Report of a *Lactuca altaica* Fisch. & C.A. Mey and *L. serriola* L. collecting expedition in Uzbekistan

Itinerary, collected material and data

Kik C, A Makhmudov & FO Khassanov

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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: *Lactuca altaica* in a farmer's field (KMK 58).

Contents

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 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 species *Lactuca altaica* forms such a case. Therefore in 2019 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. Seven plant breeding companies co-financed the mission, a fact that is duly recognized and appreciated.

During the mission in total 2493 seed samples were collected from 21 populations of *L. altaica*, 28 populations of *L. serriola* and 13 mixed populations. Upon regeneration, the samples will be made available under the terms and conditions of the Standard Material Transfer Agreement.

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), 16519 *Lactuca* accessions are present amongst which 12,980 *Lactuca sativa* L. and 3539 crop wild relatives (CWR). *Lactuca altaica* Fisch. & C.A. Mey. is present in this database with only 34 accessions, of which 10 originate from Uzbekistan. *Lactuca serriola* L. is ubiquitous present in GENESYS with 2141 accessions of which 61 originate from Uzbekistan. In total CGN maintains 5 and 803 accessions of *L. altaica* and *L. serriola* respectively and from Uzbekistan CGN holds 1 and 53 accessions of *L. altaica* and *L. serriola* respectively.

According to Web of Science *L. serriola* has often been a subject of study (n= 531). However this is not the case for *L. altaica* as only 12 records were found. Possibly this is due to the fact that many taxonomists view *L. altaica* as a synonym of *L. serriola* (Cichoriaea Portal; www.cichoriaea.e-taxonomy.net/portal) and therefore report findings for this species under the species name of *L. serriola*. Both species belong to the primary genepool of lettuce (Zohary 1991) and *L. serriola* has been (and is) used to a large extent in the breeding of new lettuce cultivars (e.g. Lebeda et al 2014). Furthermore it is known that both species can be intercrossed successfully (Lindquist 1960).

The distribution area of both species is quite different, whereas *L. serriola* is a cosmopolitan species, *L. altaica* can be found in the region in between East Anatolia to West China (Lebeda et al 2004; Fig.1).

Figure 1 *Probable distribution area of Lactuca altaica (red circle).*

Given the fact that only a few accessions of *Lactuca altaica* are present in genebanks worldwide and that the species could harbour agronomically interesting traits, a collecting mission to Uzbekistan, a country that is located within the centre of biodiversity of the species, is clearly warranted.

Therefore in the context of an already existing joint plant genetic resources cooperation between the Uzbek Academy of Sciences (Uzbekistan) and CGN (the Netherlands), a collecting project was set-up to sample *Lactuca altaica.* For *L. serriola* the need to collect in Uzbekistan is less compared to *L. altaica*. However, large areas in this country were not yet explored as previous collecting only took place in the eastern part of the country. Therefore, collecting in this expedition took place primarily in the central and southern part of the country.

In order to make the collecting mission possible, a Memorandum of Understanding (MoU) was signed using the Standard Material Transfer Agreement (SMTA) for the exchange of the material collected. The MoU was signed in January 2019 and the SMTA in August 2019 between the appropriate authorities of both countries and these 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 *Lactuca altaica* and *L. serriola* collections maintained at CGN by collecting wild populations which can subsequently be used after regeneration 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

- Prof Dr Furkat Khasanov and Dr Aziz Makhmudov, Institute of Botany, Academy Sciences of Uzbekistan, 100125, Durmon yuli str., 32 Tashkent, Uzbekistan; E-mail: fkhasanov1@mail.ru
- Dr 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 was situated primarily in the central and southern part of Uzbekistan (Fig. 2). The area covered during the mission was ca. 550 km from North to South and ca. 400 km from East to West. In total around 4000 km was travelled during a period of four weeks (July 18 – August 15).

