

**PLANT GERMPLASM (PRE)COLLECTION REPORT
USDA-ARS
FORAGE AND RANGE RESEARCH LABORATORY
LOGAN, UTAH**

**Foreign Travel to:
USSR (Moscow and Leningrad)
September 18 -October 13, 1975**

U.S. Participants:

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Purposes of Trip:

- 1. To determine the distribution and morphological variation of important range forage species in the USSR.**
- 2. To become more proficient in the identification and classification of perennial grasses of the Triticeae tribe.**
- 3. To lay the groundwork for an extended plant-collecting expedition to the USSR in 1976 or 1977.**
- 4. To observe the status of range forage breeding work in the USSR.**

Summary

A 4-day visit to the herbarium of the Komarov Botanical Institute at Leningrad made apparent the fact that most of the vast source of range forage germplasm indigenous to the USSR has never been introduced into the U.S. Less than half of the USSR Agropyron and Elymus species have entered the U.S. plant introduction system, and those species that have been introduced are inadequately sampled.

The Komarov Botanical Institute contains the worlds second largest herbarium which is particularly rich in type specimens. About half of the type specimens of the world's collections of perennial Triticeae grasses are found in this one herbarium. Any taxonomist who wishes to treat Asian species should become throughly familiar with the content of the Komarov herbarium.

The Soviets are showing only moderate interest in range forage improvement. Most forage breeding work is on species to be used in pastures or for hay on cultivated land. Small scale breeding programs are underway in crested wheatgrass and Russian wildrye. The general

disinterest in range forages is reflected in relatively small collections of those species at All Union Institute of Plant Industry (VIR) at Leningrad. The best way to obtain significant new stocks of germplasm for U.S. and USSR plant collectors.

On the basis of plant distribution determined from herbarium specimens at the Komarov Botanical Institute, we concluded the the Kazakstan Republic contained the richest supply of arid range plants; scientists at VIR confirmed this conclusion. A tentative itinerary for a joint US-USSR plant collecting expedition to Kazakstan and surrounding regions was developed in consultation with forage scientists at VIR. The proposed plant expedition met with a cool reception from the USSR Ministry of Agriculture officials at Moscow. However, they finally agreed in principle to a joint US-USSR collecting effort, but insisted that the expedition could not be arranged earlier than the summer of 1977.

Travel Details

September 18: Travel from Salt Lake City to Washington D.C.

September 19: Orientation and briefing at the US-USSR Secretariat in Washington D.C.

September 20-22: Travel from Washington D.C. to Moscow, with a 2-day layover in London.

September 23: Met with the official delegation of the All-Union Academy of Agriculture to finalize our itinerary for the next 19 days. Those in attendance included:

Academician G. S. Muromtsev - A soil microbiologist, by training, but now functioning primarily as an administrator. Muromtsev was the highest ranking member of the Soviet delegation.

Dr. S.S. Kusmin - Deputy Chief of Foreign Relations Department of the Academy of Agriculture. He speaks English very well and is not a practicing scientist.

Dr. Lev Mitraphanov - Scientific Secretary of the Academy of Agriculture. Mitraphanov's scientific field is seed production in perennial forages.

Dr. Valery N. