Report of a melon collecting expedition in Uzbekistan

Itineray, collected material and data

Kik C, F Khasanov & A Esankulov

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Centre for Genetic Resources, the Netherlands (CGN), Wageningen University & Research
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CGN is ISO 9001 certified.

Picture front page: Collecting melons at a farmer's field (KE 28-30).

Contents

Preface

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 genepool 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 genepool as possible.

The landraces of melon in Central Asia form such a case. Therefore in 2017 CGN carried out a collecting mission in Uzbekistan, in close collaboration with its local counterparts. The present report provides details of the results of this collecting mission. Six plant breeding companies co-financed the mission, a fact that is duly recognized and appreciated.

During the mission fifty seed samples were collected. 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 involved.

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

1 Introduction

In the global plant genetic database GENESYS (www.genesys-pgr.org), 8066 melon (*Cucumis melo* L.) accessions are present, which are maintained in 388 holding institutes of which 20 institutes hold more than 50 accessions. 4696 accessions are reported as landraces/traditional varieties and 214 accessions as wild/natural. The Centre for Genetic Resources, the Netherlands (CGN) holds 76 melon accessions.
It has been recently shown that melon has most probably a Central Asian origin and not, as has been thought a long time, an African origin (Sebastian *et al.* 2010). Therefore one could expect that in Central Asia, as a centre of melon biodiversity, a substantial amount of variation is present. As can be noted from Table 1 1766 melon accessions of Central Asian origin are reported in GENESYS of which 63% (1112/1766) are available for distribution. Most accessions collected originated from India, Afghanistan and Iran.

Table 1 *The number of melon accessions originating from Central Asian countries present in genebanks worldwide according to GENESYS.*

Country	Not available	Available	Unknown	Total
AFG	170	205	11	386
CHN	9	33	41	83
IND	120	647	35	802
IRN	87	123	5	215
KAZ	1	5	6	12
KGZ			3	3
PAK	23	17	27	67
TJK	2	1	8	11
TKM	20	57	13	90
UZB	26	24	47	97
total	**458**	**1112**	**196**	**1766**

Uzbekistan is since ancient times famous for its melons (Jermokhin *et al.* 1962, Mavlyanova *et al.* 2005, Hansen 2015), however its genetic resources are poorly represented in genebanks worldwide (Table 1). Therefore a collecting mission to this country is clearly warranted.

In order to make such a collecting mission possible 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 in the first half of 2017 between the appropriate authorities of both countries and this document formed the legal basis of the expedition (Appendix 1).

2 Objectives of the expedition

The major aim of this single crop expedition is to broaden the *Cucumis melo* collection (n=76) maintained at CGN by collecting landraces for breeding and research purposes, which consequently contributes to the international need for the conservation of plant genetic resources (PGR).

3 Members of the collecting team

- 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
- 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

The exploration area covered in both years together was from East to West Uzbekistan around 1000 km and from North to South Uzbekistan around 300 km (Figure 1). Two collecting mission took place. The first mission took place in 2016 and in this year Khasanov collected mostly in the Eastern part (Fergana valley) of the country. The sampling took place in June-October. The second mission took place in 2017 and this time Khasanov collected together with Esankulov and Kik. The collecting was carried out in the Central and Western part of the country and took place in August.