Figure 2 *The exploration area in Uzbekistan with the locations of the various Lactuca accessions indicated; green: L. serriola, yellow: L. altaica and blue: Lactuca populations of mxed or unclear identity (see for details Appendix 3).*

Temperatures during daytime in Uzbekistan were in between 40 and 50°C. For transport a Chevrolet Nexia LTZ was used. Overnight stays were in different places: B&Bs, farms, houses and outside on higher elevations.

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 KMKxxx. 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 collecting site. Passport data can be found in Appendix 4.

Sampling of all *Lactuca* species took place on individual plants and the seeds of a minimum of 2-3 flowering heads were collected per individual plant. If not more than 2-3 flowering heads could be collected these seeds were transferred to a single glassine bag. If a minimum of 4-6 flowering heads with ripened seeds were present per individual, seeds were collected in two glassine bags (see Appendix 4). These two glassine bags were stapled to each other. Subsequently the single and double bags per accessions were put together in one cotton bag (18 x 30 cm^2) which was tied together with a string. A plasticized paper tag with the collecting number was placed on the inside and on outside with a string which tied together the cotton bag. The glassine bags were individually marked during the expedition to be able later on to trace the origin of the seeds within a population. This was done by writing on the glassine bags the accession number, the number of the individual and an 'a' or a 'b' in case the seed of an individual was divided over two bags (example: KMK32-01-a and KMK32-01-b in case of two seed batches from plant 1 of population KMK032). During the expedition the cotton bags (with seeds) were kept under ambient room conditions. Cleaning of the seeds during the expedition was not necessary as the seeds were already reasonably clean when harvested. Upon arrival at CGN the seeds were transferred to a conditioned storage room with a temperature of 15°C and 15% relative humidity and a receipt number (RNR) was assigned to each accession.

6 Results and discussion

Seeds were collected from 2493 plants from a total of 62 populations. Probably 21 populations consisted of *Lactuca altaica*, 28 of *Lactuca serriola* and 13 mixed or unclear identity (Appendix 4).

6.1 *Lactuca altaica* and *L. serriola populations*

Lactuca altaica could be recognized by its plant height, flower diameter and flowerhead size all of which are larger than in *L. serriola*. Also its leaf apex is more acute compared to *L. serriola* and its synflorescence more slender compared to the paniculiform synflorescence of *L. serriola*. However, when collecting in the field it is not always obvious if one or two species are present in a population. More detailed species identification will be carried out during the regeneration of the seed samples.

Both species occur in disturbed habitats: road sides, fields & field margins, backyards and orchards (Photo 1a, b).

