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Original Paper

Collaborative Exploration of *Capsicum* and Cucurbitaceae Vegetable Genetic Resources in Eastern Nepal, February 2018

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Summary

This report describes the third exploration for chili pepper and cucurbitaceous vegetable genetic resources in eastern Nepal, jointly conducted by the National Agriculture and Food Research Organization (NARO) of Japan and the Nepal Agricultural Research Council (NARC). We conducted a field survey in eastern Nepal from the 14th to 24th of February 2018. We collected a total of 66 samples including; *Cucumis sativus* (27), *Cucurbita maxima* (3), *C. moschata* (5), *C. ficifolia* (1), *Luffa acutangula* (1), *Capsicum annuum* (13) *C. frutescens* (2) and *Capsicum* sp. (14). The collected seed samples were stored as seeds at the National Agriculture Genetic Resources Center, NARC and will be transferred to the Genetic Resources Center, NARO.

KEY WORDS: chili pepper, cucumber, genetic resources, Nepal, squash

Introduction

Nepal has a great deal of altitudinal and topological variation and possesses a wide range of plant genetic diversity at both the species and intra-species levels (Gupta 2012). A unique *Capsicum* sp. called 'Akbare Khursani' was collected in Central Nepal (Nemoto *et al.* 2016, 2017); its chili peppers had high similarity to the *C. annuum* group and were located at the border between the *C. annuum* and *C. frutescens-chinense* groups (Konisho *et al.* 2005). The 'Akbare Khursani' types are thought to have originated in eastern Nepal and cucumber (*Cucumis sativus*) is thought to have originated in South Asia. Yashiro *et al.* (2017) collected local cucumbers and *C. sativus* var. *hardwickii*, considered to be either a progenitor or relative of the cultivated cucumber (Bisht *et al.* 2004). Therefore, we expected to find many *Capsicum* and Cucurbitaceae landraces in Nepal.

This study was funded by the Ministry of Agriculture, Forestry and Fisheries, Japan, Plant Genetic Resources in Asia (PGRAsia) project that was established in 2014 to evaluate and explore the plant genetic resources of Asia. As part of this project, the National Agriculture and Food Research Organization (NARO) of Japan and the National Agriculture Genetic Resources Center, under the umbrella of the Nepal Agriculture Research Council (NARC) in Nepal, established a Joint Research Agreement (JRA) titled 'Characterization and Evaluation of Plant Genetic Resources for Food and Agriculture' in June 2015. Based on this agreement, the first collaborative exploration of the Central Development Region in February 2016 and the second collaborative exploration of western Nepal in November 2016 were conducted (Nemoto *et al.* 2016; Takahashi *et al.* 2017; Yashiro *et al.* 2017). During these field surveys accessions of 78 *Capsicum*, 14 *Cucumis sativus*, 3 *C. melo*, 2 *Cucurbita maxima*, 2 *C. moschata* and 1 *C. pepo* were collected. However, a field survey has not yet been conducted in the eastern areas of Nepal. The object of this survey is to explore chili pepper and cucurbitaceous crops in eastern Nepal.

Methods

From the 14th to 24th of February in 2018, we explored and collected the chili pepper and cucurbitaceous vegetable genetic resources in the Ilam, Panchthar and Dhankuta districts of Province No. 1, Nepal (Table 1, Fig. 1). Our collections were restricted to local varieties. Most of the fruit and seed

Table 1. Itinerary of the field survey in eastern Nepal, February 2018

Date	Day	Itinerary	Stay
2/14	Wed	Tsu -- Haneda	
2/15	Thu	Haneda 0:20 (TG661) -- 5:25 Bangkok; 10:30 (TG319) -- 12:45 Kathmandu, visit National Agriculture Genetic Resources Center, Genebank, Nepal Agricultural Research Council (NARC)	Kathmandu
2/16	Fri	Kathmandu 9:05 (U4 703) -- 9:45 Biratnagar -- Ilam	Ilam
2/17	Sat	Ilam -- Phidim	Phidim
2/18	Sun	Phidim -- Ilam -- Birtamod	Birtamod
2/19	Mon	Birtamod -- Bhedetar -- Hile	Hile
2/20	Tue	Hile	Hile
2/21	Wed	Hile -- Biratnagar 17:05 (U4 714) -- 17:45 Kathomandu	Kathmandu
2/22	Thu	Kathmandu, visit Genebank, NARC and arrange the collected seeds	Kathmandu
2/23	Fri	Kathmandu 13:55 (TG320) -- 18:30 Bangkok	on flight
2/24	Sat	Bangkok 0:05 (TG644) -- 7:30 Chubu	