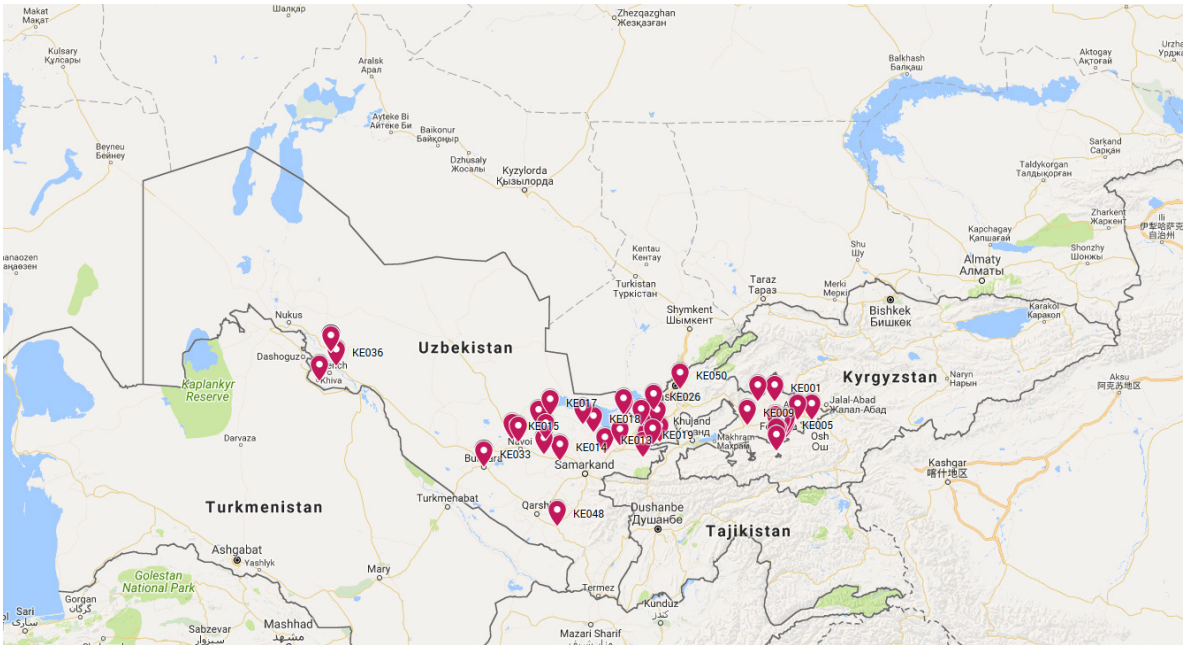

Figure 1 *The exploration area in Uzbekistan with the locations of the various accessions indicated (see also appendix 3).*

Collecting melons took place at markets from sellers (Photo 1) and along roads/fields from farmers (Photo 2).

Photo 1 *Melons sold at market places in Uzbekistan (KE 33-35; location: Bukhara market).*

Photo 2 *Melons sold on the road side by farmers (KE 39-43; location: Kalandar Khana).*

Often detailed information on melon cultivation, origin of seed, etc, could be obtained from melon farmers (Photo 3) but rarely from sellers on markets.

Photo 3 *Discussing with a farmer on his melon field (KE39-43).*

Temperatures during daytime in Uzbekistan were between 35-45 ˚C throughout the collecting period, which was considered by Uzbeks a high temperature for this time of the year. For transport a Chevrolet Lanetti 1.5 with airco (!) was used. A bit of a problem when driving around was that petrol (not gaz) was only available in Tashkent but not in the rest of the country because of a governmental regulation. This caused sometimes for some delay in the collecting work.

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 KExxx. 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°ddddd. Pictures were taken of the habitus and a cross-section of the melons collected. Occasionally pictures were taken of the collecting site. Passport data can be found in Appendix 4.

As a rule of thumb five melons were collected per accession. These melons costed around 0.5–1 € per melon depending upon the region and melon variety.

The seeds of the melons that were collected during the daytime were directly cleaned afterwards. The cleaning was done by removing gently the placentas with the seeds attached from the melons and these were put into a large diameter plastic bowl (Photo 4a). Then the seeds were gently removed from the placentas and these were put again in the plastic bowl whereas the placentas were discarded (Photo 4b). Subsequently the fine cleaning started by removing all the placenta tissue attached to the seeds. This was done via using repeated washing with water (Photo 4c). Finally the seeds were placed on a linen cloth which had a newspaper underneath (Photo 4d). The newspaper was needed for taking up excess water. Drying took place under ambient room conditions. Mostly after one night the seeds were dry and transferred in cotton bags (ca. 18 x 30 cm^2).