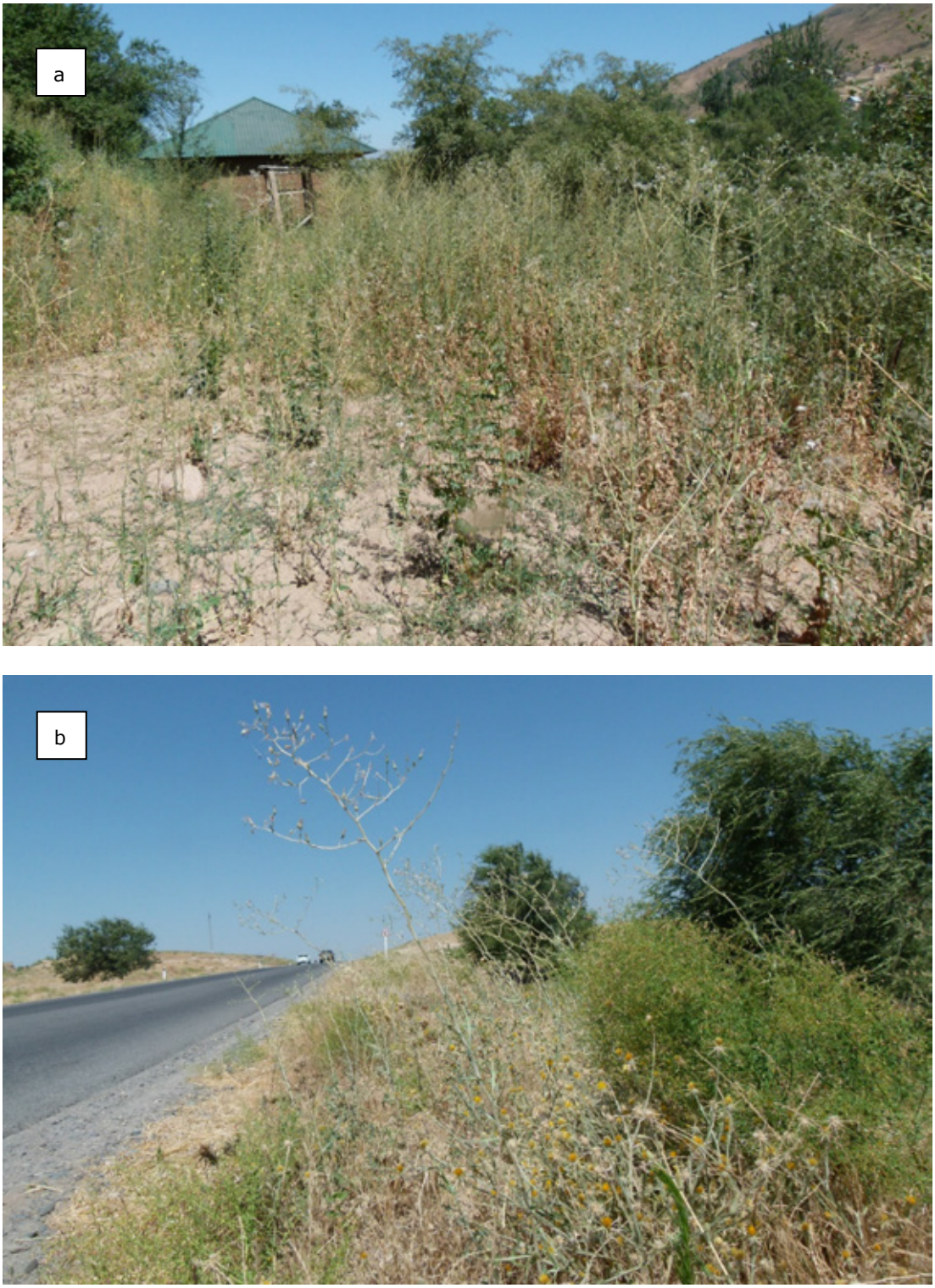

Photo 1 *Lactuca collecting sites: a. Lactuca altaica in orchard (KMK62), b. Lactuca serriola along a road (KMK06).*

The mean elevation of the locations where the two *Lactuca* species occurred clearly differed from each other [$F_{(1,47)}=79.5^{***}$]. However, overlap of the altitudes of the collecting sites of the two species occurs (Table 1). Given the

clear difference in mean altitude of the collecting sites between the two species, it could be expected that *L. altaica* prefers a more cool and moist habitat compared to *L. serriola*. However *L. serriola* can also occur on higher elevations but also in steppe habitats, a habitat in which *L. altaica* was not observed throughout the expedition. When an alpine meadow on ca. 2500 m was visted during the expedition no *L. altaica* plants were observed. This may suggest that the maximum altitude where the species can survive is around ca. 2000 m.

Table 1 *The number of collected Lactuca populations, the total number of plants sampled per species, and the mean, its standard error and range of the altitude where the species were observed.*

	N populations	N plants	altitude	
species			mean ± SE	range
L. altaica	21	793	1175 ± 54	731-1676
L. serriola	28	1210	591 ± 39	248-1066

The estimated number of plants occurring in populations varied from less than 100 to over 1000. Most populations consisted of 100-1000 plants. More *L. serriola* than *L. altaica* populations were present where over 1000 plants occurred (Table 2).

