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Original Paper

Exploration and Collection of Plant Genetic Resources in Northeastern Cambodia, 2021

Sreynech OUCH [1)], Dolla ROS [1)], Sophany SAKHAN [1)], Vathany THUN [1)],
Makara OUK [1)], Katsunori TANAKA [2)], Yoichi KAWAZU [3)]

1) *Cambodian Agricultural Research and Development Institute*, National Road 3, Prateahlang, Dangkor, P.O. Box 01, Phnom Penh, Cambodia
2) *Faculty of Agriculture and Life Science, Hirosaki University*, 3 Bunkyo, Hirosaki, Aomori 036-8561, Japan
3) *Institute of Vegetable and Floriculture Science*, *National Agriculture and Food Research Organization (NARO),* 360 Kusawa, Ano, Tsu, Mie 514-2392, Japan

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Corresponding author: Y. KAWAZU (e-mail: ykawazu@affrc.go.jp)

Summary

The Cambodian Agricultural Research and Development Institute (CARDI) conducted an exploration and collection of plant genetic resources in northeastern Cambodia in 2021 in cooperation with the National Agriculture and Food Research Organization (NARO), Japan. The exploration was conducted within the framework of the Plant Genetic Resources Asia (PGRAsia) project funded by the Ministry of Agriculture, Forestry, and Fisheries, Japan. The team surveyed mainly cucurbitaceous vegetables in two provinces of northeastern Cambodia (Ratanakiri and Stung Treng) and collected 70 samples, including 34 pumpkins (*Cucurbita moschata*), 23 melons (*Cucumis melo*), five cucumbers (*Cucumis sativus*), two watermelons (*Citrullus lanatus*), four eggplants (*Solanum melongena*), and two chili peppers (*Capsicum* sp.). Seeds were divided between the CARDI and the Genetic Resource Center, NARO, using the standard material transfer agreement (SMTA).

KEY WORDS: pumpkin, melon, cucumber, genetic resource, Cambodia

Introduction

It is important to collect new plant genetic resources to develop crop varieties with advantageous traits, such as resistance to pests or diseases, high quality, and high yield. With this goal in mind, the Plant Genetic Resources Asia (PGRAsia) project, started in 2014 and funded by the Ministry of Agriculture, Forestry and Fisheries, Japan, promotes the collection of plant genetic resources. The objectives of the project are to collect, characterize, evaluate, and develop plant genetic resources for food and agriculture (PGRFA), in collaboration between Asian countries and Japan, and establish open databases for the effective use of PGRFA.

Here, we report the results of our surveys of mainly cucurbitaceous vegetables, such as pumpkin, melon, cucumber, and watermelon, in northeastern Cambodia. Cucurbitaceous vegetables were collected from western and northwestern Cambodia in 2014 (Matsunaga *et al.* 2015) and 2018 (Yashiro *et al.* 2019); northern Cambodia in 2016 (Tanaka *et al.* 2017) and 2018 (Kondo *et al.* 2019); southern Cambodia in 2017 (Tanaka *et al.* 2019) and 2019 (Sudasinghe *et al.* 2020); and eastern Cambodia

in 2015 (Tanaka *et al.* 2016), 2016 (Tanaka *et al.* 2017), 2017 (Matsushima *et al.* 2018), and 2019 (Kawazu *et al.* 2020). The 2014 to 2019 collection sites of melons, pumpkins, and cucumbers have been summarized by Kawazu *et al.* (2020). Surveys of cucurbitaceous vegetables in northeastern Cambodia were conducted in 2015 (Tanaka *et al.* 2016) and 2017 (Matsushima *et al.* 2018). The 2016 collection sites reported in Tanaka *et al.* (2017) also included northeastern Cambodia. Therefore, the study locations of the present study avoided those reported by Tanaka *et al.* (2016), Matsushima *et al.* (2018), and Tanaka *et al.* (2017). Due to COVID-19 regulations, the present study could not be conducted in collaboration with our Japanese colleagues. Therefore, the details of exploration and collection were discussed by e-mail, and only Cambodian scientists conducted surveys on plant genetic resources in this study.

Methods

The surveys were initiated on January 7, 2021, and lasted for 10 days. With a Toyota Land Cruiser (Table 1, Fig. 1), the team travelled from Phnom Penh through Mondulkiri and spent four days collecting in Ratanakiri. We left Ratanakiri to Stung Treng on January 12 where we conducted four days of sample collections. The team left Stung Treng on January 16 and arrived at Phnom Penh in the evening. Fruit and seed samples were collected from farmers' backyards or roadsides. In the case of fruit samples, the team removed the seeds from the fruits, washed the seeds with tap water, and air-dried

Table 1. Itinerary of the exploration and collection of plant genetic resources in northeastern Cambodia, 2021

Date (month / day)	Day	Itinerary	Stay
1/7	Thu	Phnom Penh - Mondolkiri	Sen Monorom
1/8	Fri	Mondolkiri - Ratanakiri	Ratanakiri
1/9	Sat	Ratanakiri	Ratanakiri
1/10	Sun	Ratanakiri	Ratanakiri
1/11	Mon	Ratanakiri	Ratanakiri
1/12	Tue	Ratanakiri - Stung Treng	Stung Treng
1/13	Wed	Stung Treng	Stung Treng
1/14	Thu	Stung Treng	Stung Treng
1/15	Fri	Stung Treng	Stung Treng
1/16	Sat	Stung Treng - Phnom Penh	

