

Collaborative Exploration and Collection of Vegetable Genetic Resources in Kyrgyz in 2022

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Summary

A collaborative research between the Department on Expertise of Agricultural Crops, the Ministry of Agriculture of the Kyrgyz Republic, and the National Agriculture and Food Research Organization (NARO) was started in 2019 under the Plant Genetic Resources in Asia Project to survey vegetable genetic resources in Kyrgyz. In 2022, two expeditions to collect vegetable seeds in the southern regions of Kyrgyz were planned as part of this collaborative research. However, due to a border dispute during the planned expedition period, only one short expedition was conducted in the Batken, Osh, and Chuy regions in mid-September 2022. Instead of a second expedition, vegetable seeds were collected in six markets from four regions with the help of local collaborators. A total of 138 samples of 21 species from 17 genera and 9 families were collected in local markets and farmer gardens. The collected seeds were equally divided into two sets, one of which was stored in the Kyrgyz Genebank, and one of which will be transferred to the Research Center of Genetic Resources, NARO, under a standard material transfer agreement. In addition, the donated seeds of 60 vegetable accessions preserved in the Kyrgyz Genebank will also be transferred along the 138 samples.

KEY WORDS: Plant genetic resources, Vegetables, Market, Kyrgyz

Introduction

Kyrgyzstan is a relatively small country, with a total area of approximately 198,000 km², located in the heart of the Eurasian continent, between 69°15' and 80°14' E and 39°10' and 43°15' N. Despite its modest size, the country has highly diverse natural conditions and a rich flora, with 3,927 species from 830 genera of higher plants (Lazkov and Sultanova 2014), including wild relatives of important crops. However, although the Kyrgyz Republic is rich in wild plants of economic importance, these resources have not been sufficiently studied nor well used in breeding programs.

According to Vavilov, the western Tian Shan range is part of the Central Asian center of origin of cultivated plants (Dzunusova *et al.* 2008), home to populations of hexaploid wheat and small-seeded forms of pea and chickpea. Furthermore, primary forms of white and yellow carrot cultivars, onion, garlic, and alfalfa originated and have been grown here. The Tian Shan range is home to more than 100 species of wild relatives of agricultural crops. Many landraces developed by local farmers represent valuable primary materials for the selection and development of new cultivars. Although diversity among landraces and wild relatives is key for

breeding cultivated plants, many landraces and wild relatives of cultivated crops have been lost. The reasons for this include low yields and a susceptibility to diseases and pests, the introduction of high-yielding cultivars and hybrids—as has happened in other countries—and the loss of natural habitat to land development. Therefore, collecting and preserving genetic resources in these areas is vital for future breeding.

In July 2019, the National Agriculture and Food Research Organization (NARO) from 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, they pledged to jointly preserve and ensure the effective use of genetic resources through two expeditions in Kyrgyz every year. In 2022, the target areas for the two seed collection expeditions were in southern Kyrgyz: the Batken and Osh regions. Similar to previous years, the main targets were seeds of local vegetable cultivars and their wild relatives. However, owing to a border dispute, only one short expedition was conducted in mid-September 2022 in the Batken, Osh, and Chuy regions. Instead of a second expedition, vegetable seeds were collected in six markets distributed in four regions with the help of local collaborators.

Methods

The first expedition was conducted in the Batken, Osh, and Chuy regions in September 16-20, 2022. The main targets were *Cucurbita*, *Brassica*, and *Allium* crops, radish, lettuce, carrot, and their wild relatives. We started the expedition in the Batken region, but a border dispute forced us to change our original plans and immediately return to Chuy via Osh. During this return trip, we visited farmer gardens in the Osh and Chuy regions, searching for and collecting seeds of target crop species in them and in markets. After interviewing sellers and farmers regarding the local names, origins, cultivation methods, and use of the vegetables, we bought seeds of local cultivars (not commercial F₁ hybrids). Species identification was based on the external appearance of seeds and the results of the interviews. We numbered the collected samples in order of collection and recorded the place name and geographic coordinates of each collection site using a handheld GPS receiver. Instead of a second expedition in the southern regions, we collected vegetable seeds from six markets distributed in four regions—Chuy, Osh, Batken, and Issyk-Kul—with the help of local staff from the Department on Expertise of

Agricultural Crops, from the Ministry of Agriculture of the Kyrgyz Republic, in December 18-25, 2022.

Results and Discussion

We collected seeds of 30 accessions on the first expedition conducted in September, 16 accessions of diverse vegetables from the markets in the Batken region and 14 squash accessions from two gardens in the Osh and Chuy regions. In December, we obtained seeds of 108 accessions from 6 markets in the 4 regions: 52 accessions in Chuy, 36 in Osh, 8 in Batken, and 12 in Issyk-Kul. During this exploration, we were unable to collect seeds of wild individuals or wild relatives of vegetables. All the accessions were local cultivars and belonged to 21 species from 17 genera and 9 families (Tables 1 and 2).

Of the 138 accessions collected, approximately half were leafy vegetable species. Among these, the most collected vegetable was *Raphanus sativus* L. (radish, 16 accessions), followed by *Brassica oleracea* L. (cabbage, cauliflower, and broccoli, 12 accessions), *Allium cepa* L. (onion, 10 accessions), and *Daucus carota* L. (carrot, 9 accessions) (Table 1). Besides these, we collected seeds of 10 leafy vegetable species: *Beta vulgaris* L. (beet, 6 accessions), *Anethum graveolens* L. (dill, 4 accessions), *Apium graveolens* L. (celery, 3 accessions), *Brassica rapa* L. (Chinese cabbage, 2 accessions), *Coriandrum sativum* L. (coriander, 2 accessions), *Petroselinum crispum* (Mill.) Fuss (parsley, 2 accessions), *Ocimum basilicum* L. (basil, 1 accession), *Lactuca sativa* L. (lettuce, 1 accession), *Rumex patientia* L. (patience dock, 1 accession), and *Allium fistulosum* L. (welsh onion, 1 accession).

Among the fruit vegetables, the most collected species was *Cucurbita pepo* L. (squash and pumpkin, 25 accessions), followed by *Cucumis sativus* L. (cucumber, 14 accessions) and *Solanum lycopersicum* L. (tomato, 14 accessions). We also collected seeds of four other fruit vegetable species: *Capsicum annuum* L. (pepper and chili, 8 accessions), *Cucumis melo* L. (melon, 3 accessions), *Solanum melongena* L. (eggplant, 3 accessions), and *Citrullus lanatus* (Thunb.) Matsum. & Nakai (watermelon, 1 accessions).

This is the fourth collaborative expedition conducted under a Joint Research Agreement within the PGRAsia Project between the Department on Expertise of Agricultural Crops, the Ministry of Agriculture of the Kyrgyz Republic, and NARO. The first and second expeditions were conducted in 2019, collecting 254 accessions (Yoshioka *et al.* 2020). The third expedition was conducted in 2021 and collected 136 accessions

Table 1. Summary of genetic resources collected in Kyrgyz in 2022

Family	Genera	Species	September	December	Total
Amaranthaceae	<i>Beta</i>	<i>Beta vulgaris</i> L.		6	6
Amaryllidaceae	<i>Allium</i>	<i>Allium cepa</i> L.	2	8	10
		<i>Allium fistulosum</i> L.		1	1
Apiaceae	<i>Anethum</i>	<i>Anethum graveolens</i> L.	1	3	4
	<i>Apium</i>	<i>Apium graveolens</i> L.		3	3
	<i>Coriandrum</i>	<i>Coriandrum sativum</i> L.		2	2
	<i>Daucus</i>	<i>Daucus carota</i> L.		9	9
	<i>Petroselinum</i>	<i>Petroselinum crispum</i> (Mill.) Fuss	1	1	2
Asteraceae	<i>Lactuca</i>	<i>Lactuca sativa</i> L.		1	1
Brassicaceae	<i>Brassica</i>	<i>Brassica oleracea</i> L.	1	11	12
		<i>Brassica rapa</i> L.		2	2
	<i>Raphanus</i>	<i>Raphanus sativus</i> L.	2	14	16
Cucurbitaceae	<i>Citrullus</i>	<i>Citrullus lanatus</i> (Thunb.) Matsum. & Nakai		1	1
	<i>Cucumis</i>	<i>Cucumis melo</i> L.	1	2	3
		<i>Cucumis sativus</i> L.	2	12	14
	<i>Cucurbita</i>	<i>Cucurbita pepo</i> L.	16	9	25
Lamiaceae	<i>Ocimum</i>	<i>Ocimum basilicum</i> L.		1	1
Polygonaceae	<i>Rumex</i>	<i>Rumex patientia</i> L.		1	1
Solanaceae	<i>Capsicum</i>	<i>Capsicum annuum</i> L.		8	8
	<i>Solanum</i>	<i>Solanum lycopersicum</i> L.	3	11	14
		<i>Solanum melongena</i> L.	1	2	3
			30	108	138