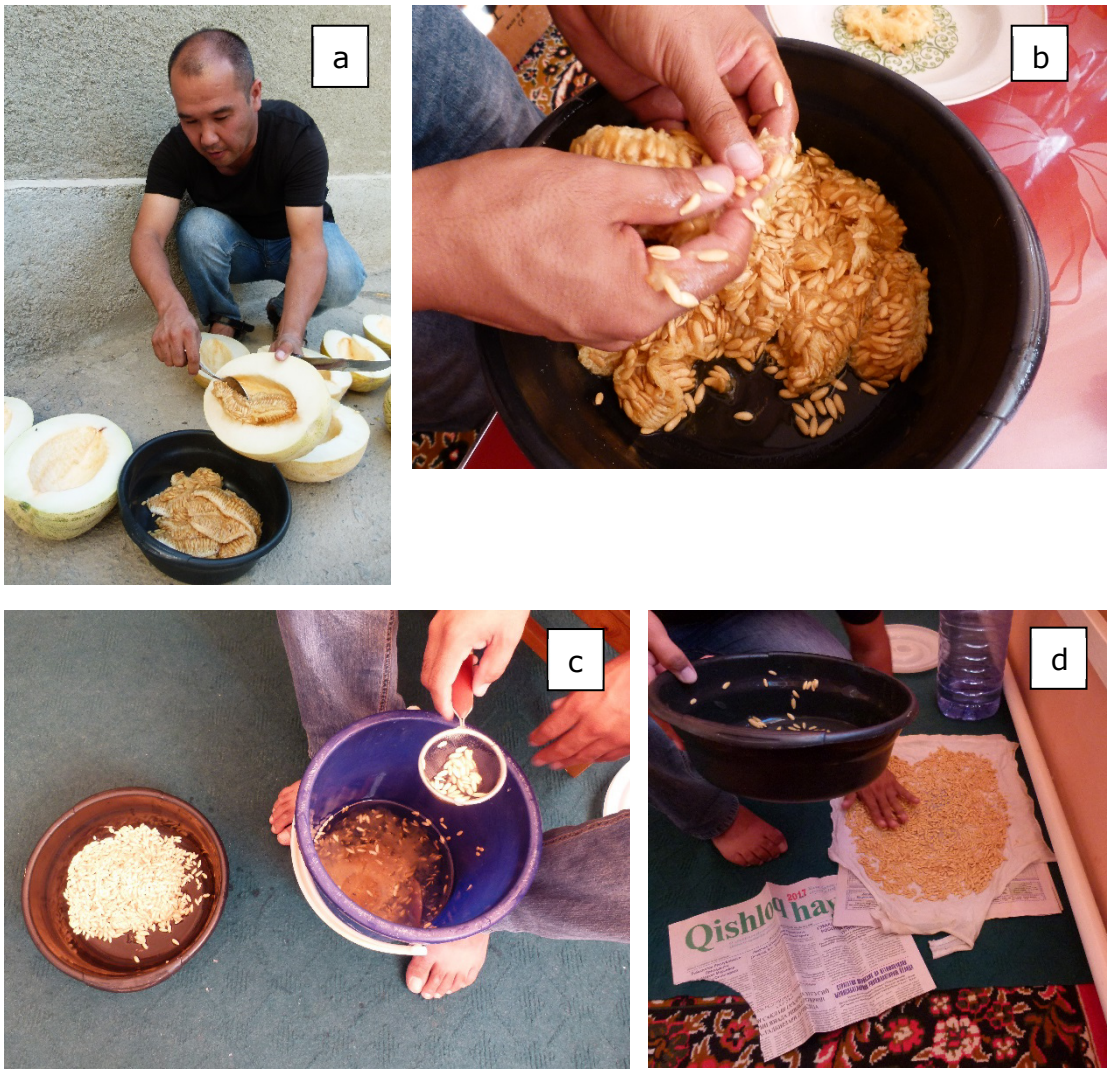

Photo 4 *Cleaning melon seeds: a. removing of the placentas with seeds from the melon by A. Esankulov, b. removing the seeds from the placentas and discarding the placentas, c. repeated washing of the seeds to remove placental tissue, d. drying of the cleaned seeds on a linen cloth.*

During the expedition the linen bags (with seeds) were kept 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 Collected material

In total 50 accessions were collected during the collecting missions. On average 155 grams of seed per accession was obtained which translated into ca. 2200 seeds per accession. Three types of melons were collected, namely Chandalak (spring-summer types), Amiri (summer types) and Zard (summer-autumn types) (Table 2). With respect to the Chandalak, Amiri and Zard types, 15, 30 and 5 accessions were sampled respectively. All three types were cultivated throughout the country. The assignment of accessions over the three types was done on the basis of the drawings and descriptions of melons in Jermokhin *et al.* (1962) and the photo's in Mavlyanova *et al.* (2005). However the book of Mavlyanova *et al.* (2005) was less useful as the pictures were often not really clear (too dark, not detailed enough, etc).

Table 2 *Distribution of the KE accessions (=numbers) collected over the three melon types: a: Amiri, c: Chandalak, z: Zard. The numbers in the Jermokin (= Jermokin et al., 1962) and Mavlyanova (= Mavlyanova et al. 2005) columns refer to the page numbers of these books where a variety is described which resembles to a large extent the variety collected. In case no resemblance in both books was found the opinion of local experts is presented.*

KE number	melon type	Jermokin	Mavlyanova	KE number	melon type	Jermokin	Mavlyanova
1	c	42	62	26	z	144	
2	a	94		27	c	52	69
3	c	62		28	c	56	71
4	c	68	79	29	a		
5	a	78		30	a	116	83
6	a	110		31	c		
7	c	44	73	32	a		
8	a	100		33	a		102
9	c	52	69	34	a	82	92
10	c	44	73	35	a	108	
11	a	118		36	z	138	174
12	c	60		37	c	60	
13	c	62		38	a		
14	a		99	39	c	46	
15	a		99	40	a	126	
16	a	124		41	a	108	
17	a	118		42	z	160	150
18	a	134		43	z	138	174
19	a	116	83	44	a	136	
20	a	116	83	45	a		99
21	a	110		46	a	108	
22	a			47	c	44	73
23	a			48	c	64	82
24	a	118		49	a	120	108
25	z	138	174	50	a	130	

As can be seen from Table 2, some collected varieties are identified as the same variety (same Jermokin page number): for example Chandalak KE 3 and 13 or Ameri 6, 21 and 50. Therefore a minimum of 10 Chandalaks varieties, 21 Amiri and 3 Zard's have been collected (Table 3). However most probably also these 'putative similar varieties' differ genetically as they are collected in different locations, where different cultivation and environmental conditions are present.

