

Collaborative Exploration of Cucurbitaceous Crops in Vietnam, 2014

Mitsuhiro SUGIYAMA ¹⁾, Kaworu EBANA ²⁾, Daisuke KAMI ³⁾,
TRAN Thi Thu Hoai ⁴⁾, NGUYEN Van Kien ⁴⁾

- 1) *National Agriculture and Food Research Organization, National Institute of Vegetable and Tea Science, Kusawa 360, Ano, Tsu, Mie 514-2392, Japan*
- 2) *National Institute of Agrobiological Sciences, Kannondai 2-1-2, Tsukuba, Ibaraki 305-8602, Japan*
- 3) *National Agriculture and Food Research Organization, Hokkaido Agricultural Research Center, Hitsujigaoka 1, Toyohira-ku, Sapporo, Hokkaido 062-8555, Japan*
- 4) *Vietnamese Academy of Agricultural Science, Plant Resources Center, Ankhanh, Hoaiduc, Hanoi, Vietnam*

Corresponding author : M. SUGIYAMA (e-mail : sugimi@affrc.go.jp)

Summary

This report describes the first expedition to collect cucurbitaceous crops in Vietnam within the terms of a Letter of Agreement signed by the Japanese National Institute of Agrobiological Sciences (NIAS) and the Plant Resources Center (PRC) of the Vietnamese Academy of Agricultural Science to establish an international research enterprise within the framework of the Plant Genetic Resources Asia project. We conducted a field survey in northern Vietnam in the period November 9-22, 2014. We collected 33 accessions of *Cucurbita moschata*, 19 accessions of *Cucumis sativus*, and 7 accessions of *Cucumis melo*. The collected seed samples were stored in the PRC gene bank, and subsets were transferred to the NIAS gene bank, where they were conserved, in accordance with the PRC/NIAS MOU.

KEY WORDS : Cucumber, *Cucumis sativus*, *Cucurbita moschata*, Genetic resource, Pumpkin, Vietnam

Introduction

The effect of the global warming have been concerned on the production of vegetables. Severe damage will be caused by invading pests and diseases. High temperature will also have damage on the quality and quantity of agricultural production. To improve cucurbitaceous vegetables genetically to meet such effects, it is necessary to introduce new genetic resources from foreign countries of tropical and subtropical regions. Southeast Asia is a promising region for such purpose, because of their environmental condition and also high genetic diversity conserved. In this area, cucurbitaceous crops have been collected in Vietnam (Yoshida *et al.* 1997), Myanmar (Saito *et al.* 2005), and Laos (Sakata *et al.* 2008, Saito *et al.*

Table 1. Itinerary of the field survey in Vietnam, 2014

Date	Day	Itinerary	Stay
11/9	Sun	Chubu 10:30 --VN347 -- 14:10 Hanoi	Hanoi
11/10	Mon	Hanoi -- Son La -- Dien Bien Phu	Dien Bien Phu
11/11	Tue	Dien Bien Phu -- Dien Bien Dong -- Dien Bien Phu	Dien Bien Phu
11/12	Wed	Dien Bien Phu -- Tuan Giao	Tuan Giao
11/13	Thu	Tuan Giao -- Thuan Chau -- Son La	Son La
11/14	Fri	Son La -- Hanoi	Hanoi
11/15	Sat	Hanoi, visit PRC	Hanoi
11/16	Sun	Hanoi -- Lao Cai	Lao Cai
11/17	Mon	Lao Cai -- Bac Ha -- Lao Cai	Lao Cai
11/18	Tue	Lao Cai -- Muong Khuong -- Ha Giang	Ha Giang
11/19	Wed	Ha Giang -- Quan Ba -- Tuyen Quang	Tuyen Quang
11/20	Thu	Tuyen Quang -- Son Duong -- Hanoi	Hanoi
11/21	Fri	Hanoi, visit PRC	on flight
11/22	Sat	Hanoi 00:15 -- VN346 -- 6:30 Chubu	

2009, Matsunaga *et al.* 2010). Seventy-seven cucumber (*Cucumis sativus*) accessions were collected during field surveys in Laos in the period 2007-2009; many local varieties are cultivated in northern regions of the country. Vietnam is the neighboring country to Laos, whereas only two cucumber and pumpkin (*Cucurbita moschata*) accessions were collected during a 1996 survey in Vietnam (Yoshida *et al.* 1997). Mountainous area of Vietnam is similar to Laos in that there are a lot of ethnic groups who have kept their own landraces of various crops. We expected many cucurbitaceous landraces in this area through the systematic exploration. The object of this survey is to explore cucurbitaceous crops in Vietnam.

National Institute of Agrobiological Sciences (NIAS) of Japan and Plant Resources Center (PRC) of the Vietnamese Academy of Agricultural Science have collaborated since 2012 within the terms of a Memorandum of Understanding (MOU). In addition, new project funded by the Ministry of Agriculture, Forestry and Fisheries, Japan, Plant Genetic Resources Asia (PGRAsia) project was established in 2014 to evaluate and explore the plant genetic resources of Asia. Here we report the results of the first survey to collect cucurbitaceous crops in northern Vietnam following the signing of a Letter of Agreement (LOA) between the NIAS and PRC in support of international collaboration within the framework of the PGRAsia.

Methods

We made two automobile trips from Hanoi (Table 1 and Fig. 1) to survey northern Vietnam. During the first trip in the period November 11-14, 2014, we visited Hoa Binh, Dien Bien, and Son La Provinces. During the second trip (November 16-20, 2014) we visited Lao Cai, Ha Giang, and Tuyen Quang Provinces. Our collections were restricted to local varieties. We collected fruit and seed samples from markets (Photo 1) and from farmers, and assembled information (collected in interviews) on each of the samples, including sowing date, harvest date, usage, and cultivation methods (Photo 2). We recorded

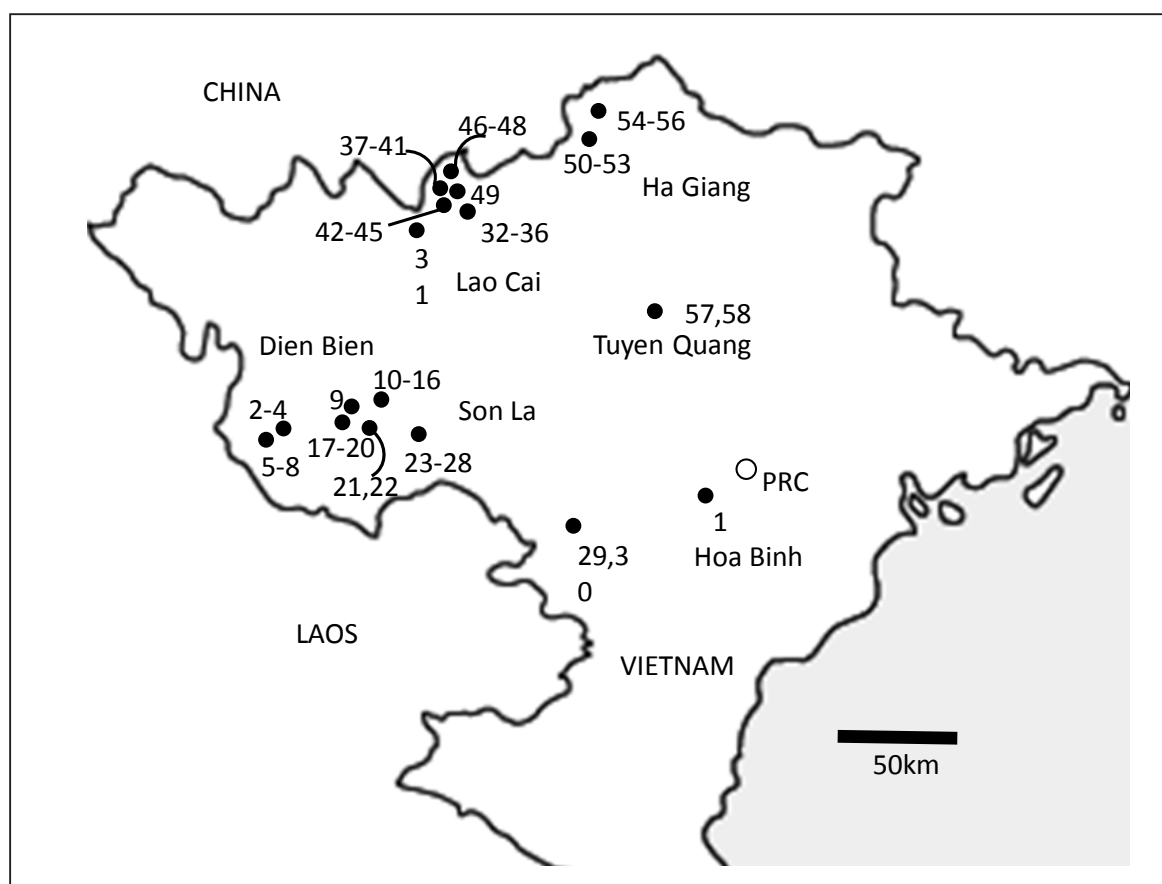


Fig. 1. Collection sites of the exploration of *Cucurbitaceae* genetic resources in northern Vietnam PRC (Vietnamese Academy of Agricultural Science, Plant Resources Center)

