Ngan Naga tribe	WP008	
9	254771	opan	tree spinach	<i>Chenopodium bengalense</i> (<i>C. giganteum</i> , <i>C. tomosanum</i>)	11/11	PAYU, HKAMTI Township	26	00	30	6	N	95	23	20	5	E	1,078	farmland	landrace	seed	shifting	May	Nov	mountainous	slope	low	clay	good	U San Kyi	for pigs Seeds are used as medicine. Leaves are used for soup Khamnu Ngan Naga tribe	WP008	
10	254772	chum	rice bean	<i>Vigna umbellata</i>	11/11	PAYU, HKAMTI Township	26	00	30	6	N	95	23	20	5	E	1,078	farmland	landrace	seed	shifting	Apr	Dec	mountainous	slope	low	clay	good	U San Kyi	Khamnu Ngan Naga tribe	WP008	
11	254773	maylam (malam)	sorghum	<i>Sorghum bicolor</i>	11/11	PAYU, HKAMTI Township	26	00	30	6	N	95	23	20	5	E	1,078	farmland	landrace	seed	shifting	Apr/ May	Nov/ Dec	mountainous	slope	low	clay	good	U San Kyi	Khamnu Ngan Naga tribe	WP008	
12	254774	tsi "zo theik"	rice	<i>Oryza sativa</i>	11/11	PAYU, HKAMTI Township	26	00	07	4	N	95	24	19	0	E	1,238	farmstore	landrace	seed	shifting	May	Nov	mountainous	slope			U San Kyi	non-glutinous	Khamnu Ngan Naga tribe	WP007	
13	254775	chieu tep	soybean	<i>Glycine max</i>	11/11	PAYU, HKAMTI Township	26	00	07	4	N	95	24	19	0	E	1,238	farmstore	landrace	seed	shifting		Nov	mountainous	slope			U San Kyi, U Kwe, et al	boiled grains are packed in banana leaves and fermented to make <i>chieu tep</i> Khamnu Ngan Naga tribe	WP007		
14	254776	tsi "zo niya"	rice	<i>Oryza sativa</i>	11/11	PAYU, HKAMTI Township	26	00	07	4	N	95	24	19	0	E	1,238	farmstore	landrace	seed	shifting	May	Nov	mountainous	slope			U San Kyi, U Kwe, et al	non-glutinous	Khamnu Ngan Naga tribe	WP007	
15	254777	mashieu "zo kop nieu"	rice	<i>Oryza sativa</i>	11/11	PAYU, HKAMTI Township	26	00	07	4	N	95	24	19	0	E	1,238	farmstore	landrace	seed	shifting	end May	end Oct	mountainous	slope			U San Kyi, U Kwe, et al	glutinous	Khamnu Ngan Naga tribe	WP007	
16	254778	mashieu "za liang"	rice	<i>Oryza sativa</i>	11/11	PAYU, HKAMTI Township	26	00	07	4	N	95	24	19	0	E	1,238	farmstore	landrace	seed	shifting	May	Oct	mountainous	slope			U San Kyi, U Kwe, et al	glutinous	good to make rice cake, <i>mont loan</i> , which is used for hunters' mobile lunch Khamnu Ngan Naga tribe	WP007	
17	254779	tsi "gjon nai"	rice	<i>Oryza sativa</i>	11/12	KYAW YWET, HKAMTI Township	26	00	04	0	N	95	28	12	9	E	981	farmstore	landrace	seed	shifting	May	Nov	mountainous	slope				non-glutinous	a little bit sticky and tasty	WP011	
18	254780	tsi "alam si"	rice	<i>Oryza sativa</i>	11/12	PYIN LON, HKAMTI Township	26	05	54	0	N	95	33	52	7	E	692	farmland	landrace	seed	shifting	May	Nov	mountainous	slope	low	clay	good		non-glutinous		WP014
19	254781	mashieu	rice	<i>Oryza sativa</i>	11/12	PYIN LON, HKAMTI Township	26	05	54	0	N	95	33	52	7	E	692	farmland	landrace	seed	shifting	May	mid-Nov	mountainous	slope	low	clay	good		glutinous	scented rice being dried after harvest	WP014
20	254782	ma lon	cucumber	<i>Cucumis sativus</i>	11/12	PYIN LON, HKAMTI Township	26	05	54	0	N	95	33	52	7	E	692	farmland	landrace	seed	shifting	Jun	mid-Nov	mountainous	slope	low	clay	good				WP014

Table 3 (Continued)

