

Collaborative Survey and Collection of Vegetable Genetic Resources in Myanmar, 2019 and 2020

Saki YOSHIDA ^{1)*}, Hidehiko KIKUNO ¹⁾, Than Naing Oo ²⁾,
Ohm Mar Saw ²⁾, Kenji IRIE ¹⁾

1) *International Agricultural Development, Graduate School of Agriculture, Tokyo University of Agriculture, 1-1-1 Sakuragaoka, Setagaya, Tokyo 156-8502, Japan*

2) *Department of Agricultural Research, Ministry of Agriculture, Livestock and Irrigation, Yezin, Ney Pyi Taw, Republic of the Union of Myanmar*

* Present affiliation: *Institute of Crop Science, National Agriculture and Food Research Organization (NARO), 2-1-2 Kannondai, Tsukuba, Ibaraki 305-8518, Japan*

Communicated by E. DOMON (Research Center of Genetic Resources, NARO)

Received Aug. 31, 2021, Accepted Dec. 21, 2021

Corresponding author: K. Irie (e-mail: k3irie@nodai.ac.jp)

Summary

Exploration and collection surveys were conducted from November 2 to November 15, 2019, and from December 26, 2019, to January 7, 2020, under a collaboration between the Tokyo University of Agriculture (TUA), Japan and the Department of Agriculture Research, Myanmar. The first survey was conducted in the northern part of the Sagaing region, and the second in the southern part of Sagaing region, the mountainous area of Nay Pyi Taw, and Shan State. For both surveys, genetic resources were collected from farmlands, farm houses, and local markets. In November 2019, 27 accessions were collected, including 17 samples of *Brassica juncea*, 4 of the *B. oleracea* L. Alboglabra group, 3 *Brassica* sp., and 3 *Raphanus sativus* L. specimens. From December 2019 to January 2020, 104 samples were collected: 34 *Brassica juncea*, 7 of the *B. oleracea* L. Alboglabra group, and 7 *Raphanus sativus* L. Root and tuber crops, such as *Dioscorea* spp. and *Colocasia esculenta* L. Schott, as well as one *Xanthosoma sagittifolium*, *Amorphophallus* spp., accounted for 15, 29, and 12 accessions, respectively. The collected genetic resources were divided between the Myanmar Seed Bank and the TUA for the PGRAsia Project, and 50 % were exported to Japan as per the Standard Material Transfer Agreement. The exported seeds and tubers will be multiplied and evaluated in Japan and will be available at the NARO Genebank, Japan for research, breeding, and educational purposes.

KEY WORDS: *Brassica juncea*, Eastern Shan State, Myanmar, root and tuber crops, Sagaing region, vegetable genetic resources

Introduction

Myanmar has diverse agro-climatic conditions owing to its large land area from the north to the south, including the western Hill region, the eastern Hill region, and the central valley region, all of which extend from

the Himalayas and vary greatly in elevation from 0 m to 5,881 m above sea level (Myo Thant *et al.* 2002). In addition, there is great diversity in culture, with various ethnic groups residing in the country. As a result, Myanmar grows a considerable variety of crops.

Genetic resources from different parts of Myanmar have been collected under the PGRAsia project (Wakui *et al.* 2016; Yoshida *et al.* 2017, 2018, 2019), which is a collaborative research agreement with NARO that is jointly promoted by the Tokyo University of Agriculture (TUA) and the Department of Agricultural Research, Ministry of Agriculture, Animal Industry and Irrigation (MOALI), Myanmar.

The results of a survey of vegetable genetic resources focusing on *Brassica juncea*, called “Mohn Nyin,” and on *B. rapa*, *B. oleracea*, and *Raphanus sativus* have been previously reported (Wakui *et al.* 2016, Yoshida *et al.* 2017, 2018, 2019). The vegetable called “Mohn Nyin” was assumed to be *B. juncea* in Myanmar. *B. juncea* originated in Central Asia and then diversified to India and China as secondary centers (Hemingway 1995; Singh *et al.* 2014). It is assumed that the genetic diversity of *B. juncea* is conserved in Myanmar, which is located between China and India. According to the “Family name and botanical names of important plants in Myanmar” published by the Myanmar government, *B. rapa*, *B. napus*, *B. juncea*, and *B. nigra* of the genus *Brassica* are cultivated in Myanmar. However, general farmers recognize these as types of “Mohn Nyin”; thus, they are not generally named properly and are often inconsistently referred to by local names based on the morphological traits or uses (Ishida *et al.* 2000; Yoshida *et al.* 2019). We speculated that “Mohn Nyin” in Myanmar consists of several *Brassica* species, such as *B. rapa* and *B. napus*, in addition to *B. juncea*, allowing for a rich diversity of *Brassica* genetic resources in this country. Therefore, there is a need to clarify the actual Brassicaceae genetic resources present in Myanmar, to select promising lines and collect further genetic material.

The tropical regions of Myanmar have also been considered as the origin of certain root and tuber crops, such as water yams and aroids (elephant foot yam and taro). Water yam (*Dioscorea alata* L.), which is one of the main yams, is widely distributed in the tropical and subtropical regions of Asia and Africa (Lebot 2009), and is thought to have originated from the tropical regions of Myanmar, India (Assam), or Thailand (Coursey 1967). Water yams collected in Myanmar exhibit greater diversity in ploidy levels and tuber components than other countries (Babil *et al.* 2010; Lee *et al.* 2010). Taro (*Colocasia esculenta* (L.) Schott) is also an important root and tuber crop in tropical and subtropical regions. Although there is currently insufficient evidence, it has been suggested that taro originated from northeast India and southeast Asia (Lebot 2009). The geographical

origin of the elephant foot yam, *Amorphophallus* spp., has been associated with Asia, Southeast Asia, and Melanesia (Lebot 2009).

Here, we report the results of an exploration and collection survey of the Sagaing Region and Shan States in 2019 and 2020.

Methods

Exploration and collection surveys of vegetable genetic resources were performed from November 2 to November 15, 2019, and from December 26, 2019, to January 7, 2020 (Table 1, Fig 1).

The first survey was conducted in the northern Sagaing region. Road development was delayed in the area around the Chindwin River in the northern part of the Sagaing region, making it difficult to travel by car. Thus, we chose the route from Yangon to Hkamti via Mandalay. After arriving at Hkamti, a four-wheel drive vehicle was used to survey the surrounding area. There was no land route along the river from Hkamti to Hta Man Thi; therefore, we traversed by boat. We reached Hta Man Thi in four hours, and the return trip required more than eight hours. The areas near Lahe and Lay shi, away from the Chindwin River, were explored by car, as land routes existed.

The second survey from 2019 to 2020 was conducted to collect genetic resources of *Brassica* spp., root and tuber crops, and vegetables in the Sagaing region, mountain areas of Nay Pyi Taw, and Shan State.

To reduce the number of travel days, we used the air route from Yangon to Homalin in the Sagaing region via Mandalay on December 26, 2019. We used Homalin as a base, and surveyed the surrounding areas using a van. After our arrival at Homalin, which took one day of travel, we visited Paungbyin, which is located in the south of Homalin on December 27 and Hta Man Thi, which is northeast of Homalin, on December 30. To cross the Chindwin River, we used a boat from the other side of the river to Hta Man Thi, which took approximately 10 – 20 min (one way). We surveyed the river basin of the Chindwin River. After the survey around Homalin, we traveled to Mandalay via the air route on December 31, from where we traveled to Nay Pyi Taw (Yezin) by road on January 1, 2020. One day (January 2) was utilized for the survey of the east side of the Nay Pyi Taw mountainous area. From January 3 to 5, we surveyed the mountainous area and Pin Laung in Shan State.