Table 2. A summary of collected cucurbitaceae samples in Vietnam, 2014

Plant name	Species	Total
Pumpkin	<i>Cucurbita moschata</i>	33
Cucumber	<i>Cucumis sativus</i>	19
Melon	<i>Cucumis melo</i>	7
Total		59

place names, local plant names, latitudes, longitudes, elevations, and characteristics of the collection site. Latitude, longitude, and elevation were determined using Garmin eTrex20J GPS technology (Garmin International Inc., Olathe, KS, USA).

Results and Discussion

We collected a total of 59 samples, including 33 of *C. moschata*, 19 of *C. sativus*, and 7 of *Cucumis melo* at 21 sites (Table 2). The collection sites are shown in Fig. 1. The collected seed samples were stored in the PRC gene bank, and subsets were transferred to the NIAS gene bank in accordance with the terms of the MOU signed by the PRC and NIAS. The seeds were conserved in the NIAS gene bank. We will explore Vietnam for genetic resources continuously during the term of PGRAsia project. In the following year, uninvestigated area of northern mountainous area of Vietnam will be surveyed.

***Cucurbita moschata* L.**

We collected 33 samples of *Cucurbita moschata* in our survey, but found neither *Cucurbita maxima* nor *Cucurbita pepo* fruits in markets, farm houses, or crop fields. Young and mature fruits, edible shoots, and flowers were available in abundance in the markets (Photo 3), but many of those were commercial cultivars. By an interview with Vietnamese farmers, we found out that they have not used any pesticides and fertilizers between pumpkin cultivation in northern area. It is reported that *C. moschata* has strong tolerance to plant disease compared with *C. pepo* and *C. maxima* (Provvidenti *et al.* 1984, Lebeda and Křístková 1994). Therefore, we estimated *C. maxima* and *C. pepo* have been lost by plant diseases, and *C. moschata* which has resistant to plant diseases has been survived even if three species have been introduced into northern parts of Vietnam,

We collected a fruit (No. 1; Photo 4) from the market in Cao Son, Hoa Binh Province, which was elongate and curved, with brown skin and white spots. In Dien Bien Province, a seed sample (No. 3; Photo 5) and eleven fruit samples were collected from farmers (Photos 6 and 7). We divided the fruit shapes in the collection into four categories: flattened (Nos. 9, 10, 15, 18, 20, and 22), cylindrical (Nos. 11 and 19), oval (No. 6), and pyriform (Nos. 12 and 13). Four fruits were collected from farmers and from a market in Son La Province (Photo 8); their shapes were globular (No. 25), oval (No. 28), and pyriform (Nos. 29 and 30). One fruit sample was collected at a market and ten from farmers in Lao Cai Province; these were flattened (Nos. 31, 32, 33, 41, 42, and 46), oval (Nos. 39, 40, and 45), and pyriform (Nos. 34 and 47). We collected five fruit samples from farmers in Ha Gian Province; these were flattened (Nos. 50, 54, and 55), oval (No. 51), and pyriform (No. 52). In all sampling areas of pumpkin, although skin colors of pumpkins were almost similar, these shapes and sizes were different. Therefore, we guessed that each farmer have been keeping pumpkin genetic resources by bulk population.

In northern Vietnam, local varieties were cultivated in crop fields and home gardens in montane regions at elevations of ca. 1000 m. The seeds of these varieties were sown from March to May at the start of the rainy season, and fruits were harvested from August to October. They were often cultivated with maize (*Zea mays* L.; Photo 9) and used as human food and pig fodder.

***Cucumis sativus* L.**

We collected 19 samples of *C. sativus*. Young fruits were abundant in the markets (Photo 10), but most were commercial cultivars. Unfortunately, the cucumber cultivation season for local varieties had ended by the time of our visit, and we were able to collect only three sample fruits (Nos. 21, 23, and 24) in addition to the seeds that were more widely available.

