

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 | |

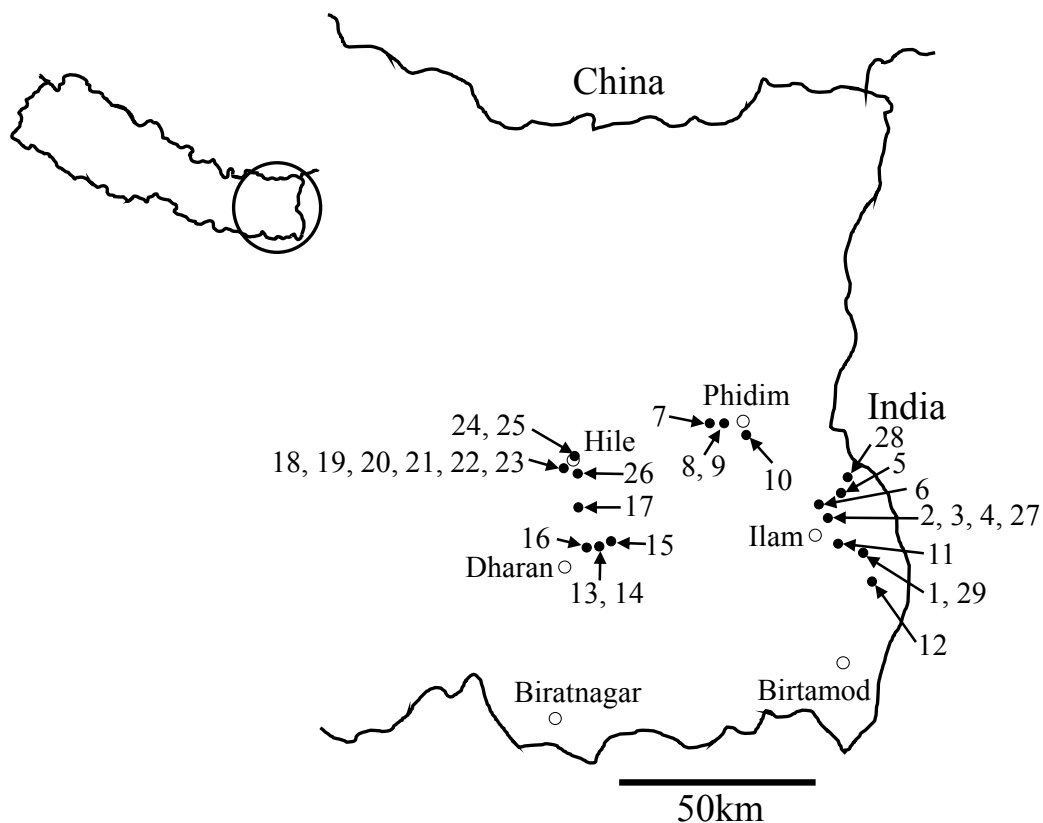


Fig. 1. Collection sites during the exploration of *Capsicum* and Cucurbitaceae crops in eastern Nepal.