Sr No *	JP No	local plant name "local variety name"	English name	Scientific name	Date MM/dd	VILLAGE NAME and/or nearest TOWN/VILLAGE	Latitude			Longitude			Altitude m	Source	Status	Status of plant sampled	Cultural practices	Sowing month	Harvest month	Topography	Site	Stoniness	Soil texture	Drainage	Farmer Name	glutinous	other observations	waypoint	
							°	'	"	°	'	"																	
21	254783	niem	perilla	<i>Perilla frutescens</i> var <i>frutescens</i>	11/12	MON YWET, LAHE Township	26	11	22 2	N	95	29	56 9	E	1,165	farmland	landrace	seed	shifting	May	Dec/Nov	mountainous	slope	low	clay	good		pound, together with glutinous rice and boil oil extraction	WP017
22	254784	zo, zot, ztot "sai liang"	rice	<i>Oryza sativa</i>	11/12	MON YWET, LAHE Township	26	11	22 2	N	95	29	56 9	E	1,165	farmstore	landrace	seed	shifting			mountainous	slope	low	clay	good		stored in a hut on a slash-and-burn field	WP017
23	254785	zo, zot, ztot "pa kang"	rice	<i>Oryza sativa</i>	11/12	MON YWET, LAHE Township	26	11	22 2	N	95	29	56 9	E	1,165	farmstore	landrace	seed	shifting	May	mid-Nov	mountainous	slope	low	clay	good		stored in a hut on a slash-and-burn field	WP017
24	254786	zo, zot, ztot "san fan zo"	rice	<i>Oryza sativa</i>	11/12	MON YWET, LAHE Township	26	11	22 2	N	95	29	56 9	E	1,165	farmstore	landrace	seed	shifting	May	mid-Nov	mountainous	slope	low	clay	good		stored in a hut on a slash-and-burn field	WP017
25	254787	zo, zot, ztot "but ton zo"	rice	<i>Oryza sativa</i>	11/12	MON YWET, LAHE Township	26	11	22 2	N	95	29	56 9	E	1,165	farmstore	landrace	seed	shifting	May	mid-Nov	mountainous	slope	low	clay	good		stored in a hut on a slash-and-burn field	WP017
26	254788	zo, zot, ztot "zo gan zot"	rice	<i>Oryza sativa</i>	11/12	MON YWET, LAHE Township	26	11	22 2	N	95	29	56 9	E	1,165	farmstore	landrace	seed	shifting	May	mid-Nov	mountainous	slope	low	clay	good		stored in a hut on a slash-and-burn field	WP017
27	254789	kahieu lappan	wild azuki bean	<i>Vigna angularis</i> var <i>nipponensis</i>	11/13	near LAHE 46 2 miles from HKAMTI toward LAHE LAHE Township	26	15	06 0	N	95	27	13 9	E	710	wild	wild	seed				mountainous	slope	medium	clay	poor		a wet place on a cliff near a stream roadside	WP020
28	254790	zang	rice	<i>Oryza sativa</i>	11/14	YAN NWAY, LAYSHEE Township	25	22	52 4	N	95	11	27 9	E	208	farmland	landrace	seed	shifting	May	Nov	hilly	slope	low	clay	good	U Tan Kho Pawn	cut trees in Jan, fire in Mar Kuki Chin tribe	WP023
29	254791	ayar, ajar "lan mayan"	rice	<i>Oryza sativa</i>	11/15	LAYSHEE No 2 Quarter	25	27	04 7	N	94	57	25 2	E	1,340	farmstore	landrace	seed	shifting	May	Nov	mountainous	slope				non-glutinous	stick sowing Para Naga tribe	WP029
30	254792	wild azuki bean	<i>Vigna angularis</i> var <i>nipponensis</i>	11/15	LAYSHEE No 2 Quarter	25	27	04 7	N	94	57	25 2	E	1,340	wild	wild	seed				mountainous	level	low	clay	moderate		on a bamboo fence at village side	WP029	