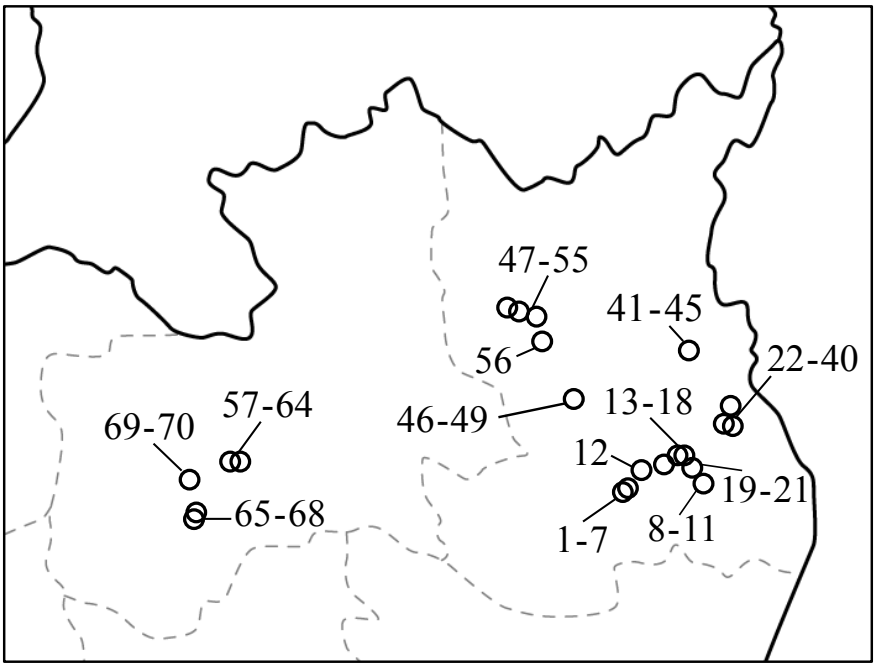

Fig. 1. Sites in northeastern Cambodia where plant genetic resources were collected. Samples 1 - 56 were collected in Ratanakiri, and 57 - 70 were collected in Stung Treng.

them in fine-mesh nets. Most farmers stored the seeds of different vegetables together, and in this case, the team separated the seeds on site. The passport data of each sample were recorded, including the local vegetable name, vegetable status, sowing season, harvest season, usage, and cultivation methods. The team also recorded information regarding the collection sites, including place name, latitude, longitude, and altitude, using a Garmin Foretrex 401 (Garmin International Inc., Olathe, KS, USA).

Results and Discussion

The team collected 70 samples, including 34 pumpkins (*Cucurbita moschata*), 23 melons (*Cucumis melo*), five cucumbers (*Cucumis sativus*), two watermelons (*Citrullus lanatus*), four eggplants (*Solanum melongena*), and two chili peppers (*Capsicum* sp.) (Table 2). Table 3 contains detailed information for all the samples. None of the farmers used any fertilizers or chemicals during the entire growing season, and all harvests were kept for subsistence only. The seeds were equally divided between the CARDI and the Genetic Resource Center, NARO, based on the standard material transfer agreement (SMTA).

Pumpkin

All pumpkin samples belonged to *Cucurbita moschata* (Table 3). Nine fruit samples were collected, and the other 25 samples were collected as seeds. The average weight of the collected fruits was 1.5 kg, of which 1.9 kg was the heaviest individual fruit (Sample 20-042) and 1.2 kg was the lightest (Sample 20-009 and 20-055). The fruit shapes of samples 20-027, 20-042, 20-054, and 20-055 were flat, while that of sample 20-009 were elongated; 20-010 were pyriform; and 20-011, 20-022, and 20-051 were narrow pyriform. Different pumpkin fruit shapes have also been observed in previous collections in Cambodia (Okuizumi *et al.* 2017; Matsushima *et al.* 2018; Kawazu *et al.* 2020). Seed and fruit samples were collected from four different ethnic groups, Tumpoun, Kroeung, Leav, and Charay, each referring to pumpkins by their local name. In Tumpoun, pumpkins are called “ropeuy”; in Kroeung, “ropov”; in Leav, “ma-euk” or “lpov”; in Charay, “plery” or “yatol”; and Khmer, also “lpov.” The Tumpoun group mostly grows pumpkin in slash-and-burn fields with other cereal crops, such as rice and sesame. Pumpkin seeds were sown at the beginning of the wet season (June), and fruits were harvested at the end of the wet season (October). In Cambodia, most farmers do not use fertilizers and chemicals in pumpkin cultivation. The pumpkin collected in this study was grown without irrigation, fertilizer, or chemical application.

Melon

Twenty-three melon samples were collected. Farmers mostly cultivate melons with rice during the wet season, in upland areas or slash-and-burn fields. The local people believe that slash-and-burn practices provide fertile soil, with no pests or diseases. Melon cultivation was for subsistence only, and fertilizers and chemicals were not applied. Some farmers in Cambodia, use fertilizers and chemicals when growing melons for the market. Most farmers in this study stored their seeds in nets or plastic bags. Only one farmer, who provided 20-025 and 20-026, stored seeds in a hollow bottle gourd and a metal box with mixed pumpkin, melon, and watermelon seeds (Photo 1). Sample 20-028 was also stored with other crop seeds. In these cases, the seeds had to be separated on site (Photo 2). The collected melon seeds varied in length (mean of 7.9 mm, ranging from 5.5 mm [Sample 20-007] to 11.7 mm [Sample 20-043]).

