

PLANT GERMPLASM COLLECTION REPORT

USDA-ARS
FORAGE AND RANGE RESEARCH LABORATORY
LOGAN, UTAH

Foreign Travel to:
Russia and Kazakhstan
July 9-August 2, 1992

TITLE: PLANT COLLECTION EXPEDITION TO RUSSIA AND KAZAKHSTAN

U.S. Participants

Kay H. Asay - *Research Geneticist*
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GERMPLASM COLLECTIONS

Travel Logan, UT to St. Petersburg, Russia ... July 9-10
St. Petersburg ... July 10-14
Travel St. Petersburg to Chelkar, Kazakhstan ... July 14-15
Chelkar - Aral Sea and Surrounding Area ... July 15-27
Chelkar to Aktyubinsk, Kazakhstan .. July 28-30
Travel Aktyubinsk to Moscow, Russia ... July 31-August 1
Moscow ... August 1. Travel Moscow to Logan .. August 2

INSTITUTIONS VISITED:

N. I. Vavilov Institute of Plant Industry, 42 Herzen Street, 190000, St. Petersburg, Russia

N. I. Vavilov Aral Experimental Station of Genetic Resources of Plants, Chelkar Town,
Aktyubinsk Region, 464760, Kazakhstan

PURPOSE OF TRIP

1. To collect seeds of the grass tribe Triticeae with emphasis on *Agropyron*, *Leymus*, *Psathyrostachys*, *Thinopyrum*, and *Elytrigia*. *Agropyron* species with resistance to prolonged drought and soil salinity were of particular interest. *Leymus* species adapted to production of nutritious forage during the late fall and winter were also of interest.

2. To make professional contacts with scientists and administrators associated with the N. I. Vavilov Institute of Plant Industry at St. Petersburg, Russia and the N. I. Vavilov Aral Experimental Station of Genetic Resources of Plants, Chelkar, Kazakhstan. A major goal was to develop and expand upon productive interactions for germplasm exchange and related agricultural research.

SUMMARY

The expedition was an unqualified success. We collected 352 accessions representing 47 species. In addition, the research institute at Chelkar, Kazakhstan has agreed to send seed of approximately 100 accessions when seed becomes available later this fall. The most noteworthy of these are collections of *Kochia prostrata*, *Ceratoides spp.*, *Agropyron spp.*, and *Thinopyrum spp.* included in nurseries at Chelkar.

Because of military restrictions, the area in Kazakhstan from Chelkar south to the Aral Sea was previously closed to foreigners. Although the Westover-Enlow expedition was in Chelkar in 1934 before restrictions were implemented, there is no evidence that they collected germplasm in the area near the Aral Sea. We are confident that we collected unique germplasm from this area (particularly *Agropyron fragile*, the Siberian form of crested wheatgrass) that was not previously included in the National Plant Germplasm System (NPGS). Several accessions of *A. fragile* were collected in areas receiving less than 150 mm of annual precipitation. The most common forms of crested wheatgrass now used in North America (*A. desertorum* and *A. cristatum*) were not found in these areas of extreme drought. Accessions of these species were collected later in the expedition from sites with more optimum soil moisture conditions.

Because of prolonged drought, crested wheatgrass stands have declined in many areas of the Intermountain Region of the U.S. These sites were seeded almost exclusively to cultivars and unimproved strains of *A. desertorum* and *A. cristatum*. The *A. fragile* forms used in these seedings were apparently derivatives from crosses with *A. desertorum*. We are confident that *A. fragile* collections from our expedition are significantly more drought resistant than previously available germplasm, and will be an invaluable genetic resource in North American breeding programs to develop improved cultivars of crested wheatgrass.

As in the past, the Foreign Relations Department (Sergey Alexanyan and Sergey Shuvalov) and other staff at the N. I. Vavilov Institute of Plant Industry (VIR) in St. Petersburg were extremely cooperative, and they did an excellent job of facilitating the expedition. Dr. Nickolay Dzyubenko (Head of Forage Crops Research) and Vladimir Chapurin (Forage Crop Specialist) from VIR were primarily responsible for organizing our expedition and accompanied us on the expedition. Dr. Dzyubenko had previously been the director of the Aral Experiment Station in Chelkar for nine years and was familiar with the collection routes and native vegetation. Mr. Chapurin was fluent in English and acted as an interpreter as well as a botanist. Excellent support also was provided through the research institute at Chelkar, which provided facilities, vehicles, and drivers for the expedition. This institute was previously under the direction of VIR in St. Petersburg, but after the breakup of the USSR it was transferred to the government of Kazakhstan. It is now administered through the Kazakhstan Academy of Science in Alma Ata. However, close cooperation between VIR and the Chelkar institute is still very much in

evidence. Aushan Husainov, director of the institute at Chelkar, was responsible for the logistics of our travel in Kazakhstan and accompanied us on the expedition and provided taxonomic expertise on shrubs. Valuable contacts also were made with other scientists at the Aral Experiment Station in Chelkar. These include Manish Takaeva (Grass Specialist), Ileyna Dzubenko (Alfalfa Specialist), Aldabergen Espanov (Alfalfa Specialist), and Cerick Utalin (Shrub Specialist).