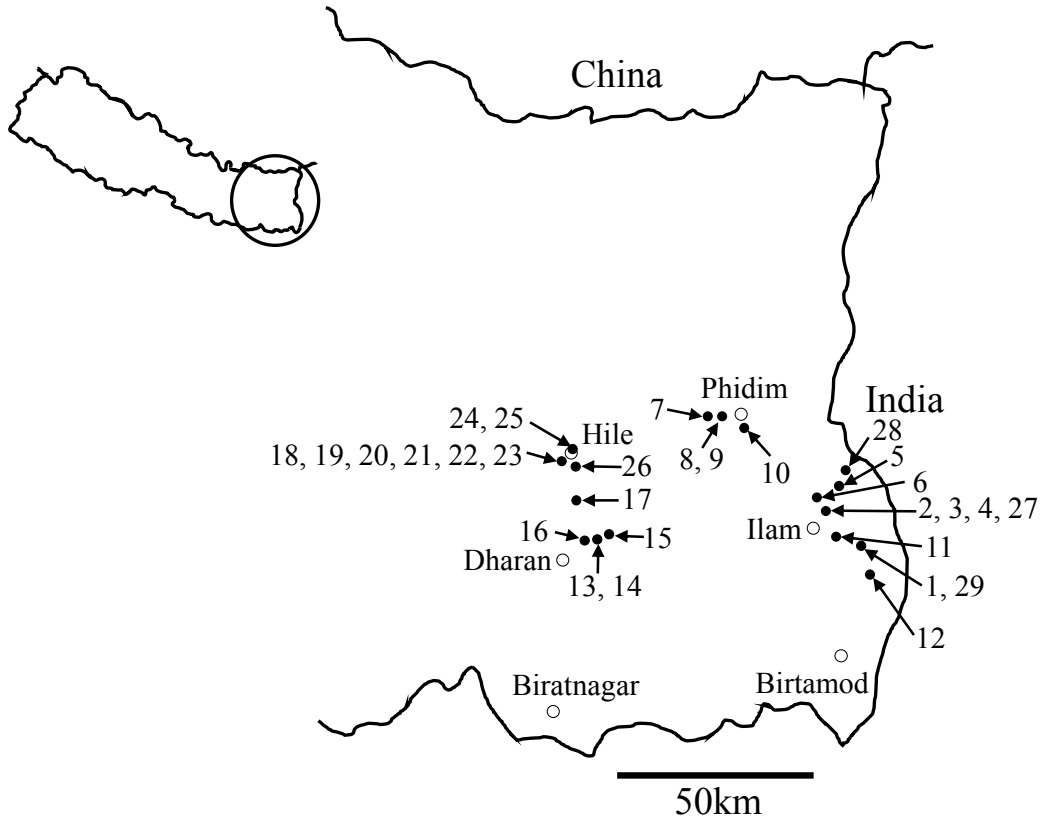

Fig. 1. Collection sites during the exploration of *Capsicum* and Cucurbitaceae crops in eastern Nepal.

samples were collected from farmers' storage, because February is the off-season for major field crops. We assembled information on each of the samples, including sowing date, harvest date, usage, and cultivation methods from interviews with the farmers (Photo 1). We also recorded place names, local plant names, latitudes, longitudes, altitudes and characteristics of the collection sites. Latitude, longitude and altitude were determined using Garmin eTrex20J GPS technology (Garmin International Inc., Olathe, KS, USA).

Results and Discussion

In this survey, we collected a total of 66 samples: 27 *Cucumis sativus*, 3 *Cucurbita maxima*, 5 *C. moschata*, 1 *C. ficifolia*, 1 *Luffa acutangula*, 13 *Capsicum annuum*, 2 *C. frutescens* and 14 *Capsicum* sp. (Table 2). The collected seed samples were stored as seeds in the National Agriculture Genetic Resources Center, NARC and will be transferred to the Genetic Resources Center, NARO.

1) Ilam district (16th - 17th February)

On the 16th of February, we travelled to Biratnagar from Kathmandu by airplane, and then travelled by car from Biratangar to Ilam. Ilam is a very famous tea production area in Nepal. We visited Kolbung, Barbote, Sumek and Mai Pokhari villages in the Ilam district and collected 17 samples from local farmers: 6 cucumber, 6 squash, 1 angled luffa and 4 chili peppers (Table 3). The collection sites were hilly and mountainous and their altitudes ranged from 1,285 to 2,113 m.

2) Panchthar and Ilam districts (18th February)

From Phidim, in the Panchthar district, we travelled to Thapa Tar, Tari Gauna, Samdhin Ghumti and Kolbung villages. Thapa Tar is located near a river and at a relatively low altitude (638 m) compared

with the other sample sites (altitude ranged from 1,024 to 1,348 m). No cucumber samples were found in Thapa Tar. Travelling back to Ilam, we visited Godhak Ghatta, Narayan Chowk and Kolbung villages in the Iram district. On the 18th of February, we collected 20 samples from these villages: 7 cucumber, 2 squash and 11 chili peppers (Table 3).