31	254793	marro "htahta"	rice	<i>Oryza sativa</i>	11/15	LAYSHEE MYOMA Quarter	25	26	56 5	N	94	57	52 6	E	1,194	farmstore	landrace	seed	shifting	May	Nov	mountainous	slope	low	clay	good	U San Ya	glutinous stored in a hut on a slash-and-burn field Small stick sowing Steam and eat Para Naga tribe	WP035
32	254794	shat zue	foxtail millet	<i>Setaria italica</i>	11/15	LAYSHEE MYOMA Quarter	25	26	56 5	N	94	57	52 6	E	1,194	farmstore	landrace	seed	shifting	May	Nov/Dec	mountainous	slope	low	clay	good	U San Ya	stored in a hut on a slash-and-burn field Sown by broadcasting Para Naga tribe	WP035
33	254795	timmar	amaranth	<i>Amaranthus cruentus</i>	11/16	SHWE PYI AYE, LAYSHEE Township	25	21	42 2	N	94	47	33 6	E	1,775	farmland	landrace	seed	backyard		Dec	mountainous	slope	medium	clay	good		sow on a backyard garden Leaves are eaten Kuka Naga tribe	WP039
34	254796	kut twi	perilla	<i>Perilla frutescens</i> var <i>frutescens</i>	11/16	SHWE PYI AYE, LAYSHEE Township	25	21	42 2	N	94	47	33 6	E	1,775	farmland	landrace	seed	shifting	Mar	Nov	mountainous	slope	rocky	loam	good		sow near houses cook seed together with glutinous rice Kuka Naga tribe	WP039
35	254797	ni thar niet	tree spinach	<i>Chenopodium bengalense</i> (<i>C. giganteum</i> , <i>C. formosanum</i>)	11/16	SHWE PYI AYE, LAYSHEE Township	25	21	42 2	N	94	47	33 6	E	1,775	farmland	landrace	seed	shifting	Mar	Nov	mountainous	slope	rocky	loam	good		dry, remove husks, together with waxy rice to brew leaves for pigs Kuka Naga tribe	WP039
36	254798	thar "fu pra tha"	rice	<i>Oryza sativa</i>	11/16	PAN SAT, LASHEE Township	25	25	33 0	N	94	44	37 7	E	1,707	farmstore	landrace	seed	transplant on irrigated terraces	Feb	Oct	mountainous	slope				U Thein Win, U Soe Maung, U De Be et al	non-glutinous sow on a non-irrigated nursery in mountains by broadcasting on mid-Feb take 40-50 cm seedlings on the last week of May, transplanted them 30 cm apart 2 days later Tan Khul Naga tribe	WP040
37	254799	thar "ah jak tha"	rice	<i>Oryza sativa</i>	11/16	PAN SAT, LASHEE Township	25	25	33 0	N	94	44	37 7	E	1,707	farmstore	landrace	seed	transplant on irrigated terraces	Feb	Oct	mountainous	slope				U Thein Win, U Soe Maung, U De Be et al	non-glutinous sow on a non-irrigated nursery in mountains by broadcasting on mid-Feb take 40-50 cm seedlings on the last week of May, transplanted them 30 cm apart 2 days later Tan Khul Naga tribe	WP040
38	254800	thar "a pwen ta poh tha"	rice	<i>Oryza sativa</i>	11/16	PAN SAT, LASHEE Township	25	25	33 0	N	94	44	37 7	E	1,707	farmstore	landrace	seed	transplant on irrigated terraces	Feb	Oct	mountainous	slope				U Thein Win, U Soe Maung, U De Be et al	non-glutinous sow on a non-irrigated nursery in mountains by broadcasting on mid-Feb take 40-50 cm seedlings on the last week of May, transplanted them 30 cm apart 2 days later Tan Khul Naga tribe	WP040

