



# Report of a *Daucus* collecting expedition in Uzbekistan and Kyrgyzstan

Itinerary, collected material and data

Kik C, F Khasanov, A Esankulov, G Laszkov & A Vorobiev



CGN Report 35



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Picture front page: *Daucus carota* growing in a grassland south of Zamin, Uzbekistan (KEK 106).

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## Foreword

The mission of the Centre for Genetic Resources, the Netherlands (CGN) is to contribute to the conservation, development and sustainable use of plant, animal and forest genetic resources, and hence to global food security, a more sustainable production, rural development, and the conservation of cultural heritage. To that end, CGN currently holds collections of over 20 crops and a total number of accessions of more than 22,500 of interest to the breeders, researchers and other users. Annually around 5000 seed samples are distributed.

To contribute to an effective global system of *ex situ* collections, for each of its collections CGN has analysed the coverage of the crop gene pool by the germplasm in its own collection and those of others. In a number of cases, CGN has been able to identify gaps in the total set of collections of a specific crop. Some genetic diversity that is known or can be assumed to exist, appeared poorly represented or even absent from the genebank collections. Such cases warrant new collecting missions, if we wish to conserve as wide a diversity for the crop gene pool as possible.

The landraces and wild populations of *Daucus carota* in Central Asia form such a case. Therefore in 2015 CGN carried out a collecting mission in Uzbekistan and Kyrgyzstan, in close collaboration with its local counterparts. The present report provides details of the results of this collecting mission. Three plant breeding companies sponsored the mission, a fact that is duly recognized and appreciated.

During the mission 112 seed samples were collected in both countries, amongst which 22 landraces. Upon regeneration, the samples will be made available under the terms and conditions of the Standard Material Transfer Agreement of the International Treaty, with the agreement of the authorities in Uzbekistan and Kyrgyzstan involved.

This collecting mission formed an activity jointly undertaken by partners in Uzbekistan, Kyrgyzstan and the Netherlands. The support from the national authorities in Uzbekistan and Kyrgyzstan is duly recognized.

Bert Visser  
Director, Centre for Genetic Resources, the Netherlands (CGN)  
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# 1. Introduction

Nowadays it is generally assumed that the centre of diversity of cultivated carrot (*Daucus carota* L.) is Central Asia (Iorizzo *et al.*, 2013). In addition, the other species belonging to the genus *Daucus* can be found in the Mediterranean basin (Spooner *et al.*, 2014). Although 7043 *Daucus* accessions are present in GENESYS ([www.genesys-pgr.org](http://www.genesys-pgr.org)), only few accessions originate from its centre of diversity in Central Asia. Analysing in detail the GRIN (<http://www.ars-grin.gov/npgs/searchgrin.html>) and EURISCO (<http://eurisco.ipk-gatersleben.de>) databases, it was found that only 120 accessions from this region are currently available for distribution (Table 1).

| Country      | GRIN | GRIN/EURISCO | EURISCO | Total |
|--------------|------|--------------|---------|-------|
| Afghanistan  | 3    | 17           | 3       | 23    |
| Iran         | 1    | 15           | 9       | 25    |
| Kazakhstan   | 6    | 0            | 1       | 7     |
| Kyrgyzstan   | 1    | 0            | 8       | 9     |
| Pakistan     | 1    | 8            | 4       | 13    |
| Tajikistan   | 4    | 0            | 1       | 5     |
| Turkmenistan | 0    | 0            | 0       | 0     |
| Uzbekistan   | 15   | 0            | 23      | 38    |
| Total        | 31   | 40           | 49      | 120   |

**Table 1.** Available accessions per Central Asian country as presented in the GRIN and EURISCO databases; in the GRIN/EURISCO column the number of accessions included in both databases are given.

Because of the low number of *Daucus carota* accessions from the centre of diversity, an area where one can expect that the species contains most of its genetic diversity, a collecting expedition was undertaken in order to collect additional wild populations and landraces of carrot. This made this expedition a single crop expedition. The countries in which the collecting expedition was carried out were Uzbekistan and Kyrgyzstan.

Analysing the 120 accessions that are currently available from *ex situ* collections, it was found that overall 61% (= 73/120) was a landrace (Table 2). Therefore the focus of the expedition was on the collecting of wild populations.



| Country      | Wild weedy | Landrace | Breeding material | Other | Total |
|--------------|------------|----------|-------------------|-------|-------|
| Afghanistan  |            | 17       |                   | 6     | 23    |
| Iran         | 1          | 16       | 7                 | 2     | 25    |
| Kazakhstan   | 2          | 3        |                   | 2     | 7     |
| Kyrgyzstan   | 8          | 1        |                   |       | 9     |
| Pakistan     |            | 7        | 2                 | 4     | 13    |
| Tajikistan   |            | 2        |                   | 3     | 5     |
| Turkmenistan |            |          |                   |       | 0     |
| Uzbekistan   | 7          | 27       |                   | 4     | 38    |
| Total        | 18         | 73       | 9                 | 21    | 120   |

**Table 2.** *The number of accessions per biological status category (see <http://eurisco.ipk-gatersleben.de> for MCPD list – SAMPSTAT descriptor) per Central Asian country. Only available and unique accessions were taken into account.*

The result of a geo-referencing exercise of the 120 available accessions proved to be poor as of only 32 accessions latitude and longitude were known (Table 3). In this collecting expedition, these geo-referenced positions were taken into account when populations were collected.

| Country      | Number of georeferenced accessions | %    |
|--------------|------------------------------------|------|
| Afghanistan  | 0                                  | 0    |
| Iran         | 6                                  | 5    |
| Kazakhstan   | 3                                  | 2.5  |
| Kyrgyzstan   | 2                                  | 1.6  |
| Pakistan     | 0                                  | 0    |
| Tajikistan   | 0                                  | 0    |
| Turkmenistan | 0                                  | 0    |
| Uzbekistan   | 21                                 | 17.5 |
| Total        | 32                                 | 26.6 |

**Table 3.** *The number and percentage of geo-referenced accessions per country. Only available accessions (n=120) were taken into account.*

In 2015 a Memorandum of Understanding adopting the standard Material Transfer Agreement (sMTA) of the Internal Treaty for Plant Genetic Resources for Food and Agriculture (IT-PGRFA) as a basis for distribution, was signed between CGN and the national authorities on access and benefit sharing in Uzbekistan and Kyrgyzstan (Appendix 1). This document formed the legal basis of the expedition.

## 2. Objectives of the expedition

There were two major aims of this single crop expedition namely:

1. To broaden the *Daucus* collection maintained at CGN by collecting *Daucus* landraces and wild populations for breeding and research purposes, and
2. To contribute to the international need for the conservation of PGR.

## 3. Members of the collecting team

Collecting took place in Uzbekistan and Kyrgyzstan by two collecting teams, namely:

Collecting team in Uzbekistan:

- Furkat Khasanov and Ali Esankulov, Institute of Gene Pool of Plants and Animals of the Academy Sciences of Uzbekistan 100125, Durmon yuli str., 32 Tashkent, Uzbekistan; e-mail: fkhasanov1@mail.ru

Collecting team in Kyrgyzstan:

- Georgy Lazkov, Innovative Center of Phytotechnology, National Academy of Sciences, 267 Chui Avenue, Bishkek, Kyrgyz Republic 720071; e-mail: glazkov1963@mail.ru
- Alexandre Vorobiev, Ala tour, 147 Abdurahmanova street, Bishkek, Kyrgystan; e-mail: ag\_vorobiev@mail.ru

Both collecting teams also included Chris Kik, Centre for Genetic Resources, the Netherlands (CGN), Droevendaalsesteeg 1, 6708 PB Wageningen, the Netherlands; E-mail: chris.kik@wur.nl.

## 4. Exploration area and expedition period

In both countries a round trip was made, so overnight stays took place in several places. Temperatures during daytime in Uzbekistan were between 35-45 °C and in Kyrgyzstan between 25-35 °C throughout the collecting period. Due to the high temperatures in Uzbekistan, overnight stays were frequently in the open air at higher elevations (mostly at local farmers). In Kyrgyzstan overnight stays were often in Bed&Breakfast places. For the field work in Uzbekistan a Chevrolet Matiz was used and in Kyrgyzstan a 4WD Toyota landcruiser.