Table 2. A summary of the genetic resources collected in northeastern Cambodia, 2021

Data	Province	District	Altitude (m)	*Cucurbita moschata*	*Cucumis melo*	*Cucumis sativus*	*Citrullus lanatus*	*Solanum melongena*	*Capsicum* sp.	Total
1/8	Ratanakiri	Lampat	131 - 147	6	2	2		1	1	12
1/8	Ratanakiri	Borkeo	140 - 172	4	2	2			1	9
1/9	Ratanakiri	O'Yadav	197 - 240	9	8	1	1			19
1/9	Ratanakiri	Ondoung Meas	112 - 115	2	2		1			5
1/10	Ratanakiri	Veoun Sai	95 - 102	6	3			1		10
1/11	Stung Treng	Thala Borivat	65 - 79	2						2
1/11	Stung Treng	Sesan	49 - 55	3	3			1		7
1/11	Stung Treng	Seim Bouk	30 - 55	1	2			1		4
1/11	Stung Treng	Thala Borivat	60	1	1					2
		Total		34	23	5	2	4	2	70

Photo 1. A fruit of bottle gourd (circle) and a metal box (rectangle) are used to store seeds.

Photo 2. Seed separation in the farmer's front yard.

Cucumber

Five cucumber seed samples were collected from Ratanakiri. These samples were provided by Tumpoun and Charay farmers. According to the farmers, they usually buy cucumber seeds at markets as they mostly harvest young cucumber fruit that lack seeds. Only some farmers that preferred preserving their landraces saved seeds for the next season.

A farmer who provided us with seeds reported that these landraces bear large fruits weighing up to 0.5 kg. Cucumber is cultivated in the wet season with upland rice, similar to pumpkins and melons. Fruit were harvested for household consumption only. As part of a traditional cultivation technique, farmers do not use fertilizers or chemicals.

Watermelon

Two samples of watermelon were collected from Charay farmers in Ratanakiri, whom called it "ov leuk," in Khmer. The cultural practice of watermelon is like pumpkin, melon, and cucumber. The farmer that provided watermelon seed 20-024 reported that this landrace was resistant to pests, but that the flesh sweetness was very low. The fruit of this landrace bears so many seeds that seeds from one fruit were enough for the next season. The seeds of the two watermelon samples had similar colors (light brown).

Eggplant

The team collected four eggplant samples (two from Ratanakiri and two from Stung Treng). Three of them were collected as seeds and the other as fruit. Farmers grow several plants in the backyard for household consumption and harvest them year-round. Kroeung and Leav call eggplant "trob," as in Khmer, while in Tumpoun eggplant is called "prao."

Chili pepper

Two chili pepper samples were collected from Ratanakiri. One was collected from a Tumpoun farmer as seeds, and the other from a Charay farmer as fruits. Chili is called "hang" by Charay and "mates," as in Khmer, by Tumpoun.

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References

Kawazu Y, Kuzuya M, Ouch S, Sakhan S and Ouk M (2020). Collaborative exploration of Cucurbitaceae genetic resources in eastern Cambodia, 2019. AREIPGR 36: 92-111.
[Genebank, NARO], [JaLC]

Kondo F, Layheng S, Tokuda M, Rathnayaka RMSMB, Sophany S and Matsushima K (2019). Collaborative exploration of plant genetic resources in north Cambodia, 2018. AREIPGR 35: 162-184.
[Genebank, NARO], [JaLC]

Matsunaga H, Matsushima K, Tanaka K, Theavy S, Layheng S, Channa T, Takahashi Y and Tomooka N (2015). Collaborative exploration of the Solanaceae and Cucurbitaceae vegetable genetic resources in Cambodia 2014. AREIPGR 31: 169-187.
[Genebank, NARO], [JaLC]

Matsushima K, Layheng S, Hatakeyama K, Kurumada S and Sophany S (2018). Collaborative exploration of plant genetic resources in eastern Cambodia, 2017. AREIPGR 34: 118-136.
[Genebank, NARO], [JaLC]

Sudasinghe SP, Leakhena M, Bando K, Yamaguchi K, Sakhan S, Ouk M and Matsushima K (2020). Collaborative exploration of plant genetic resources in southern Cambodia, 2019. AREIPGR 36: 128-147.
[Genebank, NARO], [JaLC]

Tanaka K, Duong TT, Yamashita H, Lay Heng S, Sophany S and Kato K (2016). Collection of cucurbit crops (Cucurbitaceae) from eastern Cambodia, 2015. AREIPGR 32: 109-137.
[Genebank, NARO], [JaLC]

Tanaka K, Shigita G, Sophea Y, Thun V, Sophany S and Kato K (2017). Collection of melon and other cucurbitaceous crops in Cambodia in 2016. AREIPGR 33: 175-205.
[Genebank, NARO], [JaLC]

Tanaka K, Shigita G, Dung TP, Sophea Y, Thun V, Sophany S and Kato K (2019). Collection of melon and other cucurbitaceous crops in Cambodia in 2017. AREIPGR 35: 121-146.
[Genebank, NARO], [JaLC]