Table 2. A summary of collected samples in eastern Nepal, February 2018

Plant name	Species	Total
Cucumber	*Cucumis sativus*	27
Squash	*Cucurbita maxima*	3
	Cucurbita moschata	5
Figleaf gourd	*Cucurbita ficifolia*	1
Angled luffa	*Luffa acutangula*	1
Chili pepper	*Capsicum annuum*	13
	Capsicum frutescens	2
	Capsicum sp.	14
Total		66

3) Dhankuta district (19th–21st February)

We moved to Bhedetar in the Dankuta district via Birtamod city (Table 1). On the 19th of February, we visited Thumke, Namje Tole and Mulghat villages. Mulghat is located near the Tamor river at an altitude of 264 m, the lowest in this survey. Thumke and Namje Tole are located in hilly and mountainous areas near Bhedetar city. On the 20th of February, we could not travel by car because of Nepal bandh (general strike), therefore, we explored the area around Hile city on foot. We visited Borke, Jordhara, Pakhribas and Lal Base villages and the market of Hile city, where we collected both cucumber and chili pepper samples. We also visited an agricultural research station of the Nepal Agricultural Research Council, in Pakhribas village. On the 21st of February, we moved to Biratnagar and on route we visited Nigale village in Dhankuta to collect samples. In Dhankuta district, we collected 29 samples: 14 cucumber, 1 squash and 14 chili peppers (Table 3).

4) Cucumber

We collected a total of 27 samples of cucumber, the local name of which, in Nepal, is 'Kankro'. February is the off-season for major field crops and cucumber fruits are not stored for long periods, therefore, we could not collect cucumber fruits, and all cucumber samples were seeds in this survey (Photo 2). According to the interviews with local farmers, local varieties of cucumber in eastern Nepal are roughly categorized into 3 types using the characteristics of the mature fruits: (1) cylindrical shape and brown skin type, (2) cylindrical shape and yellow skin type and (3) oblong shape type. The oblong shape type is rare and the fruits are sweeter than another types. The cylindrical shape types with brown and yellow skin are major varieties grown in these areas. Local people mainly use immature fruit in salads and mature fruits as pickles. Most of the local cucumber were cultivated in home gardens, consumed by farmers, and sometimes sold at market. The cucumber seeds mixed with ash were stored on the wall at Thumke village in the Dhankuta district (Photo 3); this unique storage method is an adaptation to help protect from mouse damage. Yashiro *et al.* (2017) collected *Cucumis sativus* var. *hardwickii* from western Nepal in November 2016. We did not collect *hardwickii* during this survey. The main cucumber cultivation season is from February to October with harvesting from July to October (Table 3). Therefore, we suggest that field surveys for cucumber genetic resources should be conducted from October to November.

5) Squash

We collected 9 samples of squash: 3 *C. maxima*, 5 *C. moschata* and 1 *C. ficifolia*. The local name of squash is 'Pharsi'. Various fruit sizes and shapes were observed for *C. moschata* (Photo 4), which is widely cultivated in eastern Nepal. In contrast to *C. moschata*, *C. maxima* was rare in this survey. *C. ficifolia* was observed in high altitude areas (>2,000 m; Photo 5), and they were used as fodder for livestock. *C. maxima* and *moschata* are not believed to be adapted to grow in high altitude areas.

6) Chili pepper

A total of 19 chili peppers samples were collected: 13 *C. annuum* L., 2 *C. frutescens* L. and 14 accessions called 'Akbare Khursani' that could not be identified (Photo 6). According to our previous research, this type, with small, round pungent fruits, showed key characteristics of *C. annuum*, *C. frutescens* and *C. chinense* species simultaneously (Konisho *et al.* 2005); which is why some of the 14 accessions could not be identified.

In Nepali, chili peppers are called 'Khursani'. In the field survey, local chili peppers of the *C. annuum* species were called just 'Khursani' or had the name combined with the fruits shape or color, for example: 'Lamo Khursani' means "Long chili pepper" and 'Karo Khursani' means "Black chili pepper". Two of the 19 samples were identified as *C. frutescens* and were called 'Jire khursani', 'Jire' means "the person who is small but strong" in Nepali, and their fruits are small but pungent. 'Jire Khursani' was used not only as a spice but also as a medicine to treat diseases for cattle tongue in Thapa Tar village, Phidim and Panchthar (No. 16).

The 14 chili samples called 'Akbare Khursani' are also known as 'Dalle Khursani'. The name 'Akbare Khursani' refers to the name of a historical Indian King, 'Akbare', and "Dalle" means "round shape" in Nepali. This type of local chili pepper variety originated from the Ilam district, one of the survey sites of this project, but recently, due to their popularity, they have been grown across the whole country. The Nepalese believe that eating excessive amounts of chili pepper can injure the stomach, however, the more pungent 'Akbare Khursani' varieties do not cause stomach upsets.

The interviews with the farmers in Eastern Nepal revealed that they have two types of 'Akbare Khursani', 'Akbare Khursani' and 'Madesh Akbare Khursani'. The 'Akbare Khursani' has a better taste and is hotter than the 'Madesh Akbare Khursani'. "Madesh" in Nepali indicates their southern border area with India and the people who live in Eastern Nepal don't eat this type. We pointed out to the farmers that even though markets sold chili peppers labelled 'Akbare Khursani', some of them were actually *C. annuum* ('Madesh Akbare Khursani' refers to the type belonging to *C. annuum*), and are completely different from the true 'Akbare Khursani' identified in the former field survey of central Nepal (Nemoto *et al*. 2016).