We collected five seed samples (Nos. 2, 7-1, 8, 14, and 17) and one fruit (No. 21) from farmers in Dien Bien Province. According to interviews with farmers, mature fruits of these varieties were brown (Nos. 2 and 14), white (No. 17), light green (No. 14), and green (Nos. 7-1 and 8), and had cylindrical shapes. Two seed samples (Nos. 23 and 24) and two fruit samples (Nos. 26 and 27; Photo 11) were collected in Son La Province. The fruits of sample Nos. 23 and 24 were light yellow. The seeds in sample No. 26 were distinct from those in the other samples. Each bore an apical spine and was smaller than the seeds of the other varieties (Photo 12). Six seed samples (Nos. 35, 36, 38, 43, 48, and 49) were collected in Lao Cai Province. According to interviews with farmers, mature fruits of samples Nos. 35, 36, and 43 had white skins. We collected two seed samples (Nos. 53 and 55) in Ha Giang Province. According to the farmer, the fruits of sample No. 55 were white. In Tuyen Quang Province, we collected one seed sample (No. 57); farmers

reported that the mature fruit skin of this sample was yellow, and collections were made at elevations of ca. 44 m. We recognized that sample No. 57 was different from other varieties collected in the survey.

In northern Vietnam, local varieties of cucumber were cultivated in high elevation fields located at ca. 1000 m above sea level. Seeds of these varieties were sown from February to May after the rainy season had started, and fruits were harvested from May to October. These varieties were often cultivated with upland rice (*Oryza sativa* L.); both young and mature fruits were eaten. For collecting cucumber fruits in northern Vietnam, it is desirable to conduct a field survey from September to October.

We visited a cucumber field in Lao Cai Province (Photo 13) where a southern Chinese cucumber type was cultivated (Photo 14). This was not considered to be a local variety, because the fruit of this variety was light green around apex and had black spine.

Seventy-seven cucumber accessions were collected during a field survey in Laos in the period 2007-2009. The mature Laotian cucumbers were oval in shape and white or light green in color. These characteristics are similar to those of the cucumber fruits collected in our survey (Photo 11).

***Cucumis melo* L.**

We collected seven samples of *C. melo*. We found the melon fruits (Photo 15) at the market. They had been imported from China and belonged to var. *inodorus*. The melon cultivation season had ended in northern Vietnam when we made our collections; hence, no fruits of local varieties were observed, and we collected only seed samples.

In Dien Bien Province, we collected four seed samples (Nos. 4, 5, 7-2, and 16) from farmers who indicated that the mature fruits of the varieties were oblong in shape and yellow with white stripes. We collected two seed samples (Nos. 37 and 44 ; Photo 16) in Lao Cai Province and one seed sample (No. 58) in Tuyen Quang Province.

Seeds of local melon varieties were sown from March to May, and fruits were harvested from June to September. These varieties were often cultivated with upland rice. For collecting melon fruits in northern Vietnam, it is desirable to conduct a field survey from August to September.

Acknowledgements

This work was supported by a grant (PGRAsia Project) from the Ministry of Agriculture, Forestry, and Fisheries of Japan.

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ベトナムにおけるウリ科遺伝資源の共同探索，2014年

杉山 充啓¹⁾・江花 薫子²⁾・嘉見 大助³⁾・TRAN Thi Thu Hoai⁴⁾・
NGUYEN Van Kien⁴⁾

- 1) 国立研究開発法人 農業・食品産業技術総合研究機構 野菜茶業研究所野菜育種・ゲノム研究領域果菜育種研究グループ
- 2) 国立研究開発法人 農業生物資源研究所 遺伝資源センター 多様性活性研究ユニット
- 3) 国立研究開発法人 農業・食品産業技術総合研究機構 北海道農業研究センター 水田作研究領域水田・園芸グループ
- 4) ベトナム植物遺伝資源センター

和文摘要

本報告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収集・提供強化」の予算により実施され、独立行政法人農業生物資源研究所ジーンバンクとベトナム植物遺伝資源センターとの間で2012年に締結した共同研究協定（MOU）に基づいて行われたベトナム北部におけるウリ科遺伝資源の探索・収集に関わる調査報告書である。調査は、2014年11月9日～22日にかけて行った。ディエンビエン省、ソンラ省、ラオカイ省、ハザン省およびトゥインクワン省において探索・調査を行った。その結果、ニホンカボチャ(*Cucurbita moschata*)を33点、キュウリ(*Cucumis sativus*)を19点、メロン(*C. melo*)を7点の合計59点を収集した。収集された遺伝資源は、ベトナム植物資源センターと農業生物資源研究所との間に交わされた試料提供契約（MTA）に基づいて両研究機関で保存する。