Table 3 *Putative similar and different collected melon varieties (KE numbers indicated). Varieties separated with a comma are putative similar varieties. Subdivision based on Jermokin (1962).*

Chandalak	Ameri	Zard
Putative similar varieties		
3, 13	6, 21	25, 36, 43
7, 10, 47	11, 17, 24	
9, 27	14, 15, 45	
12, 37	19, 20, 30	
	35, 41, 46	
Putative different varieties		
1	2	26
4	5	42
28	8	
31	16	
39	18	
48	23	
	22	
	29	
	32	
	33	
	34	
	38	
	40	
	44	
	49	
	50	

Modern varieties of melon were not encountered during the mission in Uzbekistan, which is most probably due to governmental policies (see section 6.2) Possibly KE 27 and KE 32 can be categorized as advanced-improved varieties. All other varieties collected were landraces as frequently was confirmed by farmers (Photo 5).

Photo 5 *Interview of a farmer by FO Khasanov and C Kik (KE45-46).*

A considerable number of local varieties were observed on local markets and on farms. However melon variety Torpedo [KE 14; also known as Mirzachoul or Ok-Urug (= white seed)] and Obinavot [KE 3; = sugarly water] were the most widespread melon varieties. The similarities between both varieties are that both of them have soft whitish pulp, and can be maintained for a longer time. They differ in a. sweetness (Torpedo is less sweet as Obinavot) and b. fruit shape (Torpedo has a torpedo-like shape, whereas Obinavot has a round shape). In Tashkent more variation in melon varieties were found. Probably this has to do with urban citizens which are interested in novelties for which they want to pay accordingly. Also the weight of melons was less compared to rural areas, this most probably has to do with the larger family sizes in rural areas.

Hybridization is possible when melon varieties are cultivated together in one field (Photo 5).

Photo 5 *Hybridization of melon cultivars cultivated together. From left to right: Obinavat (KE03) – Hybrid – Torpedo (KE 14).*

One farmer reported that around 20% hybridization takes place, however another farmer mentioned that hybridization between melon varieties rarely took place.
Selling of these hybrids at the market was considered problematic by one farmer as he thought that consumers didn't want to buy unknown varieties, so he used them as feed for his livestock. However often these hybrids were encountered by us on local markets.

6.2 Melon cultivation

The influence of the Uzbek government on agriculture has also a large effect on which crops are cultivated. First of all there is no private property, so farmers need to rent the land (on an annual basis?) from the government. Secondly the government decides what farmers cultivate and this results in the cultivation of cash crops, like cotton, wheat, rice, maize. Melons are not considered as cash crops due to their reduced storability. The cash crops cultivated have to be sold by farmers to the government, which subsequently sells them on the international market for the necessary foreign currency. Only 10-15% of the land rented by farmers can be used to cultivate crops for their own business. As melon is known as a profitable crop, it is often cultivated by farmers on their 'own' land.

Melons are mostly cultivated on small allotments (< 3 ha). On average two-three kg of seeds are sown per hectare. These seeds are farm-saved, are obtained from healthy plants that produce large melons, and are washed, dried and subsequently stored in a dry and dark place for next year sowing. The seeds are exchanged predominantly with trusted people (e.g. family, friends). If seeds are bought they cost around € 90 per kg.

Usually five-eight tons of melons are harvested per hectare (even 11 tons is possible). If cultivation is carried out on so-called 'bogara' fields (no use of external inputs) then the yield is low and small melons are harvested. When irrigation, chemical fertilization, and fungicides are used then yields over five tons per hectare are easily possible and large melons can be cultivated. The frequency of irrigation as reported to us was in between 2-10 times per year. Furthermore it was mentioned that around 10-15% of the plants were attacked by fungi (or fungus). The symptoms being the yellow colouring of the leaves (Photo 6).

Photo 6 *Diseased melon plants (yellow) in a melon cultivation.*

Farmers did not know the name of the fungal disease. The infected plants were treated with a $CuSO_4$ solution. Diseased plants did not die and produced small melons. Irrigation was very variable per farmer and took place in between no irrigation until 10 times per year. Chemical fertilization was applied by most farmers.

Melons were cultivated in a cycle with other crops on an allotment. Cycles mentioned were: melons (3 years) followed by wheat (2 years), followed by cotton (2-3 years) and then again melons. Also a cultivation cycle of melons (3 years) followed by 2 years fallow and then again melons was mentioned.

Next to the selling of fresh melons, also dried melons products are sold. Mostly melons are used which do not qualify for the fresh market (around 10% of the harvest). To this end melon slices are dried in the sun for a certain period and then are plaited into a pigtail of ca 30 cm (see Photo 7 a,b). Furthermore dried melons are also used as feed.

Photo 7 *Drying of melon slices (a) and the plaited melon product (b).*

Melons were predominantly used for selling at the local market. Although once a farmer was encountered that sold fresh melons (Torpedo) to Russia and the Baltic states. Furthermore he produced plaited melon pigtails. He cultivated 6 hectares of melons and 5 hectares of cotton annually.