Owing to the presence of steep mountainous areas, road construction has recently started in this area.

Genetic resources were collected from farmlands,

Table 1. Itinerary for collaborative exploration and collection of genetic resources in Myanmar from 2019 - 2020

Date	Route	Stay	Activities
2-Nov	Yangon - (airplain) - Mandalay - (airplain) - Hkamti	Hkamti	Transfer
3-Nov	Hkamti - Lahe	Lahe	Exploration & Collection
4-Nov	Lahe	Lahe	Exploration & Collection
5-Nov	Lahe - Hkamti	Hkamti	Exploration & Collection
6-Nov	Hkamti - (boat) - Hta Man Thi - Lay Shi	Lay Shi	Exploration & Collection
7-Nov	Lay Shi - Somla- Lay Shi	Lay Shi	Exploration & Collection
8-Nov	Lay Shi	Lay Shi	Exploration & Collection
9-Nov	Lay Shi	Lay Shi	Exploration & Collection
10-Nov	Lay Shi	Lay Shi	Exploration & Collection
11-Nov	Lay Shi - Hkamti	Hkamti	Exploration & Collection
12-Nov	Hkamti - (airplain) - Mandalay - Yezin	Yezin	Transfer
13-Nov	Yezin	Yezin	Visit to DAR, Signed SMTA
14-Nov	Yezin - Yangon	Yangon	Visit to PQ office, received PC
15-Nov	Yangon	Yangon	Visit to PQ office, received PC
26-Dec	Yangon - (airplain) - Mandalay - (airplain) - Homalin	Homalin	Transfer
27-Dec	Homalin - Paungbyin - Homalin	Homalin	Exploration & Collection
28-Dec	Homalin	Homalin	Exploration & Collection
29-Dec	Homalin	Homalin	Exploration & Collection
30-Dec	Homalin - Hta Man Thi - Homalin	Homalin	Exploration & Collection
31-Dec	Homalin - (airplain) - Mandalay	Mandalay	Transfer
1-Jan	Mandaly - Yezin	Nay Pyi Taw	Exploration & Collection
2-Jan	Nay Pyi Taw	Nay Pyi Taw	Exploration & Collection
3-Jan	Nay Pyi Taw - Pin Laung	Pin Laung	Exploration & Collection
4-Jan	Pin Laung	Pin Laung	Exploration & Collection
5-Jan	Pin Laung - Nay Pyi Taw	Nay Pyi Taw	Exploration & Collection
6-Jan	Yezin	Nay Pyi Taw	Visit to DAR, Signed SMTA
7-Jan	Yezin - Yangon	Yangon	Visit to PQ office, received PC

DAR: Department of Agricultural Research

SMTA: Standard Material Transfer Agreement

PQ: Plant Quarantine

PC: Phytosanitary Certificate

farm houses (Photo 1), local markets, and the areas around the administrative offices of MOALI. The information collected included the local name, cultivation time, usage method, price, and history, as had been performed in the previous year (Yoshida *et al.* 2019). In addition, we recorded the soil, terrain, surrounding environment, latitude, longitude, and altitude at the field site.

This study was performed with prior informed consent of the Seed Bank of MOALI in Myanmar and the TUA for the PGRAsia Project. The collected genetic resources, including root and tuber crops, were divided between the Myanmar Seed Bank and the TUA for the PGRAsia Project, and half were exported to Japan under the Standard Material Transfer Agreement.



Photo 1. Survey with farmers at Lay Shi township

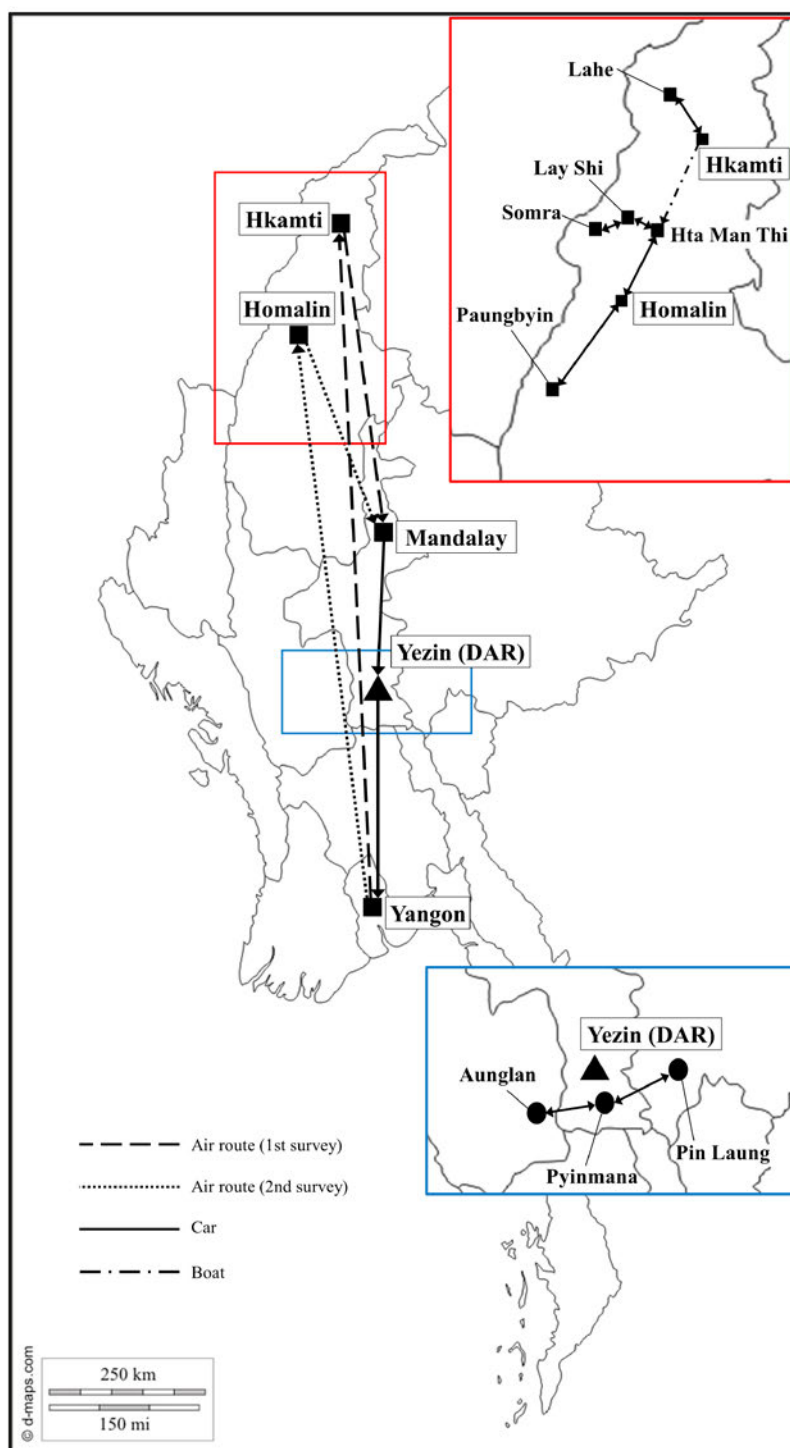


Fig. 1. Collection sites in Myanmar.