The sampling period of the collecting expedition was from July 25 to August 31 2015 and took place in Uzbekistan from July 25 – August 11 and in Kyrgyzstan from August 13 to August 31. Collecting started in Uzbekistan, because most of the country lies on a lower elevation compared to Kyrgyzstan, and as a result seed setting occurs earlier. In the collecting periods in both countries still unripe seeds were encountered at several locations, but mostly just ripened seeds and mature seeds could be collected (Photo 1). The duration of the collecting trip in both countries proved to be sufficient, although in hindsight a collecting trip in the central part of Kyrgyzstan at higher elevations than 2000 meters would also have been also interesting.



*Photo 1. Various stages of ripened fruits of Daucus carota (LVK 059).*

## **5. Data collecting, sampling procedure and seed cleaning**

A field collecting form based upon a modified multi-crop passport descriptor list (MCPD; see: <http://eurisco.ipk-gatersleben.de>) was used to document the passport data of the accessions sampled (Appendix 3). All sampled material received a so-called collecting number, in this case KEKxxx and LVKxxx for the samples collected in Uzbekistan and Kyrgyzstan respectively (KEKxx: Khasanov-Esankulov-Kik followed by a number and LVKxx: Lazkov-Vorobiev-Kik followed by a number). Latitude, longitude and

altitude were determined via GPS (Garmin, eTrex 20) with an inaccuracy of 1-5 meters. Latitude and longitude were recorded using as map datum WGS84 and as position format hddd°mm.mmmm. Pictures were taken of all collecting sites and occasionally a video was made. All accession data collected are presented in Appendix 4.

As a rule of thumb before starting to collect at a location at least 50 individual plants needed to be observed at first glance. The area explored per accession varied from ca. 0.1-1 ha.

Per location the umbels of circa 20 plants were collected (Photo 2). From each plant an umbel with a stem of around 15 cm length was cut-off with a knife (Photo 2), and put upside down in a linen bag (20 x 35 cm) to dry and further ripe if necessary. A label with the collecting number was put in the bag and was also attached to the rope which tied up the bag. In case all fruits of the umbels collected had a brown colour, indicating these were fully mature, then the umbels were directly hand-crushed in the linen bag and the stems were removed leaving behind a mixture of small stems and fruits. All accessions were treated like this in both countries at the end of the collecting mission. Later on at CGN a further cleaning act was carried out.



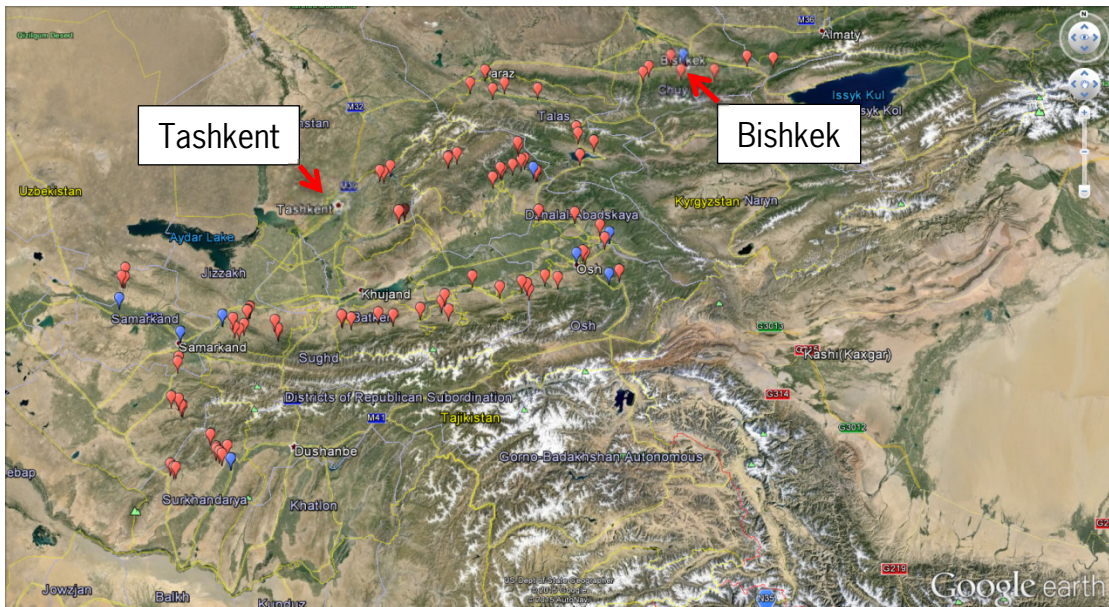
*Photo 2. Collecting seeds of wild carrots (KEK 120).*

During the expedition the linen bags were mostly kept in a cupboard in a hotel room under ambient room conditions. Upon arrival at CGN the seeds were transferred to a conditioned storage room with a temperature of 15°C and 15% relative humidity.

## 6. Results and discussion

### 6.1 Area covered

During the expedition an area of approximately 900 x 350 km<sup>2</sup> in total was covered and over 7000 km was traversed (Figure 1 & 2).



*Figure 1. Map of the collecting area in Uzbekistan and Kyrgyzstan with the *Daucus* collecting sites indicated; red: wild populations and blue: landraces (for enlarged figure: see Appendix 3).*

More schematically, from North to South, the expedition covered the northern and southern parts of the Kyrgyz Alatau range, the western part of the Fergana range and the northern and western parts of the Pamir Alay range (Figure 2).



*Figure 2. A schematic presentation of the expedition area covered.*

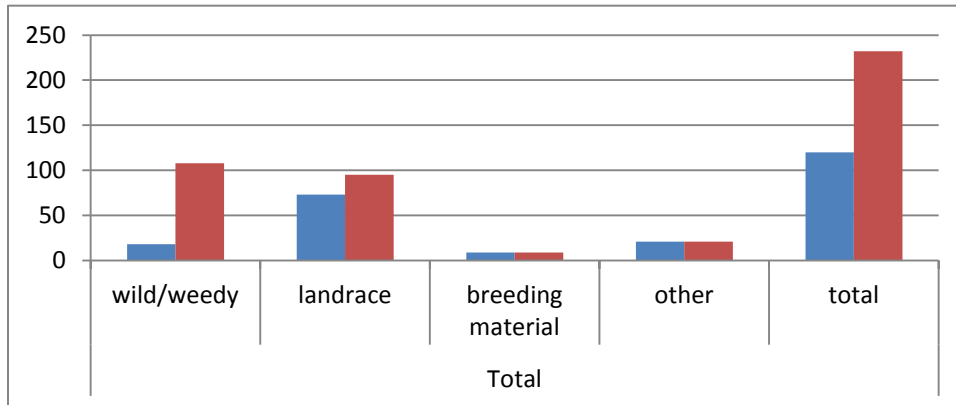
## 6.2 Collected accessions

In total 112 accessions were collected during the collecting expedition amongst which 22 (= 20%) landraces and 90 (= 80%) wild populations. In Table 4 the number of landraces and wild populations per country are presented.

| Country    | Landraces | Wild populations | Total |
|------------|-----------|------------------|-------|
| Uzbekistan | 13        | 38               | 51    |
| Kyrgystan  | 9         | 52               | 61    |
| Total      | 22        | 90               | 112   |

*Table 4. The number of landraces and wild populations collected per country during the *Daucus* expedition.*

As a result of the current expedition the percentage increase in the total number of accessions originating from Central Asian countries (see for countries included Table 1) in genebanks worldwide is 93% (from 120 to 232 accessions; Table 5); the wild/weedy category increased with 500% (from 18 to 108 accessions) whereas the landrace category increased with 30% (from 73 to 95 accessions).



**Table 5.** *The number of accessions originating from Central Asian countries present in genebanks worldwide for the various population type categories before and after the Daucus 2015 expedition. The blue and red columns indicate the number of accessions present in genebanks worldwide before and after the expedition took place respectively.*

### 6.2.1 Wild populations

The collecting of wild populations proved to be relatively easy and on average 4-5 accessions per collecting day were sampled. The only factor which seemed to have a dominant effect on the distribution and presence of the species is the availability of moisture in the soil. To illustrate this observation: in the southwestern parts of Uzbekistan where the hilly landscape consists of loess complexes which are intersected by rivulets, wild carrot populations can be found along these rivulets (green areas on the photo) but certainly not on the more elevated parts of the loess complexes (Photo 3).