7 Conclusions

a. A Memorandum of Understanding (MoU), agreeing on the use of the SMTA of the IT-PGRFA, was signed between the authorities of Uzbekistan and CGN. This MoU formed the legal basis of this expedition.

b. Fifty melon accessions were collected during the mission which can be subdivided in 30 Amiri, 15 Chandalaks and 5 Zard accessions.
c. Most accessions collected were landraces, except perhaps KE 27 and 32, which were improved landraces. No commercial varieties were encountered during the mission.
d. Torpedo (KE 14) and Obinavot (KE 3) were the landraces that were most present on markets.
e. Melons in Uzbekistan are predominantly used for local consumption.
f. Exchange of melons seeds is done via trusted relationships (predominantly within families).
g. Next to the fresh melon market there is also a dried melon market. Dried melon slices are plaited into pigtails of ca. 30 cm length and sold at bazars.
h. If melons cannot be used for the fresh or dried market they can be used as feed.
i. Hybridization between melon varieties takes place. It was mentioned that it could be around 20% of the seeds produced.
j. Often irrigation, chemical fertilization and use of fungicides takes place.
k. Ten–fifteen percent of the melon plants are annually attacked by fungi which cause a yellowing of the leaves. A $CuSO_4$-solution is often mentioned to combat the spread of fungal infections.
l. The melon collection (n= 76) maintained at CGN could be enlarged with 50 accessions from Central Asia.

8 References

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Mavlyanova R, A Rustamov, R Khakimov, M Turdieva & S Padulosi (2005). Melons of Uzbekistan. IPGRI's Sub-regional office for Central Asia, Tashkent, Uzbekistan (ISBN 978-92-9043-711-6), pp. 206.

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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 was of great value. Furthermore CK would like to express his sincere gratitude to the Furkat Khasanov and Ali Esankulov who made this collecting mission a success. The critical reviewing of the report by Willem van Dooijeweert is greatly acknowledged.

Appendix 1a Memorandum of Understanding

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

The undersigned, Dr. K. Tojibaev, Director of the Institute of the Genepool of Plants and Animals, Academy of Sciences of Uzbekistan, Tashkent, Uzbekistan and Ir. S.J. Hiemstra, 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 *Cucumis spp*, to be collected by the Institute of the Genepool of Plants and Animals and the Centre for Genetic Resources, the Netherlands in 2017.

Institute of the Genepool of Plants and Animals, Uzbekistan

Dr. K. Tojibaev (Director) Date 27.01.17

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

Ir. S.J. Hiemstra (Director) Date 8.01.2017

WAGENINGEN UR

WOT-UNIT CGN

Attachment 1: standard material transfer agreement (IT-PGRFA)

Appendix 1b SMTA

ARTICLE 10 — SIGNATURE/ACCEPTANCE

The Provider and the Recipient may choose the method of acceptance unless either party requires this Agreement to be signed.

Option 1 - Signature*

I, *(Full Name of Authorized Official)*, represent and warrant that I have the authority to execute this Agreement on behalf of the Provider and acknowledge my institution's responsibility and obligation to abide by the provisions of this Agreement, both by letter and in principle, in order to promote the conservation and sustainable use of Plant Genetic Resources for Food and Agriculture.

Signature..... Date 27.01.17

Name of the Provider .....

I, *(Full Name of Authorized Official)*, represent and warrant that I have the authority to execute this Agreement on behalf of the Recipient and acknowledge my institution's responsibility and obligation to abide by the provisions of this Agreement, both by letter and in principle, in order to promote the conservation and sustainable use of Plant Genetic Resources for Food and Agriculture.

Signature..... Date 8.01.2017

Name of the Recipient S. J. HIEMSTRA

WAGENINGEN UR WOT-UNIT CGN

Option 2 - Shrink-wrap Standard Material Transfer Agreements*

The Material is provided conditional on acceptance of the terms of this Agreement. The provision of the Material by the Provider and the Recipient's acceptance and use of the Material constitutes acceptance of the terms of this Agreement.

Option 3 - Click-wrap Standard Material Transfer Agreement*

☐ I hereby agree to the above conditions.

Appendix 2 Expedition collecting form

Uzbekistan - the Netherlands melon expedition 2016/17

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

Date…….....*Photo number*……

Crop name……*Cultivar name*……..

Latin species name……

Locality……

……

Latitude……*Longitude*……*Altitude*…….

Number of plants sampled:

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

Biological status of accession

100) Wild

200) Weedy

300) Traditional cultivar/landrace

500) Advanced/improved cultivar

Collecting/acquisition source

10) Wild habitat
11) Forest/woodland
12) Shrubland
13) Grassland
14) Desert/tundra
15) Aquatic habitat

20) Farm or cultivated habitat
21) Field
22) Orchard
23) Backyard, kitchen or home garden
24) Fallow land
25) Pasture