Results and Discussion

In this survey, we collected a total of 131 accessions, including 51 *B. juncea*, 11 of the *B. oleracea* L. Alboglabra group, 3 *Brassica* sp., 10 *R. sativus* L., and 56 root and tuber crops (Table 2).

In the first exploration in November 2019, the total collected samples amounted to 27 accessions, including 17 *B. juncea*, 4 of the *B. oleracea* L. Alboglabra group, 3 *Brassica* sp., and 3 *R. sativus* L. In the second exploration from December 2019 to January 2020, 104

accessions were collected, including 34 *B. juncea*, 7 of the *B. oleracea* L. Alboglabra group, and 7 *R. sativus* L. The majority of the *Brassica* spp. were collected from the Sagaing region, nine of which were collected from Shan State. Root and tuber crops, such as *Dioscorea* spp. (15 accessions) and *C. esculenta* (L.) Schott (28 accessions), including one *Xanthosoma sagittifolium* and *Amorphophallus* spp. (12 accessions), were also collected. Most of the collected samples were native varieties.

The Sagaing region is located in northwestern Myanmar and borders India. This region varies from north to south. The plains downstream of the Chindwin River in the south are populated by many Bamar people. The Naga and Chin people live in mountainous areas upstream of the northern Chindwin River, which has temperature that decrease to below the freezing point in winter, and the lowland areas are also cool (Myo Thant *et al.* 2002).

A large amount of native genetic resources remain in the northwestern mountainous areas of Hkamti and Lay shi because of ethnic diversity and poor transportation access. *Brassica* vegetables are more often cultivated in small vegetable gardens than in commercial facilities, and they are used as fresh vegetables and for preparing pickles (Photo 2), similar to their usage in other areas.

Hkamti is a waterway distribution base in the northern Sagaing region, and improved varieties of seeds are sold in the market, although sales of these improved seeds have not been confirmed in other markets of this region, where native vegetables and seeds were collected (Photos 3 and 4). Mohn Nyin has also been cultivated in San Tou village, where the Naga people lived on steep slope, but unlike other areas, pickling the vegetable was unknown to the local people. Radish was consumed only

as a leafy vegetable, and roots were not used. Radish is rarely cultivated in the Lahe township. Mohn Nyin was called “Kin wan” or “Khaw khi” by the Naga people and “Ka Zi Yam” in Tungkun Naga words; however, some people referred to it as Mohn Nyin, which was the common term. In various parts of Myanmar, Mohn Nyin is often cultivated with *Allium*, but only for the effective use of the land (Photo 5). We observed the mixed planting of Mohn Nyin with perennial Kai lan, which is frequently cultivated in Somra village of the Sagaing region (Photo 6). The morphological diversity of Mohn Nyin was observed in all research areas. Mohn Nyin sold at the Lay Shi market has a different leaf edge shape, but it was sold irrespective of this detail (Photo 7).

Farmers used their own seeds obtained by self-seeding and storing in vinyl bags, empty bottles, and paper, similar to other parts of Myanmar. In houses with hearths, seeds were stored above the hearth, and fumigation storage was possible (Photo 8). Line selection was performed by some farmers, and seeds of excellent strains, such as high-yield seeds and those with improved flavor, were stored separately from the other seeds (Photo 9).

In a 2018 survey, we reported that several Brassicaceae species were cultivated in the same field (Yoshida *et al.* 2018). In the northern part of the Sagaing



Photo 2. *Brassica* Pickles (Mohn Nyin Chin) sold in the Hkamti local market



Photo 4. Seeds sold in the local market (COL-No. 001)



Photo 3. *B. juncea* wrapped in bananas leaves and sold at Hkamti market

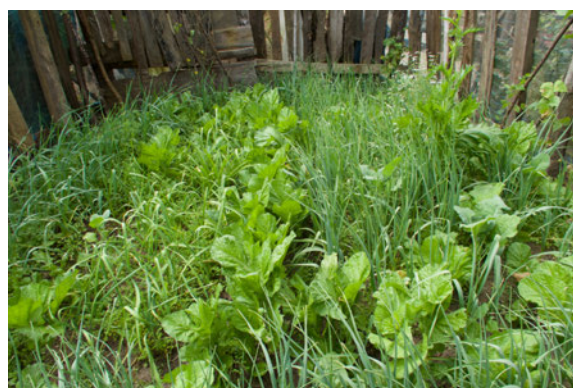


Photo 5. *B. juncea* cultivated with *Allium* in Somra, Sagaing region



Photo 6. Perennial Kai lan (*B. oleracea*) grown in Somra, Sagaing region



Photo 7. Various *Brassica* sold at the Lahe local market



Photo 8. Farmers in Lay Shi storing seeds on shelves above the hearth



Photo 9. Khaw khi and Kai lan seeds selected by a farmer in Lay Shi (COL-No. 014 – 018)

region, individual species presumed to be *B. juncea* and *B. rapa* were cultivated as the same vegetable, named Monnin, at a close distance in the same field (Photo 10, COL-No. 010). Tsuda *et al.* (2016) reported a summary of successful cases of hybridization between *B. juncea* and closely related species. *B. juncea* can form hybrids with *B. nigra* and *B. naps*, as well as the *B. rapa* collected in this study. In addition, field trials in Canada have identified plant strains that are presumed to have arisen from natural hybridization between *B. juncea* and *B. rapa* based on their morphological characteristics (Bing *et al.* 1996). Natural crossings can occur, even in the fields of Myanmar.

Myanmar is the geographic origin of certain root and tuber crops, such as the yam or taro. In the second survey, yams (*Dioscorea* spp.) and taro were found in villages or markets in the Sagaing region (Photo 11), mountainous areas of Nay Pyi Taw (Photo 12), and Shan State, while *Amorphophallus* spp. were found in the latter two regions (Table 2).

Most of the yams (*Dioscorea* spp.) collected were water yams (*D. alata* L.) that were found in all surveyed areas, but *D. esculenta* L. was only found in the mountainous area of Nay Pyi Taw (Photo 13). Water yam



Photo 10. Several *Brassica* vegetables grown in the same field around Lahe, Sagaing region (COL-No. 010)



Photo 11. Yams and taro at market in Homalin, Sagaing region



Photo 12. Water yam tuber harvested at Aung Bate Thak village in the mountainous area of Nay Pyi Taw



Photo 13. Yam tuber (*D. esculenta*) harvested at Aung Bate Thak village in a mountainous area of Nay Pyi Taw

is generally boiled and served as a side dish with oil, cooked for soup, or stir-fried. Bulbils of water yam (Photo 14) are also eaten as tubers. The germplasm collected from the water yam was that of tubers or bulbils. *D. esculenta* L. is eaten as a sweet snack. Local people in the mountainous area of Nay Pyi Taw recognize that *D. esculenta* L. is a highly nutritional food.

Most of the taro collected was *C. esculenta* (L.) Schott (Photos 15, 16, and 17), with only one *X. sagittifolium* (cocoyam) observed, which originated in Central and South America. *X. sagittifolium* was introduced outside Myanmar into Asia in the



Photo 14. Bulbils of water yam boiled with salt and oil as a side dish



Photo 15. Taro at Homalin market



Photo 16. Cultivation in a home garden near Homalin, Sagaing region

19th century by missionaries (Lebot 2009). In the mountainous area of Nay Pyi Taw, *Amorphophallus* spp. (Photo 18) were used as cash crops for export to China, and a few farmers used them as food after a long boiling time. In Shan State, the majority of *Amorphophallus* spp. are used as cash crops (Photos 19 and 20). According to farmers or middlepersons, sliced and dried tubers are exported to China.