Table 3. Data of collected *Cucurbitaceae* crops in Vietnam, 2014

JP No.	Coll. No.	Coll. Date	Species name	Local name	Type of sample	Status of sample	Coll. source	Province	District	Commune	Town or village name	Latitude	Longitude	Altitude (m)	Remarks
253524	1	10 Nov., 2014	<i>Cucurbita moschata</i>	Bi Do	fruits	landrace	village market	Hoa Binh	Cao Phong		Cao Son	N20-42-19.9	E105-19-17.8	195	
253525	2	11 Nov., 2014	<i>Cucumis sativus</i>	Di	seed	landrace	farmstore	Dien Bien	Dien Bien Dong	Keo Nom	Chop ly	N21-16-12.1	E103-12-11.4	1115	From head of village Mr. Giang A Tung (Hmong), Fruits shape: globular, Brown skin color
253526	3	11 Nov., 2014	<i>Cucurbita moschata</i>	Tau Da	seed	landrace	farmstore	Dien Bien	Dien Bien Dong	Keo Nom	Chop ly	N21-16-12.1	E103-12-11.4	1115	From head of village Mr. Giang A Tung (Hmong), cultivated with maize, From head of village Mr. Giang A Tung (Hmong), Brown skin color, Average fruit weight: 1.5kg/fruit
253527	4	11 Nov., 2014	<i>Cucumis melo</i>	Dit Chai	seed	landrace	farmstore	Dien Bien	Dien Bien Dong	Keo Nom	Chop ly	N21-16-12.1	E103-12-11.4	1115	From head of village Mr. Giang A Tung (Hmong), cultivated with rice, Yellow skin color with white stripe, Average fruit weight: 1.5kg/fruit
253528	5	11 Nov., 2014	<i>Cucumis melo</i>	Di	seed	landrace	farmstore	Dien Bien	Dien Bien Dong	Keo Nom	Tia Ghienh A	N21-15-17.4	E103-09-23.8	968	From Mr. Tho (Hmong), cultivated with rice, Fruits shape: 22~25cm x 10~15cm, Yellow skin color, hard flesh
253529	6	11 Nov., 2014	<i>Cucurbita moschata</i>	Tau	fruits	landrace	farmstore	Dien Bien	Dien Bien Dong	Keo Nom	Tia Ghienh A	N21-15-17.4	E103-09-23.8	968	From Mr. Tho (Hmong)
253530	7-1	11 Nov., 2014	<i>Cucumis sativus</i>	Di	seed	landrace	farmstore	Dien Bien	Dien Bien Dong	Keo Nom	Neo Nom 1	N21-15-46.8	E103-10-50.5	1094	From Mr. Mua A Ho (Hmong), Green skin color
253531	7-2	11 Nov., 2014	<i>Cucumis melo</i>		seed	landrace	farmstore	Dien Bien	Dien Bien Dong	Keo Nom	Neo Nom 1	N21-15-46.8	E103-10-50.5	1094	From Mr. Mua A Ho (Hmong)
253532	8	11 Nov., 2014	<i>Cucumis sativus</i>	Di	seed	landrace	farmstore	Dien Bien	Dien Bien Dong	Keo Nom	Neo Nom 1	N21-16-34.4	E103-11-9.8	1218	From Mr. Mua Ga Lan (Hmong), Green skin color
253533	9	12 Nov., 2014	<i>Cucurbita moschata</i>	Miu	fruits	landrace	farmstore	Dien Bien	Tuan Giao	Quai Nua	Long Duom	N21-38-47.5	E103-26-25.9	577	From Thai people
253534	10	12 Nov., 2014	<i>Cucurbita moschata</i>	Tau Da	fruits	landrace	farmstore	Dien Bien	Tuan Giao	Pu Nhung	Phien Pi B	N21-43-11.7	E103-25-39.4	603	
253535	11	12 Nov., 2014	<i>Cucurbita moschata</i>	Tau Da	fruits	landrace	farmstore	Dien Bien	Tuan Giao	Pu Nhung	Phien Pi B	N21-43-11.7	E103-25-39.4	603	
253536	12	12 Nov., 2014	<i>Cucurbita moschata</i>	Tau Da	fruits	landrace	farmstore	Dien Bien	Tuan Giao	Pu Nhung	Phien Pi B	N21-43-11.7	E103-25-39.4	603	
253537	13	12 Nov., 2014	<i>Cucurbita moschata</i>	Tau Da	fruits	cultivar	farmstore	Dien Bien	Tuan Giao	Pu Nhung	Phien Pi B	N21-43-11.7	E103-25-39.4	603	
253538	14	12 Nov., 2014	<i>Cucumis sativus</i>	Di	seed	landrace	farmstore	Dien Bien	Tuan Giao	Pu Nhung	Phien Pi B	N21-43-11.7	E103-25-39.4	603	Brown skin color
253539	15	12 Nov., 2014	<i>Cucurbita moschata</i>	Tau Da	fruits	landrace	farmstore	Dien Bien	Tuan Giao	Pu Nhung	Phien Pi B	N21-43-11.7	E103-25-39.4	603	
253540	16	12 Nov., 2014	<i>Cucumis melo</i>	Dit Chai	seed	landrace	farmstore	Dien Bien	Tuan Giao	Pu Nhung	Phien Pi B	N21-43-11.7	E103-25-39.4	603	Yellow skin color with white stripe
253541	17	13 Nov., 2014	<i>Cucumis sativus</i>	Di	seed	landrace	farmstore	Dien Bien	Tuan Giao	Toa Tinh	Long	N21-34-58.5	E103-31-00.1	1347	White skin color, light yellow flesh color