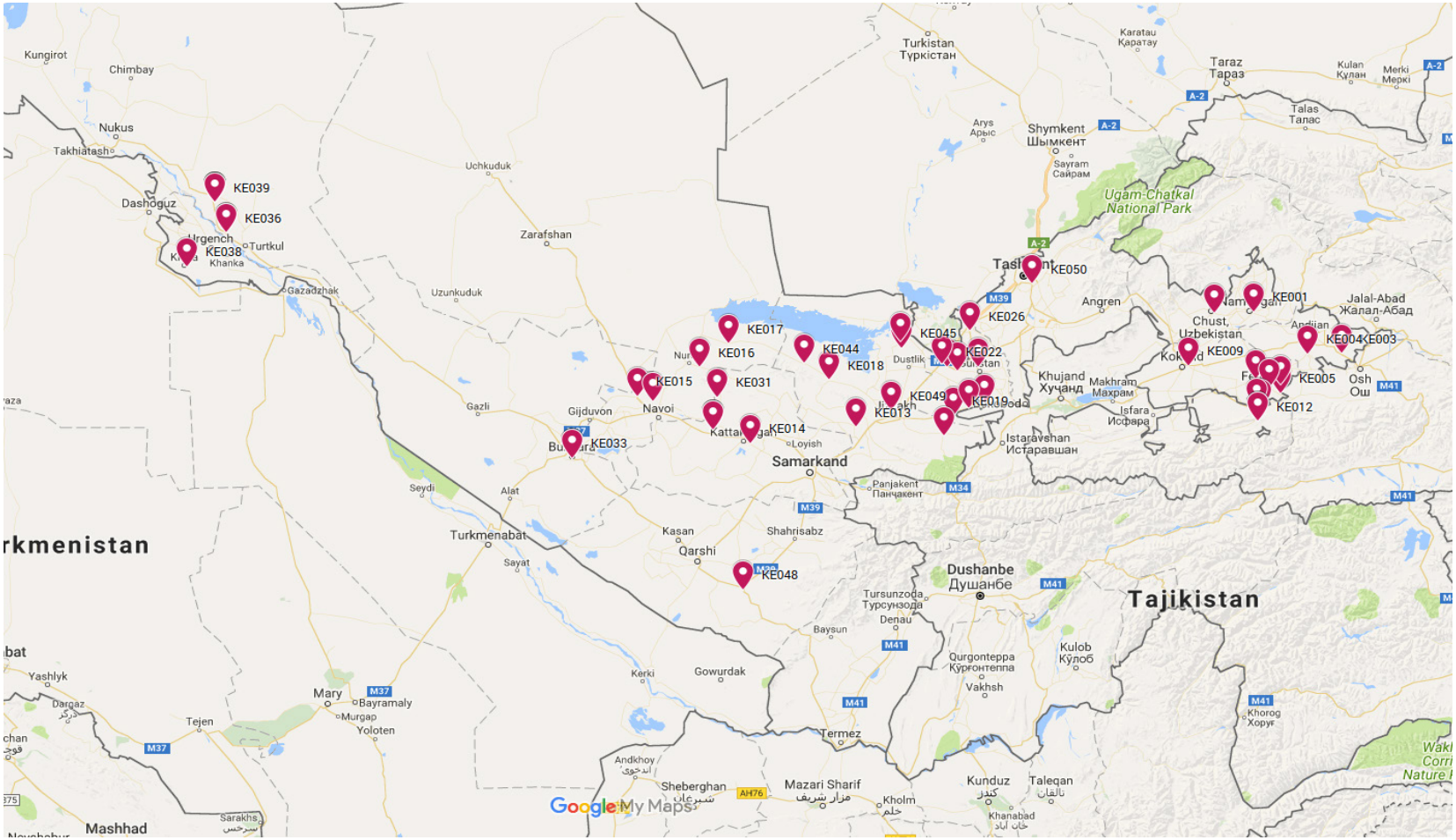
30) Market or shop

60) Weedy, disturbed or ruderal habitat
61) Roadside
62) Field margin

REMARKS
(diseases, pests, other)

Appendix 3 Map of locations where collecting took place in Uzbekistan

Collecting numbers (KExx) are indicated for the melon material collected



Appendix 4 Passport data of melon accessions (KExx) collected in Uzbekistan

Date: day-month-year; Melon type: a: ameri, C: chandalak, z: zard; Latitude and longitude determined via GPS: mapdatum WGS84, position format for longitude and latitude: hddd.ddddd'; Altitude in meters; Population type: L: landrace, A: advanced variety. Collecting source: field: roadside/field.

