

## Collaborative Exploration of Vegetable Genetic Resources in Kyrgyz in 2021

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### Summary

The Department of Crop Expertise of the Ministry of Agriculture of the Kyrgyz Republic and the National Organization for Agriculture and Food Research Organization (NARO) began collaborative research in 2019 under the Plant Genetic Resources in Asia (PGRAsia) Project to survey vegetable genetic resources in Kyrgyz. In 2021, two expeditions to collect the seeds of vegetables and their wild relatives were planned as part of this collaborative research. However, due to COVID-19, only one expedition was conducted in August 2021 in the Chuy, Jalal-Abad, Osh, Batken, and Talas regions. During the expedition, 136 samples of 29 species from 18 genera and 9 families were collected from the natural habitats and local markets. The collected seeds were equally divided into two sets, one of which was stored in the Kyrgyz Genebank. The other set will be transferred to the Research Center of Genetic Resources (NARO) under a standard material transfer agreement.

KEY WORDS: Plant genetic resources, Vegetables, Wild relatives, Kyrgyz

### Introduction

Kyrgyzstan is a relatively small country with a total area of approximately 198,000 km<sup>2</sup> and is located in the heart of the Eurasian continent between 69° 15' and 80° 14' E and 39° 10' and 43° 15' N. In the north and northeast, the border with Kazakhstan runs through the Zaili and Kungei Ala-Too mountain ranges, the foothill plain of the Kyrgyz ridge, and the Chu River valley. In the northwest, it crosses the lower part of the Talas valley and travels along the Talas ridge. The border with Uzbekistan passes mainly along the Pskem ridge and foothills of the Fergana valley. In the south, the republic

border with Tajikistan passes along the Turkestan, Alay, and Zaalay ridges, and in the southeast, the border with China passes along the Kokshaal-Too and Meridional ridges. However, despite its modest size, the country has an extraordinary diversity of natural conditions (Lazkov and Umralina 2015). With regard to the flora of Kyrgyzstan, there are 3,927 species from 830 genera of higher plants (Lazkov and Sultanova 2014). The Kyrgyz Republic is rich in wild plants of economic importance, but these resources have not been sufficiently studied and are rarely used in breeding programs (Kamelin 2002).

In July 2019, the National Agriculture and Food

Research Organization (NARO) in Japan and the Department on Expertise of Agricultural Crops under the Ministry of Agriculture of the Kyrgyz Republic established a Joint Research Agreement within the Plant Genetic Resources in Asia (PGRAsia) Project under the trust of the Ministry of Agriculture, Forestry and Fisheries of Japan to jointly preserve and ensure the effective use of genetic resources. Under this agreement, two expeditions to collect vegetable genetic resources in Kyrgyz were planned as part of this research. However, due to COVID-19, only one expedition was conducted in August 2021. The main targets were local cultivars of

vegetables and wild individuals or relatives of *Allium* sp., *Brassica* sp., *Daucus carota* L., *Lactuca* sp., and *Sinapis arvensis* L.

### Methods

The expedition was conducted from August 5 to 14, 2021. The main targets were leafy and root vegetables, such as *Brassica* and *Allium* crops, radish, lettuce, carrot, and their wild individuals or relatives. We started with Chuy and explored the Jalal-Abad, Osh, Batken, and Talas regions by car (Fig. 1; Table 1). We searched for and collected seeds of wild individuals



Fig. 1. Route of the expedition in Kyrgyz in 2021.

Table 1. Itinerary of the exploration to collect vegetable genetic resources in 2021

Date	Regions for exploration
August 5	From: Chuy Valley To: Ketmen-Tube Valley (Jalal-Abad Region)
August 6	From: Ketmen-Tube Valley (Jalal-Abad Region) To: Along the Naryn River in Fergana Valley* (Osh Region)
August 7	From: Along the Naryn River in Fergana Valley (Osh Region) To: Fergana Valley (Osh Region)
August 8	From: Fergana Valley (Osh Region) To: Fergana Valley (Batken Region)
August 9	From: Fergana Valley (Batken Region) To: Foothills of the Turkestan Ridge (Batken Region)
August 10	From: Foothills of the Turkestan Ridge (Batken Region) To: Alai Valley (Osh region)
August 11	From: Alai Valley (Osh region) To: Chatkal Valley (Jalal-Abad Region)
August 12	From: Chatkal Valley (Jalal-Abad Region) To: Talas Valley (Talas Region)
August 13	From: Talas Valley (Talas Region) To: Suusamyр Valley (Chuy Region)
August 14	From: Suusamyр Valley (Chuy Region) To: Chuy Valley

\* The Fergana Valley spreads over three countries, Kyrgyz, Uzbekistan and Tajikistan. The east and southeast part of the valley contains parts of Osh, Jalal-Abad, and Batken regions in Kyrgyz.

of the target crop species and their wild relatives in wheat and barley fields and natural habitats such as roadsides, grasslands, pastures, hills, and mountains. We also stopped at the markets (bazaars) to buy vegetable seeds. After interviewing sellers about local names, origins, cultivation, and use of the vegetables, we bought landrace seeds (not commercial F<sub>1</sub> hybrids). Species identification was based on the external appearance of the plants and seeds and the results of the interviews. The collected samples were numbered according to the order of collection. We recorded the place name and geographic coordinates at each collection location using a handheld GPS receiver (eTrex Touch 35 J; Garmin International Inc., Olathe, KS, USA).

