CGN

COLLECTION
ACTIVITIES

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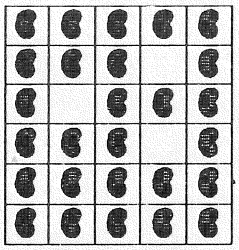

Germplasm Collection of Beta and Lactuca in Armenia and Daghestan (USSR) 19.08.90 to 09.09.90

CENTRE FOR GENETIC RESOURCES, THE NETHERLANDS (CGN/CPO)

CONTENTS

GERMPLASM COLLECTION OF BETA AND LACTUCA IN ARMENIA AND DAGHESTAN (USSR) 19-08-90 TO 09-09-90.

L.Frese*, V.Burenin and G.Seiler

1. BACKGROUND

In 1989 an agreement on a three years cooperative programme between the Vavilov Institute in Leningrad and the Centre for Genetic Resources in Wageningen was signed. Both partner institutes agreed to cooperate in the field of agricultural science for the their mutual benefit. The plant exploration in Armenia and Daghestan was the first joint activity.

The objectives of the mission were (i) to collect germplasm of the genus Beta, Lactuca, Allium and Brassica, (ii) to collect detailed passport and ecogeographical data and (iii) to explore the difficulties confined to expeditions in remote areas of the southern USSR. The expedition was financed by the Soviet counterpart. In return the CGN agreed to host a Soviet data documentation officer for a three weeks period and to supply computer hard- and software.

This expedition is part of the activities of the German-Dutch Board for Crop Genetic Resources which provides the necessary funds for a 3-years collecting programme in the USSR.

Due to political unrest in Armenia and Azerbaidjan it first seemed to be doubtful whether this expedition could be conducted at all. The CGN received an official invitation from the Office for Foreign Relations of VIR on 02-08-90 and then decided to join the expedition team. The team was guided by Prof.V.Burenin from the Vavilov Institute in Leningrad. Dr.G.Seiler from the State University Station, Fargo, North Dakota as Beta expert of the USDA/ARS.

2. JUSTIFICATION

During the past decades it was almost impossible for western countries to conduct plant explorations in the USSR. The new foreign policy and the willingness of the USSR to cooperate with western countries now has offered a unique chance to collect genetic resources in the USSR.

The CGN within the framework of the German-Dutch cooperative programme on Beta genetic resources is responsible for one of the world largest Beta collections and is responsible for the International Data Base for Beta. CGN as a part of the IBPGR network has also accepted special responsibility for Lactuca, Allium and Brassica. Hence, the CGN has a particular interest and responsibility for collecting material of the 4 genera.

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* Head of the Dutch-German Beta genetic resources programme and responsible for this report. The Beta programme is a cooperative project between the CGN/CPO and the Institut für Pflanzenbau und Pflanzenzüchtung der Bundesforschungsanstalt für Landwirtschaft (FAL) in Braunschweig-Völkenrode (D) within the framework of the German-Dutch Board for Crop Genetic Resources.

Species of Beta section Corollinae, landraces of B.vulgaris and different Lactuca species occur in the Caucasus region (Grossgejm, 1945; Krasochkin, 1959). A recent inventory of world Beta collection, however, has shown that little germplasm from the Caucasus region is hold in genebanks. Similar to beets, the CGN Lactuca collection contains only few accessions from this area which alone justifies the implementation of a collecting mission.

The scientific justification of the plant exploration is straightforward. Armenia is situated next to East Anatolia and forms a part of the centre of diversity for Beta section Corollinae. Russian scientist have claimed that this area also contains a rich diversity of B.vulgaris ssp.vulgaris landraces. Buttler (1977) has assumed that a second genepool for B.macrorhiza is existing in Daghestan. However, the distribution and frequency of B.macrorhiza in Daghestan has never been explored very carefully. Due to lack of appropriate research material Buttler's assumption has never been proved.

Especially in Armenia a number of Lactuca species of different sections are homed. The more frequent types are L.serriola, L.virosa and L.saligna. Less known types are L.viminea, L.quercina or L.undulata and others. The target area is of less interest with respect to wild Brassica and Allium since both genera have their centre of diversity elsewhere (Brassica - the Mediterranean and Allium - Middle Asia). However, landraces of cabbage and onion do exist in the Caucasus and may contain valuable genetic variation.

3. RESULTS AND FINAL ASSESSMENT

3.1 Description of the target areas, frequency and distribution of the germplasm

Fig.1 and 2 show the results of the collecting mission. Tab.1 gives a summary of the collected material. A detailed description of passport data and collecting sites is presented in Tab.2 and 3, respectively (see appendix).

Armenia
Undulating hills with step habitats, pastures or agricultural areas (Tschernosem soils) determine the landscape of this area. The temperatures in Yerevan are high in summer (average max. day temperature is 31 ^{o} C in August, average night temperature is 19 ^{o} C), the average winter temperature is -5 ^{o} C with occasional short frost periods of - 20/25 ^{o} C. Vine production is possible. The wettest months are April and May; July, August and September are very dry.

Contrary to our expectations, we were not able to find many B.corolliflora populations in Armenia. We got the overall impression that extensive use of pastures and grasslands has let to a considerable genetic erosion in Beta section Corollinae. However, it cannot be excluded that such germplasm may still occur in very remote areas which are not accessible for livestock. It was striking that one of the largest B.corolliflora populations was detected in a very remote area where livestock obviously did not graze. On that site (BFS/90 18) also L.virosa and L.viminea was found as part of a very rich vegetation.

L.serriola and L.virosa were in general collected along the roadside. This

germplasm can be found at very different locations in high frequencies. Lactuca species like L.undulata or L.altaica etc. were not encountered along the roadside or at field margins which indicates that they occur in more specific habitats like gravel banks of streams. Allium sp. of the A.scorodoprasum type were seldom encountered. The largest population (BFS/90 09) was growing in a wheat field.

Beta, Lactuca and Allium accessions occurred in Armenia and Daghestan with few exceptions on ruderal sites and were in general associated with Artemisia and Verbascum (very frequent) as well as Echinum, Cirsium, Carduus, Rumex, Arctium, Cichorium intybus, Lolium, Festuca and Avena.