(Imanbaeva *et al.* 2022). This time, we were only able to conduct a single expedition but successfully collected 138 accessions with the aid of local collaborators. 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 (SMTA). Thus, the resources collected in this year may be used in future vegetable breeding projects in Kyrgyz and Japan. In addition, donated seeds from 60 vegetable accessions preserved in the Kyrgyz Genebank will be transferred to the Research Center of Genetic Resources, NARO under the SMTA (Table 3). Therefore, a total of 198 accessions will be stored in Japan, enabling a more stable preservation of these genetic resources. The PGRAsia project plans to fund collaborative exploration of genetic resources in Kyrgyz for the next year. Further explorations are expected to result in the collection of more diverse and valuable genetic resources with large genetic variation. Moreover, we anticipate the establishment of collaborative research between Kyrgyz and Japan to utilize the genetic resources collected in this study.

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2022 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、2022年はキルギス共和国南部において野菜類種子を収集するための2回の探索を計画した。しかし、探索予定期間中に国境紛争が生じたため、バトケン州、オシ州、チュイ州における短期間の探索を9月中旬に1回だけ行った。また、2回目の探索の代わりに、各地の協力者の支援を受けて4地域の6つのマーケットから種子を入手した。結果として、各地のマーケットや農家において9科17属21種に属する合計138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、キルギスジーンバンクに保存されている60点の遺伝資源とともに、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 2. List of accessions collected in Kyrgyz in 2022

ID	JP No.	Species	Crop name	Local name	Coll. Date	Coll. site (District)	Coll. site (Region)	Type of Coll. site	Latitude	Longitude
C001	289371	<i>Cucurbita pepo</i> L.	Squash	Mandarinovii	09/16/2022	Kara-Suu	Osh	Farmer's garden	40°35'53.1"N	72°57'24.7"E
C002	289372	<i>Cucurbita pepo</i> L.	Squash	Krug	09/16/2022	Kara-Suu	Osh	Farmer's garden	40°35'53.1"N	72°57'24.7"E
C003	289373	<i>Cucurbita pepo</i> L.	Squash	Shapka	09/16/2022	Kara-Suu	Osh	Farmer's garden	40°35'53.1"N	72°57'24.7"E
C004	289374	<i>Cucurbita pepo</i> L.	Squash	Medovyi	09/16/2022	Kara-Suu	Osh	Farmer's garden	40°35'53.1"N	72°57'24.7"E
C005	289375	<i>Cucurbita pepo</i> L.	Squash	local	09/16/2022	Kara-Suu	Osh	Farmer's garden	40°35'53.1"N	72°57'24.7"E
C006	289376	<i>Cucurbita pepo</i> L.	Squash	Pyatnyshko	09/16/2022	Kara-Suu	Osh	Farmer's garden	40°35'53.1"N	72°57'24.7"E
C007	289377	<i>Cucurbita pepo</i> L.	Squash	Romashka	09/20/2022	Sokuluk	Chuy	Farmer's garden	42°51'19.2"N	74°15'17.1"E
C008	289378	<i>Cucurbita pepo</i> L.	Squash	Staraia Deva	09/20/2022	Sokuluk	Chuy	Farmer's garden	42°51'19.2"N	74°15'17.1"E
C009	289379	<i>Cucurbita pepo</i> L.	Squash	Vosmerka	09/20/2022	Sokuluk	Chuy	Farmer's garden	42°51'19.2"N	74°15'17.1"E
C010	289380	<i>Cucurbita pepo</i> L.	Squash	Medovyi	09/20/2022	Sokuluk	Chuy	Farmer's garden	42°51'19.2"N	74°15'17.1"E
C011	289381	<i>Cucurbita pepo</i> L.	Squash	Medovyi	09/20/2022	Sokuluk	Chuy	Farmer's garden	42°51'19.2"N	74°15'17.1"E
C012	289382	<i>Cucurbita pepo</i> L.	Squash	Grushevidnyi	09/20/2022	Sokuluk	Chuy	Farmer's garden	42°51'19.2"N	74°15'17.1"E
C013	289383	<i>Cucurbita pepo</i> L.	Squash	Romashka	09/20/2022	Sokuluk	Chuy	Farmer's garden	42°51'19.2"N	74°15'17.1"E
C014	289384	<i>Cucurbita pepo</i> L.	Squash	local	09/20/2022	Sokuluk	Chuy	Farmer's garden	42°51'19.2"N	74°15'17.1"E
C015	289385	<i>Cucurbita pepo</i> L.	Squash	local	09/16/2022	Kyzyl-Kiya	Batken	Market	40°35'53.2"N	72°57'24.9"E
C016	289386	<i>Allium cepa</i> L.	Onion	Bango	09/16/2022	Kyzyl-Kiya	Batken	Market	40°35'53.2"N	72°57'24.9"E
C017	289387	<i>Allium cepa</i> L.	Onion	Ispanskii	09/16/2022	Kyzyl-Kiya	Batken	Market	40°35'53.2"N	72°57'24.9"E
C018	289388	<i>Raphanus sativus</i> L.	Radish	Altarihk	09/16/2022	Kyzyl-Kiya	Batken	Market	40°35'53.2"N	72°57'24.9"E
C019	289389	<i>Solanum melongena</i> L.	Eggplant	Chernii Almaz	09/16/2022	Kyzyl-Kiya	Batken	Market	40°35'53.2"N	72°57'24.9"E
C020	289390	<i>Cucumis sativus</i> L.	Cucumber	Parad	09/16/2022	Kyzyl-Kiya	Batken	Market	40°35'53.2"N	72°57'24.9"E
C021	289391	<i>Cucumis melo</i> L.	Melon	Kyrkma	09/16/2022	Kyzyl-Kiya	Batken	Market	40°35'53.2"N	72°57'24.9"E
C022	289392	<i>Solanum lycopersicum</i> L.	Tomato	Volgograd	09/16/2022	Kyzyl-Kiya	Batken	Market	40°35'53.2"N	72°57'24.9"E
C023	289393	<i>Brassica oleracea</i> L.	Cabbage	Iyunskaia	09/16/2022	Kyzyl-Kiya	Batken	Market	40°35'53.2"N	72°57'24.9"E
C024	289394	<i>Raphanus sativus</i> L.	Radish	local	09/16/2022	Kyzyl-Kiya	Batken	Market	40°35'53.2"N	72°57'24.9"E
C025	289395	<i>Anethum graveolens</i> L.	Dill	Tashkent	09/16/2022	Kyzyl-Kiya	Batken	Market	40°35'53.2"N	72°57'24.9"E
C026	289396	<i>Solanum lycopersicum</i> L.	Tomato	TMK	09/16/2022	Kyzyl-Kiya	Batken	Market	40°35'53.2"N	72°57'24.9"E
C027	289397	<i>Solanum lycopersicum</i> L.	Tomato	Sultan	09/16/2022	Kyzyl-Kiya	Batken	Market	40°35'53.2"N	72°57'24.9"E
C028	289398	<i>Petroselinum crispum</i> (Mill.) Fuss (parsley)	Parsley	Margelanskii	09/16/2022	Kyzyl-Kiya	Batken	Market	40°35'53.2"N	72°57'24.9"E
C029	289399	<i>Cucumis sativus</i> L.	Cucumber	Arzy	09/16/2022	Kyzyl-Kiya	Batken	Market	40°35'53.2"N	72°57'24.9"E
C030	289400	<i>Cucurbita pepo</i> L.	Squash	Dlinnaia Tykva	09/16/2022	Kyzyl-Kiya	Batken	Market	40°35'53.2"N	72°57'24.9"E
C091	289461	<i>Solanum lycopersicum</i> L.	Tomato	Volgograd 595	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C092	289462	<i>Brassica oleracea</i> L.	Cabbage	Gribovskaia	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C093	289463	<i>Brassica oleracea</i> L.	Cabbage	Moskovskaia	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C094	289464	<i>Cucumis sativus</i> L.	Cucumber	Fenics	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C095	289465	<i>Cucumis sativus</i> L.	Cucumber	Dalnevostochnyi 27	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C096	289466	<i>Cucumis sativus</i> L.	Cucumber	Zazulya	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C097	289467	<i>Cucumis sativus</i> L.	Cucumber	Kustovoi	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C098	289468	<i>Cucumis sativus</i> L.	Cucumber	Konkurent	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C099	289469	<i>Cucumis sativus</i> L.	Cucumber	Margelanskii	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C100	289470	<i>Capsicum annuum</i> L.	Sweet pepper	Dar tashkenta	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C101	289471	<i>Capsicum annuum</i> L.	Sweet pepper	Lastochka	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C102	289472	<i>Capsicum annuum</i> L.	Chili	local	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C103	289473	<i>Capsicum annuum</i> L.	Sweet pepper	Kaliforniiskoe chudo	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C104	289474	<i>Allium cepa</i> L.	Onion	Halcedon	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C105	289475	<i>Allium cepa</i> L.	Onion	Manas	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C106	289476	<i>Allium fistulosum</i> L.	Welsh onion	Aprelskaia	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C107	289477	<i>Brassica oleracea</i> L.	Cauliflower	Garantiya	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C108	289478	<i>Brassica oleracea</i> L.	Cauliflower	Alfa	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C109	289479	<i>Brassica oleracea</i> L.	Cauliflower	Movir 74	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C110	289480	<i>Brassica oleracea</i> L.	Broccoli	Tonus	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E