Most of the local chili peppers, such as the above named accessions, had their seeds collected and stored in house by the local farmers. The village Namje in the Dhankuta district dried and smoked fruits above their cooking stoves, which preserved them so that the seeds could be sourced from these fruits for the next years cultivation (No. 36; Photo 7).

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ネパール東部におけるトウガラシ属およびウリ科野菜遺伝資源の共同探索，2018 年 2 月

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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，国立研究開発法人農業・食品産業技術総合研究機構 遺伝資源センターとネパール国立農業遺伝資源センターとの間で締結した共同研究協定に基づいて行われたネパール東部におけるトウガラシ属および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 2018 年 2 月 15 日～ 24 日にかけて行った．ネパール東部のイラム県，パンチタール県，ダンクタ県において探索・調査を行った．その結果，キュウリ 27 点，セイヨウカボチャ 3 点，ニホンカボチャ 5 点，クロダネカボチャ 1 点，トカドヘチマ 1 点，トウガラシ属 29 点の合計 66 点の野菜遺伝資源を収集した．収集された遺伝資源は，ネパール国立農業遺伝資源センターで保存するとともに，我が国の遺伝資源センターに導入される予定である．

Table 3. Data of collected *Capsicum* and Cucurbitaceae crops in eastern Nepal, February 2018