Daghestan
The topography of Daghestan can be divided in a) lowlands with alluvial rich soils of loam/clay texture, b) undulating hills of about 800 m elevation with pastures, grassland and spots of agricultural areas of loamy soils of different colors and c) steeply dissected mountains with 1500-2500 m elevation. Vineyards, cereal and vegetable production prevail in the lowland; cereal production and some orchards were observed in the hilly area whereas cattle and sheep production seems to be the major source of income in the mountainous regions. Contrary to Armenia large woodland areas occur in hilly and mountainous areas. A subtropical climate occurs in the lowlands. Here the summers are usually dry. At higher altitudes the precipitations increases. The major part of the rain comes from west atlantic depressions.

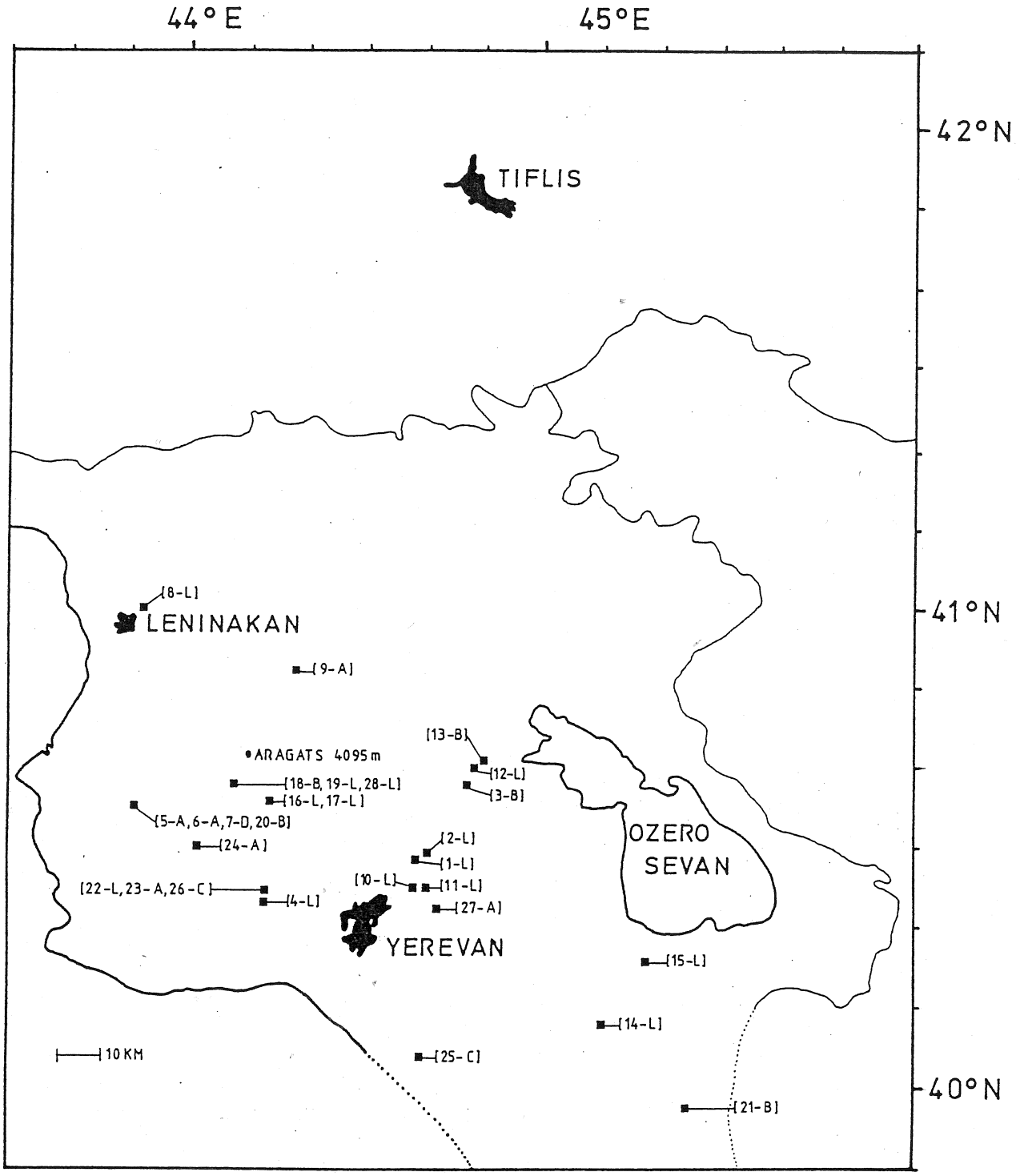
The collecting sites for Lactuca and Allium were similar to those encountered in Armenia. The two B.macrorhiza populations were found on steep slopes and wet, young mineral soil/gravel at elevations of higher than 1200 m. As already reported by Buttler (1977) this species prefers a specific habitat which is very different from the habitats occupied by B.corolliflora and B.lomatogona. Contrary to wild beets it was not difficult to find L.serriola and L.virosa in Daghestan. Allium sp. were, however, seldom encountered.

The altitude of collection sites (Tab.3) varied from -11m (near the Caspian Sea) to 2420m. Beets always occurred at elevations higher than 1200m; L.serriola appeared to prefer lowlands and the hilly area (sites between -11m and 2070m) whereas L.virosa was more frequently found at higher elevations (500m to 2420m).

Only little variation in soil type and soil colour was observed. Loamy and always well drained soils of brown or grey colour prevailed in Armenia and Daghestan. More variation was observed for 'stoniness (SO)' and 'soil nutrient content (SN)' (Tab.3).