Yashiro K, Tanaka K, Sophea Y, Thun V, Sophany S and Kato K (2019). Collaborative exploration of Cucurbitaceae vegetable genetic resources in western and northwestern Cambodia in 2018. AREIPGR 35: 147-161.
[Genebank, NARO], [JaLC]

カンボジア北東部における
植物遺伝資源の探索・収集，2021 年

Sreynech OUCH [3)]・Dolla ROS [1)]・Sophany SAKHAN [1)]・Vathany THUN [1)]・
Makara OUK [1)]・田中 克典 [2)]・川頭 洋一 [3)]

1) カンボジア農業開発研究所
2) 国立大学法人 弘前大学農学生命科学部
3) 国立研究開発法人 農業・食品産業技術総合研究機構 野菜花き研究部門

和文摘要

カンボジア農業開発研究所（CARDI）は国立研究開発法人 農業・食品産業技術総合研究機構（農研機構）と連携して，2021 年にカンボジア北東部において植物遺伝資源の探索・収集を実施した．この探索は，農林水産省委託プロジェクト研究「海外植物遺伝資源の民間等への提供促進」（PGRAsia プロジェクト）の予算により実施された．本探索ではカンボジア北東部の 2 つの州（Ratanakiri, Stung Treng）を訪問し，合計 70 点の遺伝資源を収集した．その内訳はニホンカボチャ（*Cucurbita moschata*）が 34 点，メロン（*Cucumis melo*）が 23 点，キュウリ（*C. sativus*）が 5 点，スイカ（*Citrullus lanatus*）が 2 点，ナス（*Solanum melongena*）が 4 点，トウガラシ（*Capsicum* sp.）が 2 点である．収集された遺伝資源の種子の半分は CARDI に保管され，残りの半分は標準材料移転契約（SMTA）に基づいて農研機構遺伝資源センターに送付された．

Table 3. Passport data of the genetic resources collected in northeastern Cambodia in 2021