Table 2 *The number of Lactuca altaica and L. serriola populations per estimated size class (number of plants in a population).*

category	< 100	100-1000	>1000
L. altaica	1	13	7
L. serriola	0	15	13

The total number of sampled plants was 2493 of which 2003 were sampled from *L. serriola* (n= 1140) and *L. altaica* (n= 863). The ranges, means and their standard errors of the number of plants, the number of single bags and the number of double bags per *L. altaica* and *L. serriola* population from which seed was sampled is presented in Table 3.

From Table 3 it can be concluded that both species did not differ for the mean number of plants from which seed was collected, and the mean number of single and double bags. Furthermore, from the plants from which seed was harvested only half of them had enough seed for two bags.

Table 3 *The ranges, means and their standard errors of the a. number of plants from which seed was harvested, b. sampled single glassine bags and c. sampled double glassine bags from L. altaica and L. serriola populations.*

	L. altaica		*L. serriola*	
	range	**mean ± SE**	**range**	**mean ± SE**
number of plants	7-70	41 ± 3	16-69	41 ± 2
single bags	2-40	18 ± 3	2-65	21 ± 3
double bags	0-50	23 ± 4	0-57	19 ± 3

6.2 Mixed populations

Thirteen populations were sampled in which *L. altaica* and *L. serriola* most probably co-occurred. However this observation was not based on a detailed investigation of the sampled plants, but rather on a general impression when collecting seeds. Therefore the total number of such populations could be different after careful examination. This of course is also true for the populations that were classified as *L. altaica* or *L. serriola*. More detailed examination during regeneration is expected to reveal the correct taxonomic status of the populations.

The mixed populations, like the single species populations, were also observed in ruderal habitats like road sides, fields & field margins, backyards and orchards (Photo 2).

Photo 2 *Lactuca collecting sites: mixed population in vineyard (KMK30).*

The altitude where the mixed populations were found was in between those of *L. altaica* and *L. serriola* and differed significantly from these species [$F(2,61)=37.5^{***}$]. However the range in elevation of the mixed populations overlapped with those of the two *Lactuca* species (Table 4).

Table 4 *The number of collected mixed Lactuca populations, the total number of plants sampled and the mean, its standard error and the range of the altitude where the mixed populations were observed.*

species	N populations	N plants	altitude	
			mean ± SE	range
mixed	13	490	918 ± 74	604-1469
L. altaica	*21*	*793*	*1175 ± 54*	*731-1676*
L. serriola	*28*	*1210*	*591 ± 39*	*248-1066*

The estimated number of plants occurring in mixed populations varied from less than 100 to over 1000. Most populations consisted of 100-1000 plants, which was also true for the single-species populations (Table 5).

Table 5 *The number of mixed populations per estimated size class (number of plants in a population). From a single mixed population (KMK46) the number of plants was not recorded.*

category	< 100	100-1000	>1000
mixed	3	6	3
L. altaica	1	13	7
L. serriola	0	15	13

From Table 6 it can be concluded that the mixed populations did not differ from the *L. altaica* and *L. serriola* populations with respect to the number of plants, single and double bags.

Table 6 *The ranges, means and their standard errors of the a. number of plants from which seed was harvested, b. sampled single glassine bags and c. sampled double glassine bags from mixed Lactuca populations.*

	mix		*L. altaica*		*L. serriola*	
	range	mean ± SE	range	mean ± SE	range	mean ± SE
number of plants	2-68	38 ± 5	7-70	41 ± 3	16-69	41 ± 2
single bags	2-44	20 ± 4	2-40	18 ± 3	2-65	21 ± 3
double bags	0-45	17 ± 4	0-50	23 ± 4	0-57	19 ± 3

7 Conclusions

a. This collecting mission was carried out in the context of a joint PGR project between Institute of Botany, Academy Sciences of Uzbekistan (Uzbekistan) and the Centre for Genetic Resources, the Netherlands (CGN), Wageningen University & Research (the Netherlands).
b. A SMTA was signed between the competent national authorities of Uzbekistan and the Netherlands. This formed the legal basis of the expedition.
c. From sixty-two *Lactuca* populations seeds were collected during the mission which can be subdivided in 21 *Lactuca altaica*, 28 *Lactuca serriola* and 13 populations of mixed or unclear identity.
d. Seed samples were taken from individual plants; from every plant a minimum of two flowerheads were sampled.
e. In total from 2493 plants seeds were harvested in glassine bags; from *L. altaica* 793 plants were sampled, from *L. serriola* 1210 and from mixed populations 490.
f. On average seeds were harvested from ca. 40 plants per population.
g. A clear difference in altitude between the collecting sites was found for the *Lactuca* species: *L. altaica* was found on higher elevations, *L. serriola* on lower elevations and the mixed populations in between However also overlap in altitude between the three groups was observed. This difference in altitude occurrence might point at a habitat preference of *L. altaica* for more moist and cool conditions in contrast to *L. serriola*.

8 References

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Lindqvist K (1960). Cytogenetic studies in the serriola group of *Lactuca*. Hereditas 46 (1-2): 75-151

Zohary D., 1991. The wild genetic resources of cultivated lettuce (*Lactuca sativa* L.). Euphytica 53, 31–35

9 Acknowledgements

This expedition was made possible by the financial support from breeding companies affiliated to PLANTUM-NL and the Dutch Ministry of Agriculture, Nature and Food Quality (LNV). The support and hospitality of local people in Uzbekistan was of great value. Furthermore CK would like to express his sincere gratitude to the Furkat Khassanov and Aziz Makhudov who made this collecting mission a success.

Appendix 1 SMTA (art 10 and annex I)

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..13.08.2019.....
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..4.09.2019.....
Name of the **Recipient**.....S.J. HIEMSTRA

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.

* Where the **Provider** chooses signature, only the wording in Option 1 will appear in the Standard Material Transfer Agreement. Similarly where the **Provider** chooses either shrink-wrap or click-wrap, only the wording in Option 2 or Option 3, as appropriate, will appear in the Standard Material Transfer Agreement. Where the "click-wrap" form is chosen, the **Material** should also be accompanied by a written copy of the Standard Material Transfer Agreement.

8

Annex I

LIST OF MATERIALS PROVIDED

This *Annex* contains a list of the **Material** provided under **this Agreement**, including the associated information referred to in Article 5b.

This information is either provided below or can be obtained at the following website: (*URL*).

The following information is included for each **Material** listed: all available passport data and, subject to applicable law, any other associated, available, non-confidential descriptive information.

(*List*)

The *Lactuca serriola* and *L. altaica* material collected encompassed CGN collecting numbers KMK01-KMK62.

More information can be gained from:
https://missions.cgn.wur.nl/ or www.wur/nl/cgn

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Appendix 2 Expedition collecting form

Uzbekistan - the Netherlands *Lactuca* expedition 2019

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

Date……..*Photo number*……

Crop name……*Cultivar name*……..

Latin species name……

Locality……

……

Latitude……*Longitude*……*Altitude*……..

Number of plants sampled:

Estimated size of population 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 (KMKxx) are indicated for the *Lactuca* material collected; yellow marker: *Lactuca altaica*, green: *Lactuca serriola*, blue: mixed *Lactuca* population.

Appendix 4 Passport data of *Lactuca* accessions (KMK xxx) collected in Uzbekistan

Date: day-month-year, latitude and longitude determined via GPS: mapdatum WGS84, position format for longitude and latitude: hddd.ddddd', altitude in meters; population type: W: wild material.