## Results and Discussion

We collected 136 accessions from this expedition (Tables 2 and 3). These accessions belonged to 29 species belonging to 18 genera and 9 families. We collected seeds from 44 accessions of cultivated and wild species of the genera *Allium*, *Brassica*, *Daucus*, *Lactuca*, *Sinapis* etc., from wheat and barley fields, roadsides, grasslands, pastures, hills, and mountains. In addition, we purchased seeds of 92 accessions from 20 species from the markets of Jalal-Abad, Osh, Batken, and Talas.

### Leafy and root vegetables and their wild relatives

Of the 44 accessions collected from natural habitats, 17 were of *Brassica* (Table 3). We identified these species based on their morphology and phenology. Of these, 10 were *Brassica nigra* L. collected from roadsides, vacant lands, grasslands, and wheat and barley fields in the Jalal-Abad, Osh, Batken, and Talas regions. We collected 3 accessions of *Brassica juncea* L. in Chuy, Jalal-Abad, and Talas and 3 of *Brassica elongata* L. in the Osh and Talas regions. We also found *Brassica rapa* L. in the Alai district of the Osh region, but the plants were in bloom (Photo 17). Many wild *Brassica* plants in the Alai district and mountainous areas of Talas were in full bloom (Photos 20 and 21), and their seeds could not be sampled.

The second most common genus collected in natural habitats was *Allium*: *Allium caesium* Schrenk, *Allium sarawschanicum* Regel., and *Allium platyspathum* Schrenk. These plants grow on hills and mountains in Jalal-Abad, Osh, Batken, and Talas.

We also collected seeds from 2 *Sinapis arvensis* L., 5 *Lactuca serriola* L., and 15 wild *Daucus carota* L. plants that grew on roadsides and grasslands in Chuy, Osh, Jalal-Abad, Batken, and Talas.

During the expedition, we visited six markets

Table 2. Summary of genetic resources collected in Kyrgyz in 2021

Family	Species	Number
Amaryllidaceae	<i>Allium caesium</i>	1
	<i>Allium sarawschanicum</i>	2
	<i>Allium platyspathum</i>	2
	<i>Allium cepa</i>	7
	<i>Allium odorum</i>	4
Amaranthaceae	<i>Beta vulgaris</i>	1
Apiaceae	<i>Apium graveolens</i>	2
	<i>Anethum graveolens</i>	4
	<i>Coriandrum sativum</i>	2
	<i>Daucus carota</i>	26
	<i>Petroselinum crispum</i>	2
Asteraceae	<i>Lactuca serriola</i>	5
Brassicaceae	<i>Brassica nigra</i>	10
	<i>Brassica juncea</i>	3
	<i>Brassica elongata</i>	3
	<i>Brassica</i> sp.	1
	<i>Brassica oleracea</i>	4
	<i>Brassica rapa</i>	5
	<i>Raphanus sativus</i>	11
	<i>Sinapis arvensis</i>	2
Cucurbitaceae	<i>Cucurbita</i> sp.	11
	<i>Cucurbita pepo</i>	1
	<i>Cucumis melo</i>	4
	<i>Cucumis sativus</i>	9
Fabaceae	<i>Phaseolus vulgaris</i>	1
Lamiaceae	<i>Ocimum basilicum</i>	3
	<i>Satureja</i> sp.	1
Solanaceae	<i>Capsicum annuum</i>	5
	<i>Solanum lycopersicum</i>	4

in Osh, Jalal-Abad, Batken, and Talas. Seed shops in the markets sold the seeds of local vegetable cultivars and imported F<sub>1</sub> hybrids from Russia, Europe, and China. We only purchased the seeds of local cultivars: 11 accessions of carrot (*Daucus carota* L.), 7 of onion (*Allium cepa* L.), 4 of sweet onion (*Allium odorum* L.), 4 of cabbage (*Brassica oleracea* L.), 2 of celery (*Apium graveolens* L.), 2 of parsley (*Petroselinum crispum* (Mill.) Fuss), 5 of turnip (*Brassica rapa* L.), 4 of dill (*Anethum graveolens* L.), 1 of beet (*Beta vulgaris* L.), 1 of kidney bean (*Phaseolus vulgaris* L.), 11 of squash (*Cucurbita* sp.), 5 of pepper and paprika (*Capsicum annuum* L.), 2 of coriander (*Coriandrum sativum* L.), 11 of radish (*Raphanus sativus* L.), 3 of basil (*Ocimum basilicum* L.), 9 of cucumber (*Cucumis sativus* L.), 4 of melon (*Cucumis*

*melo* L.), 1 of zucchini (*Cucurbita pepo* L.), 1 of savory (*Satureja* sp.), and 4 of tomato (*Solanum lycopersicum* L.) seeds.

### Conclusion

This is the third expedition, which was a joint expedition conducted under a Joint Research Agreement within the PGRAsia Project between the Department on Expertise of Agricultural Crops under the Ministry of Agriculture of the Kyrgyz Republic and NARO. The first and second expeditions were conducted in 2019 and collected 254 accessions (Yoshioka *et al.* 2020). In this year, we collected fewer accessions because only one expedition was conducted. However, we successfully collected accessions originating in the Batken region, which was not the target region in the first and second expeditions. The resources collected during our expeditions can be used in future vegetable breeding projects. In addition, the seeds are backed up in Japan, enabling the preservation of the genetic resources. The PGRAsia project plans to fund the collaborative exploration of genetic resources in Kyrgyz over the next three years. Further exploration could collect more diverse and valuable genetic resources with significant genetic variations. We anticipate establishing collaborative research between Kyrgyz and Japan to utilize the genetic resources collected in this study.