JP No.	Coll. No.	Crop Name	Species	Province	District	Commune	Village	North Latitude	East Longitude	Altitude (m)	Tribe	Collection method	Local name	Remarks
273988	20-001	Pumpkin	*Cucurbita moschata*	Ratanakiri	Lampat	Seda	Patok	13 29 51	107 06 46	139	Tompoun	Single fruit	ropeuy	Slash-and-burn field. Sowing: June. Harvest: Oct.
273989	20-002	Cucumber	*Cucumis sativus*	Ratanakiri	Lampat	Seda	Patok	13 29 51	107 06 46	139	Tompoun	Bulk fruit	ya-dauch	Slash-and-burn field. Sowing: June. Harvest: Oct.
273990	20-003	Melon	*Cucumis melo*	Ratanakiri	Lampat	Seda	Patok	13 29 51	107 06 46	139	Tompoun	Bulk fruit	pe-poong	Slash-and-burn field. Sowing: June. Harvest: Oct.
273991	20-004	Eggplant	*Solanum melongena*	Ratanakiri	Lampat	Seda	Patok	13 29 51	107 06 46	139	Tompoun	Bulk fruit	prao	Slash-and-burn field. Sowing: June. Harvest: Oct.
273992	20-005	Cucumber	*Cucumis sativus*	Ratanakiri	Lampat	Seda	Thmey	13 30 35.7	107 08 22.7	146	Tompoun	Bulk fruit	ten-pia	Slash-and-burn field. Sowing: June. Harvest: Oct.
273993	20-006	Chili pepper	*Capsicum* sp.	Ratanakiri	Lampat	Seda	Thmey	13 30 35.7	107 08 22.7	146	Tompoun	Bulk fruit	mates	Grow in farm yard. Sowing: all year around.
273994	20-007	Melon	*Cucumis melo*	Ratanakiri	Lampat	Seda	Thmey	13 30 35.8	107 08 22.8	147	Tompoun	Bulk fruit	tro sok srov	Slash-and-burn field. Sowing: June. Harvest: Oct.
273995	20-008	Pumpkin	*Cucurbita moschata*	Ratanakiri	Lampat	Seda	Thmey	13 30 42.7	107 20 28.3	131	Tompoun	Bulk fruit	ropeuy	Fruit: 1.8 kg. Sowing: June. Harvest: Oct.
273996	20-009	Pumpkin	*Cucurbita moschata*	Ratanakiri	Lampat	Seda	Thmey	13 30 42.7	107 20 28.3	131	Tompoun	Single fruit	ropeuy	Fruit: 1.2 kg. Fruit length: 36 cm, Fruit width: 8 cm. Sowing: June. Harvest: Oct.
273997	20-010	Pumpkin	*Cucurbita moschata*	Ratanakiri	Lampat	Seda	Thmey	13 30 42.7	107 20 28.3	131	Tompoun	Single fruit	ropeuy	Fruit: 1.7 kg, Fruit length: 19 cm, Fruit width: 15 cm. Sowing: June. Harvest: Oct.
273998	20-011	Pumpkin	*Cucurbita moschata*	Ratanakiri	Lampat	Seda	Thmey	13 30 42.7	107 20 28.3	131	Tompoun	Bulk fruit	ropeuy	Fruit: 1.6 kg, Fruit length: 30 cm, Fruit width: 14 cm. Sowing: June. Harvest: Oct.
273999	20-012	Pumpkin	*Cucurbita moschata*	Ratanakiri	Lampat	Seda	Samut Kroam	13 33 04.5	107 10 23.7	145	Khmer	Bulk fruit	lpov	Intercrop with sugar cane. Sowing: June. Harvest: Oct.
274000	20-013	Pumpkin	*Cucurbita moschata*	Ratanakiri	Borkeo	Seoung	Sormorl	13 34 29.7	107 14 05.3	172	Tompoun	Bulk fruit	ropeuy	Sowing: June. Harvest: Oct.
274001	20-014	Pumpkin	*Cucurbita moschata*	Ratanakiri	Borkeo	Seoung	Yasoum	13 34 54.9	107 16 31.7	151	Khmer	Bulk fruit	lpov	Sowing: June. Harvest: Oct.
274002	20-015	Melon	*Cucumis melo*	Ratanakiri	Borkeo	Seoung	Yasoum	13 34 54.9	107 16 31.7	151	Khmer	Bulk fruit	tro-sok	Sowing: June. Harvest: Oct.
274003	20-016	Pumpkin	*Cucurbita moschata*	Ratanakiri	Borkeo	Seoung	Yasoum	13 35 02.7	107 16 57.9	149	Jaray	Bulk fruit	plery	Sowing: June. Harvest: Oct.
274004	20-017	Melon	*Cucumis melo*	Ratanakiri	Borkeo	Seoung	Yasoum	13 35 02.7	107 16 57.9	149	Charay	Bulk fruit	mon	Sowing: June. Harvest: Oct.
274005	20-018	Chili pepper	*Capsicum* sp.	Ratanakiri	Borkeo	Seoung	Yasoum	13 35 02.7	107 16 57.9	149	Charay	Bulk fruit	hang	Sowing: June. Harvest: Oct.