JP No.	Site No.	Individual No.	Nepal genebank collection No.	Date	Province	District	VM (Village Municipality)	village name	Latitude	Longitude	Altitude (m)	Fruit/ Seed	Species name	Local name	Wild-type/ Landrace/ cultivar	Field/ Storage/ Market	Sowing month	Harvest month	Remarks
262156	1	1	1	16 Feb.	No.1	Ilam	Royung	Kolbung	N26-49-34.72	E88-03-53.90	1,422	Seed	*Cucumis sativus*	Kankro	Landrace	Farm store	Mar.-Apr.	Aug.-Sep.	Mature fruits orange skin color, cylindrical shape
262252	2	2	A8	17 Feb.	No.1	Ilam	Ilam	Barbote	N26-56-52.70	E87-55-22.35	1,285	Seed	*Cucumis sativus*	Local Kankro	Landrace	Farm store	Jan.-Feb.	May-Jun.	Mature fruits brown skin color with net,cylindrical shape
262253	3	3	A9	17 Feb.	No.1	Ilam	Ilam	Barbote	N26-56-52.10	E87-55-22.49	1,278	Fruits	*Capsicum annuum*	Khrsani	Landrace	Farm store	May-Jun.		
262254	4	4	A10	17 Feb.	No.1	Ilam	Ilam	Barbote	N26-56-50.57	E87-55-22.61	1,278	Fruits	*Capsicum* sp.	Akbare Khrsani	Landrace	Farm store	May-Jun.	Sep.-Nov.	
262255	4	5	A11	17 Feb.	No.1	Ilam	Ilam	Barbote	N26-56-50.57	E87-55-22.61	1,278	Seed	*Cucumis sativus*	Paharo Kankro	Landrace	Farm store	Feb.-Mar.	May-Jun.	
262256	4	6	A12	17 Feb.	No.1	Ilam	Ilam	Barbote	N26-56-50.57	E87-55-22.61	1,278	Fruits	*Luffa acutangula*	Jhigana	Landrace	Farm store	Feb.-Mar.	Jul.-Aug.	
262257	5	7	A13	17 Feb.	No.1	Ilam	Ilam	Sumek	N26-59-36.40	E87-55-59.34	1,887	Fruits	*Capsicum* sp.	Akbare Khrsani	Landrace	Farm store	Feb.-Mar.	Sep.-Nov.	
262258	5	8	A14	17 Feb.	No.1	Ilam	Ilam	Sumek	N26-59-36.40	E87-55-59.34	1,887	Seed	*Cucumis sativus*	Karo Kankro	Landrace	Farm store	Feb.-Mar.	Jun.-Aug.	
262259	5	9	A15	17 Feb.	No.1	Ilam	Ilam	Sumek	N26-59-36.40	E87-55-59.34	1,887	Seed	*Cucurbita maxima*	Madeshi Pharsi	Landrace	Farm store	Feb.-Mar.	Jun.-Sep.	
262260	5	10	A16	17 Feb.	No.1	Ilam	Ilam	Sumek	N26-59-36.40	E87-55-59.34	1,887	Fruits	*Cucurbita maxima*	Pahade Pharsi	Landrace	Farm store	Feb.-Mar.	Jun.-Sep.	
262261	5	11	A17	17 Feb.	No.1	Ilam	Ilam	Sumek	N26-59-36.40	E87-55-59.34	1,887	Fruits	*Cucurbita moschata*	Pahade Pharsi	Landrace	Farm store	Feb.-Mar.	Jun.-Sep.	
262263	6	12	A19	17 Feb.	No.1	Ilam	Ilam	Barbote	N26-57-37.72	E87-55-17.23	1,474	Seed	*Cucumis sativus*	Kankro	Landrace	Farm store	Feb.-Mar.	Aug.-Sep.	Long type, smooth skin
262264	6	13	A20	17 Feb.	No.1	Ilam	Ilam	Barbote	N26-57-37.72	E87-55-17.23	1,474	Fruits	*Capsicum* sp.	Akbare Khrsani	Landrace	Farm store	May-Jun.	Aug.-Sep.	Dalle khrsani
262265	7	14	A21	18 Feb.	No.1	Panchthar	Phidim	Thapa Tar	N27-09-49-22	E87-45-54.72	638	Fruits	*Capsicum annuum*	Thade Khrsani	Landrace	Farm store	Feb.-Mar.	Sep.-Oct.	
262266	7	15	A22	18 Feb.	No.1	Panchthar	Phidim	Thapa Tar	N27-09-49-22	E87-45-54.72	638	Fruits	*Capsicum annuum*	Khrsani	Landrace	Farm store	Feb.-Mar.	Sep.-Oct.	
262267	7	16	A23	18 Feb.	No.1	Panchthar	Phidim	Thapa Tar	N27-09-49-22	E87-45-54.72	638	Fruits	*Capsicum frutescens*	Jire Khrsani	Landrace	Farm store	Feb.-Mar.	Set.-Oct.	
262268	7	17	A24	18 Feb.	No.1	Panchthar	Phidim	Thapa Tar	N27-09-49-22	E87-45-54.72	638	Fruits	*Capsicum* sp.	Akbare Khrsani	Landrace	Farm store	Feb.-Mar.	Sep.-Oct.	
262269	8	18	A25	18 Feb.	No.1	Panchthar	Phidim	Tari Gaun	N27-08-42.09	E87-45-03.70	1,024	Fruits	*Capsicum annuum*	Seto Thade Khrsani	Landrace	Farm store	Feb.-Mar.	From July	