The wild populations (n= 90) in both countries were found in very diverse habitats ranging from populations found along rivers/rivulets (Photo 4) to populations found at forest margins at higher elevation. Most populations however were found in fields and field margins (n=34; Photo 1 and 5), on grassland/pastures (n=12), in orchards (n=9), on roadsides (n=12) and in backyards (n=10). In Uzbekistan more populations were collected in backyards and orchards (Uzbekistan: 17 vs Kyrgyzstan: 2), whereas in Kyrgyzstan more populations were collected in fields/field margins (Uzbekistan: 16 vs Kyrgyzstan: 8). Most probably these differences are related to the differences in land use, as in Kyrgyzstan more land in the area traversed has a nature destination and less an arable/horticultural destination compared to Uzbekistan.



*Photo 3. Loess complexes intersected with rivulets north of the line Samarkand - Bukhara (Uzbekistan).*



*Photo 4. Wild carrots growing near the river Aflatur in Kyrgyzstan (LVK 016).*





*Photo 5. Wild carrots collected by A Esonkulov growing in a hayfield near Langar Uzbekistan (KEK 117).*

### 6.2.2 Landraces

Cultivated carrots are known in Uzbek language as ‘cabzi’, in Kyrgyz language as ‘cabze’ and in Russian as ‘markovska’. In total 22 landraces were collected: 13 in Uzbekistan and 9 in Kyrgyzstan. The overriding part of the landraces acquired came from bazars (n=20; Photo 6 & 7), whereas two landraces were collected in the field (LVK 012 & 035; Table 5). The latter ones were collected in Kyrgystan (Photo 8).

| <b>Country</b> | <b>Field</b> | <b>Market/Shop/Seedbroker</b> | <b>Total</b> |
|----------------|--------------|-------------------------------|--------------|
| Uzbekistan     | 0            | 13                            | 13           |
| Kyrgyzstan     | 2            | 7                             | 9            |
| Total          | 2            | 20                            | 22           |

*Table 5. The number of landraces acquired per collecting source in Uzbekistan and Kyrgystan.*



*Photo 6. Buying landraces by G Lazkov at the Osh bazar in Bishkek (LVK 001 & 002).*



*Photo 7. Buying a carrot landrace by F Khasanov at the bazar of Khatyrchy, Uzbekistan (KEK 113).*



*Photo 8. Collecting by A Vorobiev of a carrot landrace on an arable field near Kitchi Ak Jol, Kyrgyzstan (LVK012).*

Most landraces obtained at bazars were cultivated in the vicinity of the bazar where their seeds were sold, however seven landraces (KEK 128, 129, 148, 149 & 150 and LVK 032 & 033) originated from locations more than 50 km away from the bazar. Six of these landraces were cultivated in the Fergan valley (Namangan and Andijan).

Interestingly, a difference appeared in the colours landraces in use (Photo 9) within both countries. In the North, people preferred yellow coloured landraces for plov (a national dish in both countries) and red coloured landraces for soups, lagman, etc. In the South, this was reversed. In this context it was mentioned to us that in Tajikistan only red coloured landraces were cultivated as people only preferred this type of carrots for their dish. The difference between both types of landraces seems to be that yellow ones tend to have a sweeter taste compared to the red ones.



*Photo 9. Red and yellow coloured carrot landraces at the bazar in Khatyrchy, Uzbekistan (KEK 113 & 119).*

Two cultivation cycles of carrots can take place per year, namely from February to July (120 days) and from August to November (90 days). The first cultivation period provides the best crop. The second crop is mostly planted after a cereal (wheat, barley) cultivation. Mostly 5-6 kg of seed is used per hectare which yields around 45-55 tons of carrots. One kilo of seeds of a landrace costs approximately € 14-15, whereas one kilo of seeds of a modern variety costs around five times more. Depending upon snowfall during the early phase of cultivation (March) bolting can take place which can result in around 30% flowering plants. In the absence of snow around five percent plants will be flowering. Flowering of five percent of the plants is not seen as a problem as the yield loss due to flowering is minimal. Actually, it is considered positively as it is seen as an indication that harvest of the carrots can take place. Farmers use chemical fertilizers like amonfos and also fungicides to prevent for example spreading of *Verticillium*. Farmers buy seeds mostly from other local farmers and/or seed brokers, because seeds sold at the bazars are not always trusted as mixing with wild populations or other landraces may occur. The use of modern varieties is not widespread, as low yields were observed in the past using these varieties and once such an experience is encountered, a farmer will not easily buy seed of a modern variety again. Also it was mentioned that local varieties performed better compared to modern varieties during drought.



*Photo 10. Local seed broker Anwar from Toza Uruk, Uzbekistan (KEK 148-150).*

From a discussion with a local seedbroker named Anwar (Photo 10) in Toza Uruk, a small village some 35 km southwest of Jizzakh (Uzbekistan), it appeared that he buys his carrot seeds (preferably the variety Shantoon) every year from 5-10 farmers near Namangan, Fergan valley, which is ca. 400 km eastwards. The seeds produced in Namangan yield a good crop according to him when cultivated in the Galla Arol area in Uzbekistan. This area is known to yield the best carrot harvests in the country. The carrot cultivation in the Galla Arol area is around 300 hectares. The seed broker Anwar regularly sells 500-1000 kg of carrot seeds per year to around 40% of the carrot farmers in the area. There are around 20 seed brokers like Anwar in the area and most of them sell around 40-50 kg of carrot seeds each year. Every year Anwar buys 50 kg of seeds from a new seed producer from the area around Namangan and checks the performance of the acquired seeds the year afterwards. When this subsequently results in a good harvest then he includes this seed producer in his brokerage network.

## 7. Conclusions

- a. A Memorandum of Understanding, agreeing on the use of the sMTA of the IT-PGRFA, was signed between on the one hand the national authorities of Uzbekistan and Kyrgyzstan and CGN on the other hand. This MoU formed the legal basis of this expedition.
- b. The *Daucus* collection maintained at CGN could be enlarged with 112 unique accessions amongst which 22 landraces.
- c. The expedition led to an increase in the total number of accessions originating from Central Asian countries in genebanks worldwide from 120 to 232 accessions: the wild/weedy population type category increased from 18 to 108 accessions and the landrace category from 73 to 95 accessions.
- d. Although a substantial number of *Daucus* accessions have been collected, more interesting *Daucus* accessions can be collected especially in the mountainous area of Kyrgyzstan.
- e. No carrot breeding takes place in both countries and therefore farmers rely on landraces and imported modern varieties from Western countries. Due to the high seed price of modern varieties and crop failure sometimes reported for these varieties, farmers still mostly rely on landraces.
- f. Landraces are usually bought from neighbouring farmers but also from local seed brokers, which buy their seeds sometimes far from the area where the seeds are sown.
- g. Carrot cultivation takes place in Uzbekistan especially in the Galla arol area whereas in Kyrgyzstan it is scattered over the country.

## 8. References

Iorizzo M, DA Senalik, SL Ellison, D Grzebelius, PB Cavagnaro, C Allender, J Brunet, DM Spooner, A van Deynze & PW Simon (2013). Genetic structure and domestication of carrot (*Daucus carota* subsp. *sativus*) (*Apiaceae*). *Am J Bot* 100 (5), 930-938.

Spooner DM, MP Widrlechner, KR Reitsma, DE Palmquist, S Rouz, Z Ghrabi-Gammar, M Neffati, D Bouzbida, H Ouabbou, M El Koudrim & PW Simon (2014). Reassessment of practical subspecies identifications of the USDA *Daucus carota* L. *Crop Sci.* 54:706–718

## **9. Acknowledgements**

This expedition was made possible by the financial support from breeding companies affiliated to PLANTUM-NL and the Dutch Ministry of Economic Affairs. The support and hospitality of local people in both Uzbekistan and Kyrgyzstan was of great value. Furthermore CK would like to express his sincere gratitude to the other team members who made this trip a success. Last but not least CK also would like to gratefully acknowledge Bert Visser and Roel Hoekstra (CGN) for critically reviewing the report.





## Appendix I. Memorandum of Understanding - Uzbekistan

### Memorandum of Understanding concerning the acquisition of plant genetic resources for food and agriculture in Uzbekistan

The undersigned, Dr. K. Tojibaev, director of Institute of Plant and Animals Genepool, Academy of Sciences of Uzbekistan and Dr. L. Visser, Director of the Centre for Genetic Resources, the Netherlands (CGN), Wageningen, the Netherlands herewith declare the following.