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[Genebank, NARO], [JaLC]

# 2021年キルギス共和国における 野菜遺伝資源の共同探索

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## 和文摘要

キルギス共和国農業省農作物専門局と国立研究開発法人農業・食品産業技術研究機構（NARO）は、PGRAsia（Plant Genetic Resources in Asia）プロジェクトの一環として、キルギス国内における野菜遺伝資源の共同研究を2019年から開始した。この共同研究の一環として、2021年は2回の探索を計画した。しかし、新型コロナウイルス感染症の影響により、探索は8月の1回のみ行われ、チュイ州、ジャララバード州、オシ州、バトケン州およびタラス州において野菜およびその近縁野生種の種子を収集した。この探索により、9科18属29種に属する合計136点の遺伝資源を収集することができた。収集した種子は2等分し、半分はキルギスジーンバンクで保存した。残りの半分はSMTA（標準材料移転契約）によりNARO 遺伝資源研究センターに移送する予定である。

Table 3. List of accessions collected in Kyrgyz in 2021

JP No.	Coll. No.	Species	Crop name	Local name	Status	Coll. Date M/D/Y	Coll. site	Type of coll. site	Latitude	Longitude	Altitude (m)
286311	C01	<i>Brassica nigra</i>	na	na	Wild	8/5/2021	Toktogul, Jalal-Abad	Habitat	41.885694	72.925389	953
286312	C02	<i>Brassica juncea</i>	na	na	Wild	8/5/2021	Toktogul, Jalal-Abad	Habitat	41.885694	72.925389	953
286313	C03	<i>Daucus carota</i>	na	na	Wild	8/5/2021	Toktogul, Jalal-Abad	Habitat	41.885694	72.925389	953
286314	C04	<i>Daucus carota</i>	na	na	Wild	8/6/2021	Jalal-Abad	Habitat	41.776611	73.282	927
286315	C05	<i>Daucus carota</i>	na	na	Wild	8/6/2021	Jalal-Abad	Habitat	41.764333	73.228528	914
286316	C06	<i>Allium caesium</i>	na	na	Wild	8/6/2021	Kara-Kul, Jalal-Abad	Habitat	41.654778	72.776861	995
286317	C07	<i>Lactuca serriola</i>	na	na	Wild	8/6/2021	Tash-Komur, Jalal-Abad	Habitat	41.279139	72.214833	576
286318	C08	<i>Sinapis arvensis</i>	na	na	Wild	8/6/2021	Tash-Komur, Jalal-Abad	Habitat	41.279139	72.214833	576
286319	C09	<i>Capsicum annuum</i>	Pepper	na	Landrace	8/6/2021	Kochkor-Ata, Jalal-Abad	Market	41.036785	72.478415	685
286320	C10	<i>Allium cepa</i>	Onion	na	Landrace	8/6/2021	Kochkor-Ata, Jalal-Abad	Market	41.036785	72.478415	685
286321	C11	<i>Petroselinum crispum</i>	Parsley	na	Landrace	8/6/2021	Kochkor-Ata, Jalal-Abad	Market	41.036785	72.478415	685
286322	C12	<i>Cucurbita sp.</i>	Squash	na	Landrace	8/6/2021	Kochkor-Ata, Jalal-Abad	Market	41.036785	72.478415	685
286323	C13	<i>Anethum graveolens</i>	Dill	na	Landrace	8/6/2021	Kochkor-Ata, Jalal-Abad	Market	41.036785	72.478415	685
286324	C14	<i>Cucurbita sp.</i>	Squash	na	Landrace	8/6/2021	Kochkor-Ata, Jalal-Abad	Market	41.036785	72.478415	685
286325	C15	<i>Beta vulgaris</i>	Beet	na	Landrace	8/6/2021	Kochkor-Ata, Jalal-Abad	Market	41.036785	72.478415	685
286326	C16	<i>Daucus carota</i>	Carrot	na	Landrace	8/6/2021	Kochkor-Ata, Jalal-Abad	Market	41.036785	72.478415	685
286327	C17	<i>Coriandrum sativum</i>	Coriander	na	Landrace	8/6/2021	Kochkor-Ata, Jalal-Abad	Market	41.036785	72.478415	685