Yams have been cultured in home gardens, and taro has been planted in home gardens or crop fields in the lowlands (Photo 16). *Amorphophallus* spp. are also found in home gardens or crop fields, as well as commercial farms for export.



Photo 17. Taro tuber harvested from a home garden near Homalin, Sagain region



Photo 18. *Amorphophallus* tubers in a mountainous area of Nay Pyi Taw (middle of photo)



Photo 19. *Amorphophallus* tubers with a middleperson in Pin Laung, Shan State



Photo 20. Stored tubers of *Amorphophallus* at Kut Moe village in Pin Laung, Shan State

In Myanmar, improved varieties have spread due to rapid changes in social conditions, causing native strains to be lost, and it is predicted that the number of native strains will further decrease and diversity will decline. It is important to conserve these genetic resources and develop sustainable agriculture with a high diversity of species, despite the difficult social conditions.

Acknowledgements

This work was supported by MAFF commissioned project study on “A Collaborative Research Project on Characterization and Evaluation of Plant Genetic Resources for Food and Agriculture (PGRAsia)” Grant Number JPJ007117). The first survey was supported by Norihiko Tomooka, Kenichi Matushima, Koichiro Shimomura, and Fumiya Kondo. The second survey from December 2019 to January 2020 was supported by Ayami Nishikawa, Daichi Nohara, and Kenji Wakui.

References

- Babil PK, Irie K, Shiwachi H, Tun YT, Toyohara H and Fujimaki H (2010). Ploidy variation and their effects on leaf and stoma traits of water yam (*Dioscorea alata* L.) collected in Myanmar. Trop Agr Develop 54(4): 132-139.
[JaLC]
- Bing DJ, Downey RK and Rakow GFW (1996). Hybridizations among *Brassica napus*, *B. rapa* and *B. juncea* and their two weedy relatives *B. nigra* and *Sinapis arvensis* under open pollination conditions in the field. Plant Breed 115: 470-473.
[CrossRef]
- Coursey DG (1967). Yams, an account of the nature, origins, cultivation and utilisation of the useful members of the Dioscoreaceae. Green and Co Ltd, London, UK, p. 244.
- Hemingway JS (1995). Mustards, *Brassica* spp. and *Sinapis alba* (Cruciferae). In: Evolution of Crop Plants. 2nd Ed. Smartt J and Simmonds NW (eds.). Longman Scientific and Technical, Harlow, UK, pp. 82-86.
- Ishida M, Tetsuka T, Irie K, Tin Maw Oo, Thein Zaw and Ktaw Soe (2000). Preliminary survey for exploration and collection of small grain germplasm and industrial crop in Myanmar. APEIPGR 16:153-163.
[Genebank, NARO], [JaLC]
- Lebot V (2009). Tropical root and tuber crops: cassava, sweet potato, yams and aroids. CABI, Wallingford, UK, p. 413.
- Lee PH, Shiwachi H, Irie K, Tun TY, Ishida H and Toyohara H (2010). Difference in ingredient characteristics of tuber in water yam (*Dioscorea alata* L.) varieties of Myanmar. Research for Tropical Agriculture 3(2): 62-69 (in Japanese with English abstract).
[JaLC]
- Myo Thant, Maung Hlaing, Soe Myint and Tin Tin Win (2002). Myanmar facts and figures 2002. Ministry of Information Union of Myanmar, pp. 31-52.
- Republic of the union of Myanmar, Ministry of Agriculture and Irrigation, Myanmar Agriculture Service 45. Family name and botanical names of important plants in Myanmar (Official documents with unknown year of issue).
- Singh KH, Shankya R and Mahawar K (2014). Genetic diversity and patterns of variation among Indian mustard (*Brassica juncea* (L.) Czernj. & Cosson) varieties. SABRAO J Breed Genet 46(2): 329-339.
- Tsuda M, Tabei Y, Ohsawa R, Shimono A, Yoshida Y and Yoshimura Y (2016). The biology of *Brassica juncea*, *B. rapa* and *B. napus* for biodiversity risk assessment of genetically modified *B. napus* in Japan. Bull Natl Inst Agro-Environ Sci 36: 1-45 (in Japanese with English summary).
- Wakui K, Irie K, Ohm Mar Saw and Than Naing Oo (2016). Collaborative survey and collection of *Brassica* vegetable genetic resources in and around the Southern Shan State of Myanmar. APEIPGR 32: 243-261.
[Genebank, NARO], [JaLC]
- Yoshida S, Kikuno H, Nagashima M, Than Naing Oo, Ohm Mar Saw and Irie K (2017). Exploration and collection of vegetable genetic resources within Brassicaceae in and around Kachin State of Myanmar. AREIPGR 33: 223-237.
[Genebank, NARO], [JaLC]
- Yoshida S, Kikuno H, Wakui K, Nagashima M, Sander Moe, Ohm Mar Saw and Irie K (2018). Collaborative survey and collection of *Brassica* vegetable genetic resources in Myanmar. AREIPGR 34: 147-158.
[Genebank, NARO], [JaLC]
- Yoshida S, Wakui K, Zin Thu Zar Maung, Than Naing Oo, Ohm Mar Saw and Irie K (2019). Collaborative survey and collection of *Brassica* vegetable genetic resources in Myanmar in 2018 and 2019. AREIPGR 35: 205-217.
[Genebank, NARO], [JaLC]

ミャンマーにおける野菜類遺伝資源の 共同探索・収集, 2019 年および 2020 年

吉田 沙樹^{1)*}・菊野 日出彦¹⁾・Than Naing Oo²⁾・
Ohm Mar Saw²⁾・入江 憲治¹⁾

1) 東京農業大学 農学研究科 国際農業開発学専攻

2) ミャンマー連邦共和国 農業畜産灌漑省 農業研究局

* 現所属：農業・食品産業技術総合研究機構 作物研究部門

和文摘要

ミャンマー連邦共和国において、農業畜産灌漑省農業研究局（DAR）と東京農業大学の共同で”Mohn Nyin”と呼ばれるカラシナを中心としたアブラナ科野菜およびイモ類の探索収集を行った。1 度目の調査は 2019 年 11 月 1 日から 15 日にかけてザガイン地方域北部において、2 度目の調査は 2019 年 12 月 26 日から 2020 年 1 月 7 日にかけてザガイン地方域およびマンダレー地方域、シャン州において行った。その結果、*Brassica juncea* 51 点、*Brassica oleracea* L. Alboglabra Group 11 点、*Brassica* sp. 3 点、*Raphanus sativus* L. 10 点のアブラナ科野菜遺伝資源および *Dioscorea* spp. 15 点、*Colocasia esculenta* (L.) Schott 28 点、*Xanthosoma sagittifolium* 1 点、*Amorphophallus* spp. 12 点の計 131 点が収集された。収集品は 2 分し、一方はミャンマーシードバンクで、他方は SMTA に基づき日本に導入された後、農業・食品産業技術総合研究機構遺伝資源センターにて保存される。