Recognising the provisions of the Convention on Biological Diversity, including the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization, placing the authority to determine access to genetic resources with the national governments and making access subject to national legislation,

Recognising the adoption of the Standard Material Transfer Agreement for the access of plant genetic resources in the Multilateral System of the International Treaty by the Governing Body of the International Treaty for the purposes of food and agriculture, as well as the benefit-sharing mechanism elaborated in the Standard Material Transfer Agreement,

Recognising the policy option to provide access to other plant genetic resources than listed in Annex 1 of the International Treaty under the terms and conditions of the Standard Material Transfer Agreement, in order to enhance both access and benefit-sharing,

In full compliance with national policy and regulations regarding access and benefit-sharing in Uzbekistan and the Netherlands respectively,

Agree that this policy will also be adopted to regulate the future access by users to germplasm that is to be collected in Uzbekistan, transferred to the Netherlands under the terms and conditions of the Standard Material Transfer Agreement, and included in the CGN collections in the framework of a joint collecting project,

Decide to adopt the terms and conditions of the Standard Material Transfer Agreement for the distribution to third parties of vegetable germplasm, including *Daucus*, to be collected by the Institute of Plant and Animals Genepool and the Centre for Genetic Resources, the Netherlands in 2015.

Institute of Plant and Animals Genepool, Academy of Sciences of Uzbekistan

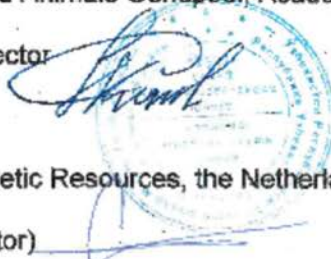
Dr. K. Tojibaev, director

Date 6 April 2015

The Centre for Genetic Resources, the Netherlands (CGN), the Netherlands

Dr. L. Visser (Director)

Date 9 April 2015



# Appendix 1 Memorandum of Understanding – Kyrgyzstan

## Memorandum of Understanding concerning the acquisition of plant genetic resources for food and agriculture in Kyrgistan

The undersigned, Dr. K. T. Shalpykov, Director of Innovative Center of Phytotechnology National Academic of Science Kyrgyz Republic and Dr. L. Visser, Director of the Centre for Genetic Resources, the Netherlands (CGN), Wageningen, the Netherlands herewith declare the following.

Recognising the provisions of the Convention on Biological Diversity, including the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization, placing the authority to determine access to genetic resources with the national governments and making access subject to national legislation,

Recognising the adoption of the Standard Material Transfer Agreement for the access of plant genetic resources in the Multilateral System of the International Treaty by the Governing Body of the International Treaty for the purposes of food and agriculture, as well as the benefit-sharing mechanism elaborated in the Standard Material Transfer Agreement,

Recognising the policy option to provide access to other plant genetic resources than listed in Annex 1 of the International Treaty under the terms and conditions of the Standard Material Transfer Agreement, in order to enhance both access and benefit-sharing,

In full compliance with national policy and regulations regarding access and benefit-sharing in Kyrgistan and the Netherlands respectively,

Agree that this policy will also be adopted to regulate the future access by users to germplasm that is to be collected in Kyrgistan, transferred to the Netherlands under the terms and conditions of the Standard Material Transfer Agreement, and included in the CGN collections in the framework of a joint collecting project,

Decide to adopt the terms and conditions of the Standard Material Transfer Agreement for the distribution to third parties of vegetable germplasm, including *Daucus*, to be collected by the Innovative Center of Phytotechnology National Academic of Science and the Centre for Genetic Resources, the Netherlands in 2015.

the Innovative Center of Phytotechnology National Academic of Science,  
Kyrgyz Republic

Dr. K. T. Shalpykov

Date 29.04.2015

The Centre for Genetic Resources, the Netherlands (CGN), the Netherlands

Dr. L. Visser (Director)

Date

29/04/2015



## Appendix II. Expedition collecting form

Uzbekistan - Kyrgystan - the Netherlands *Daucus* expedition 2015

Team/collector(s) ..... Collecting number .....

Date ..... Photo number .....

Crop name ..... Cultivar name .....

Latin species name .....

Locality .....

.....

Latitude ..... Longitude ..... Altitude .....

Number of plants in population abundant...frequent ...occasional...rare

Number of plant sampled abundant...frequent ...occasional...rare

Topography...swamp...flood plain...level...undulating...hilly...steep...mountainous

### Biological status of accession

100) Wild

110) Natural

120) Semi-natural/wild

200) Weedy

300) Traditional cultivar/landrace

500) Advanced/improved cultivar

20) Farm or cultivated habitat

21) Field

22) Orchard

23) Backyard, kitchen or home garden

24) Fallow land

25) Pasture

30) Market or shop

60) Weedy, disturbed or ruderal habitat

61) Roadside

62) Field margin

### Collecting/acquisition source

10) Wild habitat

11) Forest/woodland

12) Shrubland

13) Grassland

14) Desert/tundra

15) Aquatic habitat

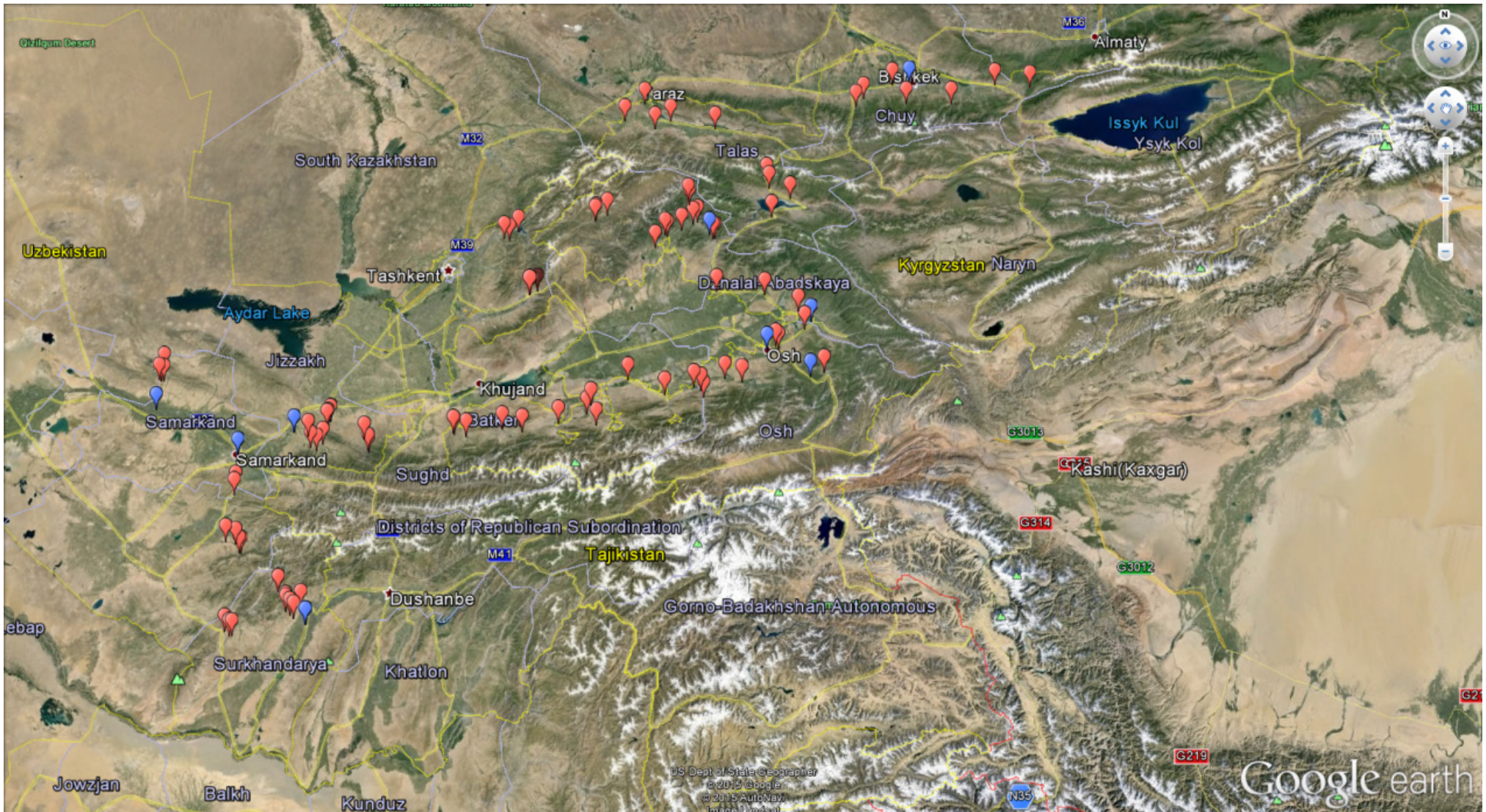
### REMARKS

(diseases, pests, other)



## **Appendix III. Map of locations where collecting took place**

Collecting numbers, KEKxxx and LVKxxx, are indicated for the *Daucus* material collected in Uzbekistan and Kyrgyzstan respectively. Red symbols indicate wild populations and blue symbols landraces.