286328	C18	<i>Daucus carota</i>	Carrot	na	Landrace	8/6/2021	Kochkor-Ata, Jalal-Abad	Market	41.036785	72.478415	685
286329	C19	<i>Raphanus sativus</i>	Radish	na	Landrace	8/6/2021	Kochkor-Ata, Jalal-Abad	Market	41.036785	72.478415	685
286330	C20	<i>Capsicum annuum</i>	Paprika	na	Landrace	8/6/2021	Kochkor-Ata, Jalal-Abad	Market	41.036785	72.478415	685
286331	C21	<i>Brassica rapa</i>	Turnip	na	Landrace	8/6/2021	Kochkor-Ata, Jalal-Abad	Market	41.036785	72.478415	685
286332	C22	<i>Ocimum basilicum</i>	Basil	na	Landrace	8/6/2021	Kochkor-Ata, Jalal-Abad	Market	41.036785	72.478415	685
286333	C23	<i>Daucus carota</i>	na	na	Wild	8/6/2021	Kochkor-Ata, Jalal-Abad	Habitat	41.036785	72.478415	579
286334	C24	<i>Lactuca serriola</i>	na	na	Wild	8/7/2021	Boston, Osh	Habitat	40.838056	73.234917	978
286335	C25	<i>Daucus carota</i>	na	na	Wild	8/7/2021	Boston, Osh	Habitat	40.838056	73.234917	978
286336	C26	<i>Cucurbita sp.</i>	Squash	na	Landrace	8/7/2021	Uzgen market, Osh	Market	40.76901	73.29015	1,023
286337	C27	<i>Cucumis sativus</i>	Cucumber	na	Landrace	8/7/2021	Uzgen market, Osh	Market	40.76901	73.29015	1,023
286338	C28	<i>Cucurbita sp.</i>	Squash	na	Landrace	8/7/2021	Uzgen market, Osh	Market	40.76901	73.29015	1,023
286339	C29	<i>Raphanus sativus</i>	Radish	na	Landrace	8/7/2021	Uzgen market, Osh	Market	40.76901	73.29015	1,023
286340	C30	<i>Cucumis melo</i>	Melon	na	Landrace	8/7/2021	Uzgen market, Osh	Market	40.76901	73.29015	1,023
286341	C31	<i>Cucurbita sp.</i>	Squash	na	Landrace	8/7/2021	Uzgen market, Osh	Market	40.76901	73.29015	1,023
286342	C32	<i>Cucurbita pepo</i>	Zucchini	na	Landrace	8/7/2021	Uzgen market, Osh	Market	40.76901	73.29015	1,023
286343	C33	<i>Ocimum basilicum</i>	Basil	na	Landrace	8/7/2021	Uzgen market, Osh	Market	40.76901	73.29015	1,023
286344	C34	<i>Brassica rapa</i>	Turnip	na	Landrace	8/7/2021	Uzgen market, Osh	Market	40.76901	73.29015	1,023
286345	C35	<i>Daucus carota</i>	Carrot	na	Landrace	8/7/2021	Uzgen market, Osh	Market	40.76901	73.29015	1,023
286346	C36	<i>Daucus carota</i>	Carrot	na	Landrace	8/7/2021	Uzgen market, Osh	Market	40.76901	73.29015	1,023
286347	C37	<i>Cucumis sativus</i>	Cucumber	na	Landrace	8/7/2021	Uzgen market, Osh	Market	40.76901	73.29015	1,023
286348	C38	<i>Anethum graveolens</i>	Dill	na	Landrace	8/7/2021	Uzgen market, Osh	Market	40.76901	73.29015	1,023
286349	C39	<i>Lactuca serriola</i>	na	na	Wild	8/7/2021	Mamazhan, Osh	Habitat	40.592361	72.933306	1,008
286350	C40	<i>Daucus carota</i>	na	na	Wild	8/7/2021	Mamazhan, Osh	Habitat	40.592361	72.933306	1,008
286351	C41	<i>Apium graveolens</i>	Celery	na	Landrace	8/7/2021	Central market, Osh	Market	40.51089	72.80723	989