Table 2. (Continued).

No.	JP No.	Species	Crop name	Local name	Coll. Date	Coll. site (District)	Coll. site (Region)	Type of Coll. site	Latitude	Longitude
C111	248481	<i>Brassica rapa</i> L.	Chinese cabbage	Bokal	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C112	289482	<i>Anethum graveolens</i> L.	Dill	Kaskelen	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C113	289483	<i>Anethum graveolens</i> L.	Dill	Kibrai	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C114	289484	<i>Petroselinum crispum</i> (Mill.) Fuss (parsley)	Parsley	Kudryavaia	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C115	289485	<i>Coriandrum sativum</i> L.	Coriander	Tashkentskaia local	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C116	289486	<i>Apium graveolens</i> L.	Celery	Silach	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C117	289487	<i>Apium graveolens</i> L.	Celery	Giant Prague	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C118	289488	<i>Apium graveolens</i> L.	Celery	Listovoi	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C119	289489	<i>Rumex patientia</i> L.	Patience dock	Shirokolistnyi	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C120	289490	<i>Coriandrum sativum</i> L.	Coriander	local	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C121	289491	<i>Ocimum basilicum</i> L.	Basil	local	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C122	289492	<i>Lactuca sativa</i> L.	Lettuce	Kudryavui	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C123	289493	<i>Daucus carota</i> L.	Carrot	Krasnyi velikan	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C124	289494	<i>Daucus carota</i> L.	Carrot	Shantane	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C125	289495	<i>Daucus carota</i> L.	Carrot	Zheltaia	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C126	289496	<i>Beta vulgaris</i> L.	Beet	Mona	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C127	289497	<i>Beta vulgaris</i> L.	Beet	Beetroot Egyptian Flat	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C128	289498	<i>Beta vulgaris</i> L.	Beet	Ekkendorfskaia	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C129	289499	<i>Beta vulgaris</i> L.	Beet	Bordo 237	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C130	289500	<i>Raphanus sativus</i> L.	Radish	Chernaia zimnyaia	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C131	289501	<i>Solanum melongena</i> L.	Eggplant	Almaz	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C132	289502	<i>Solanum melongena</i> L.	Eggplant	Matrosik	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C133	289503	<i>Cucurbita pepo</i> L.	Squash	Aeronavt	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C134	289504	<i>Cucurbita pepo</i> L.	Squash	Belyi 13	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C135	289505	<i>Cucurbita pepo</i> L.	Squash	Kustovoi	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C136	289506	<i>Raphanus sativus</i> L.	Radish	Dunganskii	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C137	289507	<i>Raphanus sativus</i> L.	Radish	Rubin	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C138	289508	<i>Brassica rapa</i> L.	Chinese cabbage	Petrovskaia	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C139	289509	<i>Solanum lycopersicum</i> L.	Tomato	Podarochnyi	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C140	289510	<i>Solanum lycopersicum</i> L.	Tomato	Bulls Heart	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C141	289511	<i>Solanum lycopersicum</i> L.	Tomato	Linda	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C142	289512	<i>Solanum lycopersicum</i> L.	Tomato	Moskvich	12/23/2022	Bishkek	Chuy	Market	42°52'30"N	74°34'14"E
C143	289513	<i>Solanum lycopersicum</i> L.	Tomato	Kartoshka palak	12/18/2022	Uzgen	Osh	Market	40°45'58"N	73°17'05"E
C144	289514	<i>Solanum lycopersicum</i> L.	Tomato	TMK	12/18/2022	Uzgen	Osh	Market	40°45'58"N	73°17'05"E
C145	289515	<i>Brassica oleracea</i> L.	Cabbage	local	12/18/2022	Uzgen	Osh	Market	40°45'58"N	73°17'05"E
C146	289516	<i>Cucumis sativus</i> L.	Cucumber	Syida	12/18/2022	Uzgen	Osh	Market	40°45'58"N	73°17'05"E
C147	289517	<i>Cucumis sativus</i> L.	Cucumber	Budur	12/18/2022	Uzgen	Osh	Market	40°45'58"N	73°17'05"E
C148	289518	<i>Allium cepa</i> L.	Onion	Kara tal	12/18/2022	Uzgen	Osh	Market	40°45'58"N	73°17'05"E
C149	289519	<i>Allium cepa</i> L.	Onion	Suiru Kyzyl (Oval red)	12/18/2022	Uzgen	Osh	Market	40°45'58"N	73°17'05"E
C150	289520	<i>Daucus carota</i> L.	Carrot	Kyzyl	12/18/2022	Uzgen	Osh	Market	40°45'58"N	73°17'05"E
C151	289521	<i>Daucus carota</i> L.	Carrot	Zheltaia	12/18/2022	Uzgen	Osh	Market	40°45'58"N	73°17'05"E
C152	289522	<i>Beta vulgaris</i> L.	Beet	Kyzyl	12/18/2022	Uzgen	Osh	Market	40°45'58"N	73°17'05"E
C153	289523	<i>Raphanus sativus</i> L.	Radish	Suiru	12/18/2022	Uzgen	Osh	Market	40°45'58"N	73°17'05"E
C154	289524	<i>Raphanus sativus</i> L.	Radish	Rubin	12/18/2022	Uzgen	Osh	Market	40°45'58"N	73°17'05"E
C155	289525	<i>Capsicum annuum</i> L.	Sweet pepper	Sortovoi	12/18/2022	Uzgen	Osh	Market	40°45'58"N	73°17'05"E
C156	289526	<i>Citrullus lanatus</i> (Thunb.) Matsum. & Nakai	Watermelon	local	12/18/2022	Uzgen	Osh	Market	40°45'58"N	73°17'05"E
C157	289527	<i>Cucurbita pepo</i> L.	Squash	Suiru	12/18/2022	Uzgen	Osh	Market	40°45'58"N	73°17'05"E
C158	289528	<i>Cucurbita pepo</i> L.	Squash	Kruglaia	12/18/2022	Uzgen	Osh	Market	40°45'58"N	73°17'05"E
C159	289529	<i>Cucurbita pepo</i> L.	Squash	Chylym	12/18/2022	Osh	Osh	Market	40°32'21"N	72°47'74"E
C160	289530	<i>Cucumis melo</i> L.	Melon	Ak-Koun	12/18/2022	Osh	Osh	Market	40°32'21"N	72°47'74"E
C161	289531	<i>Cucurbita pepo</i> L.	Squash	Salla	12/18/2022	Osh	Osh	Market	40°32'21"N	72°47'74"E
C162	289532	<i>Cucumis sativus</i> L.	Cucumber	Altaryk	12/18/2022	Osh	Osh	Market	40°32'21"N	72°47'74"E
C163	289533	<i>Capsicum annuum</i> L.	Sweet pepper	Tashkent	12/18/2022	Osh	Osh	Market	40°32'21"N	72°47'74"E
C164	289534	<i>Allium cepa</i> L.	Onion	Karatal	12/18/2022	Osh	Osh	Market	40°32'21"N	72°47'74"E
C165	289535	<i>Brassica oleracea</i> L.	Cabbage	Kyrgyz	12/18/2022	Osh	Osh	Market	40°32'21"N	72°47'74"E
C166	289536	<i>Raphanus sativus</i> L.	Radish	Ak Shalgam	12/18/2022	Osh	Osh	Market	40°32'21"N	72°47'74"E
C167	289537	<i>Raphanus sativus</i> L.	Radish	Kyzyl Bash	12/18/2022	Osh	Osh	Market	40°32'21"N	72°47'74"E
C168	289538	<i>Raphanus sativus</i> L.	Radish	Fergana	12/18/2022	Osh	Osh	Market	40°32'21"N	72°47'74"E

Table 2. (Continued).