Table 3 (Continued)

Sr No *	JP No	local plant name "local variety name"	English name	Scientific name	Date MM/dd	VILLAGE NAME and/or nearest TOWN/VILLAGE	Latitude			Longitude			Altitude m	Source	Status	Status of plant sampled	Cultural practices	Sowing month	Harvest month	Topography	Site	Stoniness	Soil texture	Drainage	Farmer Name	glutinous	other observations	waypoint	
							°	'	"	°	'	"																	
39	254801	thar "wo ri ka rain poh"	rice	<i>Oryza sativa</i>	11/16	PAN SAT, LASHEE Township	25	25	33 0	N	94	44	37 7	E	1,707	farmstore	landrace	seed	transplant on irrigated terraces	Feb	Oct	mountainous	slope			U Thein Win, U Soe Maung, U De Be et al	non-glutinous	sow on a non-irrigated nursery in mountains by broadcasting on mid-Feb take 40-50 cm seedlings on the last week of May, transplanted them 30 cm apart 2 days later Tan Khul Naga tribe	WP040
40	254802	thar "si hwei ra"	rice	<i>Oryza sativa</i>	11/16	PAN SAT, LASHEE Township	25	25	33 0	N	94	44	37 7	E	1,707	farmstore	landrace	seed	transplant on irrigated terraces	Feb	Oct	mountainous	slope			U Thein Win, U Soe Maung, U De Be et al	non-glutinous	sow on a non-irrigated nursery in mountains by broadcasting on mid-Feb take 40-50 cm seedlings on the last week of May, transplanted them 30 cm apart 2 days later Tan Khul Naga tribe	WP040
41	254803	thar "mang lha ka theng poh"	rice	<i>Oryza sativa</i>	11/16	PAN SAT, LASHEE Township	25	25	33 0	N	94	44	37 7	E	1,707	farmstore	landrace	seed	transplant on irrigated terraces	Feb	Oct	mountainous	slope			U Thein Win, U Soe Maung, U De Be et al	non-glutinous	sow on a non-irrigated nursery in mountains by broadcasting on mid-Feb take 40-50 cm seedlings on the last week of May, transplanted them 30 cm apart 2 days later Tan Khul Naga tribe	WP040
42	254804	thar "a wa ra"	rice	<i>Oryza sativa</i>	11/16	PAN SAT, LASHEE Township	25	25	33 0	N	94	44	37 7	E	1,707	farmstore	landrace	seed	transplant on irrigated terraces	Feb	Oct	mountainous	slope			U Thein Win, U Soe Maung, U De Be et al	non-glutinous	sow on a non-irrigated nursery in mountains by broadcasting on mid-Feb take 40-50 cm seedlings on the last week of May, transplanted them 30 cm apart 2 days later Tan Khul Naga tribe	WP040
43	254805	thar "ka dei"	rice	<i>Oryza sativa</i>	11/16	PAN SAT, LASHEE Township	25	25	33 0	N	94	44	37 7	E	1,707	farmstore	landrace	seed	transplant on irrigated terraces	Feb	Oct	mountainous	slope			U Thein Win, U Soe Maung, U De Be et al	glutinous	sow on a non-irrigated nursery in mountains by broadcasting on mid-Feb take 40-50 cm seedlings on the last week of May, transplanted them 30 cm apart 2 days later Tan Khul Naga tribe	WP040
44	254806	thar "ne po ri"	rice	<i>Oryza sativa</i>	11/16	PAN SAT, LASHEE Township	25	25	33 0	N	94	44	37 7	E	1,707	farmstore	landrace	seed	transplant on irrigated terraces	Feb	Oct	mountainous	slope			U Thein Win, U Soe Maung, U De Be et al	glutinous	sow on a non-irrigated nursery in mountains by broadcasting on mid-Feb take 40-50 cm seedlings on the last week of May, transplanted them 30 cm apart 2 days later Tan Khul Naga tribe	WP040
45	254807	thar "son ra"	rice	<i>Oryza sativa</i>	11/16	PAN SAT, LASHEE Township	25	25	33 0	N	94	44	37 7	E	1,707	farmstore	landrace	seed	transplant on irrigated terraces	Feb	Oct	mountainous	slope			U Thein Win, U Soe Maung, U De Be et al	glutinous	sow on a non-irrigated nursery in mountains by broadcasting on mid-Feb take 40-50 cm seedlings on the last week of May, transplanted them 30 cm apart 2 days later Tan Khul Naga tribe	WP040
46	254808	"phajang garipoh"	rice	<i>Oryza sativa</i>	11/16	LAY YUN, LAYSHEE Township	25	23	33 7	N	94	43	02 0	E	1,686	farmstore	landrace	seed	transplant on irrigated terraces	Feb/Mar	Oct	mountainous	slope			U Sar Maw Ya	non-glutinous	transplant in May a little bit sticky and tasty cold tolerance Tan Khul Naga tribe	WP042
47	254809	"awung ra"	rice	<i>Oryza sativa</i>	11/16	LAY YUN, LAYSHEE Township	25	23	33 7	N	94	43	02 0	E	1,686	farmstore	landrace	seed	transplant on irrigated terraces	Feb/Mar	Oct	mountainous	slope			U Sar Maw Ya	non-glutinous	transplant in May Tan Khul Naga tribe	WP042
48	254810	"kara poh"	rice	<i>Oryza sativa</i>	11/16	LAY YUN, LAYSHEE Township	25	23	33 7	N	94	43	02 0	E	1,686	farmstore	landrace	seed	transplant on irrigated terraces	Feb/Mar	Oct	mountainous	slope			U Sar Maw Ya	non-glutinous	transplant in May black color harvest a little bit earlier than other cultivars Tan Khul Naga tribe	WP042
49	254811	"kali"	rice	<i>Oryza sativa</i>	11/16	LAY YUN, LAYSHEE Township	25	23	33 7	N	94	43	02 0	E	1,686	farmstore	landrace	seed	shifting	Mar	Oct	mountainous	slope			U Sar Maw Ya	glutinous	Tan Khul Naga tribe	WP042

Table 3 (Continued)