Table 3. (Continued).

JP No.	Coll. No.	Species	Crop name	Local name	Status	Coll. Date M/D/Y	Coll. site	Type of coll. site	Latitude	Longitude	Altitude (m)
286352	C42	<i>Anethum graveolens</i>	Dill	na	Landrace	8/7/2021	Central market, Osh	Market	40.51089	72.80723	989
286353	C43	<i>Cucumis sativus</i>	Cucumber	na	Landrace	8/7/2021	Central market, Osh	Market	40.51089	72.80723	989
286354	C44	<i>Daucus carota</i>	Carrot	na	Landrace	8/7/2021	Central market, Osh	Market	40.51089	72.80723	989
286355	C45	<i>Daucus carota</i>	Carrot	na	Landrace	8/7/2021	Central market, Osh	Market	40.51089	72.80723	989
286356	C46	<i>Raphanus sativus</i>	Radish	Lola	Landrace	8/7/2021	Central market, Osh	Market	40.51089	72.80723	989
286357	C47	<i>Brassica rapa</i>	Turnip	na	Landrace	8/7/2021	Central market, Osh	Market	40.51089	72.80723	989
286358	C48	<i>Raphanus sativus</i>	Radish	na	Landrace	8/7/2021	Central market, Osh	Market	40.51089	72.80723	989
286359	C49	<i>Coriandrum sativum</i>	Coriander	na	Landrace	8/7/2021	Central market, Osh	Market	40.51089	72.80723	989
286360	C50	<i>Allium cepa</i>	Onion	na	Landrace	8/7/2021	Central market, Osh	Market	40.51089	72.80723	989
286361	C51	<i>Allium odorum</i>	Sweet onion	na	Landrace	8/7/2021	Central market, Osh	Market	40.51089	72.80723	989
286362	C52	<i>Satureja</i> sp.	Savory	na	Landrace	8/7/2021	Central market, Osh	Market	40.51089	72.80723	989
286363	C53	<i>Petroselinum crispum</i>	Parsley	na	Landrace	8/7/2021	Central market, Osh	Market	40.51089	72.80723	989
286364	C54	<i>Ocimum basilicum</i>	Basil	na	Landrace	8/7/2021	Central market, Osh	Market	40.51089	72.80723	989
286365	C55	<i>Daucus carota</i>	na	na	Wild	8/7/2021	On-Eki-Bel, Osh	Habitat	40.299611	72.2775	1,146
286366	C56	<i>Daucus carota</i>	na	na	Wild	8/8/2021	OPH, Batken	Habitat	40.30725	71.271472	537
286367	C57	<i>Lactuca serriola</i>	na	na	Wild	8/8/2021	OPH, Batken	Habitat	40.30725	71.271472	537
286368	C58	<i>Daucus carota</i>	na	na	Wild	8/8/2021	Chek, Batken	Habitat	40.155503	70.912222	885
286369	C59	<i>Lactuca serriola</i>	na	na	Wild	8/8/2021	Chek, Batken	Habitat	40.155503	70.912222	885
286370	C60	<i>Allium cepa</i>	Onion	na	Landrace	8/8/2021	Batken	Market	40.05767	70.8251	1,028
286371	C61	<i>Allium cepa</i>	Onion	na	Landrace	8/8/2021	Batken	Market	40.05767	70.8251	1,028
286372	C62	<i>Allium odorum</i>	Sweet onion	na	Landrace	8/8/2021	Batken	Market	40.05767	70.8251	1,028
286373	C63	<i>Raphanus sativus</i>	Radish	na	Landrace	8/8/2021	Batken	Market	40.05767	70.8251	1,028
286374	C64	<i>Cucumis sativus</i>	Cucumber	na	Landrace	8/8/2021	Batken	Market	40.05767	70.8251	1,028
286375	C65	<i>Cucumis sativus</i>	Cucumber	na	Landrace	8/8/2021	Batken	Market	40.05767	70.8251	1,028
286376	C66	<i>Capsicum annuum</i>	Pepper	na	Landrace	8/8/2021	Batken	Market	40.05767	70.8251	1,028
286377	C67	<i>Brassica rapa</i>	Turnip	na	Landrace	8/8/2021	Batken	Market	40.05767	70.8251	1,028
286378	C68	<i>Raphanus sativus</i>	Radish	na	Landrace	8/8/2021	Batken	Market	40.05767	70.8251	1,028
286379	C69	<i>Brassica oleracea</i>	Cabbage	na	Landrace	8/8/2021	Batken	Market	40.05767	70.8251	1,028
286380	C70	<i>Brassica oleracea</i>	Cabbage	na	Landrace	8/8/2021	Batken	Market	40.05767	70.8251	1,028
286381	C71	<i>Cucumis melo</i>	Melon	Andelek	Landrace	8/8/2021	Batken	Market	40.05767	70.8251	1,028
286382	C72	<i>Anethum graveolens</i>	Dill	na	Landrace	8/8/2021	Batken	Market	40.05767	70.8251	1,028
286383	C73	<i>Daucus carota</i>	Carrot	na	Landrace	8/8/2021	Batken	Market	40.05767	70.8251	1,028
286384	C74	<i>Cucurbita</i> sp.	Squash	na	Landrace	8/8/2021	Batken	Market	40.05767	70.8251	1,028
286385	C75	<i>Brassica nigra</i>	na	na	Wild	8/8/2021	Ravat, Batken	Habitat	39.904944	70.195111	1,650
286386	C76	<i>Brassica nigra</i>	na	na	Wild	8/8/2021	Ravat, Batken	Habitat	39.904944	70.195111	1,650
286387	C77	<i>Brassica nigra</i>	na	na	Wild	8/8/2021	Isfana, Batken	Habitat	39.852556	69.673194	1,600
286388	C78	<i>Brassica nigra</i>	na	na	Wild	8/8/2021	Isfana, Batken	Habitat	39.836667	69.589556	1,498
286389	C79	<i>Allium sarawshanicum</i>	na	na	Wild	8/8/2021	Isfana, Batken	Habitat	39.837583	69.580417	1,466
286390	C80	<i>Allium sarawshanicum</i>	na	na	Wild	8/8/2021	Suluktu, Batken	Habitat	39.943917	69.546583	1,302
286391	C81	<i>Sinapis arvensis</i>	na	na	Wild	8/8/2021	Suluktu, Batken	Habitat	39.943917	69.546583	1,302
286392	C82	<i>Brassica nigra</i>	na	na	Wild	8/8/2021	Suluktu, Batken	Habitat	39.943917	69.546583	1,302

Table 3. (Continued).