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 Biratnagar 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 | <i>Cucumis sativus</i> | 27 |
| Squash | <i>Cucurbita maxima</i> | 3 |
| | <i>Cucurbita moschata</i> | 5 |
| Figleaf gourd | <i>Cucurbita ficifolia</i> | 1 |
| Angled luffa | <i>Luffa acutangula</i> | 1 |
| Chili pepper | <i>Capsicum annuum</i> | 13 |
| | <i>Capsicum frutescens</i> | 2 |
| | <i>Capsicum</i> 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 | <i>Cucumis sativus</i> | 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 | <i>Cucumis sativus</i> | 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 | <i>Capsicum annuum</i> | Kharsani | 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 | <i>Capsicum</i> sp. | Akbare Kharsani | 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 | <i>Cucumis sativus</i> | 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 | <i>Luffa acutangula</i> | 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 | <i>Capsicum</i> sp. | Akbare Kharsani | 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 | <i>Cucumis sativus</i> | 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 | <i>Cucurbita maxima</i> | 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 | <i>Cucurbita maxima</i> | 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 | <i>Cucurbita moschata</i> | 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 | <i>Cucumis sativus</i> | 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 | <i>Capsicum</i> sp. | Akbare Kharsani | Landrace | Farm store | May-Jun. | Aug.-Sep. | Dalle kharsani |
| 262265 | 7 | 14 | A21 | 18 Feb. | No.1 | Panchthar | Phidim | Thapa Tar | N27-09-49-22 | E87-45-54.72 | 638 | Fruits | <i>Capsicum annuum</i> | Thade Kharsani | 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 | <i>Capsicum annuum</i> | Kharsani | 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 | <i>Capsicum frutescens</i> | Jire Kharsani | 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 | <i>Capsicum</i> sp. | Akbare Kharsani | 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 | <i>Capsicum annuum</i> | Seto Thade Kharsani | 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 | <i>Capsicum annuum</i> | Rato Thade Kharsani | 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 | <i>Capsicum annuum</i> | Karo Thade Kharsani | 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 | <i>Capsicum frutescens</i> | Jire Kharsani | 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 | <i>Cucurbita moschata</i> | 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 | <i>Cucurbita moschata</i> | 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 | <i>Capsicum annuum</i> | Lamo Kharsani | 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 | <i>Capsicum</i> sp. | Akbare Kharsani | 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 | <i>Capsicum annuum</i> | Saili Kharsani | 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 | <i>Cucumis sativus</i> | 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 | <i>Cucumis sativus</i> | 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 | <i>Cucumis sativus</i> | 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 | <i>Cucumis sativus</i> | 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 | <i>Cucumis sativus</i> | 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 | <i>Cucumis sativus</i> | 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 | <i>Cucumis sativus</i> | 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 | <i>Cucumis sativus</i> | 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 | <i>Cucumis sativus</i> | 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 | <i>Capsicum</i> 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 | <i>Capsicum annuum</i> | 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 | <i>Cucumis sativus</i> | 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 | <i>Cucurbita moschata</i> | 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 | <i>Capsicum</i> 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 | <i>Cucumis sativus</i> | 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 | <i>Cucumis sativus</i> | 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 | <i>Cucumis sativus</i> | 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 | <i>Capsicum</i> 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 | <i>Capsicum</i> 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 | <i>Capsicum annuum</i> | 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 | <i>Cucumis sativus</i> | 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 | <i>Cucumis sativus</i> | 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 | <i>Cucumis sativus</i> | 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 | <i>Capsicum annuum</i> | 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 | <i>Capsicum</i> 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 | <i>Capsicum</i> 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 | <i>Cucumis sativus</i> | 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 | <i>Capsicum annuum</i> | 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 | <i>Cucumis sativus</i> | 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 | <i>Capsicum annuum</i> | 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 | <i>Capsicum</i> 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 | <i>Cucumis sativus</i> | 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 | <i>Capsicum</i> 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 | <i>Cucumis sativus</i> | 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 | <i>Capsicum</i> 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 | <i>Cucumis sativus</i> | Kankro | Landrace | Farm store | Feb.-Mar. | Aug.-Sep. | Green and young consumption |
| 262167 | 27 | 63 | B12 | 17 Feb. | No.1 | Ilam | Ilam | Okhre Barbote | N26-57-23 | E87-55-58 | - | Seed | <i>Cucurbita moschata</i> | 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 | <i>Cucurbita maxima</i> | 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 | <i>Cucurbita ficifolia</i> | 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 | <i>Cucumis sativus</i> | 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 Ghunti, 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 annum*



No. 15 *Capsicum annum*



No. 16 *Capsicum frutescens*



No. 17 *Capsicum* sp.



No. 18 *Capsicum annum*



No. 19 *Capsicum annum*



No. 20 *Capsicum annum*



No. 21 *Capsicum frutescens*



No. 24 *Capsicum annum*



No. 25 *Capsicum* sp.



No. 26 *Capsicum annum*



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*