Sr No *	JP No	local plant name "local variety name"	English name	Scientific name	Date MM/dd	VILLAGE NAME and/or nearest TOWN/VILLAGE	Latitude			Longitude			Altitude m	Source	Status	Status of plant sampled	Cultural practices	Sowing month	Harvest month	Topography	Site	Stoniness	Soil texture	Drainage	Farmer Name	glutinous	other observations	waypoint	
							°	'	"	°	'	"																	
50	254812	"wara"	rice	<i>Oryza sativa</i>	11/16	LAY YUN, LAYSHEE Township	25	23	33 7	N	94	43	02 0	E	1,686	farmstore	landrace	seed	shifting	Mar	Oct	mountainous	slope			U Sar Maw Ya	glutinous	Tan Khul Naga tribe	WP042
51	254813	"ga noo"	rice	<i>Oryza sativa</i>	11/16	LAY YUN, LAYSHEE Township	25	23	33 7	N	94	43	02 0	E	1,686	farmstore	landrace	seed	shifting	Mar	Oct	mountainous	slope			U Sar Maw Ya	glutinous	Tan Khul Naga tribe	WP042
52	254814	chi rih mang thei	black seed squash	<i>Cucurbita ficifolia</i>	11/16	LAY YUN, LAYSHEE Township	25	23	33 7	N	94	43	02 0	E	1,686	farmstore	landrace	seed	backyard	Mar	Nov	mountainous	slope	medium	loam	good	U Sar Maw Ya	sow on backyard garden looks like water melon good to make soup Tan Khul Naga tribe	WP042
53	254815		wild azuki bean	<i>Vigna angularis</i> var <i>nipponensis</i>	11/17	between SOMRA and NGA CHAN, LAYSHEE Township	25	20	27 3	N	94	41	54 5	E	1,151	wild	wild	seed				mountainous	slope	rocky	loam	moderate		roadside population	WP048
54	254816	dat tsu "a zuwu tzu ga than"	rice	<i>Oryza sativa</i>	11/17	NGA CHAN, LAYSHEE Township	25	18	29 6	N	94	41	15 6	E	1,576	farmland	landrace	seed	transplant on irrigated terraces	Mar/Apr	Oct	mountainous	terrace, level	row	loam	moderate	U Rei Sing	transplant at last week of May Tan Khul Naga tribe	WP049
55	254817	dat tsu "ga than ga khwei pa"	rice	<i>Oryza sativa</i>	11/17	NGA CHAN, LAYSHEE Township	25	18	29 6	N	94	41	15 6	E	1,576	farmland	landrace	seed	transplant on irrigated terraces	Mar/Apr	Oct	mountainous	terrace, level	row	loam	moderate	U Rei Sing	transplant at last week of May Tan Khul Naga tribe	WP049
56	254818	dat tsu "ka than mizak pa"	rice	<i>Oryza sativa</i>	11/17	NGA CHAN, LAYSHEE Township	25	18	29 6	N	94	41	15 6	E	1,576	farmland	landrace	seed	transplant on irrigated terraces	Mar/Apr	Oct	mountainous	terrace, level	row	loam	moderate	U Rei Sing	transplant at last week of May also called "ga ma ngak pa" Tan Khul Naga tribe	WP049
57	254819	dat tsu "ga than mizok pa"	rice	<i>Oryza sativa</i>	11/17	NGA CHAN, LAYSHEE Township	25	18	29 6	N	94	41	15 6	E	1,576	farmland	landrace	seed	transplant on irrigated terraces	Mar/Apr	Oct	mountainous	terrace, level	row	loam	moderate	U Rei Sing	transplant at last week of May also called "pa ga rei pa" Tan Khul Naga tribe	WP049
58	254820	dat tsu "ma khue tzu"	rice	<i>Oryza sativa</i>	11/17	NGA CHAN, LAYSHEE Township	25	18	29 6	N	94	41	15 6	E	1,576	farmland	landrace	seed	transplant on irrigated terraces	Mar/Apr	Oct	mountainous	terrace, level	row	loam	moderate	U Rei Sing	transplant at last week of May Tan Khul Naga tribe	WP049
59	254821	dat tsu "yajo tsu"	rice	<i>Oryza sativa</i>	11/17	NGA CHAN, LAYSHEE Township	25	18	29 6	N	94	41	15 6	E	1,576	farmland	landrace	seed	transplant on irrigated terraces	Mar/Apr	Oct	mountainous	terrace, level	row	loam	moderate	U Rei Sing	transplant at last week of May Tan Khul Naga tribe	WP049
60	254822	dat tsu "ga ngee mizak pa"	rice	<i>Oryza sativa</i>	11/17	NGA CHAN, LAYSHEE Township	25	18	29 6	N	94	41	15 6	E	1,576	farmland	landrace	seed	transplant on irrigated terraces	Mar/Apr	Oct	mountainous	terrace, level	row	loam	moderate	U Rei Sing	transplant at last week of May Tan Khul Naga tribe	WP049
61	254823	dat tsu "a yaw tzu mizak pa"	rice	<i>Oryza sativa</i>	11/17	NGA CHAN, LAYSHEE Township	25	18	29 6	N	94	41	15 6	E	1,576	farmstore	landrace	seed	shifting	Mar	first Oct	mountainous	slope			U Rei Sing	transplant at last week of May for khau aye (rice wine) Tan Khul Naga tribe	WP049	
62	254824	za ru tzu	tree spinach	<i>Chenopodium bengalense</i> (<i>C. giganteum</i> , <i>C. formosanum</i>)	11/17	NGA CHAN, LAYSHEE Township	25	18	29 6	N	94	41	15 6	E	1,576	farmstore	landrace	seed	shifting	Mar/Apr	Oct/Nov	mountainous	slope			U Rei Sing	Tan Khul Naga tribe	WP049	
63	254825	tamu	foxtail millet	<i>Setaria italica</i>	11/17	NGA CHAN, LAYSHEE Township	25	18	29 6	N	94	41	15 6	E	1,576	farmstore	landrace	seed	shifting	Mar	Aug	mountainous	slope			U Rei Sing	Tan Khul Naga tribe	WP049	
64	254826	ka shee	perilla	<i>Perilla frutescens</i> var <i>frutescens</i>	11/17	NGA CHAN, LAYSHEE Township	25	18	29 6	N	94	41	15 6	E	1,576	farmstore	landrace	seed	shifting	Mar/Apr	Oct	mountainous	slope			U Rei Sing	Tan Khul Naga tribe	WP049	
65	254827	mayon tzei	lablab bean	<i>Lablab purpurea</i>	11/17	NGA CHAN, LAYSHEE Township	25	18	29 6	N	94	41	15 6	E	1,576	farmstore	landrace	seed	shifting	Mar/Apr	Dec	mountainous	slope			U Rei Sing	shifting fields, backyard, and anywhere Tan Khul Naga tribe	WP049	
66	254828	tze ray	rice bean	<i>Vigna umbellata</i>	11/17	NGA CHAN, LAYSHEE Township	25	18	29 6	N	94	41	15 6	E	1,576	farmstore	landrace	seed	shifting	Mar/Apr	Oct/Nov	mountainous	slope			U Rei Sing	for soup Tan Khul Naga tribe	WP049	