RNR	collecting number	country	photo map	photo nr	date	Lactuca species name given during expedition	nearest locality name	latitude	longitude	altitude	population type	topography	collecting source	number of single glassine bags	number of double glassine bags	number of plants sampled	population size	remarks
190206	KMK01	UZB	109	526-533	20-7-2019	L altaica	Beldergaj	41.53231	69.92512	1319	W	hilly	road side, field	5	29	34	ca 200	
190207	KMK02	UZB	109	534-536	21-7-2019	L serriola	Gulistan	40.53818	68.59012	267	W	level	road side	2	41	43	>1000	salt , heat tolerant?
190208	KMK03	UZB	109	539-543	21-7-2019	L altaica ?	Saykhan	40.05078	67.76627	604	W	hilly	road side	2	0	2	5-10	
190209	KMK04	UZB	109	544-546	21-7-2019	L serriola-L altaica	Sangzar	40.04962	67.73508	641	W	hilly	road side	5	5	10	ca. 100	
190210	KMK05	UZB	109	565-566	22-7-2019	L serriola	Kushkuduk	39.78075	66.55370	606	W	level	road side, field margin	65	4	69	>1000	
190211	KMK06	UZB	109	567-569	22-7-2019	L serriola	Kattakuvgan	39.87548	66.34735	555	W	undulating-level	road side, field margin	32	0	32	100-1000	
190212	KMK07	UZB	109	570-572	22-7-2019	L serriola	Kattakuvgan	39.93599	66.07512	448	W	level	road side, field margin	26	10	36	ca. 100	
190213	KMK08	UZB	109	573-574	22-7-2019	L serriola	Nurfishon	40.07793	65.61207	407	W	level	road side, field margin	32	16	48	100-1000	
190214	KMK09	UZB	109	569-591	23-7-2019	L serriola	Vobkent	40.08362	64.60490	248	W	level	road side, field margin	21	11	32	100-1000	
190215	KMK10	UZB	109	592-594	23-7-2019	L serriola	Kyzyltepa	40.10812	65.04762	327	W	level	road side, field margin	26	6	32	100-1000	L tatarica; photo 109: 595-596; salt stressed
190216	KMK11	UZB	109	597-601	23-7-2019	L serriola	Samarkand	39.57502	67.01160	761	W	level	road side, field margin	37	2	39	>1000	roadside burning; sampled at 109:600-801
190217	KMK12	UZB	109	603-604	24-7-2019	L serriola	Kitab	39.11243	66.81901	612	W	level	road side, field margin	40	1	41	>1000	next to orchard
190218	KMK13	UZB	109	605-606	24-7-2019	L serriola	Yakkabog	38.96155	66.72084	614	W	level	orchard	20	24	44	>1000	sampled in apple orchard
190219	KMK14	UZB	109	607-609	24-7-2019	L serriola	Guzar	38.77446	66.47889	526	W	level	road side, field margin	10	23	33	>1000	very dry and hot habitat