No.	JP No.	Species	Crop name	Local name	Coll. Date	Coll. site (District)	Coll. site (Region)	Type of Coll. site	Latitude	Longitude
C169	289539	<i>Cucurbita pepo</i> L.	Squash	Salla	12/18/2022	Kara-Suu	Osh	Market	40°42'21"N	72°53'39"E
C170	289540	<i>Solanum lycopersicum</i> L.	Tomato	Kartoshka Palak	12/18/2022	Kara-Suu	Osh	Market	40°42'21"N	72°53'39"E
C171	289541	<i>Daucus carota</i> L.	Carrot	Padavan	12/18/2022	Kara-Suu	Osh	Market	40°42'21"N	72°53'39"E
C172	289542	<i>Capsicum annuum</i> L.	Sweet pepper	Podarok Moldovy	12/18/2022	Kara-Suu	Osh	Market	40°42'21"N	72°53'39"E
C173	289543	<i>Allium cepa</i> L.	Onion	Halcedon	12/18/2022	Kara-Suu	Osh	Market	40°42'21"N	72°53'39"E
C174	289544	<i>Raphanus sativus</i> L.	Radish	Dunganskaia	12/18/2022	Kara-Suu	Osh	Market	40°42'21"N	72°53'39"E
C175	289545	<i>Cucumis sativus</i> L.	Cucumber	Margelanskii	12/18/2022	Kara-Suu	Osh	Market	40°42'21"N	72°53'39"E
C176	289546	<i>Raphanus sativus</i> L.	Radish	local	12/18/2022	Kara-Suu	Osh	Market	40°42'21"N	72°53'39"E
C177	289547	<i>Brassica oleracea</i> L.	Cabbage	Ashhabadskaia	12/18/2022	Kara-Suu	Osh	Market	40°42'21"N	72°53'39"E
C178	289548	<i>Raphanus sativus</i> L.	Radish	Margelanskaia	12/18/2022	Kara-Suu	Osh	Market	40°42'21"N	72°53'39"E
C179	289549	<i>Solanum lycopersicum</i> L.	Tomato	Volgograd	12/25/2022	Leilek	Batken	Market	39°53'15.9"N	69°45'53.6"E
C180	289550	<i>Brassica oleracea</i> L.	Cabbage	Ashhabadskaia	12/25/2022	Leilek	Batken	Market	39°53'15.9"N	69°45'53.6"E
C181	289551	<i>Cucumis sativus</i> L.	Cucumber	Margelanskii local	12/25/2022	Leilek	Batken	Market	39°53'15.9"N	69°45'53.6"E
C182	289552	<i>Capsicum annuum</i> L.	Sweet pepper	Dar Tashkenta	12/25/2022	Leilek	Batken	Market	39°53'15.9"N	69°45'53.6"E
C183	289553	<i>Allium cepa</i> L.	Onion	Banko	12/25/2022	Leilek	Batken	Market	39°53'15.9"N	69°45'53.6"E
C184	289554	<i>Daucus carota</i> L.	Carrot	Konservnaia	12/25/2022	Leilek	Batken	Market	39°53'15.9"N	69°45'53.6"E
C185	289555	<i>Raphanus sativus</i> L.	Radish	local	12/25/2022	Leilek	Batken	Market	39°53'15.9"N	69°45'53.6"E
C186	289556	<i>Cucumis melo</i> L.	Melon	Ak-Koun	12/25/2022	Leilek	Batken	Market	39°53'15.9"N	69°45'53.6"E
C187	289557	<i>Cucurbita pepo</i> L.	Squash	Zelenaia rebristaia	12/18/2022	Ak-Suu	Issyk-Kul	Market	42°30'0"N	78°31'30"E
C188	289558	<i>Solanum lycopersicum</i> L.	Tomato	Podarochnyi	12/18/2022	Ak-Suu	Issyk-Kul	Market	42°30'0"N	78°31'30"E
C189	289559	<i>Brassica oleracea</i> L.	Cabbage	Slava	12/18/2022	Ak-Suu	Issyk-Kul	Market	42°30'0"N	78°31'30"E
C190	289560	<i>Cucumis sativus</i> L.	Cucumber	Konkurent	12/18/2022	Ak-Suu	Issyk-Kul	Market	42°30'0"N	78°31'30"E
C191	289561	<i>Allium cepa</i> L.	Onion	local	12/18/2022	Ak-Suu	Issyk-Kul	Market	42°30'0"N	78°31'30"E
C192	289562	<i>Solanum lycopersicum</i> L.	Tomato	Bulls heart	12/18/2022	Ak-Suu	Issyk-Kul	Market	42°30'0"N	78°31'30"E
C193	289563	<i>Anethum graveolens</i> L.	Dill	local	12/18/2022	Ak-Suu	Issyk-Kul	Market	42°30'0"N	78°31'30"E
C194	289564	<i>Daucus carota</i> L.	Carrot	Shantane	12/18/2022	Ak-Suu	Issyk-Kul	Market	42°30'0"N	78°31'30"E
C195	289565	<i>Daucus carota</i> L.	Carrot	Nanskaia	12/18/2022	Ak-Suu	Issyk-Kul	Market	42°30'0"N	78°31'30"E
C196	289566	<i>Beta vulgaris</i> L.	Beet	Bordo	12/18/2022	Ak-Suu	Issyk-Kul	Market	42°30'0"N	78°31'30"E
C197	289567	<i>Raphanus sativus</i> L.	Radish	Krasnyi kruglyi	12/18/2022	Ak-Suu	Issyk-Kul	Market	42°30'0"N	78°31'30"E
C198	289568	<i>Raphanus sativus</i> L.	Radish	Dunganskii	12/18/2022	Ak-Suu	Issyk-Kul	Market	42°30'0"N	78°31'30"E

Table 3. List of accessions donated from the Kyrgyz Genebank to the Research Center of Genetic Resources, NARO