collecting number	country	photo map	photo nr	date	melon variety name	melon type	nearest locality name	latitude	longitude	altitude	population type	topography	collecting source	number of plants sampled	remarks	grams of seed	estimated number of seeds
KE01	UZB	IMG	1046, 1051	21-6-2016	Saryk samarkandi	c	Namangan	40.99840	71.6693	510	L	-	market	4	semi-sweet, no smell, taste like sweet avocado	64	635
KE02	UZB	IMG	1063	11-7-2016	Bekzodi	a	Chust	40.99020	71.2582	634	L	-	market	3	semi-sweet, no smell, taste like sweet avocado	118	1536
KE03	UZB	IMG	1068	11-7-2016	Obynavat	c	Khodzhiobod	40.64357	72.608	718	L	-	market	3	semi-sweet, light smell, very sweet	95	1152
KE04	UZB	IMG	1073	17-7-2016	Asaty	c	Asaka	40.64010	72.2486	518	L	-	market	4	no diseases, smell, semi-sweet	119	1553
KE05	UZB	IMG	1078, 1082	18-7-2016	Beshuruk	a	Kuvasoj	40.30850	71.9654	792	L	-	market	6	no smell, semi-sweet	78	868
KE06	UZB	IMG	1084, 1086	18-7-2016	Kokcha	a	Kuvasoj	40.38050	71.9654	792	L	-	market	5	light smell, semi-sweet	151	2088
KE07	UZB	IMG	1089, 1092	19-7-2016	Bosvoldy	c	Margilan	40.42635	71.7003	523	L	-	market	4	light smell, sweet	115	1486
KE08	UZB	IMG	1094, 1095, 1098	19-7-2016	Oknavat	a	Ferghana	40.35083	71.8434	651	L	-	market	4	strong smell, very sweet	95	1152
KE09	UZB	IMG	1100, 1104	19-7-2016	Kukalljapush	c	Kokand	40.54145	70.986	415	L	-	market	5	light smell, sweet	99	1219
KE10	UZB	IMG	1106, 1109	22-7-2016	Bosvoldy	c	Vuadyl	40.17895	71.7561	914	L	-	market	4	smell, very sweet	95	1152
KE11	UZB	IMG	1115	22-7-2016	Chillaky	a	Vuadyl	40.18770	71.7102	885	L	?	field	4	smell, sweet	110	1403
KE12	UZB	IMG	1119, 1122	22-7-2016	Asaty	c	Shahimardan	40.06562	71.7201	1163	L	?	field	3	smell, sweet	86	1002
KE13	UZB	IMG	1123, 1126	14-8-2016	Obynavat	c	Gallyaral	40.01697	67.4579	631	L	?	field	6	smell, very sweet, white pulp	122	1603
KE14	UZB	IMG	1130	14-8-2016	Palvanak	a	Kattakurgan	39.87673	66.3324	536	L	?	field	4	smell, very sweet, yellow pulp; Pavlanak = Torpedo	143	1954
KE15	UZB	IMG	1134, 1136	14-8-2016	Palvanak	a	Kanimech	40.28132	65.1421	328	L	?	field	3	smell, very sweet, yellow pulp; Pavlanak = Torpedo	139	1887
KE16	UZB	IMG	1139, 1142	17-8-2016	Amyri	a	Nurata	40.52972	65.8009	510	L	?	field	5	smell, semi-sweet	113	1453
KE17	UZB	IMG	1144, 1146	17-8-2016	Amyri	a	Kyzylcha	40.72828	66.1015	474	L	?	field	4	smell, semi-sweet	129	1720
KE18	UZB	IMG	1148, 1151	17-8-2016	Toychy	a	Yangikishlak	40.42145	67.1754	525	L	?	field	5	smell, sweet	90	1069
KE19	UZB	IMG	1154, 1157	18-8-2016	Kyzylgush	a	Uljanovo	40.11185	68.4918	413	L	?	field	4	smell, sweet, red pulp	132	1770
KE20	UZB	IMG	1160, 1163	18-8-2016	Zaamin	a	Havast	40.22098	68.8226	353	L	?	field	5	smell, sweet, red pulp	119	1553
KE21	UZB	IMG	1167, 1171	18-8-2016	Zaamin	a	Zaamin	39.94197	68.3919	707	L	?	field	4	ripened, smell, sweet	138	1870
KE22	UZB	IMG	1173, 1176	21-8-2106	Maxalliy	a	Shordaba	40.53102	68.4268	268	L	?	field	2	smell, sweet, 49 cm long; Mirchakul = Torpedo	85	985
KE23	UZB	IMG	1177, 1181	21-8-2016	Mirzachul	a	Shodlik	40.50037	68.5311	264	L	?	field	3	smell, sweet, 35 cm long; Mirchakul = Torpedo	85	985
KE24	UZB	IMG	1189, 1192	12-9-2016	Dzhurakanta	a	Bakht	40.52845	68.7562	?	L	-	market	6	smell, very sweet	126	1670
KE25	UZB	IMG	1195, 1197	22-7-2016	Kampyrchopon	z	Altynkulj	40.06562	71.7201	443	L	?	field	4	smell, tastes inbetween melon and water melon	174	2472
KE26	UZB	IMG	1199, 1202	9-10-2016	Syrdarya	z	Kysh-kovon	40.83660	68.6699	260	L	-	market	4	semi-ripened (winter melon)	123	1620
KE27	UZB	P108	320-322, 348	7-8-2017	Sadoba	c	Kokalapush	40.55457	68.3641	269	A		field	5	seeds from abroad (Iran/Turkmenistan?), sweet	163	2288