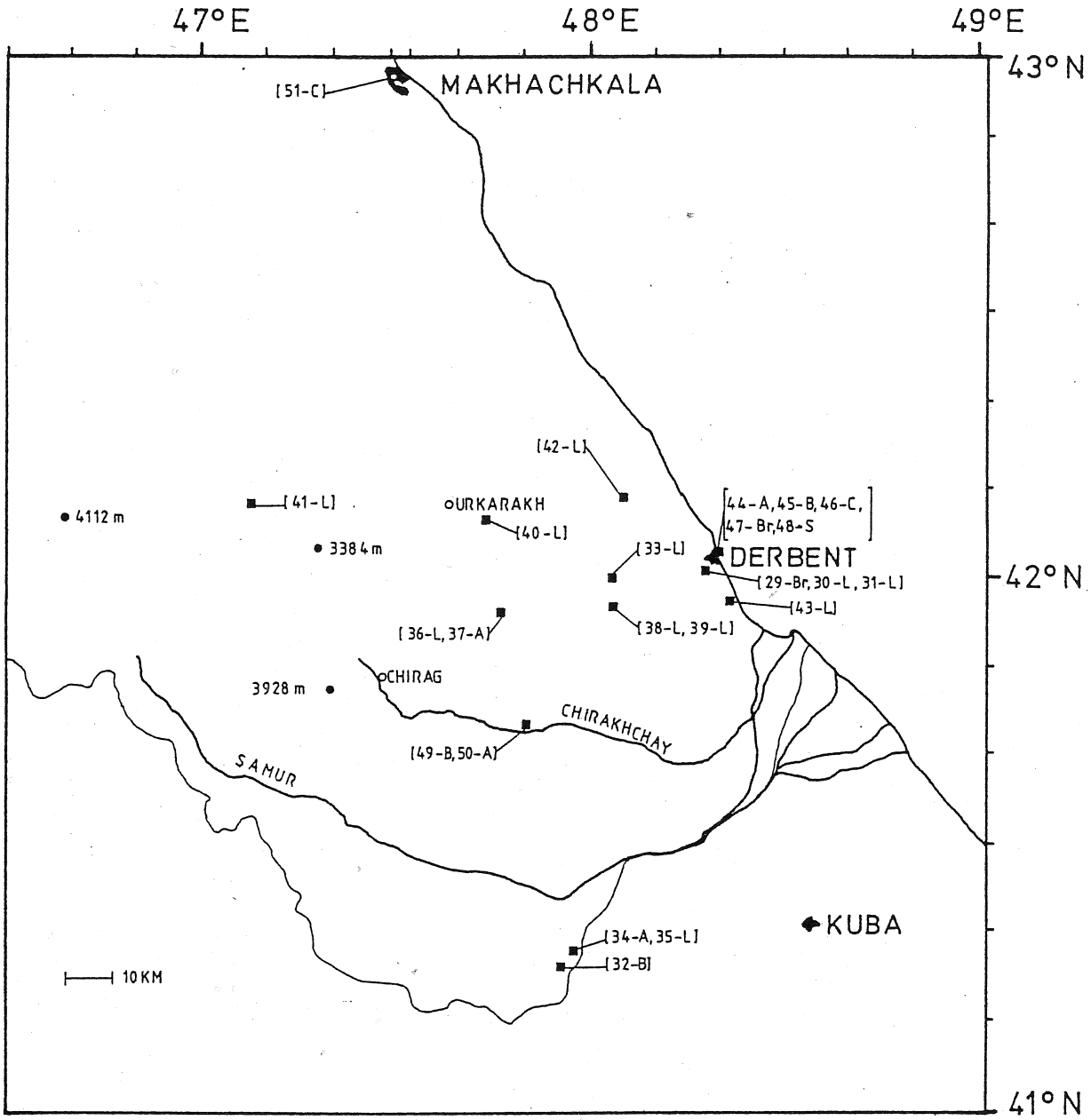
3.2 Equipment, collecting procedures, seed maturity and habitat data

During previous collecting missions topographic maps (scale 1:50,000 to 100,000) proved to be very helpful for the identification of potential collecting sites. For the southern USSR such maps do not exists or have not been published. Navigation maps (number ONC-F4, scale 1:1,000,000) with a longitude/latitude grid were the best maps we could purchase (address: E.Stanfords Ltd., 12-14 Long Acre, London WC2E 9LP, United Kingdom). In Daghestan we also used a road map which showed village names etc. The altitude of locations were measured by means of a Thommen altimeter.



A= ALLIUM, B=BETA, C=CORIANDRUM, D=DAUCUS, L=LACTUCA. Numbers refer to collection number and must be prefixed by BFS/90.

Fig.1: Collecting sites in Armenia



A=ALLIUM, B=BETA, Br=BRASSICA, C=CORIANDRUM, L=LACTUCA, S=SPINACIA. Numbers refer to collection number and must be prefixed by BFS/90.

Fig.2: Collecting sites in Daghestan

Tab.1: Summary of the collected material

Botanic name	No. of accessions
Allium cepa	2
Allium flavum	1
Allium sp. (*)	7
Beta corolliflora	4
Beta macrorhiza	2
Beta lomatogona	1
Beta vulgaris ssp.vulgaris var.conditiva	1
Brassica oleracea	1
Brassica sp.	1
Coriandrum sativum	4
Daucus sp.	1
Lactuca viminea	1
Lactuca virosa	10
Lactuca serriola	13
Lactuca serriola+virosa	1
Spinacia oleracea	1
Total number	51

(*) presumably A.scorodoprasum.

Local guides usually preferred to search for Beta germplasm on sites already described in literature. A.Melikjan (Armenia) visited these potential sites in 1988 and 1989 and talking with local farmers and shepherds he was able to trace the exact site locations. Less attention was given to active search based on topographic features of the visited area and habitat characters. Since Lactuca species are widely distributed it was decided to sample few but potentially distinct populations. Lactuca populations were chosen if a) spatially separation was 20-40 km between two sites, b) differences in altitude of collecting sites were large, c) different plant morphology could be observed at one site (especially seed characteristics). Since Allium and Brassica had the lowest priority for collecting we did not very actively search for such germplasm.

If possible about 50 plants/population were sampled in wild beets. In Lactuca sample size was about 16 plants. Due to small sized populations only few plants per Allium population could be sampled. Some bulbs were usually also collected since later this allows for a more rapid taxonomic determination of the Allium germplasm.

Seeds of Beta and Lactuca were sufficiently mature in August. Since only few heads mature during one day Lactuca seeds stalks were cut from a number of plants and then stored in a 20 l plastic bag to allow for further seed ripening. This harvest procedure yielded rather large quantities of seeds/accession. In Allium considerable differences in seed maturity were observed.

It was intended to determine the soil texture in the field according to the classification key of E.Schlichting and H.P. Blume and to measure the soil

pH-value. Dry soil and lack of time and facilities made it usually impossible to classify the soil texture and to measure the pH-value during a day excursion. Hence, a soil sample was stored in a plastic bag and brought to Wageningen for further analysis. Since our luggage with all the necessary equipment for seed and soil sampling arrived several days after our arrival at Yerevan, soil samples were only taken in Daghestan. Additional habitat data were recorded according to the collection form (see appendix).

3.3 Logistics

One objective of our expedition was to gain experiences in implementing collecting missions in remote areas and to identify the major problems.