274006	20-019	Pumpkin	*Cucurbita moschata*	Ratanakiri	Borkeo	Seoung	Takok Jray	13 33 37.2	107 18 32.5	140	Charay	Bulk fruit	ya-tol	Grow with rice. Sowing: June. Harvest: Sep.
274007	20-020	Cucumber	*Cucumis sativus*	Ratanakiri	Borkeo	Seoung	Takok Jray	13 33 37.2	107 18 32.5	140	Charay	Bulk fruit	mon	Sowing: June. Harvest: Sep.
274008	20-021	Melon	*Cucumis melo*	Ratanakiri	Borkeo	Seoung	Takok Jray	13 33 37.2	107 18 32.5	140	Charay	Bulk fruit	tro-sok srov	Sowing: June. Harvest: Sep.
274009	20-022	Pumpkin	*Cucurbita moschata*	Ratanakiri	O'Yadav	Yatong	Pak	13 40 14.0	107 23 59.8	197	Charay	Single fruit	tol	Sowing: June. Harvest: Oct.
274010	20-023	Melon	*Cucumis melo*	Ratanakiri	O'Yadav	Yatong	Pak	13 40 04.6	107 23 57.6	207	Charay	Bulk fruit	tro-sok srov	Sowing: June. Harvest: Oct.
274011	20-024	Watermelon	*Citrullus lanatus*	Ratanakiri	O'Yadav	Yatong	Pak	13 40 04.6	107 23 57.6	207	Charay	Bulk fruit	ov leuk	Sowing: June. Harvest: Sep.
274012	20-025	Melon	*Cucumis melo*	Ratanakiri	O'Yadav	Yatong	Pak	13 40 04.4	107 23 58.1	211	Charay	Bulk fruit	chhel-mon	Grow with rice. Sowing: June. Harvest: Sep.
274013	20-026	Pumpkin	*Cucurbita moschata*	Ratanakiri	O'Yadav	Yatong	Pak	13 40 04.4	107 23 58.1	211	Charay	Bulk fruit	lpov	Sowing: June. Harvest: Oct.
274014	20-027	Pumpkin	*Cucurbita moschata*	Ratanakiri	O'Yadav	Yatong	Ten	13 40 31.2	107 25 09.0	233	Khmer	Single fruit	lpov	Sowing: June. Harvest: Oct.
274015	20-028	Melon	*Cucumis melo*	Ratanakiri	O'Yadav	Yatong	Ten	13 40 31.2	107 25 09.0	233	Khmer	Bulk fruit	tro-sok srov	Sowing: June. Harvest: Sep.
274016	20-029	Melon	*Cucumis melo*	Ratanakiri	O'Yadav	Yatong	Tensos	13 40 24.1	107 25 18.5	226	Charay	Bulk fruit	tro-sok srov	Grow with rice. Sowing: June. Harvest: Sep.
274017	20-030	Pumpkin	*Cucurbita moschata*	Ratanakiri	O'Yadav	Yatong	Tensos	13 40 24.1	107 25 18.5	226	Charay	Bulk fruit	lpov	Grow with rice. Sowing: June. Harvest: Oct.
274018	20-031	Pumpkin	*Cucurbita moschata*	Ratanakiri	O'Yadav	Yatong	Tensos	13 40 30.8	107 25 06.9	228	Charay	Bulk fruit	lpov	Grow with rice. Sowing: June. Harvest: Oct.
274019	20-032	Melon	*Cucumis melo*	Ratanakiri	O'Yadav	Yatong	Tensos	13 40 30.8	107 25 06.9	228	Charay	Bulk fruit	tro-sok srov	Grow with rice. Sowing: June. Harvest: Oct.
274020	20-033	Pumpkin	*Cucurbita moschata*	Ratanakiri	O'Yadav	Yatong	Ten Ngol	13 40 57.1	107 25 26.6	228	Charay	Bulk fruit	lpov	Sowing: June. Harvest: Oct.
274021	20-034	Cucumber	*Cucumis sativus*	Ratanakiri	O'Yadav	Yatong	Ten Ngol	13 40 57.1	107 25 26.6	228	Charay	Bulk fruit	tro-sok srov	Sowing: June. Harvest: Oct.
274022	20-035	Pumpkin	*Cucurbita moschata*	Ratanakiri	O'Yadav	Saom Thom	Saom Trok Jas	13 42 49.1	107 24 15.6	240	Charay	Bulk fruit	lpov	Sowing: June. Harvest: Oct.
274023	20-036	Cucumber	*Cucumis sativus*	Ratanakiri	O'Yadav	Saom Thom	Saom Trok Jas	13 42 49.1	107 24 15.6	240	Charay	Bulk fruit	tro-sok	Sowing: June. Harvest: Oct.
274024	20-037	Pumpkin	*Cucurbita moschata*	Ratanakiri	O'Yadav	Saom Thom	Saom Trok Jas	13 42 49.1	107 24 15.6	240	Charay	Bulk fruit	lpov	Sowing: June. Harvest: Oct.
274025	20-038	Pumpkin	*Cucurbita moschata*	Ratanakiri	O'Yadav	Pok Nhai	Jas	13 44 26.6	107 26 12.7	210	Charay	Bulk fruit	lpov	Sowing: June. Harvest: Oct.