262270	8	19	A26	18 Feb.	No.1	Panchthar	Phidim	Tari Gaun	N27-08-42.09	E87-45-03.70	1,024	Fruits	*Capsicum annuum*	Rato Thade Khrsani	Landrace	Farm store	Feb.-Mar.	From July	
262271	8	20	A27	18 Feb.	No.1	Panchthar	Phidim	Tari Gaun	N27-08-42.09	E87-45-03.70	1,024	Fruits	*Capsicum annuum*	Karo Thade Khrsani	Landrace	Farm store	Feb.-Mar.	From July	
262272	8	21	A28	18 Feb.	No.1	Panchthar	Phidim	Tari Gaun	N27-08-42.09	E87-45-03.70	1,024	Fruits	*Capsicum frutescens*	Jire Khrsani	Landrace	Farm store	Feb.-Mar.	From July	
262273	8	22	A29	18 Feb.	No.1	Panchthar	Phidim	Tari Gaun	N27-08-42.09	E87-45-03.70	1,024	Seed	*Cucurbita moschata*	Thulo Pharsi	Landrace	Farm store	Feb.-Mar.	From July	
262274	8	23	A30	18 Feb.	No.1	Panchthar	Phidim	Tari Gaun	N27-08-42.09	E87-45-03.70	1,024	Seed	*Cucurbita moschata*	Sano Pharsi	Landrace	Farm store	Feb.-Mar.	From July	
262277	9	24	A33	18 Feb.	No.1	Panchthar	Phidim	Tari Gaun	N27-08-42.24	E87-45-03.02	1,019	Fruits	*Capsicum annuum*	Lamo Khrsani	Landrace	Farm store	Feb.-Mar.	Jul.-Aug.	
262278	9	25	A34	18 Feb.	No.1	Panchthar	Phidim	Tari Gaun	N27-08-42.24	E87-45-03.02	1,019	Fruits	*Capsicum* sp.	Akbare Khrsani	Landrace	Farm store	Feb.-Mar.	Jul.-Aug.	
262279	9	26	A35	18 Feb.	No.1	Panchthar	Phidim	Tari Gaun	N27-08-42.24	E87-45-03.02	1,019	Fruits	*Capsicum annuum*	Saili Khrsani	Landrace	Farm store	Feb.-Mar.	Jul.-Aug.	
262280	10	27	A36	18 Feb.	No.1	Panchthar	Phidim	Samdhin Ghumti	N27-07-45.49	E87-45-35.10	1,348	Seed	*Cucumis sativus*	Hariyo Kankro	Landrace	Farm store	Mar.-Apr.	From June	Mature fruits green skin color, cylindrical shape
262281	11	28	A37	18 Feb.	No.1	Ilam	Ilam	Godhak Ghatta	N26-52-39.40	E87-57-36.74	929	Seed	*Cucumis sativus*	Local Kankro	Landrace	Farm store	Feb.-Mar.	Aug.-Sep.	Mature fruits brown skin color with net, cylindrical shape
262282	12	29	A38	18 Feb.	No.1	Ilam	Ilam	Narayan Chowk	N26-52-52.84	E87-59-00.93	1,297	Seed	*Cucumis sativus*	Local Kankro	Landrace	Farm store	Feb.-Mar.	Jul.-Aug.	Mature fruits brown skin color with net, cylindrical shape
262283	12	30	A39	18 Feb.	No.1	Ilam	Ilam	Narayan Chowk	N26-52-52.84	E87-59-00.93	1,297	Seed	*Cucumis sativus*	Local Kankro	Landrace	Farm store	Feb.-Mar.	Jul.-Aug.	Mature fruits brown skin color with net, cylindrical shape
262284	12	31	A40	18 Feb.	No.1	Ilam	Ilam	Narayan Chowk	N26-52-52.84	E87-59-00.93	1,297	Seed	*Cucumis sativus*	Local Kankro	Landrace	Farm store	Feb.-Mar.	Jul.-Aug.	Mature fruits brown skin color with net, cylindrical shape
262285	12	32	A41	18 Feb.	No.1	Ilam	Ilam	Narayan Chowk	N26-52-52.84	E87-59-00.93	1,297	Seed	*Cucumis sativus*	Local Kankro	Landrace	Farm store	Feb.-Mar.	Jul.-Aug.	Mature fruits brown skin color with net, cylindrical shape
262286	13	33	A42	19 Feb.	No.1	Dhankuta	Sangurigadi	Thumke	N26-51-41.04	E87-20-19.67	1,605	Seed	*Cucumis sativus*	Chillo Kankro	Landrace	Farm store	Feb.-Mar.	May-Jun.	Mature fruits orange skin color, cylindrical shape
262288	14	34	A44	19 Feb.	No.1	Dhankuta	Sangurigadi	Thumke	N26-51-37.76	E87-20-22.36	1,613	Seed	*Cucumis sativus*	Pudke Kankro	Landrace	Farm store	Feb.-Mar.	Jun.-Jul.	Oblong shape, sweet type
262290	15	35	A46	19 Feb.	No.1	Dhankuta	Sangurigari Gaunpalika	Namje Tole	N26-51-13.83	E87-20-19.65	1,614	Seed	*Cucumis sativus*	Kankro	Landrace	Farm store	Feb.-Mar.	Oct.-Nov.	Mature fruits brown skin color, cylindrical shape