KE28	UZB	P108	329, 330, 349	7-8-2017	Burykalja	c	Chingizkent	39.99043	65.9415	420	L	level	field	5	local seeds, no chemical fertilizer used, once a year irrigation, cultivated with KE 30 on one field	127	1687
KE29	UZB	P108	331, 332, 350	7-8-2017	Donyor	a	Chingizkent	39.99043	65.9415	420	L	level	field	5	local seeds; 10% of plants are diseased, root system is affected, CuSO4 is used; KE28 is tolerant	165	2321
KE30	UZB	P108	333, 334, 351	7-8-2017	Tirylla	a	Chingizkent	39.99043	65.9415	420	L	level	field	5	local seeds; KE28-30 not good for transport to Tashkent; KE28-30:traditional varieties Samarkand region	128	1703
KE31	UZB			8-8-2017	Maxalliy-Esankalov	c	Shagyrkul	40.27283	65.9862	687	L	?	field	-	local seeds	124	1637
KE32	UZB	P108	374, 378	8-8-2017	?	a	Beshrabot	40.23365	65.2395	330	A	-	market	5	origin: Sirdarya district	211	3090
KE33	UZB	P108	407-409, 415	9-8-2017	Amyri	a	Bukhara	39.75170	64.4442	219	L	-	market	5	origin: 70 km south of Bukhara in Karakul desert	165	2321
KE34	UZB	P108	403, 410, 411, 416	9-8-2017	Guvrak	a	Bukhara	39.75170	64.4442	219	L	-	market	5	origin: Karalpakistan	199	2889
KE35	UZB	P108	401, 402, 412-414	9-8-2017	Kokche	a	Bukhara	39.75170	64.4442	219	L	-	market	5	origin: Karakul desert; Kokche = green	216	3173
KE36	UZB	P108	465, 466, 469	10-8-2017	Karykyz	z	Beruny	41.66397	60.7797	111	L	-	market	5	bought from farmer along road; Karykyz = old woman (wrinkled surface)	194	2806
KE37	UZB	P108	465, 467, 468, 470	10-8-2017	Sarykkovun	c	Beruny	41.66397	60.7797	111	L		field	5	like KE36; Sarykkovun = yellow melon; general pictures KE36-37: 457-462	188	2705
KE38	UZB	P108	507, 508, 533-535	11-8-2017	Kiwi	a	Khiva	41.37965	60.3632	103	L	-	market	5	origin: Karalpakistan	250	3741
KE39	UZB	P108	513, 514, 520	11-8-2017	Zomcha	c	Kalandar Khana	41.91697	60.6511	98	L	level	field	5	from farm field nearby (0.5 km); KE39-43: general pictures: 511, 512, 538-540	133	1787
KE40	UZB	P108	515, 516, 522	11-8-2017	Torlama	a	Kalandar Khana	41.91697	60.6511	98	L	level	field	5	see remarks KE39	251	3758
KE41	UZB	P108	518, 519, 523	11-8-2017	Bolkovan	a	Kalandar Khana	41.91697	60.6511	98	L	level	field	5	see remarks KE 39	209	3056
KE42	UZB	P108	526-528	11-8-2017	Andyrkhan	z	Kalandar Khana	41.91697	60.6511	98	L	level	field	5	see remarks KE 39; good storability, sold in Tashkent; farmers from Jizzax buy seeds of Andyrkhan	302	4609
KE43	UZB	P108	530-532	11-8-2017	Tyrkysh	z	Kalandar Khana	41.91697	60.6511	98	L	level	field	5	see remarks KE 39, good storability, sold locally	275	4158
KE44	UZB	P108	574-580, 587	11-8-2017	Amyri	a	Eskifarish	40.56343	66.9021	464	L	level	field	5	origin: on the North shores of lake Tuzkon	176	2505
KE45	UZB	P108	592, 593, 626	14-8-2017	Mirzachul	a	Bogbon	40.69280	67.9357	248	L	level	field	5	pictures: 600: KE3- hybrid-KE45; 609: interview; Mirzachul = Torpedo	214	3140
KE46	UZB	P108	624, 625, 627	14-8-2017	Kokturna	a	Bogbon	40.75032	67.9257	245	L	level	field	5	pictures: 597: melon cultivation, 616: melon feed	309	4726
KE47	UZB	P108	628-630, 651	15-8-2017	Bosvoldy	c	Uljanovo-Havast	40.17627	68.6482	367	L	level	field	5	general pictures: KE47: 633: drying melon slices, 634: seed drying, 639: dried slices; 648-649: diseased melon plants	216	3173
KE48	UZB	P108	658-660, 670	17-8-2017	Airport	c	Guzor	38.60890	66.2611	1202	L	-	market	5	melons from Mubarek; soft pulp; Airport = Chogary, Bucharka; cleaning seeds: 672, 678, 682, 688	192	2772
KE49	UZB	P108	689, 694, 696	18-8-2017	Doniyar	a	Jizzax	40.15880	67.8272	1483	L	-	market	5	picture: 716: the melon collecting team (Kasanov-Kik-Esankulov)	277	4192
KE50	UZB	P108	720, 721, 726	21-8-2017	Dzhurakanta	a	Tashkent	41.23410	69.3265	419	L	-	market	5	melons from Jizzax; pictures: 722, 723: plaited melon pigtails	172	2438

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