Table 2. A list of plant materials collected in 2019 and 2020

COL-No.	JP No.	Species	Local name	Date of collection	Collection sites	Town Ship	Name of Village/market	Latitude	Longitude	Altitude (m)	Collection source	Usage
001	271252	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	3-Nov-19	Sagaing Region	Hkamti	Hkamti market	N25-00-05.41	E95-41-30.26	50	Market	Leaf vegetable
002	271253	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Chaula Mohn Nyin	3-Nov-19	Sagaing Region	Hkamti	Hkamti market	N25-00-05.41	E95-41-30.26	50	Market	Leaf vegetable
003	271254	<i>Brassica oleracea</i> L. Alboglabra Group	Kailan	3-Nov-19	Sagaing Region	Hkamti	Hkamti market	N25-00-05.41	E95-41-30.26	50	Market	Leaf vegetable
004	271255	<i>Raphanus sativus</i> L.	Monlan U	3-Nov-19	Sagaing Region	Hkamti	Hkamti market	N25-00-05.41	E95-41-30.26	50	Market	Vegetable
005	271256	<i>Brassica oleracea</i> L. Alboglabra Group	Kailan	3-Nov-19	Sagaing Region	Hkamti	Hkamti market	N26-00-05.80	E95-41-34.17	-	Market	Leaf vegetable
006	271257	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	3-Nov-19	Sagaing Region	Hkamti	Hkamti market	N26-00-05.80	E95-41-34.17	-	Market	Leaf vegetable
007	271258	<i>Raphanus sativus</i> L.	Monlan U	4-Nov-19	Sagaing Region	Hkamti	Hkamti market	N26-00-05.80	E95-41-34.17	-	Market	Fruit vegetable
008	271259	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin ka	4-Nov-19	Sagaing Region	Lahe	Ma Kyan village	N26-23-53.51	E95-27-50.09	1,617	Farmer	Leaf vegetable
009	271260	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	4-Nov-19	Sagaing Region	Lahe	Ma Kyan village	N26-23-53.51	E95-27-50.09	1,617	Farmer	Leaf vegetable
010	271261	<i>Brassica</i> sp.	Khin wan	4-Nov-19	Sagaing Region	Lahe	San Tou village	N26-25-56.04	E95-31-11.31	1,226	Farmer	Leaf vegetable
011	271262	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Khin wan	4-Nov-19	Sagaing Region	Lahe	San Tou village	N26-26-17.80	E95-31-39.00	1,333	Farmer	Leaf vegetable
012	271263	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	4-Nov-19	Sagaing Region	Lahe	Lahe	N26-26-17.83	E95-31-38.99	990	Farmer	Leaf vegetable
013	271264	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	7-Nov-19	Sagaing Region	Lahe	Lahe	N26-19-15.86	E95-27-01.06	743	Farmer	Leaf vegetable
014	271265	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Khaw Khi	7-Nov-19	Sagaing Region	Lay Shi	Sap Pyar village	N25-30-03.28	E94-56-33.46	1,103	Farmer	Leaf vegetable
015	271266	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Khaw Khi	7-Nov-19	Sagaing Region	Lay Shi	Sap Pyar village	N25-30-01.10	E94-56-31.30	1,114	Farmer	Leaf vegetable
016	271267	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Khaw Khi	7-Nov-19	Sagaing Region	Lay Shi	Sap Pyar village	N25-30-01.10	E94-56-31.30	1,114	Farmer	Leaf vegetable
017	271268	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Khaw Khi	7-Nov-19	Sagaing Region	Lay Shi	Sap Pyar village	N25-30-01.10	E94-56-31.30	1,114	Farmer	Leaf vegetable
018	271269	<i>Brassica oleracea</i> L. Alboglabra Group	Kailan	7-Nov-19	Sagaing Region	Lay Shi	Sap Pyar village	N25-30-01.10	E94-56-31.30	1,114	Farmer	Leaf vegetable
019	271270	<i>Brassica oleracea</i> L. Alboglabra Group	Kailan	7-Nov-19	Sagaing Region	Lay Shi	Sap Pyar village	N25-30-01.10	E94-56-31.30	1,114	Farmer	Leaf vegetable
020	271271	<i>Brassica</i> sp.	Mohn Nyin	8-Nov-19	Sagaing Region	Lay Shi	Pein Ne Gone village	N25-29-07.01	E94-57-59.74	769	Farmer	Leaf vegetable
021	271272	<i>Brassica</i> sp.	Ka Zi Yam	8-Nov-19	Sagaing Region	Lay Shi	Somla village	N25-21-51.26	E94-41-15.77	1,885	Farmer	Leaf vegetable
022	271273	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	9-Nov-19	Sagaing Region	Lay Shi	Kuki village	N25-28-33.32	E94-49-03.15	1,582	Farmer	Leaf vegetable
023	271274	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	9-Nov-19	Sagaing Region	Lay Shi	Sone Kin village	N25-22-33.37	E94-49-03.16	926	Farmer	Leaf vegetable
024	271275	<i>Raphanus sativus</i> L.	Mohn Nyin	9-Nov-19	Sagaing Region	Lay Shi	Sone Kin village	N25-22-33.37	E94-49-03.16	926	Farmer	Vegetable
025	271276	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	10-Nov-19	Sagaing Region	Lay Shi	Lhan Lai Hla village	N25-25-27.22	E95-01-51.28	749	Farmer	Leaf vegetable
026	271277	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Chaula Mohn Nyin	10-Nov-19	Sagaing Region	Lay Shi	Daing Ka Lain Away village	N25-28-10.45	E95-57-05.23	1,305	Farmer	Leaf vegetable
027	271278	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Chaula Mohn Nyin	10-Nov-19	Sagaing Region	Lay Shi	Daing Ka Lain Sam Pya village	N25-27-29.60	E94-56-30.75	1,401	Farmer	Leaf vegetable
(1)Br-2	271788	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	26-Dec-19	Sagaing Region	Homalin	Kettha	N24-50-44.13	E094-54-52.36	546	Farmer	Leaf vegetable
(1)Br-4	271790	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	26-Dec-19	Sagaing Region	Homalin	Kettha	N24-50-47.15	E094-54-56.23	546	Farmer	Leaf vegetable
(1)Br-5	271791	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	26-Dec-19	Sagaing Region	Homalin	Kettha	N24-50-47.15	E094-54-56.23	546	Farmer	Leaf vegetable
(2)Br-6	271793	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	27-Dec-19	Sagaing Region	Homalin	Koung Toung	N24-52-03.20	E095-00-49.98	126	Farmer	Leaf vegetable
(3)Br-7	271798	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	27-Dec-19	Sagaing Region	Paungbyin	Ingyin Myint	N24-52-03.03	E095-00-50.63	117	Farmer	Leaf vegetable
(5)Br-8	271802	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	27-Dec-19	Sagaing Region	Paungbyin	Harpa	N24-23-02.48	E094-53-54.74	94	Farmer	Leaf vegetable
(7)Br-10	271807	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	28-Dec-19	Sagaing Region	Homalin	Homalin market	N24-23-02.43	E094-53-54.76	79	Market	Leaf vegetable
(8)Br-14	271812	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	28-Dec-19	Sagaing Region	Homalin	Homalin market	N24-23-02.43	E094-53-54.76	79	Market	Leaf vegetable
(9)Br-16	271815	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	28-Dec-19	Sagaing Region	Homalin	Nan ton	N24-23-02.43	E094-53-54.76	72	Farmer	Leaf vegetable
(9)Br-18	271817	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	28-Dec-19	Sagaing Region	Homalin	Nan ton	N24-23-02.43	E094-53-54.76	72	Farmer	Leaf vegetable
(11)Br-19	271820	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	28-Dec-19	Sagaing Region	Homalin	Parmalon	N24-53-00.30	E094-52-52.47	117	Farmer	Leaf vegetable
(12)Br-21	271823	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	28-Dec-19	Sagaing Region	Homalin	Manpin	N24-53-34.65	E094-53-07.59	162	Farmer	Leaf vegetable

Table 2. (Continued).