## **Appendix IV. List of accessions collected**

Passport data of *Daucus* accessions collected in Uzbekistan (KEKxxx) and Kyrgyzstan (LVKxxx). Date: year-month-date; Latitude and longitude determined via GPS: mapdatum WGS84, position format for longitude and latitude: hddd°mm.mmmm'; Altitude in meters; Population type: W: wild; L: landrace; Population size: abundant: > 100 plants, frequent: 50-100 plants, occasionally: < 50 plants.

| RNR    | collecting number | country | photo map | photo nr | date      | species name given during expedition | nearest locality name | latitude   | longitude   | altitude (m) | population type | topography      | collecting source | population size | number of plants sampled  | remarks |
|--------|-------------------|---------|-----------|----------|-----------|--------------------------------------|-----------------------|------------|-------------|--------------|-----------------|-----------------|-------------------|-----------------|---|---------|
| 150262 | KEK100            | UZB     | 107       | 251-254  | 28-7-2015 | carota                               | Tokkyzkul             | 41°33.151' | 069°50.437' | 834 W        | hilly           | field           | abundant          | 15              | with Prunus and Crataegus   |         |
| 150263 | KEK101            | UZB     | 107       | 255-258  | 28-7-2015 | carota                               | Uchterek              | 41°31.923' | 069°54.193' | 1120 W       | hilly           | roadside        | abundant          | 15              | Irano-Turranian steppe dominated by grasses like Hordeum bulbosum       |         |
| 150264 | KEK102            | UZB     | 107       | 259-262  | 28-7-2015 | carota                               | Yusufhona             | 41°36.415' | 070°00.155' | 975 W        | steep           | wild habitat    | abundant          | 19              | hill with Hordeum bulbosum overlooking lake Charvaq                     |         |
| 150265 | KEK103            | UZB     | 107       | 265-268  | 29-7-2015 | carota                               | Baksuk                | 41°03.024' | 070°09.561' | 1082 W       | level           | pasture         | abundant          | 26              | aspect determining species: Daucus, with present Lactuca and Poa        |         |
| 150266 | KEK104            | UZB     | 107       | 269-270  | 29-7-2015 | carota                               | Chitsy                | 41°04.935' | 070°14.875' | 1194 W       | undulating      | backyard        | abundant          | 11              |   |         |
| 150267 | KEK105            | UZB     | 107       | 271-272  | 29-7-2015 | carota                               | Baksuk                | 41°03.118' | 070°09.607' | 1103 W       | level           | pasture         | abundant          | 16              | aspect determining species: Daucus, with Lolium, Trifolium and Plantago |         |
| 150268 | KEK106            | UZB     | 107       | 273-279  | 30-7-2015 | carota                               | Dugoba                | 39°48.824' | 068°23.290' | 936 W        | flood plain     | field           | abundant          | 28              | along river, swampy area, next to tomato field                          |         |
| 150269 | KEK107            | UZB     | 107       | 293-294  | 31-7-2015 | carota                               | Urkly-1               | 39°42.155' | 068°27.129' | 1399 W       | undulating      | roadside        | frequent          | 14              |   |         |
| 150270 | KEK108            | UZB     | 107       | 297-298  | 31-7-2015 | carota                               | Urkly-2               | 39°43.115' | 068°26.419' | 1294 W       | level           | roadside        | frequent          | 14              |   |         |
| 150271 | KEK109            | UZB     | 107       | 299-303  | 31-7-2015 | carota                               | Ravot-1               | 39°57.748' | 067°59.685' | 505 W        | undulating      | backyard        | abundant          | 17              | many plant with ripened seeds   |         |
| 150272 | KEK110            | UZB     | 107       | 304-306  | 31-7-2015 | carota                               | Ravot-2               | 39°57.448' | 067°59.648' | 513 W        | undulating      | backyard        | frequent          | 17              | many ripened plants   |         |
| 150273 | KEK111            | UZB     | 107       | 307-311  | 31-7-2015 | carota                               | Uob-1                 | 39°55.412' | 067°58.316' | 654 W        | undulating      | aquatic habitat | frequent          | 24              | along rivulet   |         |
| 150274 | KEK112            | UZB     | 107       | 312-313  | 31-7-2015 | carota                               | Uob-2                 | 39°55.043' | 067°57.589' | 712 W        | hilly           | backyard        | frequent          | 14              |   |         |
| 150275 | KEK113            | UZB     | 107       | 314-317  | 1-8-2015  | carota                               | Khatyrchy-1           | 40°01.643' | 065°58.196' | L            |                 | market          |                   |                 | landrace from Omon a village close to Khatyrchy                         |         |
| 150276 | KEK114            | UZB     | 107       | 318      | 2-8-2015  | carota                               | Chaqurcul-1           | 40°16.325' | 065°59.206' | 685 W        | level           | pasture         | occasionally      | 10              |   |         |
| 150277 | KEK115            | UZB     | 107       | 319-321  | 2-8-2015  | carota                               | Chaqurcul-2           | 40°16.377' | 065°59.164' | 694 W        | level           | backyard        | occasionally      | 14              | family Gofir Esankulov  |         |
| 150278 | KEK116            | UZB     | 107       | 322-324  | 2-8-2015  | carota                               | Og tepa               | 40°16.584' | 066°01.041' | 718 W        | level           | backyard        | abundant          | 15              |   |         |
| 150279 | KEK117            | UZB     | 107       | 325-332  | 2-8-2015  | carota                               | Langar                | 40°22.719' | 066°00.303' | 1200 W       | hilly           | grassland       | abundant          | 17              | 5 m above a rivulet   |         |
| 150280 | KEK118            | UZB     | 107       | 335-336  | 2-8-2015  | carota                               | Chaqurcul-3           | 40°17.116' | 065°57.656' | 766 W        | undulating      | field margin    | frequent          | 15              | ripened seeds   |         |
| 150281 | KEK119            | UZB     | 107       | 340-344  | 2-8-2015  | carota                               | Khatyrchy-2           | 40°01.638' | 065°58.217' | L            |                 | market          |                   |                 | landrace from Chozatov ; village close to Khatyrchy                     |         |
| 150282 | KEK120            | UZB     | 107       | 345-347  | 2-8-2015  | carota                               | Karatepa              | 39°22.686' | 066°59.690' | 1001 W       | steep           | shrubland       | abundant          | 15              |   |         |
| 150283 | KEK121            | UZB     | 107       | 348-349  | 2-8-2015  | carota                               | Omonguton             | 39°19.323' | 066°59.250' | 1173 W       | hilly           | backyard        | abundant          | 16              | backyard looks like a field; 90% flowering plants + 10% ripened seeds   |         |
| 150284 | KEK122            | UZB     | 107       | 351-352  | 3-8-2015  | carota                               | Derband               | 38°11.641' | 067°01.110' | 994 W        | level           | field margin    | frequent          | 16              |   |         |
| 150285 | KEK123            | UZB     | 107       | 353-354  | 3-8-2015  | carota                               | Balandgumsoy          | 38°09.615' | 067°04.307' | 1026 W       | level           | orchard         | abundant          | 32              | all plants with ripened seeds   |         |
| 150286 | KEK124            | UZB     | 107       | 361-367  | 3-8-2015  | carota                               | Sina-1                | 38°19.372' | 067°45.539' | 820 W        | undulating      | roadside        | frequent          | 16              | many plants with ripened seeds, also flowering ones                     |         |
| 150287 | KEK125            | UZB     | 107       | 368-369  | 3-8-2015  | carota                               | Kukabuloq             | 38°20.850' | 067°43.033' | 1079 W       | undulating      | orchard         | abundant          | 30              | grape orchard; many ripened   |         |
| 150288 | KEK126            | UZB     | 107       | 370-371  | 3-8-2015  | carota                               | Sina-2                | 38°22.666' | 067°40.197' | 1433 W       | undulating      | backyard        | frequent          | 18              | 10% ripened, 90% flowering  |         |
| 150289 | KEK127            | UZB     | 107       | 379-380  | 4-8-2015  | carota                               | Ushor-1               | 38°23.719' | 067°40.100' | 1487 W       | undulating      | field margin    | abundant          | 17              | many ripened plants, some flowering                                     |         |
| 150290 | KEK128            | UZB     | 107       | 381-385  | 4-8-2015  | carota                               | Denau-1               | 38°16.451' | 067°53.359' | L            |                 | market          |                   |                 | landrace from Buchara, red carrot, local name Mirzoi                    |         |
| 150291 | KEK129            | UZB     | 107       | 381-385  | 4-8-2015  | carota                               | Denau-2               | 38°16.451' | 067°53.359' | L            |                 | market          |                   |                 | from Namangan, yellow carrot; local name Mushki                         |         |
| 150292 | KEK130            | UZB     | 107       | 386-389  | 4-8-2015  | carota                               | Denau-3               | 38°16.451' | 067°53.359' | L            |                 | market          |                   |                 | local landrace; red carrot; name Diloram                                |         |
| 150293 | KEK131            | UZB     | 107       | 390      | 4-8-2015  | carota                               | Denau-4               | 38°16.451' | 067°53.359' | L            |                 | market          |                   |                 | mixture red/yellow seeds?; local name: Kysyl mischki; seller: Khakibes  |         |