Armenia
The tense political situation in Armenia has had considerable impact on the success of our mission. For the sake of our own security local authorities obviously were not willing to provide a governmental expedition car which has delayed the start of the plant explorations. After extensive discussions with the Office for Foreign Relations our team leader and A.Melikjan finally succeeded to hire a private car. This has changed the official character of our mission into a private one. It should be noted that our mission in Armenia would have become a total failure without the great private initiative of A.Melikjan and his friend L.Parsadanjan. Since we stayed in an hotel there were no problems in food supply. However, the acquisition of gasoline was sometimes difficult.

Daghestan
The Derbent experimental station is part of the VIR Institute. The hospitality of the director V.Medvedev was overwhelming. We stayed in the guest-house and were provided with all the necessary food. The experimental station also provided an expedition car (a 4-wheel driven bus) which was much better suited for difficult road conditions than the 18-years old car we were forced to use in Armenia. Our day excursions were guided by members of the Derbent experimental station which were able to communicate with the different ethnic groups like Azerbaidjans and Lesguese and who knew how to find a specific village etc.. This is essential for visitors from abroad since road maps are not very detailed. Name plates only very seldom indicate how to reach towns or villages in Daghestan. The day excursions in Daghestan were well prepared and our local colleagues did their best to help us through this country. Since only few hotels or similar facilities exist in the target area we had to return in the evening to our basis in Derbent. This has limited our range of action and appeared to be the major logistic problem in Daghestan.

4. RECOMMENDATIONS FOR FUTURE COLLECTING MISSIONS IN THE CAUCASUS

Armenia
Due to ethnic conflicts and fights between local mafia groups the range of accessible areas is limited. However, our impression is that genetic erosion progresses in Armenia. In situ conservation projects are being planned but seem to be very weakly funded. Hence, it is reasonable to continue collecting activities.
In consideration of the sometimes rapidly changing security situation it

can perhaps be more efficient to conduct plant explorations on a contract basis. The University of Yerevan has Beta and Lactuca experts which when supplied with comparatively little funds (f 200,- equals about 2 good months salaries !), could in a more flexible way implement the collecting work alone. This could also allow to search more intensively for remainders of Corollinae species in less accessible mountainous areas and to look for specific Lactuca germplasm. During our bus travel from Yerevan to Groznyy we have crossed the Caucasus mountains. The topography of this landscape indicates that B.corolliflora may also occur north of Armenia. Hence, this area should be explored for Corollinae germplasm during a follow-up expedition.

We have frequently seen Cannabis sativa (Cannabis ruderalis ?) in the area of the Sevan lake but also close to the Aragats mountain. This material could be interesting for the CPO's hemp research programme. At the time of our visit the hemp had just started flowering.

A.Melikjan reported that the oriental and western genepool of the cultivated carrot overlap in Armenia. We have observed many Daucus populations growing along the roadside but since there was no clear mandate for this crop species this germplasm was usually not sampled.

Contact addresses:

Responsible for official cooperative programmes is:

Dr. Vartanjan
Head of the Office for Foreign Relations
Gosagroprom Armenii, Otdel Vnestchnich Svjasi
Leninplace, Governmental Building No.2
Yerevan
Armjanskaja Respublika

Telex: 243369 Trans SU

The Lactuca specialist is:

Prof. E.A.Nasarova
Institute for Botany
Armenian Academy of Science
375063 Yerevan-63
Armanskaja Respublika

The private address of the Beta specialist is:

A.Melikjan
SFLO Oshakan
ul. Nalbandjana, 80
378430 Ashtatakskji Raion
Armanskaja Respublika

Daghestan/Azerbaidjan
This experimental station has supported various plant explorations. The director V.Medvedev is willing to support further plant exploration in Daghestan and is anxious to establish contacts with institutes in European

countries and the USA especially in the field of Triticum durum breeding. Since climatic conditions in Derbent favor regular epidemics of Ustilago and Puccinia disease this experimental station is used by VIR to evaluate germplasm for disease resistance in the field. Recently, screening for Fusarium resistance in cereals has been added to the research programme. Currently, the Institute is being remodeled.

During our 7 days stay in Derbent we were able to identify the typical habitat of B.macrorhiza. Based on this knowledge a future expedition team can more purposefully search for that type of beet germplasm even without the help of location name published in literature. Daghestan is claimed to home a second genepool of B.macrorhiza which is located at the boarder of the total distribution area of the Corollinae section. Since this genepool may contain genetic variation different from the Turkish B.macrorhiza genepool it is sensible to care for its collection and maintenance. In Daghestan we have encountered a greater diversity of landscapes, climatic conditions and soil types than in Armenia. North of Makhachakla the climatic conditions are considerable different (average temperature in January is about - 5 ^{o} C) from the subtropical climate of Derbent. This indicates that additional genetic variation can also be acquired for the CGN Lactuca collection. Further fields of interests could be: Allium, Brassica, wild relatives of cereals, fruit trees and spices.

Before our departure to Leningrad we have shortly discussed the requirements for a follow-up expedition in that area. First priority is a new expedition car. Second priority are more detailed topographic maps of this area (more information from Michael Jackson, Birmingham ?) which would allow to identify potential distribution areas for Beta section Corollinae based on topographic information. The Derbent experimental station has two more experimental farms in the Daghestan region, one of it is located northwards further inland at 2000 m elevation. Both experimental farms could be used as a basis for excursions even within the adjacent Georgian part of the Caucasus mountains. To gain more time for exploration of the area we suggested to supply a future team with camping equipment to allow for one or two stays over night in the field.

The feasibility of a plant exploration in Azerbaidjan was also discussed. The Talysch mountains close to the Iranian boarder are of great interest since B.lomatogona and L.aculeata occur in this small area. However, it is doubtful whether the political situation as well as the current shortage of food supply will allow to visit this area during the next years.

Contact addresses:

Director V.D. Medvedev
Daghestan Experimental Station of the Vavilov Institute
368612 Derbent, Vavilovo
Daghestan ASSR

Staff of this station:
Roman Boguslavskij (Triticum durum, cereal wild species). Speaks German. Is interested in exchange projects. Derbent could provide experimental fields for resistance screening. In return R.Boguslavskij would like to receive technical equipment for research.
Magomed Achmedov (cereal genetics). Speaks Russian and Lesguese.