JP No.	Coll. No.	Species	Crop name	Local name	Status	Coll. Date M/D/Y	Coll. site	Type of coll. site	Latitude	Longitude	Altitude (m)
286393	C83	<i>Brassica nigra</i>	na	na	Wild	8/9/2021	Andarak, Batken	Habitat	39.797222	69.472333	1,592
286394	C84	<i>Brassica nigra</i>	na	na	Wild	8/10/2021	Taldyk, Osh	Habitat	40.3125	73.227694	1,978
286395	C85	<i>Brassica elongata</i>	na	na	Wild	8/10/2021	Zhash-Tilek, Osh	Habitat	39.57275	72.033278	2,570
286396	C86	<i>Allium platyspathum</i>	na	na	Wild	8/11/2021	Kok-Suu, Osh	Habitat	39.594861	71.879667	2,867
286397	C87	<i>Brassica elongata</i>	na	na	Wild	8/11/2021	Kyzyl-Eshme, Osh	Habitat	39.561472	72.306528	2,557
286398	C88	<i>Daucus carota</i>	na	na	Wild	8/11/2021	Yntymak, Osh	Habitat	40.593139	72.936556	1,000
286399	C89	<i>Daucus carota</i>	Carrot	na	Landrace	8/12/2021	Central market, Jalal-Abad	Market	40.56927	73.00699	764
286400	C90	<i>Daucus carota</i>	Carrot	na	Landrace	8/12/2021	Central market, Jalal-Abad	Market	40.56927	73.00699	764
286401	C91	<i>Cucurbita</i> sp.	Squash	na	Landrace	8/12/2021	Central market, Jalal-Abad	Market	40.56927	73.00699	764
286402	C92	<i>Cucumis melo</i>	Melon	Metrovka	Landrace	8/12/2021	Central market, Jalal-Abad	Market	40.56927	73.00699	764
286403	C93	<i>Capsicum annuum</i>	Paprika	na	Landrace	8/12/2021	Central market, Jalal-Abad	Market	40.56927	73.00699	764
286404	C94	<i>Cucurbita</i> sp.	Squash	na	Landrace	8/12/2021	Central market, Jalal-Abad	Market	40.56927	73.00699	764
286405	C95	<i>Brassica rapa</i>	Turnip	na	Landrace	8/12/2021	Central market, Jalal-Abad	Market	40.56927	73.00699	764
286406	C96	<i>Allium odorum</i>	Sweet onion	na	Landrace	8/12/2021	Central market, Jalal-Abad	Market	40.56927	73.00699	764
286407	C97	<i>Cucumis sativus</i>	Cucumber	na	Landrace	8/12/2021	Central market, Jalal-Abad	Market	40.56927	73.00699	764
286408	C98	<i>Allium cepa</i>	Onion	na	Landrace	8/12/2021	Central market, Jalal-Abad	Market	40.56927	73.00699	764
286409	C99	<i>Cucumis melo</i>	Melon	na	Landrace	8/12/2021	Central market, Jalal-Abad	Market	40.56927	73.00699	764
286410	C100	<i>Brassica oleracea</i>	Cabbage	na	Landrace	8/12/2021	Central market, Jalal-Abad	Market	40.56927	73.00699	764
286411	C101	<i>Raphanus sativus</i>	Radish	na	Landrace	8/12/2021	Central market, Jalal-Abad	Market	40.56927	73.00699	764
286412	C102	<i>Solanum lycopersicum</i>	Tomato	na	Landrace	8/12/2021	Central market, Jalal-Abad	Market	40.56927	73.00699	764
286413	C103	<i>Raphanus sativus</i>	Radish	na	Landrace	8/12/2021	Central market, Jalal-Abad	Market	40.56927	73.00699	764
286414	C104	<i>Cucurbita</i> sp.	Squash	na	Landrace	8/12/2021	Central market, Jalal-Abad	Market	40.56927	73.00699	764
286415	C105	<i>Daucus carota</i>	na	na	Wild	8/12/2021	Kichi Ak-Jol, Jalal-Abad	Habitat	41.556583	72.174139	827
286416	C106	<i>Daucus carota</i>	na	na	Wild	8/12/2021	Avletim, Jalal-Abad	Habitat	41.592194	71.863111	1,193
286417	C107	<i>Daucus carota</i>	na	na	Wild	8/12/2021	Ak-Tash, Jalal-Abad	Habitat	41.440972	71.550972	1,310
286418	C108	<i>Brassica nigra</i>	na	na	Wild	8/13/2021	Kurulush, Jalal-Abad	Habitat	41.665778	70.796944	1,485
286419	C109	<i>Allium platyspathum</i>	na	na	Wild	8/13/2021	Kara-Buura, Talas	Habitat	42.210417	71.582944	3,227
286420	C110	<i>Daucus carota</i>	na	na	Wild	8/13/2021	Kara-Buura, Talas	Habitat	42.543917	71.578028	1,072
286421	C111	<i>Allium cepa</i>	Onion	na	Landrace	8/14/2021	Central market, Talas	Market	42.5181	72.24678	1,282
286422	C112	<i>Allium cepa</i>	Onion	na	Landrace	8/14/2021	Central market, Talas	Market	42.5181	72.24678	1,282
286423	C113	<i>Cucurbita</i> sp.	Squash	na	Landrace	8/14/2021	Central market, Talas	Market	42.5181	72.24678	1,282
286424	C114	<i>Cucurbita</i> sp.	Squash	Honey	Landrace	8/14/2021	Central market, Talas	Market	42.5181	72.24678	1,282
286425	C115	<i>Raphanus sativus</i>	Radish	na	Landrace	8/14/2021	Central market, Talas	Market	42.5181	72.24678	1,282
286426	C116	<i>Raphanus sativus</i>	Radish	na	Landrace	8/14/2021	Central market, Talas	Market	42.5181	72.24678	1,282
286427	C117	<i>Raphanus sativus</i>	Radish	Margelanskaya	Landrace	8/14/2021	Central market, Talas	Market	42.5181	72.24678	1,282
286428	C118	<i>Cucumis sativus</i>	Cucumber	Konkurent	Landrace	8/14/2021	Central market, Talas	Market	42.5181	72.24678	1,282
286429	C119	<i>Solanum lycopersicum</i>	Tomato	Volgograd	Landrace	8/14/2021	Central market, Talas	Market	42.5181	72.24678	1,282
286430	C120	<i>Solanum lycopersicum</i>	Tomato	Kolhoznitsa	Landrace	8/14/2021	Central market, Talas	Market	42.5181	72.24678	1,282
286431	C121	<i>Apium graveolens</i>	Celery	na	Landrace	8/14/2021	Central market, Talas	Market	42.5181	72.24678	1,282
286432	C122	<i>Cucumis sativus</i>	Cucumber	Margelanskaya	Landrace	8/14/2021	Central market, Talas	Market	42.5181	72.24678	1,282
286433	C123	<i>Daucus carota</i>	Carrot	Shantane	Landrace	8/14/2021	Central market, Talas	Market	42.5181	72.24678	1,282



Table 3. (Continued).