190220	KMK15	UZB	109	610-612	24-7-2019	L serriola	Derband	38.16055	67.06095	971	W	undulating-hilly	road side, field margin	38	4	42	100-1000	hot and dry habitat
190221	KMK16	UZB	109	613-616	25-7-2019	L serriola	Rudina	38.10861	67.40065	781	W	level	backyard	13	33	46	>1000	
190222	KMK17	UZB	109	620-621	25-7-2019	L serriola	Shurchy	37.99896	67.50285	532	W	level	backyard	11	20	31	ca. 100	along farmhouse
190223	KMK18	UZB	109	622-623	25-7-2019	L serriola	Detynsay	38.07970	67.62884	537	W	level	field margin	9	33	42	> 1000	good population
190224	KMK19	UZB	109	624-636	25-7-2019	L altaica	Shargunj	38.60423	67.9656	1451	W	undulating	backyard	40	6	46	ca. 100	good population of L altaica!
190225	KMK20	UZB	109	637-640	25-7-2019	L altaica	Shargunj	38.58491	67.98461	1206	W	hilly	pasture	18	6	24	ca. 100	
190226	KMK21	UZB	109	641-643	26-7-2019	L serriola	Denov	38.24735	67.8802	457	W	undulating-level	field margin	11	19	30	100-1000	
190227	KMK22	UZB	109	644-646	26-7-2019	L serriola	Baysun	38.15773	67.10224	540	W	level	field margin	24	12	36	>1000	+ 2 movies
190228	KMK23	UZB	109	648-653	26-7-2019	L serriola ?	Dekhkanabad	38.31386	66.61793	1043	W	level	roadside	13	0	13	ca. 100	hot/dry, gypsum soil, some plants altaica?
190229	KMK24	UZB	109	654-668	27-7-2019	L altaica	Tarkaragay	39.41948	66.74065	1145	W	undulating	field margin	35	1	36	100-1000	on mudwall, spines under leaves
190230	KMK25	UZB	109	670-672	28-7-2019	L serriola (+ L altaica)?	Ozbegim	38.93504	66.92942	856	W	undulating-level	backyard	13	32	45	ca. 1000	95% ser + 5% alt?
190231	KMK26	UZB	109	673-675	28-7-2019	L altaica	Minjir	38.91058	67.05617	1016	W	level	field	10	30	40	ca. 1000	larger flowers
190232	KMK27	UZB	109	676-679	28-7-2019	L altaica	Kattakul	38.83842	67.12917	1515	W	steep	field margin	23	14	37	100-1000	
190233	KMK28	UZB	109	694-696	29-7-2019	L altaica	Tatar	38.85300	67.09071	1126	W	undulating	roadside	11	10	21	100-500	
190234	KMK29	UZB	109	697-700	30-7-2019	L altaica	Sevaz	39.10779	66.99223	731	W	undulating	field	3	41	44	>1000	good population!; with flowering plants, many flowerheads in seed
190235	KMK30	UZB	109	701-703	30-7-2019	L altaica - L serriola	Iskon	39.03981	67.06406	901	W	undulating	orchard	19	30	49	100-1000	mixed population?
190236	KMK31	UZB	109	704-705	30-7-2019	L altaica - L serriola	Miraki	39.02879	67.1394	992	W	hilly	road side, field margin	7	37	44	100-1000	