Table 3 (Continued).

JP No.	Coll. No.	Coll. Date	Species name	Local name	Type of sample	Status of sample	Coll. source	Province	District	Commune	Town or village name	Latitude	Longitude	Altitude (m)	Remarks
253542	18	13 Nov., 2014	<i>Cucurbita moschata</i>	Tau Da	fruits	landrace	farmstore	Dien Bien	Tuan Giao	Toa Tinh	Long	N21-34-58.5	E103-31-00.1	1347	
253543	19	13 Nov., 2014	<i>Cucurbita moschata</i>	Tau Da	fruits	landrace	farmstore	Dien Bien	Tuan Giao	Toa Tinh	Long	N21-34-58.5	E103-31-00.1	1347	
253544	20	13 Nov., 2014	<i>Cucurbita moschata</i>	Tau Da	fruits	landrace	homegarden	Dien Bien	Tuan Giao	Toa Tinh	Long	N21-34-58.5	E103-31-00.1	1347	Cultivated in home garden
253545	21	13 Nov., 2014	<i>Cucumis sativus</i>	Di	fruits	landrace	farmstore	Dien Bien	Tuan Giao	Toa Tinh	Ha Tau	N21-33-42.4	E103-30-46.5	1206	From Mr. Mua A Sung, Light green white skin color with net
253546	22	13 Nov., 2014	<i>Cucurbita moschata</i>	Tau Da	fruits	landrace	farmstore	Dien Bien	Tuan Giao	Toa Tinh	Ha Tau	N21-33-42.4	E103-30-46.5	1206	Cultivated in home garden
253547	23	13 Nov., 2014	<i>Cucumis sativus</i>	Di	fruits	landrace	farmstore	Son La	Thuan Chau	Coma	Coma	N21-22-02.1	E103-30-13.8	1380	From Mua A Sung, Light green white skin color with net
253548	24	13 Nov., 2014	<i>Cucumis sativus</i>	Di	fruits	landrace	farmstore	Son La	Thuan Chau	Coma	Coma	N21-22-02.1	E103-30-13.8	1380	From Mua A Sung, Light green white skin color with net
253549	25	13 Nov., 2014	<i>Cucurbita moschata</i>	Tau Da	fruits	landrace	farmstore	Son La	Thuan Chau	Coma	Coma	N21-22-02.1	E103-30-13.8	1380	
253550	26	13 Nov., 2014	<i>Cucumis sativus</i>	Di	seed	landrace	farmstore	Son La	Thuan Chau	Coma	Coma	N21-22-02.1	E103-30-13.8	1380	Small seed size
253551	27	13 Nov., 2014	<i>Cucumis sativus</i>	Di	seed	landrace	farmstore	Son La	Thuan Chau	Coma	Coma	N21-22-02.1	E103-30-13.8	1380	
253552	28	13 Nov., 2014	<i>Cucurbita moschata</i>	Tau Da	fruits	landrace	farmstore	Son La	Thuan Chau	Coma	Coma	N21-22-02.1	E103-30-13.8	1380	
253553	29	14 Nov., 2014	<i>Cucurbita moschata</i>	Tau Da	fruits	landrace	village market	Son La	Van Ho	Van Ho	Hua Tat	N20-46-39.2	E104-46-04.4	1109	
253554	30	14 Nov., 2014	<i>Cucurbita moschata</i>	Tau Da	fruits	landrace	village market	Son La	Van Ho	Van Ho	Hua Tat	N20-46-39.2	E104-46-04.4	1109	
253555	31	16 Nov., 2014	<i>Cucurbita moschata</i>	Bi Do	fruits	landrace	town market	Lao Cai	Lao Cai	Lao Cai town	Lao Cai town	N22-30-07.5	E103-58-03.9	167	Fruits from Bat Xat district
253556	32	17 Nov., 2014	<i>Cucurbita moschata</i>	Lang Cua	fruits	landrace	farmstore	Lao Cai	Bac Ha	Bac Ha town	Ban Pho 2B	N22-32-53.0	E104-16-32.6	954	From Mr. Mac Seo Su, cultivated homegarden
253557	33	17 Nov., 2014	<i>Cucurbita moschata</i>	Lang Cua	fruits	landrace	farmstore	Lao Cai	Bac Ha	Bac Ha town	Ban Pho 2B	N22-32-53.0	E104-16-32.6	954	from Mr. Mac Seo Su, cultivated homegarden
253558	34	17 Nov., 2014	<i>Cucurbita moschata</i>	Lang Cua	fruits	landrace	farmstore	Lao Cai	Bac Ha	Bac Ha town	Ban Pho 2B	N22-32-53.0	E104-16-32.6	954	From Mr. Sung Seo Dzin, cultivated homegarden
253559	35	17 Nov., 2014	<i>Cucumis sativus</i>	Di	seed	landrace	farmstore	Lao Cai	Bac Ha	Bac Ha town	Ban Pho 2B	N22-32-53.0	E104-16-32.6	954	From Mr. Ma Seo Gaia, white skin color
253560	36	17 Nov., 2014	<i>Cucumis sativus</i>	Di	seed	landrace	farmstore	Lao Cai	Bac Ha	Bac Ha town	Ban Pho 2B	N22-32-53.0	E104-16-32.6	954	From Mr. Ly Sao Toa, white skin color
253561	37	18 Nov., 2014	<i>Cucumis melo</i>		seed	landrace	office	Lao Cai	Muong Khuong	Thanh Binh	Ba Ho	N22-45-43.8	E104-07-15.8	785	From Moung Khuong office, Dao minority
253562	38	18 Nov., 2014	<i>Cucumis sativus</i>		seed	landrace	office	Lao Cai	Muong Khuong	Thanh Binh	Ba Ho	N22-45-43.8	E104-07-15.8	785	From Moung Khuong office, Dao minority
253563	39	18 Nov., 2014	<i>Cucurbita moschata</i>	Kieng Qua	fruits	landrace	farmstore	Lao Cai	Muong Khuong	Thanh Binh	Ba Ho	N22-41-10.8	E104-06-36.5	617	Dao minority