COL-No.	JP No.	Species	Local name	Date of collection	Collection sites	Town Ship	Name of Village/market	Latitude	Longitude	Altitude (m)	Collection source	Usage
(13)Br-23	271826	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	28-Dec-19	Sagaing Region	Homalin	Mya Wa Day	N24-51-47.00	E094-56-29.26	118	Farmer	Leaf vegetable
(14)Br-24	271829	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	28-Dec-19	Sagaing Region	Homalin	Mya Wa Day	N24-51-09.52	E094-57-10.86	102	Farmer	Leaf vegetable
(16)Br-25	271830	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	29-Dec-19	Sagaing Region	Homalin	Twat wat	N24-49-02.76	E094-49-17.28	137	Farmer	Leaf vegetable
(17)Br-26	271831	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	29-Dec-19	Sagaing Region	Homalin	Moe made	N24-49-02.77	E094-49-17.41	138	Farmer	Leaf vegetable
(21)Br-29	271846	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	30-Dec-19	Sagaing Region	Homalin	Man Li	N25-14-18.22	E095-12-43.10	144	Farmer	Leaf vegetable
(23)Br-30	271852	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	30-Dec-19	Sagaing Region	Homalin	Yain Mar	N25-20-13.42	E095-17-38.35	172	Farmer	Leaf vegetable
(24)Br-31	271854	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	30-Dec-19	Sagaing Region	Homalin	Tan Man Thoi market	N25-19-53.57	E095-17-22.50	164	Farmer	Leaf vegetable
(24)Br-32	271855	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	30-Dec-19	Sagaing Region	Homalin	Tan Man Thoi market	N25-19-53.57	E095-17-24.33	167	Farmer	Leaf vegetable
(26)Br-33	271858	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	30-Dec-19	Sagaing Region	Homalin	Win Holing	N25-19-56.90	E095-17-20.36	60	Farmer	Leaf vegetable
(27)Br-34	271861	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	30-Dec-19	Sagaing Region	Homalin	Mom Yon Myan	N25-12-10.36	E095-09-47.31	151	Farmer	Leaf vegetable
(28)Br-36	271863	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	30-Dec-19	Sagaing Region	Homalin	Mom Yon Myan	N25-12-09.42	E095-09-47.66	198	Farmer	Leaf vegetable
(29)Br-38	271866	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	31-Dec-19	Sagaing Region	Homalin	Homalin market	N24-23-02.43	E094-53-54.76	79	Market	Leaf vegetable
(33)Br-39	271884	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	2-Jan-20	Mandalay Region	Pyinmanar	Mya Thi Tar	N19-42-30.00	E096-34-19.92	952	Farmer	Leaf vegetable
(36)Br-40	271897	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	3-Jan-20	Shan State	Pin Laung	Mingalar	N20-07-05.44	E096-46-56.39	1,456	Farmer	Leaf vegetable
(37)Br-41	271898	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	3-Jan-20	Shan State	Pin Laung	Noi Pyar	N20-08-54.66	E096-46-14.70	1,449	Farmer	Leaf vegetable
(37)Br-42	271899	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	3-Jan-20	Shan State	Pin Laung	Noi Pyar	N20-08-54.66	E096-46-14.70	1,449	Farmer	Leaf vegetable
(37)Br-43	271900	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	3-Jan-20	Shan State	Pin Laung	Noi Pyar	N20-08-54.66	E096-46-14.70	1,449	Farmer	Leaf vegetable
(38)Br-44	271905	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	4-Jan-20	Shan State	Pin Laung	Saung Pyie Market	N20-08-54.75	E096-46-14.87	1,270	Market	Leaf vegetable
(42)Br-45	271922	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	4-Jan-20	Shan State	Pin Laung	Saung Pyaung	N19-56-51.38	E096-51-18.68	1,307	Farmer	Leaf vegetable
(42)Br-46	271923	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	4-Jan-20	Shan State	Pin Laung	Saung Pyaung	N19-56-51.38	E096-51-18.68	1,307	Farmer	Leaf vegetable
(43)Br-47	271932	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	4-Jan-20	Shan State	Pin Laung	Nan Farmu	N19-56-51.59	E096-51-18.87	988	Farmer	Leaf vegetable
(45)Br-48	271940	<i>Brassica juncea</i> (L.) Czern. Cernua Group	Mohn Nyin	4-Jan-20	Shan State	Pin Laung	Saung Myout	N19-56-36.29	E096-51-21.18	1,312	Trader	Leaf vegetable
(1)Br-3	271789	<i>Brassica oleracea</i> L. Alboglabra Group	Mohn Nyin	26-Dec-19	Sagaing Region	Homalin	Kettha	N24-50-47.15	E094-54-56.23	546	Farmer	Leaf vegetable
(7)Br-11	271808	<i>Brassica oleracea</i> L. Alboglabra Group	Mohn Nyin	28-Dec-19	Sagaing Region	Homalin	Homalin market	N24-23-02.43	E094-53-54.76	79	Market	Leaf vegetable
(8)Br-13	271811	<i>Brassica oleracea</i> L. Alboglabra Group	Mohn Nyin	28-Dec-19	Sagaing Region	Homalin	Homalin market	N24-23-02.43	E094-53-54.76	79	Market	Leaf vegetable
(9)Br-17	271816	<i>Brassica oleracea</i> L. Alboglabra Group	Mohn Nyin	28-Dec-19	Sagaing Region	Homalin	Nan ton	N24-23-02.43	E094-53-54.76	72	Farmer	Leaf vegetable
(13)Br-22	271825	<i>Brassica oleracea</i> L. Alboglabra Group	Mohn Nyin	28-Dec-19	Sagaing Region	Homalin	Mya Wa Day	N24-51-47.00	E094-56-29.26	118	Farmer	Leaf vegetable
(17)Br-27	271832	<i>Brassica oleracea</i> L. Alboglabra Group	Mohn Nyin	29-Dec-19	Sagaing Region	Homalin	Moe made	N24-49-02.77	E094-49-17.41	138	Farmer	Leaf vegetable
(19)Br-28	271837	<i>Brassica oleracea</i> L. Alboglabra Group	Mohn Nyin	29-Dec-19	Sagaing Region	Homalin	Moe made	N24-49-05.29	E094-49-19.42	122	Farmer	Leaf vegetable
(1)Br-1	271787	<i>Raphanus sativus</i> L.	Monlan U	26-Dec-19	Sagaing Region	Homalin	Kettha	N24-50-44.13	E094-54-52.36	546	Farmer	Vegetable
(5)Br-9	271803	<i>Raphanus sativus</i> L.	Monlan U	27-Dec-19	Sagaing Region	Paungbyin	Harpa	N24-23-02.48	E094-53-54.74	94	Farmer	Vegetable
(7)Br-12	271809	<i>Raphanus sativus</i> L.	Monlan U	28-Dec-19	Sagaing Region	Homalin	Homalin market	N24-23-02.43	E094-53-54.76	79	Market	Vegetable
(8)Br-15	271813	<i>Raphanus sativus</i> L.	Monlan U	28-Dec-19	Sagaing Region	Homalin	Homalin market	N24-23-02.43	E094-53-54.76	79	Market	Vegetable
(11)Br-20	271821	<i>Raphanus sativus</i> L.	Monlan U	28-Dec-19	Sagaing Region	Homalin	Parmalon	N24-53-00.30	E094-52-52.47	117	Farmer	Vegetable
(27)Br-35	271862	<i>Raphanus sativus</i> L.	Monlan U	30-Dec-19	Sagaing Region	Homalin	Mom Yon Myan	N25-12-10.36	E095-09-47.31	151	Farmer	Vegetable
(29)Br-37	271865	<i>Raphanus sativus</i> L.	Monlan U	31-Dec-19	Sagaing Region	Homalin	Homalin market	N24-23-02.43	E094-53-54.76	79	Market	Vegetable
(2)Co-1	271794	<i>Colocasia esculenta</i> (L.) Schott	Pein U	27-Dec-19	Sagaing Region	Homalin	Koung Toung	N24-52-03.20	E095-00-49.98	126	Farmer	Side dish
(4)Co-2	271800	<i>Colocasia esculenta</i> (L.) Schott	Pein U	27-Dec-19	Sagaing Region	Paungbyin	Paungbyin market	N24-15-58.33	E094-48-57.73	114	Farmer	Side dish
(4)Co-3	271801	<i>Colocasia esculenta</i> (L.) Schott	Pein U	27-Dec-19	Sagaing Region	Paungbyin	Paungbyin market	N24-15-58.33	E094-48-57.73	114	Farmer	Side dish
(6)Co-4	271804	<i>Colocasia esculenta</i> (L.) Schott	Pein U	28-Dec-19	Sagaing Region	Homalin	Homalin market	N24-23-02.43	E094-53-54.76	79	Farmer	Side dish
(6)Co-5	271805	<i>Colocasia esculenta</i> (L.) Schott	Pein U	28-Dec-19	Sagaing Region	Homalin	Homalin market	N24-23-02.43	E094-53-54.76	79	Farmer	Side dish