Table 3 (Continued)

Sr No *	JP No	local plant name "local variety name"	English name	Scientific name	Date MM/dd	VILLAGE NAME and/or nearest TOWN/VILLAGE	Latitude			Longitude			Altitude m	Source	Status	Status of plant sampled	Cultural practices	Sowing month	Harvest month	Topography	Site	Stoniness	Soil texture	Drainage	Farmer Name	glutinous	other observations	waypoint				
							°	'	"	°	'	"																				
67	254829		wild azuki bean	<i>Vigna angularis</i> var <i>nipponensis</i> ?	11/17	near LAYSHEE, LAYSHEE Township	25	25	44	0	N	94	54	55	3	E	612	wild	wild	seed			mountainous	depression	rocky	sand	moderate			on a bank of stream, near a bridge small seed small hilem <i>Vigna nepalensis</i> ?	WP053	
68	254830	aja, aya "ka la so"	rice	<i>Oryza sativa</i>	11/18	PEIN NEL KONE (SO SU TE NDA), LAYSHEE Township	25	28	49	1	N	94	58	02	3	E	1,016	farmstore	landrace	seed	transplant on irrigated terraces	April	Nov	mountainous	depression	low	clay	moderate	U Khaw Re Ko, U Sa Ra Mu, et al		transplant 40-50 cm long seedlings in Jun/Jul Para Naga tribe	WP054
69	254831	aja, aya "ta bu sha sha"	rice	<i>Oryza sativa</i>	11/18	PEIN NEL KONE (SO SU TE NDA), LAYSHEE Township	25	28	49	1	N	94	58	02	3	E	1,016	farmstore	landrace	seed	transplant on irrigated terraces	April	Nov	mountainous	depression	low	clay	moderate	U Khaw Re Ko, U Sa Ra Mu, et al		transplant 40-50 cm long seedlings in Jun/Jul Para Naga tribe	WP054
70	254832	joh ma ra	basil	<i>Ocimum basilicum</i>	11/18	PEIN NEL KONE (SO SU TE NDA), LAYSHEE Township	25	28	49	1	N	94	58	02	3	E	1,016	farmstore	landrace	seed	shifting/backyard	Apr/May	Nov	mountainous	slope			U Khaw Re Ko, U Sa Ra Mu, et al		sow on slash-and-burn fields and backyard garden medicine for headache cook with pumpkin Para Naga tribe	WP054	
71	254833	hot chel, hot chel jeh mpi	Italian persley	<i>Petroselinum crispum</i> var <i>neapolitanum</i>	11/18	PEIN NEL KONE (SO SU TE NDA), LAYSHEE Township	25	28	49	1	N	94	58	02	3	E	1,016	farmstore	landrace	seed	shifting/backyard	May/June	Nov	mountainous	slope			U Khaw Re Ko, U Sa Ra Mu, et al		cook in soup put in nga phi paste jeh mpi means coriander Para Naga tribe	WP054	
72	254834	aja, aya "la may jah"	rice	<i>Oryza sativa</i>	11/18	PEIN NEL KONE (SO SU TE NDA), LAYSHEE Township	25	28	55	6	N	94	58	03	9	E	974	farmstore	landrace	seed	shifting	last May	Nov	mountainous	slope			U Khaw Re Ko, U Sa Ra Mu, et al	non-glutinous	Para Naga tribe	WP055	
73	254835	aja, aya "ke le jah jah"	rice	<i>Oryza sativa</i>	11/18	PEIN NEL KONE (SO SU TE NDA), LAYSHEE Township	25	28	55	6	N	94	58	03	9	E	974	farmstore	landrace	seed	transplant on irrigated terraces	April	Nov	mountainous	terrace, level			U Khaw Re Ko, U Sa Ra Mu, et al		transplant 40-50 cm long seedlings in Jun/Jul Para Naga tribe	WP055	