| RNR    | collecting number | country | photo map | photo nr | date      | species name given during expedition | nearest locality name | latitude   | longitude   | altitude (m) | population type | topography | collecting source | population size | number of plants sampled | remarks  |
|--------|-------------------|---------|-----------|----------|-----------|--------------------------------------|-----------------------|------------|-------------|--------------|-----------------|------------|-------------------|-----------------|--------------------------|--|
| 150294 | KEK132            | UZB     | 107       | 394-395  | 4-8-2015  | carota                               | Nilu                  | 38°24.931' | 067°49.729' | 683          | W               | level      | field margin      | frequent        | 15                       | apple/apricot garden; plants with ripened seeds and plants still flowering |
| 150295 | KEK133            | UZB     | 107       | 396-397  | 4-8-2015  | carota                               | Sangardak-1           | 38°31.883' | 067°34.631' | 1167         | W               | undulating | aquatic habitat   | frequent        | 26                       | along rivulet  |
| 150296 | KEK134            | UZB     | 107       | 400-401  | 4-8-2015  | carota                               | Sangardak-2           | 38°31.998' | 067°34.418' | 1153         | W               | undulating | orchard           | abundant        | 25                       | apple orchard; 5 m above river, 5% of plants with ripened seeds            |
| 150297 | KEK135            | UZB     | 107       | 411-412  | 5-8-2015  | carota                               | Boyson                | 38°09.576' | 067°06.121' | 1082         | W               | undulating | orchard           | abundant        | 38                       | apple orchard, flowering and ripened                                       |
| 150298 | KEK136            | UZB     | 107       | 423-424  | 5-8-2015  | carota                               | Chigatoy              | 38°56.015' | 066°56.523' | 859          | W               | undulating | field margin      | abundant        | 18                       | vineyard; all plants with ripened seeds                                    |
| 150299 | KEK137            | UZB     | 107       | 425-426  | 5-8-2015  | carota                               | Pinji                 | 38°54.604' | 067°03.481' | 1015         | W               | level      | orchard           | abundant        | 20                       | apple orchard, many flowering plants, also ripened seeds                   |
| 150300 | KEK138            | UZB     | 107       | 427-429  | 6-8-2015  | carota                               | Kaltagul-1            | 38°50.235' | 067°07.718' | 1526         | W               | hilly      | grassland         | abundant        | 17                       | half flowering half with ripened seeds                                     |
| 150301 | KEK139            | UZB     | 107       | 430-431  | 6-8-2015  | carota                               | Kaltagul-2            | 38°50.585' | 067°06.490' | 1296         | W               | undulating | orchard           | abundant        | 26                       | many ripened   |
| 150302 | KEK140            | UZB     | 107       | 432-433  | 6-8-2015  | carota                               | Samarkand-1           | 39°39.719' | 066°58.780' |              | L               |            | market            |                 |                          | from Akdarja; local name: Mushtum; red carrot                              |
| 150303 | KEK141            | UZB     | 107       | 432-433  | 6-8-2015  | carota                               | Samarkand-2           | 39°39.719' | 066°58.780' |              | L               |            | market            |                 |                          | from Akdarja; local name: Mirzoi; yellow carrot                            |
| 150304 | KEK142            | UZB     | 107       | 434-435  | 6-8-2015  | carota                               | Samarkand-3           | 39°39.708' | 066°58.807' |              | L               |            | market            |                 |                          | from Urgut; local name Mirzoi; red carrot                                  |
| 150305 | KEK143            | UZB     | 107       | 434-435  | 6-8-2015  | carota                               | Samarkand-4           | 39°39.708' | 066°58.807' |              | L               |            | market            |                 |                          | from Urgut, local name Mirzoi, yellow carrot                               |
| 150306 | KEK144            | UZB     | 107       | 437-438  | 6-8-2015  | carota                               | Chubar                | 39°49.787' | 067°45.419' | 926          | W               | level      | backyard          | abundant        | 15                       | flowering + ripened  |
| 150307 | KEK145            | UZB     | 107       | 439      | 6-8-2015  | carota                               | Jadik                 | 39°45.849' | 067°55.853' | 1206         | W               | undulating | field             | abundant        | 20                       | many flowering , few ripened   |
| 150308 | KEK146            | UZB     | 107       | 440-441  | 7-8-2015  | carota                               | Jum-jum               | 39°42.460' | 067°51.962' | 1481         | W               | level      | orchard           | abundant        | 15                       | many flowering , few ripened   |
| 150309 | KEK147            | UZB     | 107       | 444-445  | 7-8-2015  | carota                               | Mugol                 | 39°43.942' | 067°47.706' | 1270         | W               | level      | orchard           | abundant        | 12                       | apple orchard; many flowering , few ripened                                |
| 150310 | KEK148            | UZB     | 107       | 450-452  | 7-8-2015  | carota                               | Toza Uruk-1           | 39°51.848' | 067°35.542' |              | L               |            | shop              |                 |                          | from broker; Namangan area; 120 days red cultivar; name cv: Shantoon       |
| 150311 | KEK149            | UZB     | 107       | 450-452  | 7-8-2015  | carota                               | Toza Uruk-2           | 39°51.848' | 067°35.542' |              | L               |            | shop              |                 |                          | from broker; Namangan area; name cv Shantoon-mixed seeds; 90 days cv       |
| 150312 | KEK150            | UZB     | 107       | 450-452  | 7-8-2015  | carota                               | Toza Uruk-3           | 39°51.848' | 067°35.542' |              | L               |            | shop              |                 |                          | from broker; Namangan area; local name: Shantoon, 70 days yellow carrot cv |
| 150201 | LVK001            | KGZ     | 107       | 458-459  | 12-8-2015 | carota                               | Bishkek-1             | 42°52.479' | 074°34.200' |              | L               |            | market            |                 |                          | Osh bazar; landrace from Alexandrovka; local name: Carotelle               |
| 150202 | LVK002            | KGZ     | 107       | 458-459  | 12-8-2015 | carota                               | Bishkek-2             | 42°52.479' | 074°34.200' |              | L               |            | market            |                 |                          | Osh bazar; landrace from Alexandrovka; yellow carrot                       |
| 150203 | LVK003            | KGZ     | 107       | 460-461  | 14-8-2015 | carota                               | Gavrilovka            | 42°52.125' | 074°22.240' | 737          | W               | level      | field margin      | frequent        | 14                       | flowering + ripened  |
| 150204 | LVK004            | KGZ     | 107       | 462-463  | 14-8-2015 | carota                               | Myrake                | 42°44.626' | 074°01.143' | 972          | W               | level      | roadside          | frequent        | 17                       | flowering + ripened  |
| 150205 | LVK005            | KGZ     | 107       | 464-465  | 14-8-2015 | carota                               | Sosnovka              | 42°40.443' | 073°55.394' | 1120         | W               | level      | field margin      | abundant        | 17                       | flowering + ripened  |
| 150206 | LVK006            | KGZ     | 107       | 466-467  | 14-8-2015 | carota                               | Chichkan              | 42°01.310' | 072°50.893' | 1310         | W               | undulating | roadside          | abundant        | 25                       | many flowering, few ripened  |
| 150207 | LVK007            | KGZ     | 107       | 468-469  | 14-8-2015 | carota                               | Toktogul-1            | 41°56.812' | 072°52.465' | 1063         | W               | level      | shrubland         | abundant        | 20                       | half flowering half with ripened seeds                                     |
| 150208 | LVK008            | KGZ     | 107       | 471-472  | 15-8-2015 | carota                               | Tortkent              | 41°50.696' | 073°06.584' | 982          | W               | level      | field margin      | frequent        | 22                       | most ripened   |
| 150209 | LVK009            | KGZ     | 107       | 474-475  | 15-8-2015 | carota                               | Toktogul-reservoir    | 41°41.219' | 072°53.530' | 1116         | W               | level      | roadside          | frequent        | 27                       | few ripened  |
| 150210 | LVK010            | KGZ     | 107       | 484-486  | 15-8-2015 | carota                               | Kara-tit              | 41°30.784' | 072°14.682' | 1124         | W               | undulating | grassland         | frequent        | 22                       | many ripened, but also unripened   |
| 150211 | LVK011            | KGZ     | 107       | 489-490  | 15-8-2015 | carota                               | Tegene                | 41°30.942' | 072°13.400' | 1027         | W               | undulating | roadside          | abundant        | 16                       | most ripened   |
| 150212 | LVK012            | KGZ     | 107       | 491-494  | 15-8-2015 | carota                               | Kichi Ak Jol          | 41°33.096' | 072°10.900' | 908          | L               | undulating | field             | abundant        | 25                       | field with carrot landrace; all ripened seeds                              |
| 150213 | LVK013            | KGZ     | 107       | 495-496  | 15-8-2015 | carota                               | Kizil Tuu             | 41°39.943' | 072°03.049' | 903          | W               | undulating | roadside          | abundant        | 17                       | many ripened, but also unripened   |