Table 2. (Continued).

COL-No.	JP No.	Species	Local name	Date of collection	Collection sites	Town Ship	Name of Village/market	Latitude	Longitude	Altitude (m)	Collection source	Usage
(9)Co-6	271818	<i>Colocasia esculenta</i> (L.) Schott	Pein U	28-Dec-19	Sagaing Region	Homalin	Nan ton	N24-23-02.43	E094-53-54.76	72	Farmer	Side dish
(20)Co-7	271843	<i>Colocasia esculenta</i> (L.) Schott	Pein U	30-Dec-19	Sagaing Region	Homalin	Shoung Some	N24-52-31.13	E094-54-55.45	57	Farmer	Side dish
(20)Co-8	271844	<i>Colocasia esculenta</i> (L.) Schott	Pein U	30-Dec-19	Sagaing Region	Homalin	Shoung Some	N24-52-31.13	E094-54-55.45	57	Farmer	Side dish
(21)Co-9	271847	<i>Colocasia esculenta</i> (L.) Schott	Pein U	30-Dec-19	Sagaing Region	Homalin	Man Li	N25-14-18.22	E095-12-43.10	144	Farmer	Side dish
(21)Co-10	271848	<i>Colocasia esculenta</i> (L.) Schott	Pein U	30-Dec-19	Sagaing Region	Homalin	Man Li	N25-14-18.22	E095-12-43.10	144	Farmer	Side dish
(25)Co-12	271857	<i>Colocasia esculenta</i> (L.) Schott	Pein U	30-Dec-19	Sagaing Region	Homalin	Tan Man Thoi	N25-19-53.54	E095-17-24.33	167	Farmer	Side dish
(26)Co-13	271859	<i>Colocasia esculenta</i> (L.) Schott	Pein U	30-Dec-19	Sagaing Region	Homalin	Tan Man Thoi	N25-19-56.90	E095-17-20.36	60	Farmer	Side dish
(30)Co-14	271870	<i>Colocasia esculenta</i> (L.) Schott	Pein U	1-Jan-20	Magway Region	Aurg Lan	Satyo Me Piay	-	-	-	Driver's family home	Side dish
(30)Co-15	271871	<i>Colocasia esculenta</i> (L.) Schott	Pein U	1-Jan-20	Magway Region	Aurg Lan	Pya Loe	-	-	-	Driver's family home	Side dish
(30)Co-16	271872	<i>Colocasia esculenta</i> (L.) Schott	Pein U	1-Jan-20	Magway Region	Aurg Lan	Magyi Yone	-	-	-	Driver's family home	Side dish
(31)Co-17	271875	<i>Colocasia esculenta</i> (L.) Schott	Pein U	2-Jan-20	Mandalay Region	Pyin Mana	Than Ma Ye	N19-35-16.88	E096-23-39.65	81	Farmer	Side dish
(32)Co-18	271878	<i>Colocasia esculenta</i> (L.) Schott	Pein U	2-Jan-20	Mandalay Region	Pyin Mana	Aung Bate Thak	N19-36-53.97	E096-27-24.91	725	Farmer	Side dish
(33)Co-19	271885	<i>Colocasia esculenta</i> (L.) Schott	Pein U	2-Jan-20	Mandalay Region	Pyin Mana	Mya Thi Tar	N19-42-30.00	E096-34-19.92	952	Farmer	Side dish
(33)Co-20	271886	<i>Colocasia esculenta</i> (L.) Schott	Pein U	2-Jan-20	Mandalay Region	Pyin Mana	Mya Thi Tar	N19-42-30.00	E096-34-19.92	952	Farmer	Side dish
(33)Co-21	271887	<i>Colocasia esculenta</i> (L.) Schott	Pein U	2-Jan-20	Mandalay Region	Pyin Mana	Mya Thi Tar	N19-42-30.00	E096-34-19.92	952	Farmer	Side dish
(34)Co-22	271895	<i>Colocasia esculenta</i> (L.) Schott	Pein U	3-Jan-20	Shan State	Pin Laung	Towng Kya	N19-44-07.70	E096-13-19.57	452	Farmer	Side dish
(39)Co-23	271909	<i>Colocasia esculenta</i> (L.) Schott	Pein U	4-Jan-20	Shan State	Pin Laung	Saung Pyie market	N20-08-54.75	E096-46-14.87	1,270	Market	Side dish
(39)Co-24	271910	<i>Colocasia esculenta</i> (L.) Schott	Pein U	4-Jan-20	Shan State	Pin Laung	Saung Pyie market	N20-08-54.75	E096-46-14.87	1,270	Market	Side dish
(39)Co-25	271911	<i>Colocasia esculenta</i> (L.) Schott	Pein U	4-Jan-20	Shan State	Pin Laung	Saung Pyie market	N20-08-54.75	E096-46-14.87	1,270	Market	Side dish
(39)Co-26	271912	<i>Colocasia esculenta</i> (L.) Schott	Pein U	4-Jan-20	Shan State	Pin Laung	Saung Pyie market	N20-08-54.75	E096-46-14.87	1,270	Market	Side dish
(42)Co-27	271924	<i>Colocasia esculenta</i> (L.) Schott	Pein U	4-Jan-20	Shan State	Pin Laung	Khun Aung Moe	N19-56-51.38	E096-51-18.68	1,307	Farmer	Side dish
(43)Co-28	271933	<i>Colocasia esculenta</i> (L.) Schott	Pein U	4-Jan-20	Shan State	Pin Laung	Nan Farmu	N19-56-51.59	E096-51-18.87	988	Farmer	Side dish
(46)Co-29	271942	<i>Colocasia esculenta</i> (L.) Schott	Pein U	5-Jan-20	Shan State	Pin Laung	Kut Moe	N20-00-11.69	E096-22-14.10	723	Farmer	Side dish
(21)Co-11	271849	<i>Xanthosoma</i> sp.	Pein U	30-Dec-19	Sagaing Region	Homalin	Man Li	N25-14-18.22	E095-12-43.10	144	Farmer	Side dish
(2)Di-2	271796	<i>Dioscorea alata</i> L.	Myut U	27-Dec-19	Sagaing Region	Homalin	Koung Toung	N24-52-03.20	E095-00-49.98	126	Farmer	Side dish
(6)Di-3	271806	<i>Dioscorea alata</i> L.	Myut U	28-Dec-19	Sagaing Region	Homalin	Homalin market	N24-23-02.43	E094-53-54.76	79	Market	Side dish
(9)Di-4	271819	<i>Dioscorea alata</i> L.	Myut U	28-Dec-19	Sagaing Region	Homalin	Nan ton	N24-23-02.43	E094-53-54.76	72	Farmer	Side dish
(21)Di-5	271850	<i>Dioscorea alata</i> L.	Myut U	30-Dec-19	Sagaing Region	Homalin	Man Li	N25-14-18.22	E095-12-43.10	144	Farmer	Side dish
(22)Di-6	271851	<i>Dioscorea alata</i> L.	Myut U	30-Dec-19	Sagaing Region	Homalin	Man Li	N25-14-18.37	E095-12-43.10	144	Farmer	Side dish
(26)Di-7	271860	<i>Dioscorea alata</i> L.	Myut U	30-Dec-19	Sagaing Region	Homalin	Tan Man Thoi	N25-19-56.90	E095-17-20.36	60	Farmer	Side dish
(29)Di-8	271867	<i>Dioscorea alata</i> L.	Myut U	31-Dec-19	Sagaing Region	Homalin	Homalin market	N24-23-02.43	E094-53-54.76	79	Market	Side dish
(30)Di-9	271873	<i>Dioscorea alata</i> L.	Myut U	1-Jan-20	Magway Region	Aurg Lan	Pya Loe	-	-	-	Driver's family home	Side dish
(32)Di-10	271879	<i>Dioscorea alata</i> L.	Myut U	2-Jan-20	Mandalay Region	Pyin Mana	Aung Bate Thak	N19-36-53.97	E096-27-24.91	725	Farmer	Side dish
(33)Di-13	271889	<i>Dioscorea alata</i> L.	Myut U	2-Jan-20	Mandalay Region	Pyin Mana	Mya Thi Tar	N19-42-30.00	E096-34-19.92	952	Farmer	Side dish
(42)Di-14	271925	<i>Dioscorea alata</i> L.	Myut U	4-Jan-20	Shan State	Pin Laung	Khun Aung Moe	N19-56-51.38	E096-51-18.68	1,307	Farmer	Side dish
(46)Di-15	271943	<i>Dioscorea alata</i> L.	Myut U	5-Jan-20	Shan State	Pin Laung	Kut Moe	N20-00-11.69	E096-22-14.10	723	Farmer	Side dish