It was evident that the research institutes in St. Petersburg and Chelkar are operating under severe budget restraints. The value of the rouble has been reduced by more than 100-fold since our 1988 expedition and budget allocations have not increased accordingly. We were informed that the numbers of staff had been decreased substantially in St. Petersburg and similar reductions have occurred at Chelkar. Because of the disparity between values of the dollar and rouble, it is also virtually impossible for scientists in the former USSR to participate in an exchange visit if they are required to pay airline fares to and from the U.S. Tickets would cost approximately 1,500 dollars or 210,000 roubles, which amounts to the salary of an average scientist for nearly six years. We strongly recommend that consideration be given for financial assistance to these research institutions. Also, we plan to submit a proposal for a scientific exchange that would permit Dr. Dzyubenko, Mr. Chapurin, and Mr. Husainov to visit research facilities in the U. S. Our proposals will include round trip airline fares between Russia and the U.S.

TECHNICAL REPORT AND DETAILS OF EXPEDITION

July 9-10 Team members left Logan, Utah and traveled to St. Petersburg, Russia. En route we stopped at Dulles International Airport in Washington, D.C. where we took possession of two micro computers from the USDA-ARS Germplasm Services Laboratory. We were met at the St. Petersburg Airport by Sergey V. Shuvalov and Antone Krylov from the Foreign Relations Department of VIR. The computers were cleared through customs and delivered to the institute. Details of the expedition were briefly discussed, and we were taken to our hostel. The hostel is owned by VIR and is located in the outskirts of St. Petersburg.

July 11-13 Final arrangements were made for the expedition and airline tickets purchased for travel between St. Petersburg and Aktyubinsk, Kazakhstan.

July 14-15 Accompanied by Vladimir Chapurin, Forage Crop Specialist from VIR, we traveled by air from St. Petersburg to Aktyubinsk. Mr. Chapurin also served as an interpreter during our expedition. We were met in Aktyubinsk by Dr. Nickolay Dzyubenko, Head of Forage Crops Research at VIR. Dr. Dzyubenko had traveled to Chelkar two weeks prior to our arrival to make preparations for our expedition and to complete research projects at the Aral Research Institute. His wife, Ilyena, is a technician at VIR in Pushkin and also is completing alfalfa research projects at Chelkar. She had been in Chelkar since March. Because of the late arrival of our flight, it was necessary for us to take the night train from Aktyubinsk to Chelkar.

July 15-17 We visited staff and research projects at the Chelkar research institute. Members of the staff included Sultanback 'Aushan' Husainov, director of the institute; Vladimir Karpenko, head of field crops research; Manish Takaeva, grass specialist; Aldabergen Espanov, alfalfa specialist; and Cerick Utalin, shrub specialist. We also met with a local news correspondent and an AGRIPROM official to discuss our research programs and objectives of the collection expedition. The institute has evaluated 305 collections (representing 40 ecotypes) of *Kochia prostrata* for persistence and forage production. They agreed to send us approximately 50 selected accessions from this population. During our tour of research projects, we also were favorably impressed with the shrubs *Haloxylon* for revegetation of sand dunes and *Salsola rigida* and *Camphorosma lessingii* for grazing during the late summer and autumn. Two shrubs, *Ceratoides veresimum* and *C. papposa*, appeared to be potentially valuable forages as well. They will send seed of these species as well as seed from selected accessions of *Agropyron* and *Thinopyrum* when seed becomes available later in the season. We learned of a potentially new forage crop that VIR is working with, *Trifolium apertum*, a legume that is endemic to the Northern Caucasus Mountains. We agreed to send them released cultivars and experimental strains of *Agropyron*, *Psathyrostachys*, *Leymus*, and interspecific hybrids involving perennial Triticeae species. We also agreed to send them seed of germplasms and cultivars of *Medicago*, including germplasms 'AZMFA1' and 'AZRON' from Arizona; experimental strains from the USDA-ARS breeding program at Logan; and the cultivars 'CUF 101', 'Agate', 'Pierce', 'Fortress', and 'Trumpetor'. Seed samples were collected from research plots at the institute and from native stands in the vicinity of Chelkar (Fig. 1).