| RNR    | collecting number | country | photo map | photo nr | date      | species name given during expedition | nearest locality name | latitude   | longitude   | altitude (m) | population type | topography      | collecting source | population size | number of plants sampled | remarks   |
|--------|-------------------|---------|-----------|----------|-----------|--------------------------------------|-----------------------|------------|-------------|--------------|-----------------|-----------------|-------------------|-----------------|--------------------------|---|
| 150214 | LVK014            | KGZ     | 107       | 506-507  | 16-8-2015 | carota                               | Sary Chelek lake      | 41°51.531' | 071°56.774' | 1626 W       | hilly           | forest/woodland | frequent          |                 | 12                       | along road on forest margin; few ripened                      |
| 150215 | LVK015            | KGZ     | 107       | 508-509  | 16-8-2015 | carota                               | Arky                  | 41°49.112' | 071°57.444' | 1285 W       | undulating      | shrubland       | abundant          |                 | 15                       | most ripened but also flowering plants                        |
| 150216 | LVK016            | KGZ     | 107       | 510-513  | 16-8-2015 | carota                               | Aflatun               | 41°39.094' | 071°59.916' | 956 W        | level           | roadside        | frequent          |                 | 28                       | along river; ripened + unripened                              |
| 150217 | LVK017            | KGZ     | 107       | 514-517  | 16-8-2015 | carota                               | Jerge-Tal             | 41°35.767' | 071°52.116' | 1182 W       | level           | roadside        | abundant          |                 | 33                       | many ripened, but also unripened                              |
| 150218 | LVK018            | KGZ     | 107       | 518-519  | 16-8-2015 | carota                               | Padysh-Ata-1          | 41°32.688' | 071°42.382' | 1480 W       | undulating      | wild habitat    | abundant          |                 | 20                       | flowering + ripened plants                                    |
| 150219 | LVK019            | KGZ     | 107       | 522-523  | 16-8-2015 | carota                               | Padysh-Ata-2          | 41°33.670' | 071°40.830' | 1461 W       | hilly           | field           | abundant          |                 | 21                       | many ripened, but also unripened                              |
| 150220 | LVK020            | KGZ     | 107       | 531-532  | 16-8-2015 | carota                               | Japa-Saldy            | 41°27.011' | 071°34.082' | 1340 W       | level           | field margin    | frequent          |                 | 13                       | ripened + unripened seeds                                     |
| 150221 | LVK021            | KGZ     | 107       | 542-544  | 17-8-2015 | carota                               | Jany Bazar-1          | 41°41.474' | 070°53.030' | 1524 W       | undulating      | grassland       | frequent          |                 | 26                       | few ripened, many flowering                                   |
| 150222 | LVK022            | KGZ     | 107       | 545-546  | 17-8-2015 | carota                               | Aygyr-Djal            | 41°44.686' | 071°01.246' | 1648 W       | level           | grassland       | frequent          |                 | 20                       | many flowering, some ripened                                  |
| 150223 | LVK023            | KGZ     | 107       | 547-549  | 17-8-2015 | carota                               | Jany Bazar-2          | 41°42.302' | 070°53.562' | 1551 W       | undulating      | grassland       | abundant          |                 | 17                       | along river; fl+unripe+rip                                    |
| 150224 | LVK024            | KGZ     | 107       | 555-556  | 18-8-2015 | carota                               | Burgondu              | 41°03.212' | 072°15.186' | 574 W        | undulating      | field margin    | abundant          |                 | 20                       | all plants with ripened seeds                                 |
| 150225 | LVK025            | KGZ     | 107       | 557-558  | 18-8-2015 | carota                               | Kyarma                | 41°00.697' | 072°47.266' | 731 W        | level           | field margin    | abundant          |                 | 20                       | fl+unripe+ripe  |
| 150226 | LVK026            | KGZ     | 107       | 559-560  | 18-8-2015 | carota                               | Ozgorush              | 40°51.555' | 073°09.299' | 1097 W       | level           | field margin    | abundant          |                 | 20                       | fl+unripe+ripe; most ripe; margin of wheat field              |
| 150227 | LVK027            | KGZ     | 107       | 561-563  | 18-8-2015 | carota                               | Ozgen-1               | 40°46.167' | 073°17.401' |              | L               |                 | market            |                 |                          | yellow variety; name seller: Ulmaghan; origin close to Ozgen  |
| 150228 | LVK028            | KGZ     | 107       | 561-563  | 18-8-2015 | carota                               | Ozgen-2               | 40°46.167' | 073°17.401' |              | L               |                 | market            |                 |                          | red variety; name seller: Ulmaghan; origin close to Ozgen     |
| 150229 | LVK029            | KGZ     | 107       | 561-563  | 18-8-2015 | carota                               | Ozgen-3               | 40°46.167' | 073°17.401' |              | L               |                 | market            |                 |                          | yellow variety ; name seller: Hatanjan; origin close to Ozgen |
| 150230 | LVK030            | KGZ     | 107       | 567-568  | 18-8-2015 | carota                               | Kurshab               | 40°42.480' | 073°13.008' | 967 W        | undulating      | field margin    | abundant          |                 | 20                       | fl+unripe+ ripe seeds   |
| 150231 | LVK031            | KGZ     | 107       | 569-570  | 18-8-2015 | carota                               | Karman                | 40°34.009' | 072°53.494' | 986 W        | level           | field margin    | abundant          |                 | 20                       | unripe+ripe seeds   |
| 150232 | LVK032            | KGZ     | 107       | 571-572  | 19-8-2015 | carota                               | Osh bazar-1           | 40°32.422' | 072°47.721' |              | L               |                 | market            |                 |                          | red variety; from Andyan                                      |
| 150233 | LVK033            | KGZ     | 107       | 571-572  | 19-8-2015 | carota                               | Osh bazar-2           | 40°32.422' | 072°47.721' |              | L               |                 | market            |                 |                          | yellow variety; from Andyan                                   |
| 150234 | LVK034            | KGZ     | 107       | 577-578  | 19-8-2015 | carota                               | Madi                  | 40°32.685' | 072°55.360' | 1066 W       | level           | field margin    | abundant          |                 | 20                       | many ripe seeds, but also flowering plants                    |
| 150235 | LVK035            | KGZ     | 107       | 582-583  | 19-8-2015 | carota                               | Kata Kaldik           | 40°17.764' | 073°15.510' | 2042 L       | level           | field           | frequent          |                 | 5                        | landrace from farmers field along M41                         |
| 150236 | LVK036            | KGZ     | 107       | 586-687  | 19-8-2015 | carota                               | Gulca                 | 40°19.821' | 073°24.529' | 1542 W       | hilly           | grassland       | frequent          |                 | 20                       | flowering+ripe+unripe seeds                                   |
| 150237 | LVK037            | KGZ     | 107       | 588-589  | 20-8-2015 | carota                               | Borbash               | 40°16.169' | 072°30.878' | 1376 W       | level           | field margin    | frequent          |                 | 18                       | flowering+ripe+unripe seeds                                   |
| 150238 | LVK038            | KGZ     | 107       | 590      | 20-8-2015 | carota                               | Kok-Jar               | 40°18.088' | 072°19.742' | 1236 W       | level           | field margin    | abundant          |                 | 20                       | flowering+ripe+unripe seeds                                   |
| 150239 | LVK039            | KGZ     | 107       | 591-592  | 20-8-2015 | carota                               | Uch-Kurgan            | 40°12.570' | 072°03.947' | 1007 W       | level           | orchard         | abundant          |                 | 20                       | peach orchard; flowering+ripe+unripe seeds                    |
| 150240 | LVK040            | KGZ     | 107       | 593-594  | 20-8-2015 | carota                               | Kara-Jigach           | 40°08.725' | 072°05.721' | 1101 W       | undulating      | pasture         | abundant          |                 | 16                       | flowering+ripe+unripe seeds; few ripe seeds                   |
| 150241 | LVK041            | KGZ     | 107       | 595-596  | 20-8-2015 | carota                               | Shady                 | 40°10.856' | 071°40.364' | 851 W        | undulating      | field           | abundant          |                 | 20                       | flowering+ripe+unripe seeds; most ripe seeds                  |
| 150242 | LVK042            | KGZ     | 107       | 597-598  | 20-8-2015 | carota                               | Oph                   | 40°18.454' | 071°16.265' | 531 W        | level           | field margin    | abundant          |                 | 20                       | all plants with ripened seeds                                 |
| 150243 | LVK043            | KGZ     | 107       | 603-604  | 20-8-2015 | carota                               | Bathken-1             | 40°06.056' | 070°52.225' | 967 W        | level           | field           | abundant          |                 | 25                       | maize field and apricot orchard; all ripened seeds            |
| 150244 | LVK044            | KGZ     | 107       | 605-606  | 21-8-2015 | carota                               | Bathken-2             | 40°01.702' | 070°49.686' | 1082 W       | level           | field margin    | frequent          |                 | 20                       | maize field; all ripened seeds                                |
| 150245 | LVK045            | KGZ     | 107       | 607-609  | 21-8-2015 | carota                               | Kara Bulak            | 39°55.770' | 070°55.847' | 1550 W       | steep           | grassland       | abundant          |                 | 20                       | flowering+unripe+ripe seeds                                   |