74	254836		job's tears	<i>Coix lacrym-jobi</i> var <i>mayuen</i>	11/18	AYE TAUNG, LAYSHEE Township	25	25	30	2	N	94	56	16	3	E	907	farmland	landrace	seed	shifting		Nov	mountainous	slope	medium	loam	good	U Thein Lin			WP056
75	254837	tu tha	rice bean	<i>Vigna umbellata</i>	11/18	NAMI YUPI SANPIAR, LEISHEE Township	25	25	03	4	N	94	54	19	5	E	745	farmland	landrace	seed	shifting			mountainous	slope	low	loam	good			short statue without vining Kuki Naga tribe	WP058
76	254838	marru	soybean	<i>Glycine max</i>	11/18	NAMI YUPI SANPIAR, LEISHEE Township	25	25	03	4	N	94	54	19	5	E	745	farmland	landrace	seed	shifting			mountainous	slope	low	loam	good			short height Kuki Naga tribe	WP058
77	254839	"cho shu the"	rice	<i>Oryza sativa</i>	11/18	NAMI YUPI SANPIAR, LEISHEE Township	25	25	03	4	N	94	54	19	5	E	745	farmland	landrace	seed	transplant on irrigated terraces	May	Nov	mountainous	terrace, level	none	loam	moderate			transplant Jul/Aug introduced from LAYSHEE 4 years ago Kuki Naga tribe	WP058
78	254840	"let chie thar"	cowpea	<i>Vigna unguiculata</i>	11/18	NAMI YUPI SANPIAR, LEISHEE Township	25	25	03	4	N	94	54	19	5	E	745	farmland	landrace	seed	paddy field edge			terrace, level	none	loam	moderate			on a edge of a terraced paddy field Kuki Naga tribe	WP058	
79	254841	"la bar the"	rice	<i>Oryza sativa</i>	11/18	NAMI YUPI SANPIAR, LEISHEE Township	25	25	03	4	N	94	54	19	5	E	745	farmland	landrace	seed	transplant on irrigated terraces	May	Nov	mountainous	terrace, level	none	loam	moderate			transplant Jul/Aug introduced from LAYSHEE 4 years ago Kuki Naga tribe	WP058
80	254842	"shwe lan bo"	chili pepper	<i>Capsicum annum</i>	11/20	Pyi Taw Pyan Zee, HOMMALIN, HOMMALIN Township	24	51	52	1	N	94	54	32	7	E	130	market place	landrace	seed	shifting									at a shop in morning roadside market in northern HOMMALIN downtown	WP060	

Table 3 (Continued)

Sr No *	JP No	local plant name "local variety name"	English name	Scientific name	Date MM/dd	VILLAGE NAME and/or nearest TOWN/VILLAGE	Latitude				Longitude				Altitude m	Source	Status	Status of plant sampled	Cultural practices	Sowing month	Harvest month	Topography	Site	Stoniness	Soil texture	Drainage	Farmer Name	glutinous	other observations	waypoint	
							°	'	"	N	°	'	"	E																	
81	254843	kan sein	Chinese pepper (zanthoxylum pepper)	<i>Zanthoxylum bungeanum</i>	11/20	Hommalin Zee Gyi, HOMMALIN, HOMMALIN Township	24	51	52	1	N	94	54	32	7	E	130	market place	landrace	seed	wild									a shop in HOMMALIN Zee Gyo, a market place spontaneously grown in mountains	WP060
82	254844	kan sein	Chinese pepper (zanthoxylum pepper)	<i>Zanthoxylum alatum</i>	11/20	Hommalin Zee Gyi, HOMMALIN, HOMMALIN Township	24	51	52	1	N	94	54	32	7	E	130	market place	landrace	seed	wild									a shop in HOMMALIN Zee Gyo, a market place traded from HKAMTI spontaneously grown in mountain forests	WP060