Table 3. (Continued).

JP No.	Site No.	Individual No.	Nepal genebank collection No.	Date	Province	District	VM (Village Municipality)	village name	Latitude	Longitude	Altitude (m)	Fruit/ Seed	Species name	Local name	Wild-type/ Landrace/ cultivar	Field/ Storage/ Market	Sowing month	Harvest month	Remarks
262292	15	36	A48	19 Feb.	No.1	Dhankuta	Sangurigari Gaunpalika	Namje Tole	N26-51-13.83	E87-20-19.65	1,614	Fruits	*Capsicum* sp.	Akbare Khrsani	Landrace	Farm store	Mar.-Apr.	Jun.-Jul.	
262293	15	37	A49	19 Feb.	No.1	Dhankuta	Sangurigari Gaunpalika	Namje Tole	N26-51-13.83	E87-20-19.65	1614	Fruits	*Capsicum annuum*	Lamche Khrsani	Landrace	Farm store	Mar.-Apr.	Jun.-Jul.	
262295	16	38	A51	19 Feb.	No.1	Dhankuta	Sangurigari Gaunpalika	Namje Tole	N26-51-17.34	E87-19-45.20	1,457	Seed	*Cucumis sativus*	Local Kankro	Landrace	Farm store	Feb.-Mar.	Oct.-Nov.	Mature fruits brown skin color, cylindrical shape
262296	16	39	A52	19 Feb.	No.1	Dhankuta	Sangurigari Gaunpalika	Namje Tole	N26-51-17.34	E87-19-45.20	1,457	Seed	*Cucurbita moschata*	Local Pharsi	Landrace	Farm store	Feb.-Mar.	Oct.-Nov.	
262297	17	40	A53	19 Feb.	No.1	Dhankuta	Dhankuta	Mulghat	N26-55-51.47	E87-19-13.63	264	Fruits	*Capsicum* sp.	Akbare Khrsani	Landrace	Farm store	May-Jun.	Aug.-Sep.	
262298	18	41	A54	20 Feb.	No.1	Dhankuta	Pakhribas Gaunpalika	Bokre	N27-02-26.95	E87-18-25.01	1,853	Seed	*Cucumis sativus*	Local Kankro	Landrace	Farm store	Feb.-Mar.	Jun.-Jul.	Mature fruits orange skin color, cylindrical shape
262299	18	42	A55	20 Feb.	No.1	Dhankuta	Pakhribas Gaunpalika	Bokre	N27-02-26.95	E87-18-25.01	1,853	Seed	*Cucumis sativus*	Local Kankro	Landrace	Farm store	Feb.-Mar.	Jun.-Jul.	Mature fruits white skin color, cylindrical shape
262300	18	43	A56	20 Feb.	No.1	Dhankuta	Pakhribas Gaunpalika	Bokre	N27-02-26.95	E87-18-25.01	1,853	Seed	*Cucumis sativus*	Local Kankro	Landrace	Farm store	Feb.-Mar.	Jun.-Jul.	Mature fruits brown skin color with net, earl mature type, oblong shape
262301	18	44	A57	20 Feb.	No.1	Dhankuta	Pakhribas Gaunpalika	Bokre	N27-02-26.95	E87-18-25.01	1,853	Fruits	*Capsicum* sp.	Akbare Khrsani	Landrace	Farm store	Feb.-Mar.	Jun.-Jul.	Dalle khrsani
262302	19	45	A58	20 Feb.	No.1	Dhankuta	Pakhribas Gaunpalika	Jordhara	N27-02-39.27	E87-17-59.85	1,766	Fruits	*Capsicum* sp.	Akbare Khrsani	Landrace	Farm store	Feb.-Mar.	Jul.-Aug.	
262303	19	46	A59	20 Feb.	No.1	Dhankuta	Pakhribas Gaunpalika	Jordhara	N27-02-39.27	E87-17-59.85	1,766	Fruits	*Capsicum annuum*	Lamche Khrsani	Landrace	Farm store	Mar.-Apr.	Jun.-Jul.	
262304	20	47	A60	20 Feb.	No.1	Dhankuta	Pakhribas Gaunpalika	Pakhribas	N27-02-47.41	E87-17-46.04	1,724	Seed	*Cucumis sativus*	Local Kankro	Landrace	Farm store	Feb.-Mar.	Jun.-Jul.	Mature fruits orange skin color, cylindrical shape, big type
262305	21	48	A61	20 Feb.	No.1	Dhankuta	Pakhribas Gaunpalika	Lal Base	N27-02-48.23	E87-17-36.69	1,716	Seed	*Cucumis sativus*	Local Kankro	Landrace	Institute	Mar.-Apr.	Jun.-Jul.	Mature fruits brown skin color with net, cylindrical shape
262306	21	49	A62	20 Feb.	No.1	Dhankuta	Pakhribas Gaunpalika	Lal Base	N27-02-48.23	E87-17-36.69	1,716	Seed	*Cucumis sativus*	Local Kankro	Landrace	Institute	Mar.-Apr.	Jun.-Jul.	Mature fruits dark yellow skin color, cylindrical shape
262307	21	50	A63	20 Feb.	No.1	Dhankuta	Pakhribas Gaunpalika	Lal Base	N27-02-48.23	E87-17-36.69	1,716	Fruits	*Capsicum annuum*	Lamche Khrsani	Landrace	Institute	Feb.-Mar.	Aug.-Sep.	
262308	21	51	A64	20 Feb.	No.1	Dhankuta	Pakhribas Gaunpalika	Lal Base	N27-02-48.23	E87-17-36.69	1,716	Fruits	*Capsicum* sp.	Akbare Khrsani	Landrace	Institute	Feb.-Mar.	Aug.-Sep.	
262309	22	52	A65	20 Feb.	No.1	Dhankuta	Pakhribas Gaunpalika	Pakhribas	N27-02-55.59	E87-17-27.33	1,746	Fruits	*Capsicum* sp.	Akbare Khrsani	Landrace	Farm store	Feb.-Mar.	Jul.-Aug.	
262310	22	53	A66	20 Feb.	No.1	Dhankuta	Pakhribas Gaunpalika	Pakhribas	N27-02-55.59	E87-17-27.33	1,746	Seed	*Cucumis sativus*	Kankro	Landrace	Farm store	Mar.-Apr.	Jun.-Jul.	Mature fruits dark yellow skin color, cylindrical shape
262311	22	54	A67	20 Feb.	No.1	Dhankuta	Pakhribas Gaunpalika	Pakhribas	N27-02-55.59	E87-17-27.33	1,746	Fruits	*Capsicum annuum*	Lamche Khrsani	Landrace	Farm store	Mar.-Apr.	Jun.-Jul.	
262312	23	55	A68	20 Feb.	No.1	Dhankuta	Pakhribas Gaunpalika	Pakhribas	N27-02-58.05	E87-17-24.45	1,729	Seed	*Cucumis sativus*	Local Kankro	Landrace	Farm store	Mar.-Apr.	Jun.-Jul.	Mature fruits brown skin color with net, cylindrical shape
262313	23	56	A69	20 Feb.	No.1	Dhankuta	Pakhribas Gaunpalika	Pakhribas	N27-02-58.05	E87-17-24.45	1,729	Fruits	*Capsicum annuum*	Lamche Khrsani	Landrace	Farm store	Mar.-Apr.	Jun.-Jul.	
262314	23	57	A70	20 Feb.	No.1	Dhankuta	Pakhribas Gaunpalika	Pakhribas	N27-02-58.05	E87-17-24.45	1,729	Fruits	*Capsicum* sp.	Akbare Khrsani	Landrace	Farm store	Mar.-Apr.	Jun.-Jul.	
262315	24	58	A71	20 Feb.	No.1	Dhankuta	Dhankuta	Hile	N27-01-55.54	E87-18-47.60	1,929	Seed	*Cucumis sativus*	Local Kankro	Landrace	Market	Feb.-Apr.	Jul.-Aug.	From the seed shop, mature fruits orange skin color, cylindrical shape
262316	25	59	A72	20 Feb.	No.1	Dhankuta	Dhankuta	Hile	N27-01-49.98	E87-18-47.00	1,909	Fruits	*Capsicum* sp.	Akbare Khrsani	Landrace	Market			

Table 3. (Continued).