No.	JP No.	Species	Crop name	Local name	Coll. Date	Coll. site (District)	Coll. site (Region)	Coll. site (Country)
C031	289401	<i>Solanum lycopersicum</i> L.	Tomato	Volgograd		Nooken	Jalal-Abad	Kyrgyz
C032	289402	<i>Solanum lycopersicum</i> L.	Tomato	Local		Issyk-At	Chuy	Kyrgyz
C033	289403	<i>Solanum lycopersicum</i> L.	Tomato	Guzal		Issyk-At	Chuy	Kyrgyz
C034	289404	<i>Solanum lycopersicum</i> L.	Tomato	Cherri		Ak-Suu	Issyk-Kul	Kyrgyz
C035	289405	<i>Solanum lycopersicum</i> L.	Tomato	Saltanat				Kyrgyz
C036	289406	<i>Solanum lycopersicum</i> L.	Tomato	Rozovii		Chuy	Chuy	Kyrgyz
C037	289407	<i>Solanum lycopersicum</i> L.	Tomato	Orangevii		Issyk-Ata	Chuy	Kyrgyz
C038	289408	<i>Solanum lycopersicum</i> L.	Tomato	Novichok		Tyup	Issyk-Kul	Kyrgyz
C039	289409	<i>Solanum lycopersicum</i> L.	Tomato	TMK		Issyk-Ata	Chuy	Kyrgyz
C040	289410	<i>Solanum lycopersicum</i> L.	Tomato	Local Kruglyi		Tyup	Issyk-Kul	Kyrgyz
C041	289411	<i>Brassica oleracea</i> L.	Cabbage	Iyunskaiia		Issyk-Ata	Chuy	Kyrgyz
C042	289412	<i>Cucumis sativus</i> L.	Cucumber	Fenics		Issyk-Ata	Chuy	Kyrgyz
C043	289413	<i>Cucumis sativus</i> L.	Cucumber	TSH		Issyk-Ata	Chuy	Kyrgyz
C044	289414	<i>Capsicum annuum</i> L.	Chili	Polugorkii		Issyk-Ata	Chuy	Kyrgyz
C045	289415	<i>Capsicum annuum</i> L.	Sweet pepper	Sladkii Uzgenskii		Nooken	Jalal-Abad	Kyrgyz
C046	289416	<i>Capsicum annuum</i> L.	Chili	Gorkii Kolocolchik		Issyk-Ata	Chuy	Kyrgyz
C047	289417	<i>Capsicum annuum</i> L.	Chili	Gorkii Ogonek		Issyk-Ata	Chuy	Kyrgyz
C048	289418	<i>Allium cepa</i> L.	Onion	Elena		Issyk-Ata	Chuy	Kyrgyz
C049	289419	<i>Allium cepa</i> L.	Onion	Karatalskii			Batken	Kyrgyz
C050	289420	<i>Coriandrum sativum</i> L.	Coriander	Local		Issyk-Ata	Chuy	Kyrgyz
C051	289421	<i>Anethum graveolens</i> L.	Dill	Kaskelen		Issyk-Ata	Chuy	Kyrgyz
C052	289422	<i>Daucus carota</i> L.	Carrot	Nanskaia		Issyk-Ata	Chuy	Kyrgyz
C053	289423	<i>Beta vulgaris</i> L.	Beet	Bordo		Tyup	Issyk-Kul	Kyrgyz
C054	289424	<i>Phaseolus vulgaris</i> L.	Common bean	Dunganskii		Suzak	Jalal-Abad	Kyrgyz
C055	289425	<i>Solanum lycopersicum</i> L.	Tomato	Local 3		Ak-Suu	Issyk-Kul	Kyrgyz
C056	289426	<i>Solanum lycopersicum</i> L.	Tomato	Rozovii		Issyk-Ata	Chuy	Kyrgyz
C057	289427	<i>Brassica oleracea</i> L.	Cabbage	Ashhabadskaia		Zhety-Oguz	Issyk-Kul	Kyrgyz
C058	289428	<i>Cucumis sativus</i> L.	Cucumber	Fenics		Zhety-Oguz	Issyk-Kul	Kyrgyz
C059	289429	<i>Capsicum annuum</i> L.	Sweet pepper	Sladkii		Ak-Suu	Issyk-Kul	Kyrgyz
C060	289430	<i>Capsicum annuum</i> L.	Sweet pepper	Gorkii		Zhety-Oguz	Issyk-Kul	Kyrgyz
C061	289431	<i>Anethum graveolens</i> L.	Dill	Kaskelen		Zhety-Oguz	Issyk-Kul	Kyrgyz
C062	289432	<i>Anethum graveolens</i> L.	Dill	Kaskelen 1		Issyk-Ata	Chuy	Kyrgyz
C063	289433	<i>Daucus carota</i> L.	Carrot	Nanskaia		Zhety-Oguz	Issyk-Kul	Kyrgyz
C064	289434	<i>Beta vulgaris</i> L.	Beet	Bordo		Zhety-Oguz	Issyk-Kul	Kyrgyz
C065	289435	<i>Phaseolus vulgaris</i> L.	Common bean	Dunganskii		Issyk-Ata	Chuy	Kyrgyz
C066	289436	<i>Phaseolus vulgaris</i> L.	Common bean	Dunganskii		Chuy	Chuy	Kyrgyz
C067	289437	<i>Solanum lycopersicum</i> L.	Tomato	Mira		Sokuluk	Chuy	Kyrgyz
C068	289438	<i>Solanum lycopersicum</i> L.	Tomato	Darhan		Sokuluk	Chuy	Kyrgyz
C069	289439	<i>Allium tuberosum</i> L.	Oriental garlic	local		Issyk-Ata	Chuy	Kyrgyz
C070	289440	<i>Allium cepa</i> L.	Onion	Zoloty kupola				Russia
C071	289441	<i>Allium cepa</i> L.	Onion	Odicovec				Russia
C072	289442	<i>Allium cepa</i> L.	Onion	Azelros				Russia
C073	289443	<i>Allium cepa</i> L.	Onion	Valanciana				Spain
C074	289444	<i>Allium cepa</i> L.	Onion	Espanyol				France
C075	289445	<i>Apium graveolens</i> L.	Celery	Samurai				Russia
C076	289446	<i>Capsicum annuum</i> L.	Sweet pepper	Belosnezhka				Russia
C077	289447	<i>Capsicum annuum</i> L.	Sweet pepper	Rodnik				Russia
C078	289448	<i>Cucurbita pepo</i> L.	Squash	Pharaon				Russia
C079	289449	<i>Cucurbita pepo</i> L.	Squash	Rolik				Russia
C080	289450	<i>Cucurbita pepo</i> L.	Squash	Gribovskii 37				Russia
C081	289451	<i>Cucurbita pepo</i> L.	Squash	Yakor				Russia
C082	289452	<i>Capsicum annuum</i> L.	Sweet pepper	Zheltiy bukiet				Russia
C083	289453	<i>Cucurbita pepo</i> L.	Squash	Yantar				Russia
C084	289454	<i>Cucurbita pepo</i> L.	Squash	Medal				Russia
C085	289455	<i>Brassica oleracea</i> L.	Cabbage	Nomer pervyi 147				Russia
C086	289456	<i>Cucurbita pepo</i> L.	Squash	Disk				Russia
C087	289457	<i>Cucurbita pepo</i> L.	Squash	Belyi 13				Russia
C088	289458	<i>Cucumis sativus</i> L.	Cucumber	Edinstvo				Russia
C089	289459	<i>Cucumis sativus</i> L.	Cucumber	Elektron				Russia
C090	289460	<i>Daucus carota</i> L.	Carrot	Marlinka				Russia