Table 3. (Continued).

JP No.	Coll. No.	Crop Name	Species	Province	District	Commune	Village	North Latitude	East Longitude	Altitude (m)	Tribe	Collection method	Local name	Remarks
274026	20-039	Melon	*Cucumis melo*	Ratanakiri	O'Yadav	Pok Nhai	Jas	13 44 26.6	107 26 12.7	210	Charay	Bulk fruit	tro-sok srov	Sowing: June. Harvest: Oct.
274027	20-040	Melon	*Cucumis melo*	Ratanakiri	O'Yadav	Pok Nhai	Jas	13 44 26.6	107 26 12.7	210	Charay	Bulk fruit	tro-sok srov	Sowing: June. Harvest: Oct.
274028	20-041	Pumpkin	*Cucurbita moschata*	Ratanakiri	Ondoung Meas	Nhang	Ka Jout kroam	13 52 24.9	107 18 10.6	112	Khmer	Bulk fruit	lpov	Sowing: June. Harvest: Oct.
274029	20-042	Pumpkin	*Cucurbita moschata*	Ratanakiri	Ondoung Meas	Nhang	Ka Jout kroam	13 52 25.0	107 18 09.5	115	Charay	Single fruit	lpov	Sowing: June. Harvest: Oct.
274030	20-043	Melon	*Cucumis melo*	Ratanakiri	Ondoung Meas	Nhang	Ka Jout kroam	13 52 24.7	107 18 11.3	115	Charay	Bulk fruit	tro-sok srov	Sowing: June. Harvest: Oct.
274031	20-044	Melon	*Cucumis melo*	Ratanakiri	Ondoung Meas	Nhang	Ka Jout kroam	13 52 24.7	107 18 11.3	115	Khmer	Bulk fruit	tro-sok srov	Sowing: June. Harvest: Sep.
274032	20-045	Watermelon	*Citrullus lanatus*	Ratanakiri	Ondoung Meas	Nhang	Ka Jout kroam	13 52 24.7	107 18 11.3	115	Charay	Bulk fruit	ov-leouk	Sowing: June. Harvest: Sep.
274033	20-046	Pumpkin	*Cucurbita moschata*	Ratanakiri	Veoun Sai	Kajoun	Vong vay	13 44 25.3	106 59 08.4	102	Kreoung	Bulk fruit	ropov	Sowing: June. Harvest: Oct.
274034	20-047	Melon	*Cucumis melo*	Ratanakiri	Veoun Sai	Kajoun	Vong vay	13 44 25.3	106 59 08.4	102	Kreoung	Bulk fruit	ro-dob	Sowing: June. Harvest: Oct.
274035	20-048	Melon	*Cucumis melo*	Ratanakiri	Veoun Sai	Kajoun	Vong vay	13 44 25.3	106 59 08.4	102	Kreoung	Bulk fruit	ro-dob	Sowing: June. Harvest: Oct.
274036	20-049	Melon	*Cucumis melo*	Ratanakiri	Veoun Sai	Kajoun	Vong vay	13 44 25.3	106 59 08.4	102	Kreoung	Bulk fruit	tro-sok srov	Sowing: June. Harvest: Oct.
274037	20-050	Pumpkin	*Cucurbita moschata*	Ratanakiri	Veoun Sai	Kajoun	Kajoun	13 57 23.1	106 53 14.4	102	Tompoun	Bulk fruit	lpov	Sowing: June. Harvest: Oct.
274038	20-051	Pumpkin	*Cucurbita moschata*	Ratanakiri	Veoun Sai	Kajoun	Kajoun	13 58 11.0	106 53 43.8	96	Tompoun	Single fruit	lpov	
274039	20-052	Eggplant	*Solanum melongena*	Ratanakiri	Veoun Sai	Koh peak	Koun				Kreoung	Bulk fruit	trob	Sowing: all year around.
274040	20-053	Pumpkin	*Cucurbita moschata*	Ratanakiri	Veoun Sai		Pong	13 58 23.1	106 49 55.5	97	Leav	Bulk fruit	lpov	Sowing: June. Harvest: Oct.
274041	20-054	Pumpkin	*Cucurbita moschata*	Ratanakiri	Veoun Sai	Veoun Sai	Veoun Sai	13 58 43.8	106 48 39.3	95	Leav	Bulk fruit	lpov	Sowing: June. Harvest: Oct.
274042	20-055	Pumpkin	*Cucurbita moschata*	Ratanakiri	Veoun Sai	Veoun Sai	Veoun Sai	13 58 43.8	106 48 39.3	95	Leav	Bulk fruit	lpov	Sowing: June. Harvest: Oct.
274043	20-056	Pumpkin	*Cucurbita moschata*	Stung Treng	Thala Borivat	Hang ko ban	Sakhoun	13 53 54.1	106 53 42.0	79	Leav	Bulk fruit	lpov	Sowing: June. Harvest: Oct.
274044	20-057	Pumpkin	*Cucurbita moschata*	Stung Treng	Thala Borivat	Hang ko ban	Sakhoun	13 33 45.5	106 01 43.9	65	Leav	Bulk fruit	ma-euk	Seeds from Banlong. Sowing: June. Harvest: Oct.
274045	20-058	Pumpkin	*Cucurbita moschata*	Stung Treng	Sesan	Som khouy	Srae tapan	13 33 48.5	106 02 32.5	55	Leav	Bulk fruit	lpov	Sowing: June. Harvest: Oct.
274046	20-059	Melon	*Cucumis melo*	Stung Treng	Sesan	Som khouy	Srae tapan	13 33 48.5	106 02 32.5	55	Leav	Bulk fruit	tro-sok srov	Sowing: June. Harvest: Oct.
274047	20-060	Melon	*Cucumis melo*	Stung Treng	Sesan	Som khouy	Srae tapan	13 33 48.5	106 02 32.5	55	Leav	Bulk fruit	tro-sok srov	Sowing: June. Harvest: Oct.
274048	20-061	Melon	*Cucumis melo*	Stung Treng	Sesan	Som khouy	Srae tapan	13 33 48.5	106 02 32.5	55	Leav	Bulk fruit	tro-sok srov	Sowing: June. Harvest: Oct.
274049	20-062	Pumpkin	*Cucurbita moschata*	Stung Treng	Sesan	Som khouy	Srae tapan	13 33 48.5	106 02 32.5	55	Leav	Bulk fruit	lpov	Sowing: June. Harvest: Oct.
274050	20-063	Pumpkin	*Cucurbita moschata*	Stung Treng	Sesan	Som khouy	Srae tapan	13 34 13.6	106 03 32.8	49	Leav	Bulk fruit	lpov	Sowing: June. Harvest: Oct.
274051	20-064	Eggplant	*Solanum melongena*	Stung Treng	Sesan	Som khouy	Srae tapan	13 34 13.6	106 03 32.8	49	Leav	Bulk fruit	trob	Sowing: June. Harvest: Oct.
274052	20-065	Melon	*Cucumis melo*	Stung Treng	Seim Bouk	Koh Sampeay	Koh Sampeay	13 26 43.9	105 56 56.7	55	Khmer	Bulk fruit	tro-sok srov	Sowing: June. Harvest: Oct.
274053	20-066	Melon	*Cucumis melo*	Stung Treng	Seim Bouk	Koh Sampeay	Koh Sampeay	13 25 22.6	105 56 49.3	30	Leav	Bulk fruit	tro-sok srov	Sowing: June. Harvest: Oct.
274054	20-067	Eggplant	*Solanum melongena*	Stung Treng	Seim Bouk	Koh Sampeay	Koh Sampeay	13 25 22.6	105 56 49.3	30	Leav	Bulk fruit	trob	Sowing: June. Harvest: Oct.
274055	20-068	Pumpkin	*Cucurbita moschata*	Stung Treng	Seim Bouk	Koh Sampeay	Koh Sampeay	13 24 55.7	105 56 31.8	47	Khmer	Single fruit	lpov	Sowing: June. Harvest: Oct.

Table 3. (Continued).

JP No.	Coll. No.	Crop Name	Species	Province	District	Commune	Village	North Latitude	East Longitude	Altitude (m)	Tribe	Collection method	Local name	Remarks
274056	20-069	Pumpkin	*Cucurbita moschata*	Stung Treng	Thala Borivat	Thala	O'trel	13 32 09.2	105 55 58.6	60	Leav	Bulk fruit	lpov	Sowing: June. Harvest: Oct.
274057	20-070	Melon	*Cucumis melo*	Stung Treng	Thala Borivat	Thala	O'trel	13 32 09.2	105 55 58.6	60	Leav	Bulk fruit	tro-sok srov	Sowing: June. Harvest: Oct.