JP No.	Site No.	Individual No.	Nepal genebank collection No.	Date	Province	District	VM (Village Municipality)	village name	Latitude	Longitude	Altitude (m)	Fruit/ Seed	Species name	Local name	Wild-type/ Landrace/ cultivar	Field/ Storage/ Market	Sowing month	Harvest month	Remarks
262317	26	60	A73	21 Feb.	No.1	Dhankuta	Dhankuta	Nigale	N27-00-41.51	E87-19-32.64	1,645	Seed	*Cucumis sativus*	Kankro	Landrace	Farm store	Feb.-Mar.	Sep.-Oct.	Mature fruits orange skin color, cylindrical shape
262318	26	61	A74	21 Feb.	No.1	Dhankuta	Dhankuta	Nigale	N27-00-41.51	E87-19-32.64	1,645	Fruits	*Capsicum* sp.	Akbare Khrsani	Landrace	Farm store	Feb.-Mar.	Nov.-Dec.	
262166	27	62	B11	17 Feb.	No.1	Ilam	Ilam	Okhre Barbote	N26-57-23	E87-55-58	-	Seed	*Cucumis sativus*	Kankro	Landrace	Farm store	Feb.-Mar.	Aug.-Sep.	Green and yound consumption
262167	27	63	B12	17 Feb.	No.1	Ilam	Ilam	Okhre Barbote	N26-57-23	E87-55-58	-	Seed	*Cucurbita moschata*	Dalle Pharsi	Landrace	Farm store	Jan.-Feb.	Sep.-Oct.	Vegetable purpose
262176	28	64	B21	17 Feb.	No.1	Ilam	Santapur Gaun Palika	Mai Pokhari	N27-00-35.00	E87-55-76.30	2,113	Seed	*Cucurbita maxima*	Pharsi	Landrace	Farm store	Feb.-Mar.	Jun.-Jul.	
262177	28	65	B22	17 Feb.	No.1	Ilam	Santapur Gaun Palika	Mai Pokhari	N27-00-35.00	E87-55-76.30	2,113	Fruits	*Cucurbita ficifolia*	Kharbjuja	Landrace	Farm store	Feb.-Mar.	Jun.-Jul.	
262203	29	66	B48	18 Feb.	No.1	Ilam	Royung Gaun Palika	Kolbung	N26-49-18.00	E88-03-59.70	1,482	Seed	*Cucumis sativus*	Kankro	Landrace	Farm store	Mar.-Apr.	Jul.-Aug.	

Photo 1. Interviewing local farmers at Sangurigari, Dhankuta District.

Photo 2. Seeds of Cucurbitaceae crops at Barbote, Ilam District.

Photo 3. Cucumber seeds mixed with ash were stored on the wall at Thumke, Dhankuta District.

Photo 4. Fruits of *Cucurbita moschata* at Samdhin Ghumti, Panchthar District.

Photo 5. Fruits of *Cucurbita ficifolia* at Thumke, Dhankuta District.

Photo 6. 'Akbare Khursani' sold in the vegetable market at Hile, Dhankute District.

Photo 7. Dried and smoked fruits above a cooking stove to preserve their seeds, Namje village, Dhankuta District.

Photos of collected fruits samples


No. 4 *Capsicum* sp.


No. 6 *Luffa acutangula*


No. 7 *Capsicum* sp.


No. 10 *Cucurbita maxima*


No. 11 *Cucurbita moschata*


No. 13 *Capsicum* sp.


No. 14 *Capsicum annuum*


No. 15 *Capsicum annuum*


No. 16 *Capsicum frutescens*


No. 17 *Capsicum* sp.


No. 18 *Capsicum annuum*


No. 19 *Capsicum annuum*


No. 20 *Capsicum annuum*


No. 21 *Capsicum frutescens*


No. 24 *Capsicum annuum*


No. 25 *Capsicum* sp.


No. 26 *Capsicum annuum*


No. 36 *Capsicum* sp.

No. 37 *Capsicum annuum*

No. 40 *Capsicum* sp.

No. 44 *Capsicum* sp.

No. 45 *Capsicum* sp.

No. 46 *Capsicum annuum*

No. 50 *Capsicum annuum*

No. 51 *Capsicum* sp.

No. 52 *Capsicum* sp.

No. 54 *Capsicum annuum*

No. 56 *Capsicum annuum*

No. 57 *Capsicum* sp.

No. 59 *Capsicum* sp.

No. 61 *Capsicum* sp.

No. 65 *Cucurbita ficifolia*