5. APPENDIX

Itinerary

19-08-90
Departure from Amsterdam to Leningrad. Meeting with G.Seiler and S.Shuvalov (VIR Office for Foreign Relations) at the airport.

20-08-90
Meeting at the Office for Foreign Relations. Preparation of the itinerary for Armenia according to the advice given by the Office for Foreign Relations in Yerivan. Visit of the exposition on Vavilov's work and live. Meeting with Prof. V.I.Burenin, the team leader. First attempts of the VIR to purchase flight tickets to Yerevan.

21-08-90
Waiting for flight tickets. Discussion on the collecting strategy. A. Melikjan an Armenian Beta specialist will guide the collecting team in Armenia.

22-08-90
Due to weather conditions delayed arrival of the airplane from Yerevan. Departure to Yerevan in the late afternoon. Arrival at Yerevan in the evening. Luggage lost. First meeting with A.Melikjan, the local Beta specialist and guide.

23-08-90
Meeting at the Office for Foreign Relations in Yerevan. Discussion on the security of the planned itinerary. We are not allowed to visit a small region in southwestern part of Armenia close to the Turkish boarder. The rest of the itinerary is claimed to be save. According to an agreement between VIR and the Armenian authorities an expedition car must be provided by the Armenian Ministry for Agriculture. Gasoline is available, a car may be provided tomorrow. In the evening first discussion on taking a private car/taxi on hire.
24-08-90
It is now clear that the Armenian authorities will not provide a car. They fear that it may be confiscated by the recently established Armenian army.In the late afternoon a private car is hired. 2 L.serriola and 1 B.corolliflora population sampled.

25-08-90
Travel from Yerevan to Leninakan, Spitak and back to Yerevan. Extensive search for B.lomatogona on known collecting site. Some destroyed plants found. Population probably grew within a cereal field which was recently harvested. 2 L.serriola, 3 Allium sp. and 1 Daucus sp.? collected. It is decided to leave Armenia earlier than planned. Now, it becomes clear that there is no direct flight from Yerevan to Makhachkala in Daghestan.

26-08-90
Travel to a site where B.macrorhiza was claimed to occur (Sevan lake area). A few seeds of B.corolliflora ? were found. 3 L.serriola and 2 L.virosa sampled. Train connections between Armenia and Azerbaidjan have been interrupted due to the ethnic conflict between both republics. Bus ticket for travel from Yerevan to Groznyy (Tscheschen Republic) purchased.

27-08-90
Meeting at the Office for Foreign Relations to assess the course of the Armenian part of our expeditions. Ad hoc visit of the University of Yerevan. Lecture on wheat interspecific crosses and cytology. Travel to a known collecting site of B.corolliflora on the Aragats mountain. 1 large B.corolliflora population, 1 L.viminea, 2 L.serriola, 2 L.virosa sampled. In the evening 1 B.lomatogona, 1 B.corolliflora, 3 Allium sp. and 2 Coriandrum sativum samples received from A.Melikjan. Preparation of the luggage during the night for departure to Derbent on 28-08-90.

28-08-90
14 hours bus travel to Groznyy. Meeting with the director of the VIR experimental station at Derbent in Groznyy. Travel by car from Groznyy to Derbent.

29-08-90
Arrival on 29-08-90 at about 6 o'clock in the morning. 1 L.virosa?, 1 L.serriola and 1 Brassica sp. sampled. Expedition car has to be fixed for the next day.

30-08-90
Search for B.macrorhiza in known distribution area. In the evening finally 1 B.macrorhiza population sampled.

31-08-90
Travel to district Tabazaran to search for second B.macrorhiza population in known distribution area. After extensive discussions with elder inhabitants of different villages one possible site identified. Site cannot be reached by car due to wet roads. In addition, shepherds report on extensive sheep grazing on the potential collecting site which is 6 km to walk. Decision was taken to return to Derbent. 4 L.virosa, 1 L.serriola, 2 Allium sp. sampled.

01-09-90
A new attempt to find B.macrorhiza. In the afternoon heavy rain showers. Potential collecting site not accessible due to very slippy roads. 2 L.serriola and 2 L.virosa populations sampled.
02-09-90
Day of rest. Visit of Derbent and its local market. Collection of landraces. 1 Allium cepa, 1 B.vulgaris ssp.vulgaris (red beet), 1 C.sativum, 1 Brassica oleracea and 1 Spinacia olercaea.

03-09-90
New attempt and itinerary to reach the B.macrorhiza site of 31-08-90. After extensive search it was decided to stop the search, since topography seemed to be unsuited for B.macrorhiza. Travel to the Chirakhchay river valley. Steeply dissected mountains with gravel slopes. Promising topography and soil conditions. At 18.00 one B.macrorhiza and 1 Allium sp. population detected. Return to Derbent. Seed cleaning. Preparing the departure to Leningrad.

04-09-90
Seed cleaning. Final discussion on the collecting mission in Daghestan and on the requirements for a follow-up expedition in that area. Departure to Makhachkala, visit of the local market and collection of the last accession, a C.sativum landrace. Flight from Makhachkala to Leningrad.

Arrival in the late evening.

05-09-90
Supplementation of the field books, sharing of seed samples with G.Seiler and preparation of the seed samples for the quarantine office. Visit of the quarantine office and the Office for Foreign relations. Leisure time.

06-09-90
Meeting at the Office for Foreign relations. Short discussion with the plant introduction officer. Discussion with the data documentation officer (Dr.Chvytov). Leisure time.

07-09-90
Visit of the Pushkin Laboratory. Leisure time.

08-09-90
Sight seeing tour in Leningrad.

09-09-90
Departure from Leningrad to Amsterdam.