RNR	collecting number	country	photo map	photo nr	date	Lactuca species name given during expedition	nearest locality name	latitude	longitude	altitude	population type	topography	collecting source	number of single glassine bags	number of double glassine bags	number of plants sampled	population size	remarks
190237	KMK32	UZB	109	706-707	30-7-2019	L serriola	Mo'Minobad	39.04547	66.92142	698	W	level	road side	26	40	66	>1000	
190238	KMK33	UZB	109	708-712	30-7-2019	L altaica	pass Amankutan (Kashkadarja)	39.27194	66.90941	1194	W	steep-mountainous	shrubland	26	0	26	100-1000	
190239	KMK34	UZB	109	714-715	31-7-2019	L altaica - L serriola	Karatepa	39.44791	67.03192	892	W	level	roadside	20	2	22	100-1000	many plants flowering
190240	KMK35	UZB	109	716-717	31-7-2019	L altaica	Samarkand	39.49121	67.202023	867	W	level	field margin	8	50	58	>1000	large population
190241	KMK36	UZB	109	718-723	31-7-2019	L serriola	Ravot	40.08465	67.98355	401	W	level	road side, field margin	38	15	53	100-1000	growing together with Spinacia turkestanica; few seeds/plant
190242	KMK37	UZB	109	724-725	1-8-2019	L serriola + L altaica ?	Msmenlysay	39.78190	68.39623	1030	W	steep	field	29	15	44	>1000	no flowering
190243	KMK38	UZB	109	726-727	1-8-2019	L serriola	Sarikamar	39.86216	68.37778	839	W	level	field	22	21	43	>1000	
190244	KMK39	UZB	109	728-729	1-8-2019	L altaica - L serriola?	Zaamin	39.91744	68.39336	735	W	hilly	fallow land	21	22	43	>1000	
190245	KMK40	UZB	109	730-732	1-8-2019	L serriola	Qangli	39.97748	68.10862	432	W	undulating-level	field margin	7	21	28	100-1000	very dry habitat
190246	KMK41	UZB	109	733-735	2-8-2019	L serriola	Qorasoy	40.09064	67.75275	451	W	level	roadside	14	38	52	>1000	large population, many plants flowering
190247	KMK42	UZB	109	736-738	2-8-2019	L serriola	Marjanbulak	39.97894	67.55756	624	W	level	orchard	3	57	60	>1000	large population; flowerheads in seed
190248	KMK43	UZB	109	739-740	2-8-2019	L serriola	Lalmikor	39.93760	67.4436	756	W	level	orchard	29	15	44	100-1000	apple orchard
190249	KMK44	UZB	109	741-743	4-8-2019	L serriola	Guliston	40.96383	70.75549	1005	W	hilly	field margin	17	12	29	ca. 100	
190250	KMK45	UZB	109	744-745	4-8-2019	L serriola	Guliston	40.99827	70.73891	1066	W	undulating	road side	17	12	29	100-1000	
190251	KMK46	UZB	109	746-749	5-8-2019	L serriola - L altaica?	Eshon	41.07069	70.70579	1369	W	hilly	road side, field margin	40	3	43	?	
190252	KMK47	UZB	109	750-751	5-8-2019	L serriola - L altaica	Eshon	41.07764	70.68275	1469	W	level	along railroad track	44	8	52	100-1000	
190253	KMK48	UZB	109	752-755	5-8-2019	L serriola - L altaica?	Achy	40.84672	70.80314	663	W	level	orchard	29	26	55	100-1000	water in between rows
190254	KMK49	UZB	109	756-758	5-8-2019	L serriola	Pop	40.88125	71.03001	497	W	level	road side, field margin	8	8	16	> 100	
190255	KMK50	UZB	109	759-761	5-8-2019	L serriola	Parkent	41.30581	69.59969	591	W	level	backyard	3	41	44	100-1000	datscha
190256	KMK51	UZB	109	762-763	6-8-2019	L altaica	Sijjak	41.63565	69.96926	969	W	undulating	field	36	14	50	100-1000	few seeds/plant, large flowers, more wet habitat
190257	KMK52	UZB	109	764-766	6-8-2019	L altaica	Sijjak	41.64685	69.98152	1181	W	level	roadside	30	27	57	ca. 1000	no flowers, only in wet habitat
190258	KMK53	UZB	109	767-768	6-8-2019	L altaica	Nanay	41.71293	70.1103	943	W	hilly	field	24	11	35	ca. 100	
190259	KMK54	UZB	109	769-770	6-8-2019	L altaica	Sijjak	41.70004	70.06871	971	W	hilly	backyard	5	45	50	>1000	
190260	KMK55	UZB	109	771-772	7-8-2019	L altaica (+ L serriola)	Tavaksay	41.58849	69.76236	750	W	level	orchard	23	45	68	>1000	a number of plants flowering
190261	KMK56	UZB	109	773-775	7-8-2019	L altaica	Aktash	41.62352	69.76366	911	W	undulating	road side, field margin	32	13	45	100-1000	few plants flowering
190262	KMK57	UZB	109	776-777	7-8-2019	L altaica	Aktash	41.63617	69.76073	1057	W	undulating-hilly	orchard	19	29	48	>1000	apple orchard, very tall plants, very large and nice population
190263	KMK58	UZB	109	778-784	7-8-2019	L altaica	Aktash	41.63968	69.76163	1086	W	hilly	field	31	39	70	>1000	archetype L altaica!
190264	KMK59	UZB	109	785-791	10-8-2019	L altaica	Beldyrsay	41.53201	69.92351	1318	W	undulating	road side, field margin	8	46	54	>ca. 1000	some plants with Bremia, some plants flowering
190265	KMK60	UZB	109	792-794	10-8-2019	L altaica	Beldyrsay	41.50191	69.97695	1519	W	hilly	road side	2	5	7	ca .10	forest margin
190266	KMK61	UZB	109	795-798	10-8-2019	L altaica	Chimgan mountain	41.52322	70.01376	1676	W	level	roadside	16	22	38	100-1000	
190267	KMK62	UZB	109	799-802	10-8-2019	L altaica	Chimgan mountain	41.54553	70.02247	1466	W	undulating-hilly	field	3	40	43	>1000	

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