Table 2. (Continued).

COL-No.	JP No.	Species	Local name	Date of collection	Collection sites	Town Ship	Name of Village/market	Latitude	Longitude	Altitude (m)	Collection source	Usage
(32)Di-11	271880	<i>Dioscorea esculenta</i> Burkil	Myut U	2-Jan-20	Mandalay Region	Pyin Mana	Aung Bate Thak	N19-36-53.97	E096-27-24.91	725	Farmer	Side dish
(33)Di-12	271888	<i>Dioscorea esculenta</i> Burkil	Myut U	2-Jan-20	Mandalay Region	Pyin Mana	Mya Thi Tar	N19-42-30.00	E096-34-19.92	952	Farmer	Side dish
(2)Di-1	271795	<i>Dioscorea</i> sp.	Myut U	27-Dec-19	Sagaing Region	Homalin	Koung Toung	N24-52-03.20	E095-00-49.98	126	Farmer	Side dish
(18)Konjac-1	271834	<i>Amorphophallus</i> spp.	Wa U	29-Dec-19	Sagaing Region	Homalin	Moe made	N24-49-00.51	E094-49-18.12	104	Farmer	Side dish
(20)Konjac-2	271845	<i>Amorphophallus</i> spp.	Wa U	30-Dec-19	Sagaing Region	Homalin	Shoung Some	N24-52-31.13	E094-54-55.45	57	Farmer	Side dish
(30)Konjac-3	271874	<i>Amorphophallus</i> spp.	Wa U	1-Jan-20	Magway Region	Aurg Lan	Baye	-	-	-	Driver's family home	Raw materials for processing
(31)Konjac-4	271876	<i>Amorphophallus</i> spp.	Wa U	2-Jan-20	Mandalay Region	Pyin Mana	Than Ma Ye	N19-35-16.88	E096-23-39.65	81	Farmer	Raw materials for processing
(32)Konjac-5	271881	<i>Amorphophallus</i> spp.	Wa U	2-Jan-20	Mandalay Region	Pyin Mana	Aung Bate Thak	N19-36-53.97	E096-27-24.91	725	Farmer	Side dish
(32)Konjac-6	271882	<i>Amorphophallus</i> spp.	Wa U	2-Jan-20	Mandalay Region	Pyin Mana	Aung Bate Thak	N19-36-53.97	E096-27-24.91	725	Farmer	Raw materials for processing
(35)Konjac-7	271896	<i>Amorphophallus</i> spp.	Wa U	3-Jan-20	Shan State	Pin Laung	Lan Eli	N19-59-15.61	E096-37-48.74	363	Farmer	Raw materials for processing
(41)Konjac-8	271921	<i>Amorphophallus</i> spp.	Wa U	4-Jan-20	Shan State	Pin Laung	Soung Pyaung	N19-56-05.07	E096-52-04.85	1,302	Farmer	Raw materials for processing
(43)Konjac-9	271934	<i>Amorphophallus</i> spp.	Wa U	4-Jan-20	Shan State	Pin Laung	Nan Farmu	N19-56-51.59	E096-51-18.87	988	Farmer	Raw materials for processing
(44)Konjac-10	271939	<i>Amorphophallus</i> spp.	Wa U	4-Jan-20	Shan State	Pin Laung	Saung Myout	N19-56-34.50	E096-51-27.83	1,298	Trader	Raw materials for processing
(45)Konjac-11	271941	<i>Amorphophallus</i> spp.	Wa U	4-Jan-20	Shan State	Pin Laung	Saung Myout	N19-56-36.29	E096-51-21.18	1,312	Trader	Raw materials for processing
(46)Konjac-12	271944	<i>Amorphophallus</i> spp.	Wa U	5-Jan-20	Shan State	Pin Laung	Kut Moe	N20-00-11.69	E096-22-14.10	723	Farmer	Raw materials for processing