Tab.2: Passport data

Coll.nr.	Subspecific name	Oc.	District	Location	Longi.	Lati.
BFS/90 01	L.serriola	USSR	ARMENIA, YEREVAN	YEREVAN, 17KM NE, TO LUSAVAN	04438E	04019N
BFS/90 02	L.serriola	USSR	ARMENIA, YEREVAN	YEREVAN, 21KM NE, TO LUSAVAN	04439E	04020N
BFS/90 03	B.corolliflora	USSR	ARMENIA, YEREVAN	RAZDAN, 1KM NE, HILL NEAR PRISON CAMP	04448E	04028N
BFS/90 04	L.serriola	USSR	ARMENIA, ASHTARAKSKIJ	OSHAKAN, 0.5KM BEFORE JUNCTION	04415E	04012N
BFS/90 05	Allium sp.?	USSR	ARMENIA, TALIN	NORACHEN, W, 0.5KM BEFORE	04352E	04025N
BFS/90 06	A.flavum ?	USSR	ARMENIA, TALIN	NORACHEN, W, 2KM BEFORE	04352E	04025N
BFS/90 07	D.carota ?	USSR	ARMENIA, TALIN	NORACHEN, W, OUTSKIRTS/AT CANYON	04352E	04025N
BFS/90 08	L.serriola	USSR	ARMENIA, LENINAKAN	LENINAKAN TO SPITAK, 2.5KM BEHIND	04354E	04049N
BFS/90 09	A.scorodoprasum ?	USSR	ARMENIA, ARAGATS	RA-TASA TO APARAN, 0.5KM BEHIND	04419E	04042N
BFS/90 10	L.serriola	USSR	ARMENIA, YEREVAN	GARNI, GREEK MONUMENT	04439E	04015N
BFS/90 11	L.virosa	USSR	ARMENIA, YEREVAN	GEWGART (GEGARD), MONASTRY	04440E	04015N
BFS/90 12	L.serriola	USSR	ARMENIA, RAZDAN	RAZDAN TO SEVAN, 5KM E OF	04449E	04030N
BFS/90 13	B.corolliflora	USSR	ARMENIA, RAZDAN	RAZDAN TO SEVAN, 5KM E OF	04449E	04030N
BFS/90 14	L.virosa	USSR	ARMENIA, KAMO	KARVAN SARAJI	04510E	03958N
BFS/90 15	L.serriola	USSR	ARMENIA, KAMO	KARANLUKH (NEW: CEGHOVIT)	04517E	04005N
BFS/90 16	L.serriola	USSR	ARMENIA, ASHTARAKSKIJ	BYURAKAN, N OF	04414E	04025N
BFS/90 17	L.virosa	USSR	ARMENIA, ASHTARAKSKIJ	BYURAKAN, N OF	04414E	04025N
BFS/90 18	B.corolliflora	USSR	ARMENIA, ASHTARAKSKIJ	ARAGATS, MONESTRY PACHLAVUNIE (AMBERT)	04409E	04028N
BFS/90 19	L.virosa	USSR	ARMENIA, ASHTARAKSKIJ	ARAGATS, MONESTRY PACHLAVUNIE (AMBERT)	04409E	04028N
BFS/90 20	B.lomatogona	USSR	ARMENIA, TALIN	NORACHEN, W OF, 0.5KM BEFORE	04352E	04025N
BFS/90 21	B.corolliflora	USSR	ARMENIA, JEHEKNAZOR	GLADZOR	04522E	03948N
BFS/90 22	L.serriola	USSR	ARMENIA, ASHTARAKSKIJ	OSHAKAN, GARDENS AT RIVER	04414E	04014N
BFS/90 23	A.cepa	USSR	ARMENIA, ASHTARAKSKIJ	OSHAKAN, GARDEN OF A.MELIKJAN	04414E	04014N
BFS/90 24	A.scorodoprasum ?	USSR	ARMENIA, TALIN	ASHTARAK TO TALIN, 43KM BEHIND	04403E	04020N
BFS/90 25	C.sativum	USSR	ARMENIA, YEREVAN	YEREVAN, S OF	0444 E	0395 N
BFS/90 26	C.sativum	USSR	ARMENIA, ASHTARAKSKIJ	OSHAKAN, NEAR RAILWAY	04414E	04014N
BFS/90 27	A.scorodoprasum ?	USSR	ARMENIA, ABOLIAN	ATIS MOUNTAIN	04442E	04012N
BFS/90 28	L.viminea	USSR	ARMENIA, ASHTARAKSKIJ	ARAGATS, MONESTRY PACHLAVUNIE (AMBERT)	04409E	04028N
BFS/90 29	Brassica sp.?	USSR	DAGHESTAN, DERBENT	DJALGAN MOUNTAIN	04817E	04202N
BFS/90 30	L.virosa ?	USSR	DAGHESTAN, DERBENT	DJALGAN MOUNTAIN	04817E	04202N
BFS/90 31	L.serriola	USSR	DAGHESTAN, DERBENT	DJALGAN MOUNTAIN, VINEYARD MID OF HILL	04817E	04202N
BFS/90 32	B.macrorhiza	USSR	DAGHESTAN, ACHTUNSKIJ	DIMIRKENT, 1KM TO MIKRA	04753E	04117N

Tab.2 (cont.): Passport data

Coll.nr.	Subspecific name	Oc.	District	Location	Longi.	Lati.
BFS/90 33	L.virosa	USSR	DAGHESTAN, TABASARAN	MARAGA TO CHILIPINDJIG, 4KM BEHIND	04802E	04201N
BFS/90 34	A.scorodoprasum ?	USSR	DAGHESTAN, TABASARAN	KURKAK, S, 2KM TO SIJKA	04755E	04119N
BFS/90 35	L.virosa/serriola	USSR	DAGHESTAN, TABASARAN	KURKAK, S, 2KM TO SIJKA	04755E	04119N
BFS/90 36	L.virosa	USSR	DAGHESTAN, TABASARAN	KUDJNIK, 1KM TO KULUSE	04745E	04157N
BFS/90 37	Allium ?	USSR	DAGHESTAN, TABASARAN	KUDJNIK, 1KM TO KULUSE	04775E	04157N
BFS/90 38	L.serriola	USSR	DAGHESTAN, TABASARAN	RUSHUL, 1KM BEFORE	04802E	04157N
BFS/90 39	L.virosa	USSR	DAGHESTAN, TABASARAN	RUSHUL, 1KM BEFORE	04802E	04157N
BFS/90 40	L.virosa	USSR	DAGHESTAN, URKARACH	TRISANDIJ, S, 1KM BEFORE	04743E	04207N
BFS/90 41	L.virosa	USSR	DAGHESTAN, URKARACH	URKARACH, S, 2KM BEHIND, TO KUBACHI	04707E	04210N
BFS/90 42	L.serriola	USSR	DAGHESTAN, DERBENT	MAMEDKALA, W, 4KM BEFORE	04804E	04210N
BFS/90 43	L.serriola	USSR	DAGHESTAN, DERBENT	VIR EXPERIM.STATION, AT RAILWAY/STREAM	04820E	04158N
BFS/90 44	A.cepa	USSR	DAGHESTAN, DERBENT	CENTRE OF TOWN	04818E	04203N
BFS/90 45	B.vulgaris	USSR	DAGHESTAN, DERBENT	CENTRE OF TOWN	04818E	04203N
BFS/90 46	C.sativum	USSR	DAGHESTAN, DERBENT	CENTRE OF TOWN	04818E	04203N
BFS/90 47	B.oleracea	USSR	DAGHESTAN, DERBENT	CENTRE OF TOWN	04818E	04203N
BFS/90 48	S.oleracea	USSR	DAGHESTAN, DERBENT	CENTRE OF TOWN	04818E	04203N
BFS/90 49	B.macrorhiza	USSR	DAGHESTAN, AGUL	DULDUG, 3KM W OF (CHIRAKCHAY RIVER)	04749E	04145N
BFS/90 50	Allium sp. ?	USSR	DAGHESTAN, AGUL	DULDUG, 3KM W OF (CHIRAKCHAY RIVER)	04749E	04145N
BFS/90 51	C.sativum	USSR	DAGHESTAN, MAKHACHKALA	MAKHACHKALA, MARKET	04730E	04258N