Table 3 (Continued).

JP No.	Coll. No.	Coll. Date	Species name	Local name	Type of sample	Status of sample	Coll. source	Province	District	Commune	Town or village name	Latitude	Longitude	Altitude (m)	Remarks
253564	40	18 Nov., 2014	<i>Cucurbita moschata</i>	Kieng Qua	fruits	landrace	farmstore	Lao Cai	Muong Khuong	Thanh Binh	Ba Ho	N22-41-10.8	E104-06-36.5	617	Dao minority
253565	41	18 Nov., 2014	<i>Cucurbita moschata</i>	Kieng Qua	fruits	landrace	farmstore	Lao Cai	Muong Khuong	Thanh Binh	Ba Ho	N22-41-10.8	E104-06-36.5	617	Dao minority
253566	42	18 Nov., 2014	<i>Cucurbita moschata</i>	Ne Qua	fruits	landrace	farmstore	Lao Cai	Muong Khuong	Thanh Binh	Po Ho	N22-40-44.5	E104-06-39.9	570	From Tudai minority, Mr. Vang Chan Si, cultivated homegarden
253567	43	18 Nov., 2014	<i>Cucumis sativus</i>	Khonag Qua	seed	landrace	farmstore	Lao Cai	Muong Khuong	Thanh Binh	Po Ho	N22-40-44.5	E104-06-39.9	570	From Tudai minority, Mr. Vang Chan Si, cultivated homegarden, white skin color
253568	44	18 Nov., 2014	<i>Cucumis melo</i>	Khoa Qua	seed	landrace	farmstore	Lao Cai	Muong Khuong	Thanh Binh	Po Ho	N22-40-44.5	E104-06-39.9	570	From Tudai minority, Mr. Vang Chan Si, yellow skin color with white stripe
253569	45	18 Nov., 2014	<i>Cucurbita moschata</i>	Ne Qua	fruits	landrace	farmstore	Lao Cai	Muong Khuong	Thanh Binh	Po Ho	N22-40-44.5	E104-06-39.9	570	From Tudai minority, Mr. Lo Du Xe
253570	46	18 Nov., 2014	<i>Cucurbita moschata</i>	Nam Tau	fruits	landrace	farmstore	Lao Cai	Muong Khuong	Tung Pho	Di Thang	N22-46-01.3	E104-08-03.4	883	
253571	47	18 Nov., 2014	<i>Cucurbita moschata</i>	Nam Tau	fruits	landrace	farmstore	Lao Cai	Muong Khuong	Tung Pho	Di Thang	N22-46-01.3	E104-08-03.4	883	
253572	48	18 Nov., 2014	<i>Cucumis sativus</i>	Teng	seed	landrace	farmstore	Lao Cai	Muong Khuong	Tung Pho	Di Thang	N22-46-01.3	E104-08-03.4	883	
253573	49	18 Nov., 2014	<i>Cucumis sativus</i>	Mac Phen Nu	seed	landrace	farmstore	Lao Cai	Lao Cai	Hap Thanh	Tuong	N22-23-01.4	E104-01-29.9	150	Thai minority
253574	50	19 Nov., 2014	<i>Cucurbita moschata</i>	Cong Qua	fruits	landrace	farmstore	Ha Giang	Quan Ba	Quyét Tien	Xong Lan	N23-00-56.3	E104-59-06.0	800	Dao minority, from Mr. Ly To Pho
253575	51	19 Nov., 2014	<i>Cucurbita moschata</i>	Cong Qua	fruits	landrace	farmstore	Ha Giang	Quan Ba	Quyét Tien	Xong Lan	N23-00-56.3	E104-59-06.0	800	Dao minority, from Mr. Ly To Pho