JP No.	Coll. No.	Species	Crop name	Local name	Status	Coll. Date M/D/Y	Coll. site	Type of coll. site	Latitude	Longitude	Altitude (m)
286434	C124	<i>Brassica oleracea</i>	Cabbage	Slava	Landrace	8/14/2021	Central market, Talas	Market	42.5181	72.24678	1,282
286435	C125	<i>Daucus carota</i>	Carrot	Dunganskaya	Landrace	8/14/2021	Central market, Talas	Market	42.5181	72.24678	1,282
286436	C126	<i>Capsicum annuum</i>	Paprika	na	Landrace	8/14/2021	Central market, Talas	Market	42.5181	72.24678	1,282
286437	C127	<i>Cucumis sativus</i>	Cucumber	Holland	Landrace	8/14/2021	Central market, Talas	Market	42.5181	72.24678	1,282
286438	C128	<i>Solanum lycopersicum</i>	Tomato	Stakanchick	Landrace	8/14/2021	Central market, Talas	Market	42.5181	72.24678	1,282
286439	C129	<i>Allium odorum</i>	Sweet onion	na	Landrace	8/14/2021	Central market, Talas	Market	42.5181	72.24678	1,282
286440	C130	<i>Phaseolus vulgaris</i>	Kidney bean	Lopatka	Landrace	8/14/2021	Central market, Talas	Market	42.5181	72.24678	1,282
286441	C131	<i>Brassica juncea</i>	na	na	Wild	8/14/2021	Sasyk-Bulak, Talas	Habitat	42.463028	72.684917	1,646
286442	C132	<i>Brassica nigra</i>	na	na	Wild	8/14/2021	Zher-Yui, Talas	Habitat	42.445	72.789972	1,816
286443	C133	<i>Brassica elongata</i>	na	na	Wild	8/14/2021	Taldy-Bulak, Talas	Habitat	42.421111	72.878611	1,882
286444	C134	<i>Daucus carota</i>	na	na	Wild	8/14/2021	Bala-Aylchy, Chuy	Habitat	42.670194	74.002167	1,149
286445	C135	<i>Brassica</i> sp.	na	na	Wild	8/14/2021	Bala-Aylchy, Chuy	Habitat	42.683083	74.015139	1,146
286446	C136	<i>Brassica juncea</i>	na	na	Wild	8/14/2021	Belovodskoe, Chuy	Habitat	42.794083	74.067333	830





Photo 9. Seed shop in the Uzgen bazaar



Photo 10. Vegetable market



Photo 11. Fresh figs shop in the Batken bazaar



Photo 12. Fresh figs in the Batken bazaar



Photo 13. Fresh bread in the Jalal-Abad bazaar



Photo 14. Dried fruits and nuts shop in the bazaar



Photo 15. Collection of seeds from mature plants



Photo 16. Collected *Brassica nigra* plants



Photo 17. *Brassica rapa* in natural habitat (Alai region)



Photo 18. *Sinapis arvensis* among cultivated cereals



Photo 19. *Brassica* sp. at the foot of a mountain (Alai region)



Photo 20. *Brassica* sp. in Alai valley



Photo 21. *Brassica* sp. in natural habitat



Photo 22. *Lactuca* sp. plant with yellow flower in natural habitat



Photo 23. *Lactuca* sp. plant with a purple flower in natural habitat



Photo 24. Collected seeds of *Daucus carota* (C05)



Photo 25. Seeds of *Sinapis arvensis* (C08)



Photo 26. Seeds of *Cucurbita* sp. from local cultivars (C14)



Photo 27. Survey of plants in the valley (Alai region)



Photo 28. Survey of plants in the Batken region



Photo 29. Survey of plants near the Toktogul reservoir (Jalal-Abad)



Photo 30. Vegetable shop on the main road



Photo 31. Red-book pear (*Pyrus korshinskyi*) in its natural habitat (Kochkor-Ata, Jalal-Abad region)



Photo 32. Red-book pear – (*Pyrus korshinskyi*)



Photo 33. C01 seeds (*Brassica nigra*)



Photo 34. C04 seeds (*Daucus carota*)

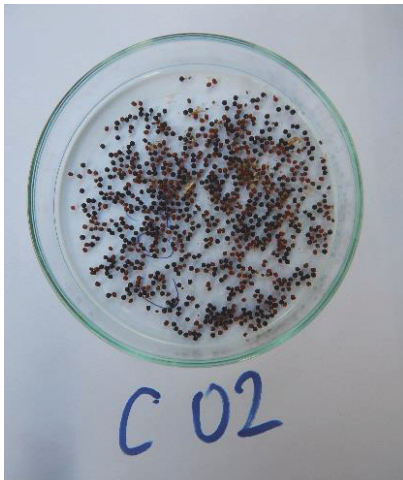


Photo 35. C02 seeds (*Brassica juncea*)



Photo 36. C03 seeds (*Daucus carota*)



Photo 37. C05 seeds (*Daucus carota*)



Photo 38. C06 seeds (*Allium caesium*)



Photo 39. C07 seeds (*Lactuca serriola*)



Photo 40. C08 seeds (*Sinapis arvensis*)



Photo 41. C23 seeds (*Daucus carota*)