July 18-22 A collection expedition was conducted southwest of Chelkar at various elevations along the Shagon Valley to the northern shores of the Aral Sea and north to Chelkar (Fig. 1). Vast areas within this region were ungrazed because of a lack of water. Until recently, this area was closed to plant exploration because of military restrictions. To the best of our knowledge, we were the first North Americans to make plant collections there. Samples of *Agropyron fragile* were collected in areas receiving less than 150 mm of annual precipitation. This is the driest environment that we have collected any species of crested wheatgrass. It is noteworthy that other forms of crested wheatgrass (*A. cristatum* and *A. desertorum*) were not found until soil moisture conditions improved markedly. Another grass of interest, *Psathyrostachys juncea* (Russian wildrye), was not found in the extremely dry areas (150 mm annual precipitation or less) and was never observed on sandy soils. This species was most prevalent on clay (often alkaline) soils, particularly in drainage areas where soil moisture was more optimum. *Poa bulbosa* and species of *Stipa* were the most common grasses, and *Artemisia terrae-albae* and *Kochia prostrata* were the most frequently observed shrubs in this collection area. Although collections of *Astragalus* spp. were made in this area, these species did not appear to be grazed by livestock. No other leguminous forbs were found during this phase of the expedition.

July 23-27 Seed samples were organized, and accessions were collected from areas in the vicinity (within 50 km) of Chelkar. Most of these collections were made from extremely sandy sites, particularly in areas within 20 km of Chelkar (Fig. 1). Because of more optimum soil moisture conditions (150 to 200 mm annual precipitation), samples of *A. cristatum*, *A. desertorum*, *Ps. juncea*, and *Leymus angustus* were collected.

July 28-July 31 A final expedition was made in the area north of Chelkar to Aktyubinsk (Fig. 2). This area was characterized by higher elevations (up to 350 m) and greater precipitation (250 to 350 mm annual precipitation) than found near and south of Chelkar. *Agropyron cristatum* and *A. desertorum* occurred about as frequently as *A. fragile*, and several collections were made of these species. In addition, collections were made of *Ps. juncea* and *Leymus angustus*. *Bromus inermis* and *Dactylis glomerata* along with species of *Poa* and *Festuca* also were obtained in the more optimum sites near Aktyubinsk. *Medicago falcata*, *M. sativa*, and variegated flower types of alfalfa were found within about 50 km east of Aktyubinsk, but seed of these species was not yet mature enough for collection. After arrival in Aktyubinsk, seed samples were organized and prepared for shipment. The samples were sent with Mr. Vladimir Chapurin to VIR in St. Petersburg, where they will be processed and sent to the Plant Germplasm Quarantine Center in Beltsville, MD. We left Aktyubinsk at 11:30 PM on Aeroflot.

August 1 Our flight arrived in Moscow at 2:00 AM, and we reached our hotel (arranged by VIR in St. Petersburg) at 3:30 AM.

August 2 We boarded a Delta flight at 1:30 PM, and after stops in JFK in New York City and Salt Lake City, arrived in Logan at 11:00 PM

Table 1. Species collected during expedition to Kazakhstan in 1992¹

Species	Number of Samples	Species	Number of Samples
<i>Aeluropus litoralis</i>	1	<i>Poa pratensis</i>	1
<i>Aeluropus</i> spp.	1	<i>Poa</i> spp.	1
<i>Agropyron cristatum</i>	21	<i>Psathyrostachys juncea</i>	96
<i>Agropyron desertorum</i>	20	<i>Rheum tartaricum</i>	2
<i>Agropyron fragile</i>	49	<i>Roegneria</i> spp.	10
<i>Alopecurus arundinaceus</i>	1	<i>Stipa capillata</i>	6
<i>Astragalus nutans</i>	1	<i>Stipa tirsia</i>	1
<i>Astragalus</i> spp.	2	<i>Stipagrostis karelinii</i>	1
<i>Bromopsis</i> spp.	17	<i>Thinopyrum intermedium</i>	10
<i>Bromus inermis</i>	13	<i>Tulipa alberti</i>	1
<i>Calamagrostis epigeios</i>	1	TOTAL	352
<i>Calligonum</i> spp.	1		
<i>Catabrosella humilis</i>	2		
<i>Dactylis glomerata</i>	1		
<i>Elymus dahuricus</i>	15		
<i>Elymus sibiricus</i>	22		

Elymus spp.	15		
Elytrigia ramosus	1		
Elytrigia repens	5		
Elytrigia spp.	1		
Festuca pratensis	1		
Festuca spp.	1		
Hordeum violaceum	2		
Koelaria glauca	3		
Leymus angustus	15		
Leymus racemosus	3		
Leymus secalinus	6		
Phleum spp.	1		
Poa bulbosa	1		

¹ In addition, germplasm specialists at the Chelkar, Kazakhstan agreed to send an estimated 50 samples of *Kochia prostrata*, 5 samples of *Ceratoides spp.*, 10 samples of *Agropyron*, and 3 samples of *Thinopyrum* when seed becomes available.