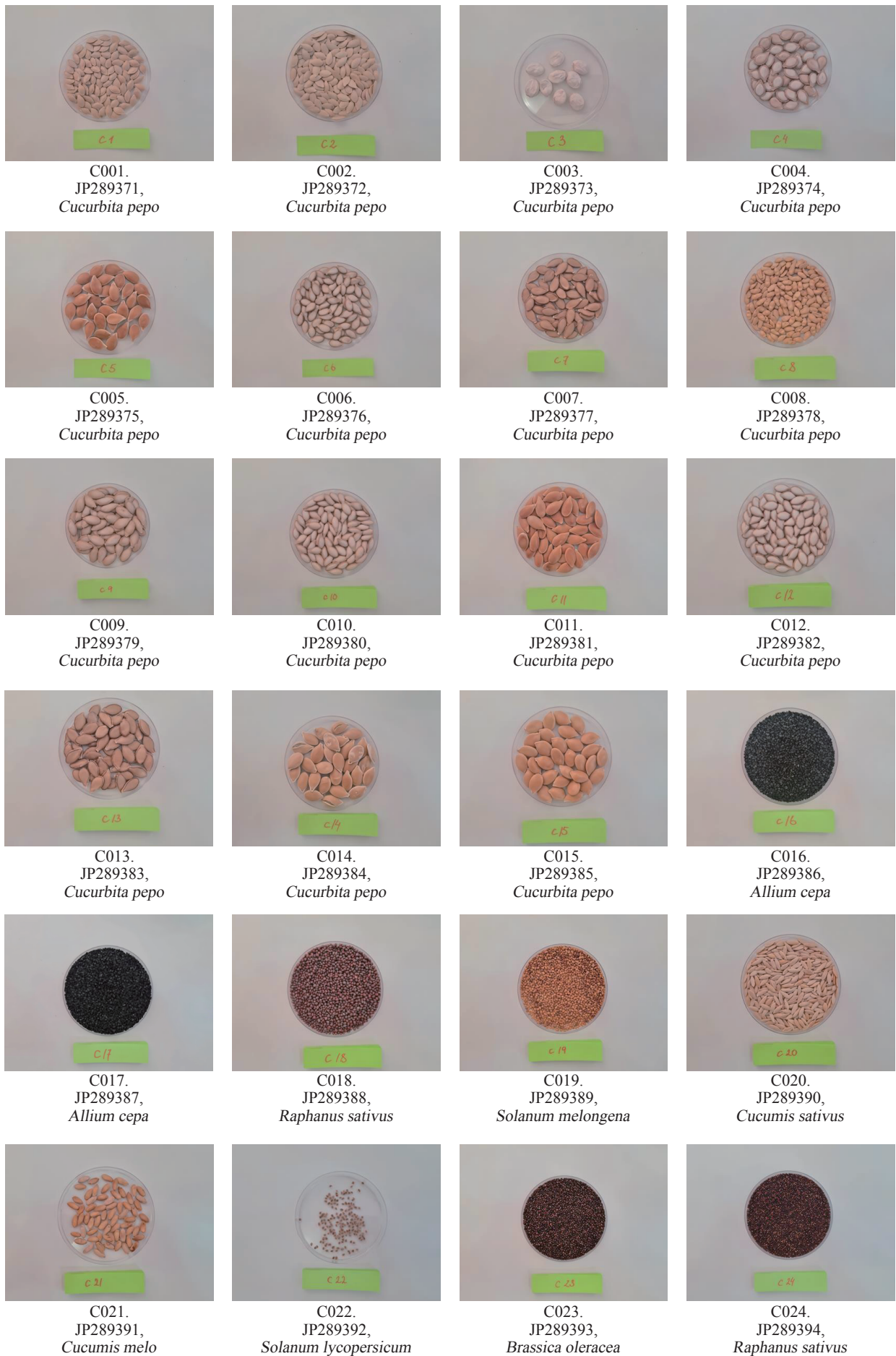


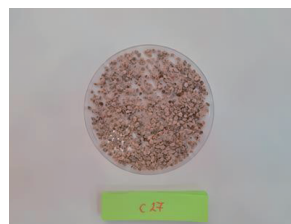
Photo 1. Seeds of each accession. The label in each image corresponds to the ID in Tables 2 and 3.



C025.
JP289395,
Aneyhum graveolens



C026.
JP289396,
Solanum lycopersicum



C027.
JP289397,
Solanum lycopersicum



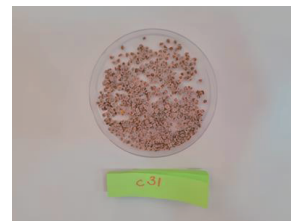
C028.
JP289398,
Petroselinum crispum



C029.
JP289399,
Cucumis sativus



C030.
JP289400,
Cucurbita pepo



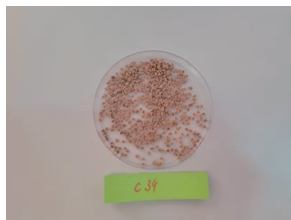
C031.
JP289401,
Solanum lycopersicum



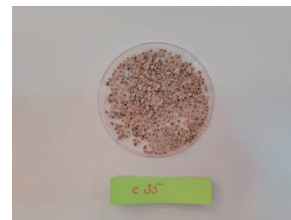
C032.
JP289402,
Solanum lycopersicum



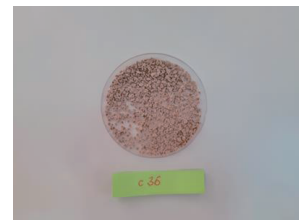
C033.
JP289403,
Solanum lycopersicum



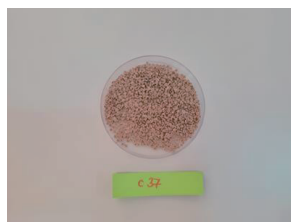
C034.
JP289404,
Solanum lycopersicum



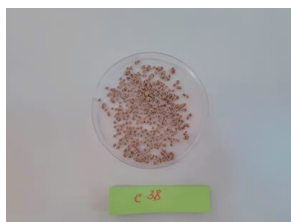
C035.
JP289405,
Solanum lycopersicum



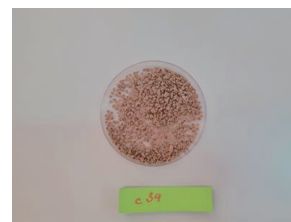
C036.
JP289406,
Solanum lycopersicum



C037.
JP289407,
Solanum lycopersicum



C038.
JP289408,
Solanum lycopersicum



C039.
JP289409,
Solanum lycopersicum



C040.
JP289410,
Solanum lycopersicum



C041.
JP289411,
Brassica oleracea



C042.
JP289412,
Cucumis sativus



C043.
JP289413,
Cucumis sativus



C044.
JP289414,
Capsicum annuum



C045.
JP289415,
Capsicum annuum



C046.
JP289416,
Capsicum annuum

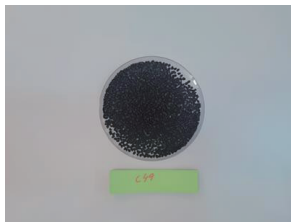


C047.
JP289417,
Capsicum annuum



C048.
JP289418,
Allium cepa

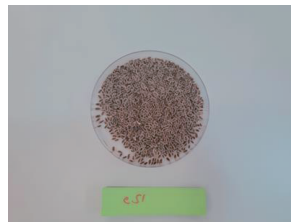
Photo 1. (Continued).



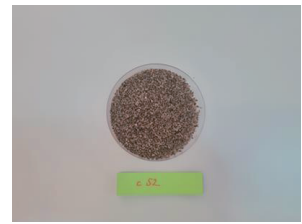
C049.
JP289419,
Allium cepa



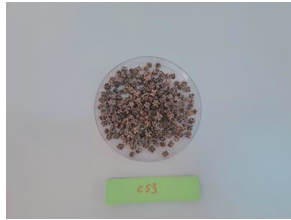
C050.
JP289420,
Coriandrum sativum



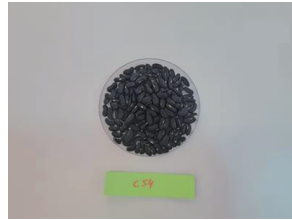
C051.
JP289421,
Anethum graveolens



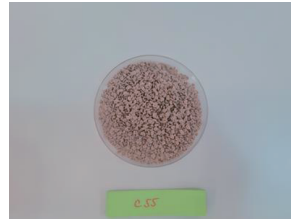
C052.
JP289422,
Daucus carota



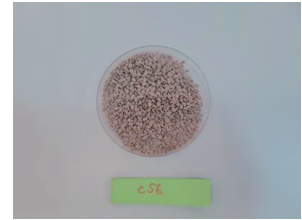
C053.
JP289423,
Beta vulgaris



C054.
JP289424,
Phaseolus vulgaris



C055.
JP289425,
Solanum lycopersicum



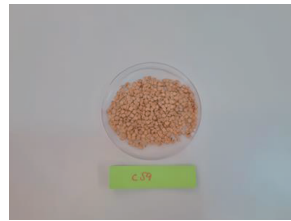
C056.
JP289426,
Solanum lycopersicum



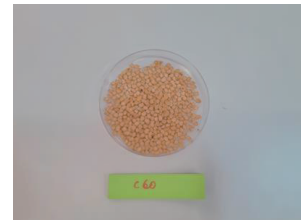
C057.
JP289427,
Brassica oleracea



C058.
JP289428,
Cucumis sativus



C059.
JP289429,
Capsicum annuum



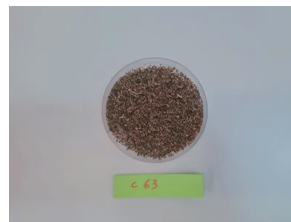
C060.
JP289430,
Capsicum annuum



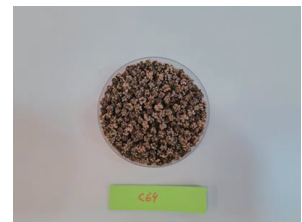
C061.
JP289431,
Anethum graveolens



C062.
JP289432,
Anethum graveolens



C063.
JP289433,
Daucus carota



C064.
JP289434,
Beta vulgaris



C065.
JP289435,
Phaseolus vulgaris



C066.
JP289436,
Phaseolus vulgaris



C067.
JP289437,
Solanum lycopersicum



C068.
JP289438,
Solanum lycopersicum



C069.
JP289439,
Allium tuberosum



C070.
JP289440,
Allium cepa

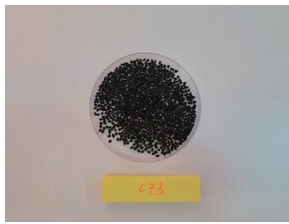


C071.
JP289441,
Allium cepa

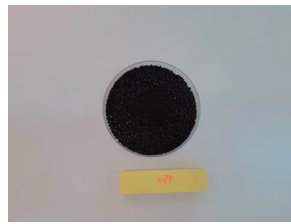


C072.
JP289442,
Allium cepa

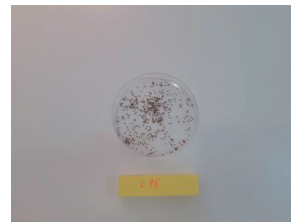
Photo 1. (Continued).