Explanations: Coll.nr.= collection number, Lati.= latitude, Longi. = longitude.

Tab.3: Population and site location characters

Coll.nr.	Sam.	EPS	P.area	P	O	Alt	T	CS	A	SL	SPH	SO	ST	SC	SN	Remark
BFS/90 01	20	15	10000	W	2	1600	3	0	W	-	-	3	2	2	1	roadside, grassland
BFS/90 02	5	200	5000	W	3	1700	4	8	-	0	-	1	2	2	3	Tschernosem, 40cm deep
BFS/90 03	41	60	10000	W	2	1900	4	3-5	S	40	6.3	3	2	2	2	pasture, Tschernosem
BFS/90 04	20	25	1000	W	2	1000	4	8	-	-	-	4	2	6	1	roadside, step
BFS/90 05	9	-	1900	W	2	1900	4	4	S	5	-	4	2	6	1	pasture, step
BFS/90 06	1	1	-	W	1	1780	4	0	-	-	-	4	2	6	1	roadside, step
BFS/90 07	23	100	1800	W	1	1800	4	4	S	50	-	5	2	6	1	rocky slope, step
BFS/90 08	30	500	3000	W	2	1560	3	0	-	-	-	1	2	6	3	roadside ditch, agricultural area
BFS/90 09	7	40	1000	W	3	1950	4	8	-	-	-	1	2	6	3	field margin, agricultural area
BFS/90 10	20	30	1000	W	2	1370	6	0	-	-	-	4	2	6	1	touristic site, x(*) :sandy loam
BFS/90 11	20	200	200	W	2	1720	6	8	S	20	-	4	2	6	3	stream, grassland and bushes
BFS/90 12	26	500	1000	W	2	1860	4	-	-	-	-	4	2	6	2	roadside ditch near treas, shrubs
BFS/90 13	3	-	200	W	2	1860	4	8	-	-	-	3	2	6	2	roadside/bushes, 20 veg. plants cut
BFS/90 14	1	2	1	W	2	2420	5	3	-	-	-	5	1	6	2	entrance to ancient building, grassland
BFS/90 15	60	1000	5000	W	2	2070	5	4-7	E	30	-	4	2	6	2	above roadside ditch, grassland
BFS/90 16	17	60	100	W	2	1970	5	5	SW	10	-	4	2	2	2	roadside, bushes, x:sandy loam
BFS/90 17	7	15	200	W	2	1970	5	5	SW	10	-	4	2	2	2	roadside, bushes
BFS/90 18	25	40	10000	W	2	2160	6	3	S	10	-	4	2	6	2	ruin, step, very rich vegetation
BFS/90 19	12	30	10000	W	2	2160	6	3	S	10	-	4	2	6	2	ruin, step, very rich vegetation
BFS/90 20	1	-	-	W	5	1900	4	0	-	-	-	4	2	6	1	wheatfield, grassland
BFS/90 21	3	3	5	W	5	-	4	5	-	-	-	4	2	6	3	outskirts of village, shrubs
BFS/90 22	1	-	-	W	5	1040	3	0	-	-	-	1	2	2	3	garden, stream valley, Fluvisol
BFS/90 23	4	-	-	L	5	1040	3	0	-	-	-	1	2	2	3	garden, stream valley, Fluvisol
BFS/90 24	7	-	-	W	1	1350	4	5	SW	10	-	4	2	6	1	step
BFS/90 25	100	-	-	W	1	550	3	0	-	-	-	1	2	6	2	humide site nearby
BFS/90 26	25	-	-	L	2	1040	-	-	-	-	-	-	-	-	-	
BFS/90 27	14	-	-	W	1	1600	4	5	SW	10	-	3	2	6	2	grassland
BFS/90 28	4	20	100	W	2	2160	6	3	S	10	-	4	2	6	2	ruin, step
BFS/90 29	50	150	2000	W	2	709	4	5	E	10	8.3	1	2	2	2	construction area, bushes, x:loam
BFS/90 30	4	6	200	W	2	709	4	5	E	70	8.3	1	2	2	2	slope with little vegetation, bushes, x:loam
BFS/90 31	16	500	5000	W	2	440	5	5	E	5	8.5	1	2	2	2	vineyard, agricultural area, x:loam
BFS/90 32	50	100	10000	W	1	1200	6	5	W	65	7.5	4	2	6	1	hillside, grassland, x:loamy sand