253576	52	19 Nov., 2014	<i>Cucurbita moschata</i>	Cong Qua	fruits	landrace	farmstore	Ha Giang	Quan Ba	Quyét Tien	Xong Lan	N23-00-56.3	E104-59-06.0	800	Dao minority, from Mr. Ly To Pho
253577	53	19 Nov., 2014	<i>Cucumis sativus</i>	Qua	seed	landrace	farmstore	Ha Giang	Quan Ba	Quyét Tien	Xong Lan	N23-00-56.3	E104-59-06.0	800	Dao minority, from Mr. Day Xun Thi, mixed seeds of 3 types
253578	54	19 Nov., 2014	<i>Cucurbita moschata</i>	Tau Da	fruits	landrace	farmstore	Ha Giang	Quan Ba	Thanh Van	Ma Hong	N23-05-58.8	E104-58-12.3	944	Hmong minority, from Mr. Sung Dau Lenh
253579	55	19 Nov., 2014	<i>Cucumis sativus</i>	Di	seed	landrace	farmstore	Ha Giang	Quan Ba	Thanh Van	Ma Hong	N23-05-58.8	E104-58-12.3	944	Hmong minority, from Mr. Sung Dau Lenh, white skin color
253580	56	19 Nov., 2014	<i>Cucurbita moschata</i>	Tau Da	fruits	landrace	farmstore	Ha Giang	Quan Ba	Thanh Van	Ma Hong	N23-05-58.8	E104-58-12.3	944	Hmong minority, from Mr. Thau Van Thau
253581	57	20 Nov., 2014	<i>Cucumis sativus</i>	Dua Chot	seed	landrace	farmstore	Tuyen Quang	Son Duong	Son Nam	Thanh That	N21-33-39.1	E105-27-40.1	44	Cao Lan minority, from Mr. Le The Kien, yellow skin color matured fruits
253582	58	20 Nov., 2014	<i>Cucumis melo</i>	Dua Bo	seed	landrace	farmstore	Tuyen Quang	Son Duong	Son Nam	Thanh That	N21-33-39.1	E105-27-40.1	44	Cao Lan minority



Photo 1. Market at Lao Cai town



Photo 2. Interviewing local people at Phien Pi B village, Tuan Gia



Photo 3. Pumpkin shoots at Cao Son town, Cao Phong



Photo 4. No. 1 pumpkin fruits at Cao Son town, Cao Phong



Photo 5. No. 3 pumpkin seeds at Chop ly village, Dien Bien Dong



Photo 6. Pumpkin fruit cultivated at farmer's garden, Tuan Giao



Photo 7. Collected pumpkin fruits



Photo 8. Pumpkin fruits at Hua Tat village, Son La



Photo 9. Pumpkin cultivated with maize in Xong Lan village, Quan Ba



Photo 10. Cucumber fruits of commercial cultivar at Cao Son town, Cao Phong



Photo 11. Collected cucumber fruits at Coma village, Thuan Chau



Photo 12. No. 26 cucumber seeds at Hua Tat village, Son La



Photo 13. Cucumber cultivation field, Lao Cai



Photo 14. South Chinese type cucumber, Lao Cai



Photo 15. Melon fruits from China at Lao Cai town, Lao Cai



Photo 16. No. 37 melon seeds at Ba Ho village, Muong Khuong