| RNR    | collecting number | country | photo map | photo nr | date      | species name given during expedition | nearest locality name | latitude   | longitude   | altitude (m) | population type | topography | collecting source | population size | number of plants sampled | remarks   |
|--------|-------------------|---------|-----------|----------|-----------|--------------------------------------|-----------------------|------------|-------------|--------------|-----------------|------------|-------------------|-----------------|--------------------------|---|
| 150246 | LVK046            | KGZ     | 107       | 612-614  | 21-8-2015 | carota                               | Koktash               | 39°56.939' | 070°31.227' | 1140 W       | level           |            | field             | abundant        | 20                       | field in between maize and apricot field; flowering+ripe+unripe seeds |
| 150247 | LVK047            | KGZ     | 107       | 615      | 21-8-2015 | carota                               | Leylek                | 39°52.867' | 070°07.642' | 1662 W       | level           |            | field margin      | frequent        | 15                       | young apple plantation; flowering+ripe+unripe seeds                   |
| 150248 | LVK048            | KGZ     | 107       | 618-619  | 21-8-2015 | carota                               | Isfana                | 39°50.591' | 069°30.939' | 1229 W       | level           |            | field margin      | frequent        | 23                       | wheat field next to rivulet; flowering+ripe+unripe seeds              |
| 150249 | LVK049            | KGZ     | 107       | 620-622  | 21-8-2015 | carota                               | Ak-Suu                | 39°52.370' | 069°22.332' | 992 W        | undulating      |            | field             | abundant        | 25                       | tomato field; all ripened seeds                                       |
| 150250 | LVK050            | KGZ     | 107       | 623-625  | 21-8-2015 | carota                               | Suu-Bash              | 39°51.631' | 069°23.042' | 1073 W       | level           |            | field             | abundant        | 21                       | 5 m above a rivulet; fl+unripe+ripe seeds                             |
| 150251 | LVK051            | KGZ     | 107       | 628-629  | 22-8-2015 | carota                               | Korgon                | 39°54.260' | 069°54.457' | 1010 W       | level           |            | field margin      | abundant        | 20                       | along maize field and along rivulet                                   |
| 150252 | LVK052            | KGZ     | 107       | 630-631  | 22-8-2015 | carota                               | Markax                | 40°14.406' | 071°59.362' | 858 W        | level           |            | field margin      | abundant        | 20                       | flowering+ripe+unripe seeds   |
| 150253 | LVK053            | KGZ     | 107       | 640-641  | 24-8-2015 | carota                               | Talas                 | 42°30.463' | 072°15.922' | 1264 W       | level           |            | fallow land       | frequent        | 20                       | unripe+ripe seeds   |
| 150254 | LVK054            | KGZ     | 107       | 642-644  | 24-8-2015 | carota                               | Boo Terek             | 42°35.327' | 071°44.801' | 919 W        | level           |            | roadside          | frequent        | 15                       | unripe+ripe seeds   |
| 150255 | LVK055            | KGZ     | 107       | 645-646  | 24-8-2015 | carota                               | Chong Kara Buura      | 42°31.234' | 071°33.831' | 1110 W       | level           |            | wild habitat      | abundant        | 20                       | along river; all ripened seeds  |
| 150256 | LVK056            | KGZ     | 107       | 649-650  | 24-8-2015 | carota                               | Amanbaev              | 42°36.034' | 071°12.449' | 999 W        | level           |            | weedy habitat     | frequent        | 22                       | flowering+ripe+unripe seeds   |
| 150257 | LVK057            | KGZ     | 107       | 651-652  | 24-8-2015 | carota                               | Kok Dodo              | 42°45.379' | 071°26.355' | 736 W        | level           |            | field             | abundant        | 20                       | all plants with ripened seeds   |
| 150258 | LVK058            | KGZ     | 107       | 670-671  | 27-8-2015 | carota                               | Kashka-Su             | 42°40.932' | 074°30.979' | 1425 W       | level           |            | weedy habitat     | frequent        | 20                       | flowering+ripe+unripe seeds   |
| 150259 | LVK059            | KGZ     | 107       | 672-674  | 27-8-2015 | carota                               | Kizil-Arik            | 42°39.938' | 075°02.728' | 1295 W       | level           |            | backyard          | abundant        | 21                       | flowering+ripe+unripe seeds   |
| 150260 | LVK060            | KGZ     | 107       | 675-676  | 28-8-2015 | carota                               | Kemin                 | 42°49.058' | 075°34.816' | 1024 W       | level           |            | farm habitat      | abundant        | 22                       | mostly ripe seeds   |
| 150261 | LVK061            | KGZ     | 107       | 677-678  | 28-8-2015 | carota                               | Jangi-Jol             | 42°46.811' | 075°59.480' | 1520 W       | level           |            | field margin      | abundant        | 21                       | wheat field; all ripe seeds   |