Photo 42. C24 seeds (*Lactuca serriola*)



Photo 43. C25 seeds (*Daucus carota*)



Photo 44. C39 seeds (*Lactuca serriola*)



Photo 45. C40 seeds (*Daucus carota*)



Photo 46. C55 seeds (*Daucus carota*)



Photo 47. C56 seeds (*Daucus carota*)

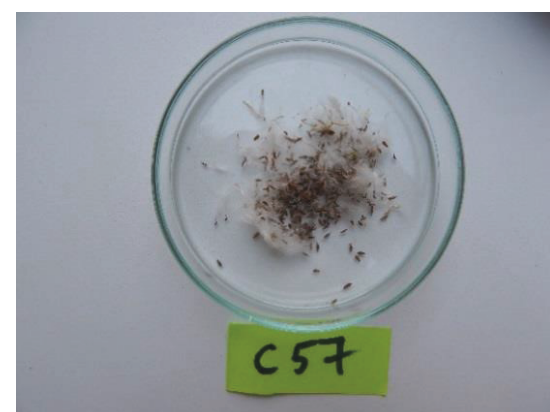


Photo 48. C57 seeds (*Lactuca serriola*)



Photo 49. C58 seeds (*Daucus carota*)



Photo 50. C59 seeds (*Lactuca serriola*)



Photo 51. C75 seeds (*Brassica nigra*)

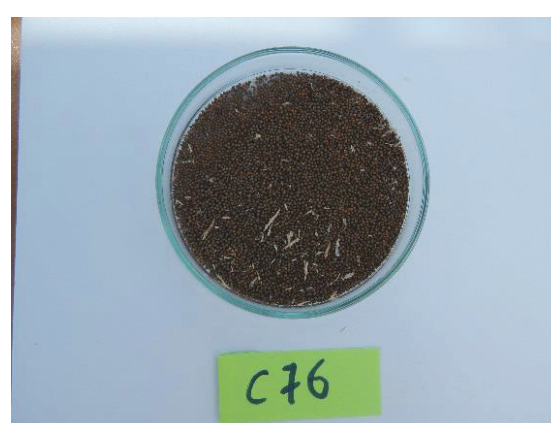


Photo 52. C76 seeds (*Brassica nigra*)

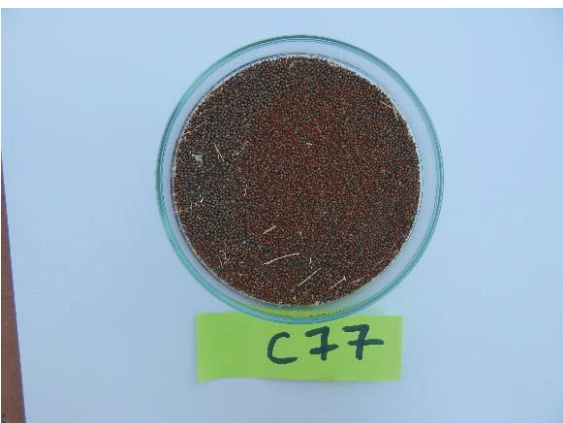


Photo 53. C77 seeds (*Brassica nigra*)

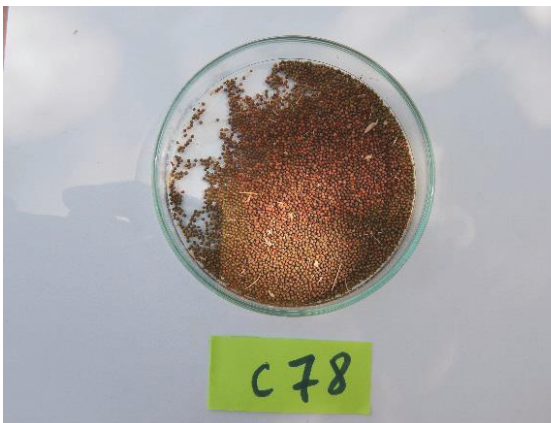


Photo 54. C78 seeds (*Brassica nigra*)



Photo 55. C79 seeds (*Allium sarawschanicum*)



Photo 56. C80 seeds (*Allium sarawschanicum*)





Photo 57. C82 seeds (*Brassica nigra*)



Photo 58. C83 seeds (*Brassica nigra*)



Photo 59. C84 seeds (*Brassica nigra*)

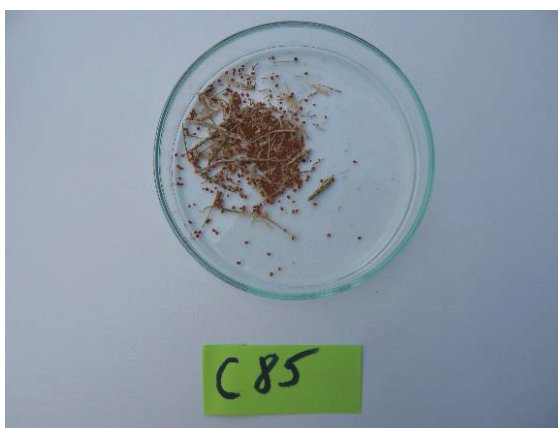


Photo 60. C85 seeds (*Brassica elongata*)



Photo 61. C86 seeds (*Allium platyspathum*)



Photo 62. C87 seeds (*Brassica elongata*)



Photo 63. C88 seeds (*Daucus carota*)



Photo 64. Seeds from the markets of Jalal-Abad, Osh, Batken, and Talas