* Collection No is designated as COL/MYANMAR/2015/UT-NIAS-DAR/Sr No for each

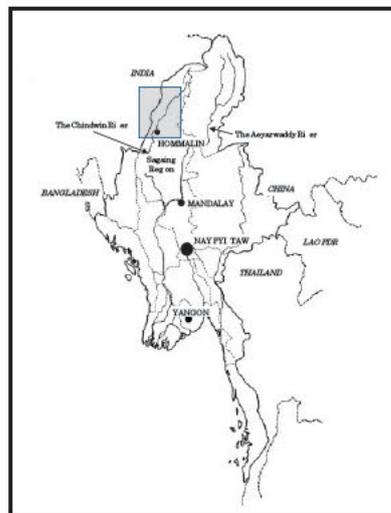
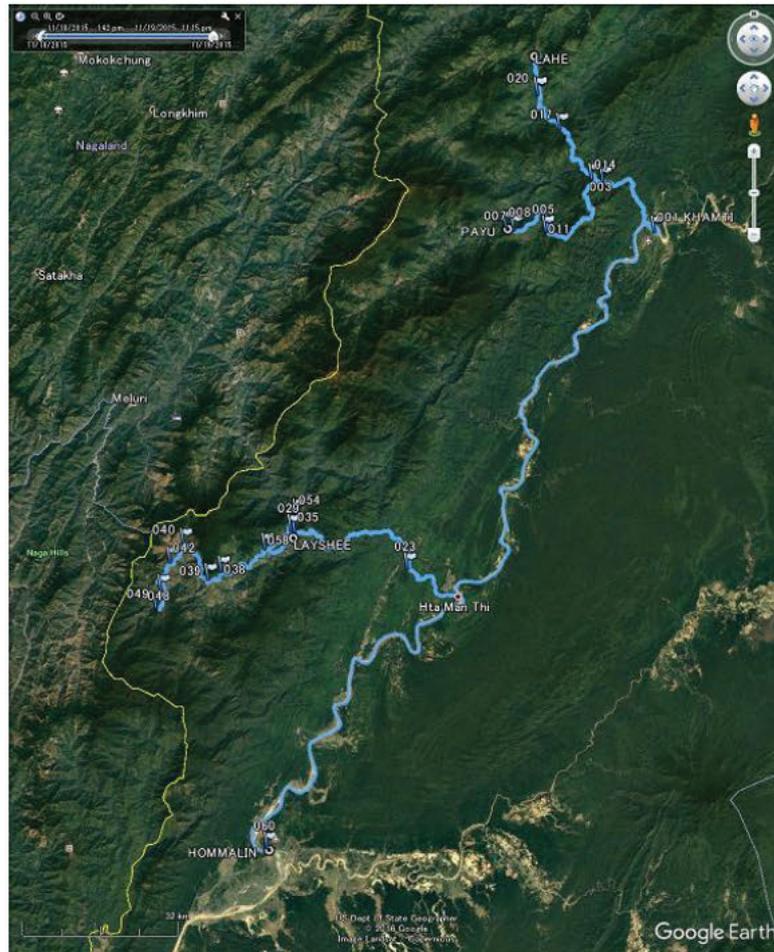


Fig. 1. Map of routes and collection sites (waypoints) during the field study in the northern Sagaing Region of Myanmar in November 2015. The map was generated on Google Earth (Google Inc.).



Photograph 1. Villagers were conveying harvests from a slash-and-burn field (WP008) to home at Payu village.



Photograph 2. Different kinds of crops were grown in addition to rice in a slash-and-burn field (WP008) of Payu village.



Photograph 3. The site near Pa Sang village, where several crops had been cultivated in 2014 became an abandoned slope field covered with wild grasses and shrubs in 2015.



Photograph 4. Layshee town was located on a sloping land at around 1,300 m above the sea level.



Photograph 5. A slash-and-burn cultivation field in Layshee township, where rice and several crops were admixed grown.



Photograph 6. There were many rice terraces already harvested on the way from Layshee town toward Somra town.



Photograph 7. Somra town was located near the border with Nagaland State of India and had an altitude of over 1,900 m above sea level.



Photograph 8. *Gymnopetalum chinense* (left) and *Momordica balsamina* (right), minor cucurbitaceous fruit vegetables sold at local market.



Photograph 9. *Coccinia grandis*, another minor cucurbitaceous fruit vegetable sold at local market.



Photograph 10. Black seed squash (*Cucurbita ficifolia*) observed at Lay Yun village (WP042).



Photograph 11. A population of wild azuki bean (*Vigna angularis* var. *nipponensis*) near a bridge (WP053).