Photos of collected samples

Sample Photo 1.
20-001 *Cucurbita moschata*

Sample Photo 2.
20-002 *Cucumis sativus*

Sample Photo 3.
20-003 *Cucumis melo*

Sample Photo 4.
20-004 *Solanum melongena*

Sample Photo 5.
20-005 *Cucumis sativus*

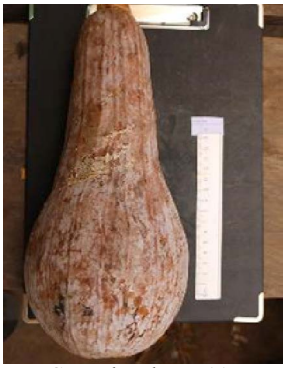
Sample Photo 6.
20-006 *Capsicum* sp.

Sample Photo 7.
20-007 *Cucumis melo*

Sample Photo 8.
20-008 *Cucurbita moschata*

Sample Photo 9.
20-009 *Cucurbita moschata*

Sample Photo 10.
20-010 *Cucurbita moschata*



Sample Photo 11.
20-011 *Cucurbita moschata*

Sample Photo 12.
20-012 *Cucurbita moschata*

Sample Photo 13.
20-013 *Cucurbita moschata*

Sample Photo 14.
20-014 *Cucurbita moschata*

Sample Photo 15.
20-015 *Cucumis melo*

Sample Photo 16.
20-016 *Cucurbita moschata*

Sample Photo 17.
20-017 *Cucumis melo*

Sample Photo 18.
20-018 *Capsicum* sp.

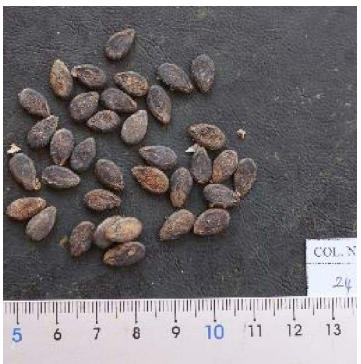
Sample Photo 19.
20-019 *Cucurbita moschata*

Sample Photo 20.
20-020 *Cucumis sativus*

Sample Photo 21.
20-021 *Cucumis melo*

Sample Photo 22.
20-022 *Cucurbita moschata*

Sample Photo 23.
20-023 *Cucumis melo*



Sample Photo 24.
20-024 *Citrullus lanatus*

Sample Photo 25.
20-025 *Cucumis melo*

Sample Photo 26.
20-026 *Cucurbita moschata*


Sample Photo 27.
20-027 *Cucurbita moschata*

Sample Photo 28.
20-028 *Cucumis melo*

Sample Photo 29.
20-029 *Cucumis melo*

Sample Photo 30.
20-030 *Cucurbita moschata*


Sample Photo 31.
20-031 *Cucurbita moschata*

Sample Photo 32.
20-032 *Cucumis melo*

Sample Photo 33.
20-033 *Cucurbita moschata*

Sample Photo 34.
20-034 *Cucumis sativus*

Sample Photo 35.
20-035 *Cucurbita moschata*

Sample Photo 36.
20-036 *Cucumis sativus*

Sample Photo 37.
20-037 *Cucurbita moschata*

Sample Photo 38.
20-038 *Cucurbita moschata*

Sample Photo 39.
20-039 *Cucumis melo*

Sample Photo 40.
20-040 *Cucumis melo*

Sample Photo 41.
20-041 *Cucurbita moschata*

Sample Photo 42.
20-042 *Cucurbita moschata*

Sample Photo 43.
20-043 *Cucumis melo*

Sample Photo 44.
20-044 *Cucumis melo*

Sample Photo 45.
20-045 *Citrullus lanatus*

Sample Photo 46.
20-046 *Cucurbita moschata*

Sample Photo 47.
20-047 *Cucumis melo*

Sample Photo 48.
20-048 *Cucumis melo*

Sample Photo 49.
20-049 *Cucumis melo*

Sample Photo 50.
20-050 *Cucurbita moschata*

Sample Photo 51.
20-051 *Cucurbita moschata*

Sample Photo 52.
20-052 *Solanum melongena*

Sample Photo 53.
20-053 *Cucurbita moschata*

Sample Photo 54.
20-054 *Cucurbita moschata*

Sample Photo 55.
20-055 *Cucurbita moschata*

Sample Photo 56.
20-056 *Cucurbita moschata*

Sample Photo 57.
20-057 *Cucurbita moschata*

Sample Photo 58.
20-058 *Cucurbita moschata*

Sample Photo 59.
20-059 *Cucumis melo*

Sample Photo 60.
20-060 *Cucumis melo*

Sample Photo 61.
20-061 *Cucumis melo*

Sample Photo 62.
20-062 *Cucurbita moschata*

Sample Photo 63.
20-063 *Cucurbita moschata*

Sample Photo 64.
20-064 *Solanum melongena*

Sample Photo 65.
20-065 *Cucumis melo*

Sample Photo 66.
20-066 *Cucumis melo*

Sample Photo 67.
20-067 *Solanum melongena*

Sample Photo 68.
20-068 *Cucurbita moschata*

Sample Photo 69.
20-069 *Cucurbita moschata*

Sample Photo 70.
20-070 *Cucumis melo*