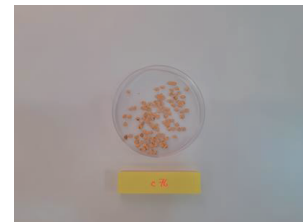
C073.
JP289443,
Allium cepa



C074.
JP289444,
Allium cepa



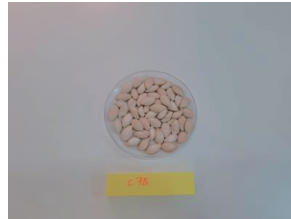
C075.
JP289445,
Apium graveolens



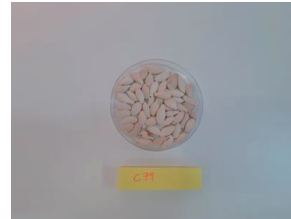
C076.
JP289446,
Capsicum annuum



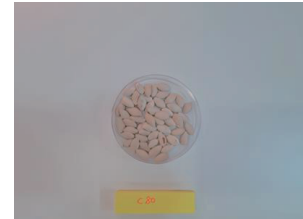
C077.
JP289447,
Capsicum annuum



C078.
JP289448,
Cucurbita pepo



C079.
JP289449,
Cucurbita pepo



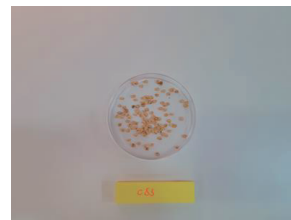
C080.
JP289450,
Cucurbita pepo



C081.
JP289451,
Cucurbita pepo



C082.
JP289452,
Capsicum annuum



C083.
JP289453,
Cucurbita pepo



C084.
JP289454,
Cucurbita pepo



C085.
JP289455,
Brassica oleracea



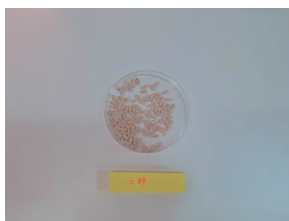
C086.
JP289456,
Cucurbita pepo



C087.
JP289457,
Cucurbita pepo



C088.
JP289458,
Cucumis sativus



C089.
JP289459,
Cucumis sativus



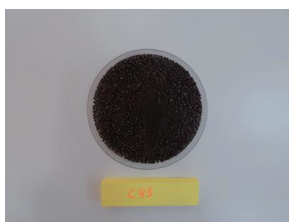
C090.
JP289460,
Daucus carota



C091.
JP289461,
Solanum lycopersicum



C092.
JP289462,
Brassica oleracea



C093.
JP289463,
Brassica oleracea



C094.
JP289464,
Cucumis sativus



C095.
JP289465,
Cucumis sativus



C096.
JP289466,
Cucumis sativus

Photo 1. (Continued).

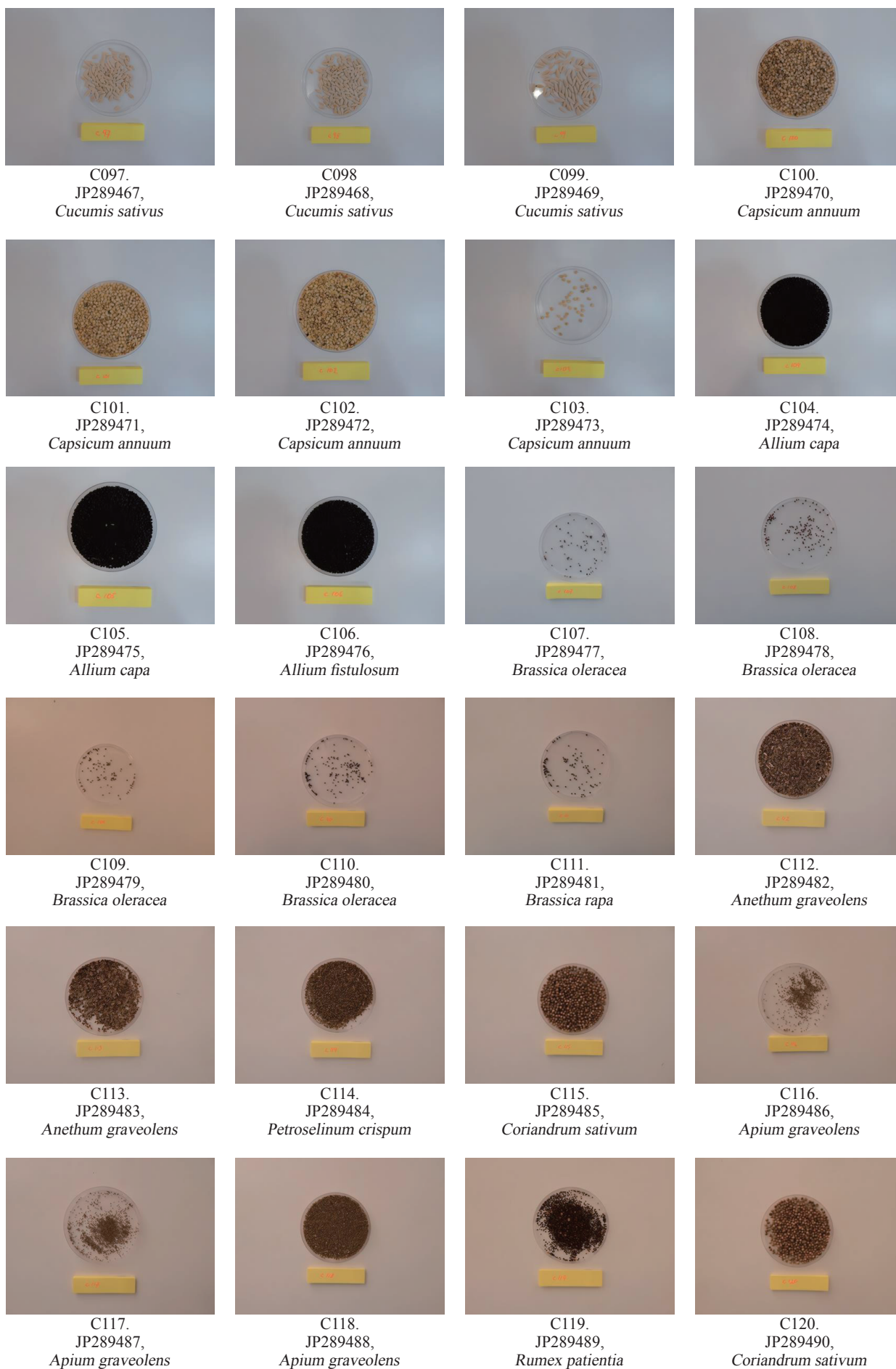


Photo 1. (Continued).