Tab.3 (cont.): Population and site location characteristics

Coll.nr.	Sam.	EPS	P.area	P	O	Alt	T	CS	A	SL	SPH	SO	ST	SC	SN	Remark
BFS/90 33	16	25	100	W	2	660	4	5	N	10	8.3	1	2	2	2	roadside, near wheat field, x:loam
BFS/90 34	5	5	10000	W	3	1050	4	5	E	10	8.3	1	2	2	2	field boarder, wheat field, x:loam
BFS/90 35	8	20	500	W	3	1050	4	5	E	15	8.3	1	2	2	2	field boarder, grassland/bushes, x:loam
BFS/90 36	18	40	1000	W	2	1100	5	4	-	15	7.4	1	2	2	2	field boarder, grassland/bushes, x:loam
BFS/90 37	4	-	10000	W	2	1000	5	4	-	15	7.4	1	2	2	2	field boarder, grassland/bushes, x:loam
BFS/90 38	5	15	1000	W	2	500	5	5	SO	15	-	1	2	2	2	roadside/field, grassland/bushes
BFS/90 39	9	15	1000	W	2	500	5	5	SO	15	-	1	2	2	2	roadside/field, grassland/bushes
BFS/90 40	16	20	10000	W	2	880	6	4	SE	20	8.7	1	2	6	2	ditch/powerline, grassland/wood, x:sandy loam
BFS/90 41	9	15	100	W	2	1200	6	5	E	30	8.1	3	1	6	3	field margin near stream, grassland, x:sand
BFS/90 42	29	1000	10000	W	3	70	3	0	-	-	8.1	1	3	6	2	vineyard/stream, grassland, Fluvisol,x:loamy clay
BFS/90 43	16	100	1000	W	2	-11	3	0	-	-	-	1	3	6	3	nearby stream, grassland/bushes
BFS/90 44	-	-	-	L	6	-	-	-	-	-	-	-	-	-	-	
BFS/90 45	-	-	-	L	6	-	-	-	-	-	-	-	-	-	-	
BFS/90 46	-	-	-	L	6	-	-	-	-	-	-	-	-	-	-	
BFS/90 47	-	-	-	L	6	-	-	-	-	-	-	-	-	-	-	
BFS/90 48	-	-	-	L	6	-	-	-	-	-	-	-	-	-	-	
BFS/90 49	16	20	2500	W	1	1610	6	5	S	40	7.7	4	1	6	2	roadside, grassland/stream valley, x:loamy sand
BFS/90 50	10	50	2500	W	1	1610	6	5	S	40	7.7	4	1	6	2	roadside, grassland/stream valley, x:loamy sand
BFS/90 51	-	-	-	L	6	-	-	-	-	-	-	-	-	-	-	

Explanations: Collec.nr.= collection number; Sam.= number of plants sampled; EPS= effective population size, P.area= estimated area in m2 occupied by a population; P= population type: W - wild, L - landrace; O=origin type: 1 - wild habitat, 2 - ruderal, 3 - farm field, 5 - backyard, 6 - local market; Alt=altitude in m; T=topography: 3 - plain level, 4 - undulating, 5 - hilly, 6 - hilly dissected; CS= collection site: 0 - level, 3 - rounded summit, 4 - upper slope, 5 - mid slope, 6 - terrace, 7 - lower slope, 8 - open depression; A= aspect: S - slope facing the south, SW - southwest direction etc.; S= slope: in degrees; SPH= soil pH value; SO= stoniness: 1 - tillage unaffected, 2 - t. affected, 3 - t. difficult, 4 - t. impossible, 5 - essentially paved; ST= soil texture: 1 - sand, 2 - loam, 3 - clay, 4 - highly organic; SC= soil colour: 2 - brown, 6 - grey; SN= soil nutrient content: 1 - poor, 2 - medium, 3 - high; Remark: first information is given on the site type, then the vegetation type of the region is described. (*) x:loam means: soil texture was estimated according to the classification method of Schlichting and Blume.

COLLECTION FORM
I.First priority descriptors

Expedition:_____

Collectors name(s):_____

Collection date :_____

Genus:_____ Species:_____

Subspecies:_____ SCNR:_____

Effective pop. size:_____ Sample size :_____ Pop. area: _____ (m^2)

Collection number:

Herbarium number:

Photo number:

Object:

Population type: [ ] W=wild L=landrace B=breeder's variety R=research material

Origin type: [ ] 1=wild 2=ruderal 3=farm field 4=farm store 5=backyard 6=local market 7=modern seed trade 8=institute/ breeding company

Local name (note ethnic group):_____

Variety name:_____

Cultivation data: Sowing date:_____ Harvest date:_____

End use:_____

Country: _____ District:_____

Location:_____

Latitude:_____ N Longitude:_____ E Altitude:_____

_____ S _____ W

Remarks:_____

_____

_____

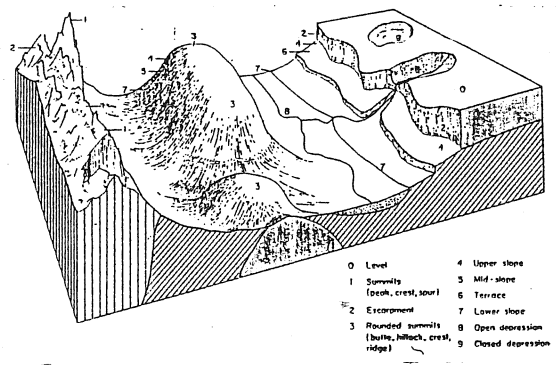
(microclimate e.g. fog formation,late frosts etc.; pest and pathogens, growth habit, phenology, hybrid occurrence, disturbance factors like sheep grazing, wind or water erosion, primary geographic origin of landraces if relevant)

II. Facultative descriptors

Topography: [ ]
1=swamp 2=flood plain 3=plain level 4=undulating
5=hilly 6=hilly dissected 7=steeply dissected
8=mountainous 9=other (specifiy)
specify: _____

Collection site: [ ]

0=level 1=summits
2=escarpment
3=rounded summits
4=upper slope
5=mid slope
6=terrace 7=lower slope 8=open depression 9=closed depression



ASPECT: _____ Slope(degrees): _____ Soil pH: _____

Stoniness: [ ]
1=tillage uneffected
2=tillage affected
3=tillage difficult
4=tillage impossible
5=essentially paved

Soil texture: [ ]
1=sand
2=loam
3=clay,silt
4=highly organic

Soil colour: [ ]
1=black 2=brown
3=red 4=orange
5=yellow 6=grey
7=other(specify)
specify: _____

Soil nutrient content: [ ]
1=poor
2=medium
3=high

Salinity: [ ]
0=none
1=low
2=medium
3=high

Drainage: [ ]
1=imperfect
2=moderate
3=well drained
4=excessive

Site type: _____ Vegetation type: _____
(e.g.: roadside, orchard) (e.g.:grassland, woodland)

Associated wild species: _____
(related species first)

_____

_____

Population variability: [ ]
(under homogeneous cultivation conditions)
1=uniform 2=low 3=medium 4=high

Cropping system: _____

_____
(associated crops, crop rotation systems etc.)