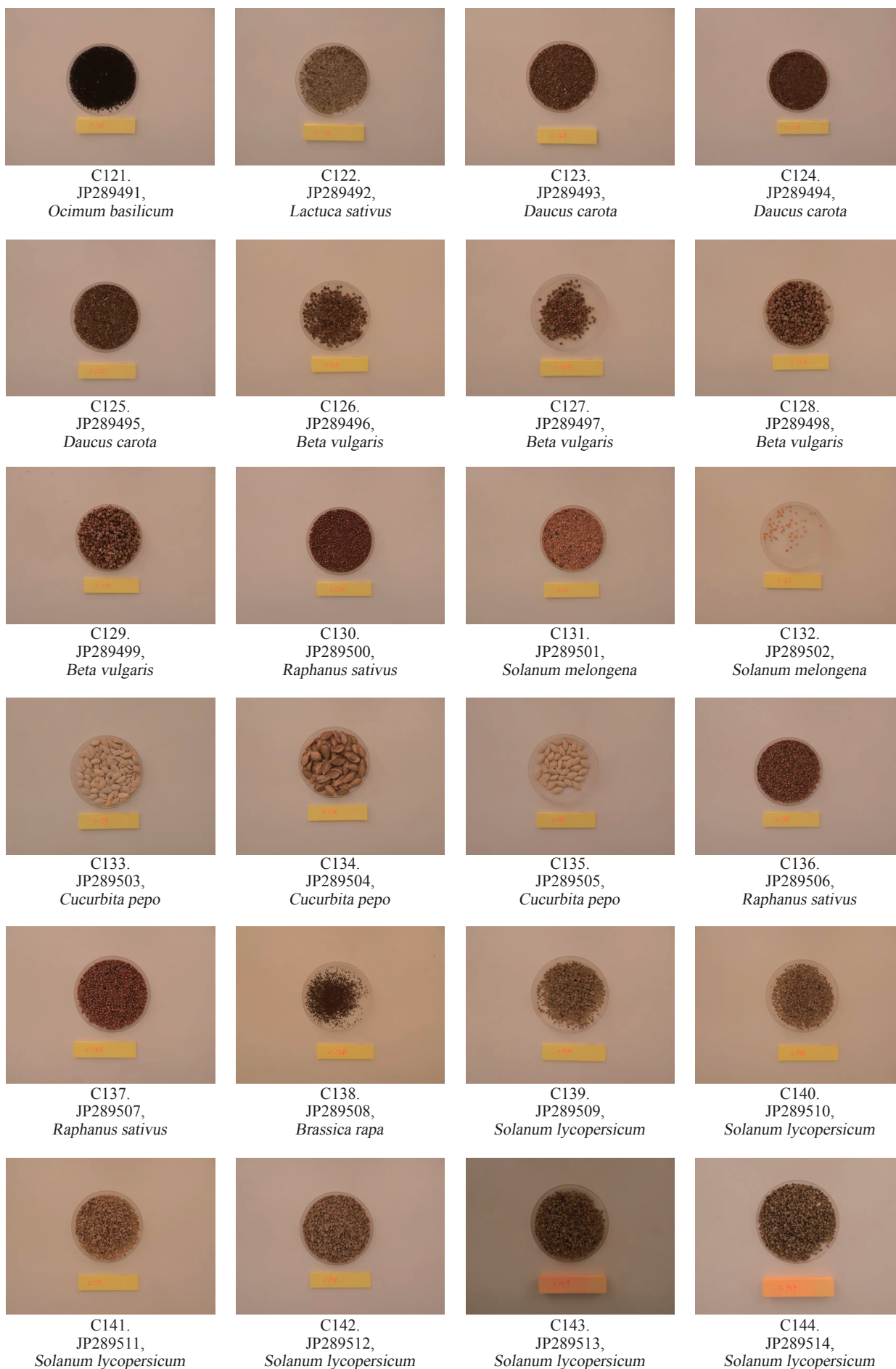
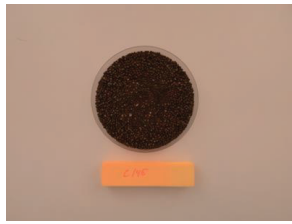
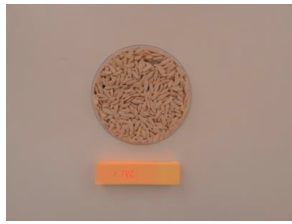


Photo 1. (Continued).



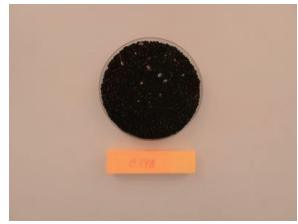
C145.
JP289515,
Brassica oleracea



C146.
JP289516,
Cucumis sativus



C147.
JP289517,
Cucumis sativus



C148.
JP289518,
Allium cepa



C149.
JP289519,
Allium cepa



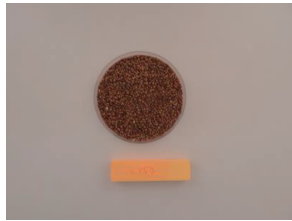
C150.
JP289520,
Daucus carota



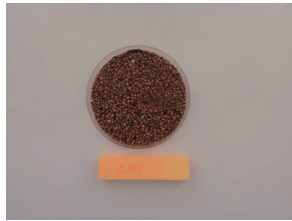
C151.
JP289521,
Daucus carota



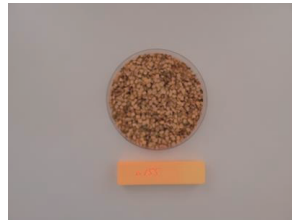
C152.
JP289522,
Beta vulgaris



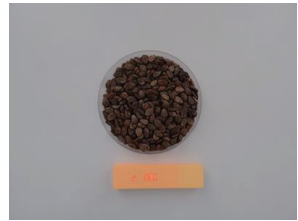
C153.
JP289523,
Raphanus sativus



C154.
JP289524,
Raphanus sativus



C155.
JP289525,
Capsicum annuum



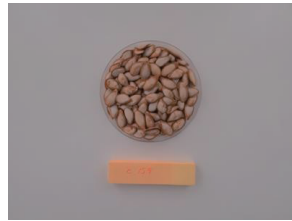
C156.
JP289526,
Citrullus lanatus



C157.
JP289527,
Cucurbita pepo



C158.
JP289528,
Cucurbita pepo



C159.
JP289529,
Cucurbita pepo



C160.
JP289530,
Cucumis melo



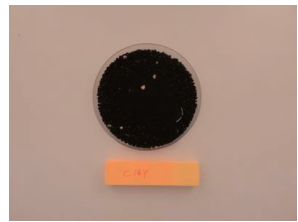
C161.
JP289531,
Cucurbita pepo



C162.
JP289532,
Cucumis sativus



C163.
JP289533,
Capsicum annuum



C164.
JP289534,
Allium cepa



C165.
JP289535,
Brassica oleracea



C166.
JP289536,
Raphanus sativus



C167.
JP289537,
Raphanus sativus



C168.
JP289538,
Raphanus sativus

Photo 1. (Continued).



C169.
JP289539,
Cucurbita pepo



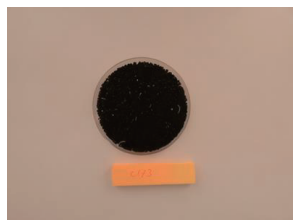
C170.
JP289540,
Solanum lycopersicum



C171.
JP289541,
Caucis carota



C172.
JP289542,
Capsicum annuum



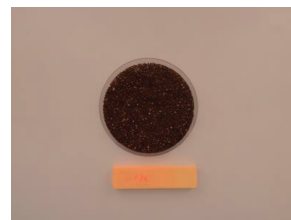
C173.
JP289543,
Allium cepa



C174.
JP289544,
Raphanus sativus



C175.
JP289545,
Cucumis sativus



C176.
JP289546,
Raphanus sativus



C177.
JP289547,
Brassica oleracea



C178.
JP289548,
Raphanus sativus



C179.
JP289549,
Solanum lycopersicum



C180.
JP289550,
Brassica oleracea



C181.
JP289551,
Cucumis sativus



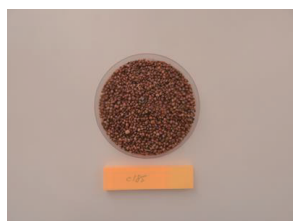
C182.
JP289552,
Capsicum annuum



C183.
JP289553,
Allium cepa



C184.
JP289554,
Daucus carota



C185.
JP289555,
Raphanus sativus



C186.
JP289556,
Cucumis melo



C187.
JP289557,
Cucurbita pepo



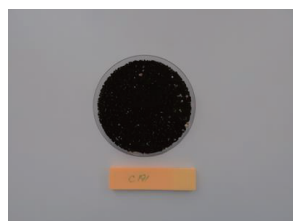
C188.
JP289558,
Solanum lycopersicum



C189.
JP289559,
Brassica oleracea



C190.
JP289560,
Cucumis sativus

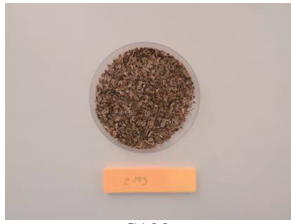


C191.
JP289561,
Allium cepa

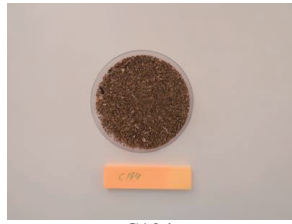


C192.
JP289562,
Solanum lycopersicum

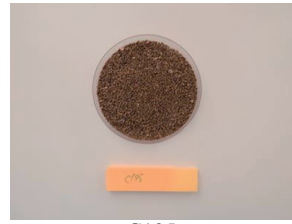
Photo 1. (Continued).



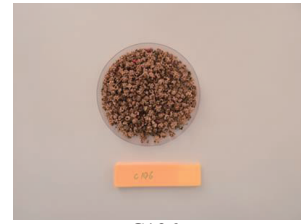
C193.
JP289563,
Anethum graveolens



C194.
JP289564,
Daucus carota



C195.
JP289565,
Daucus carota



C196.
JP289566,
Beta vulgaris



C197.
JP289567,
Raphanus sativus



C198.
JP289568,
Raphanus sativus

Photo 1. (Continued).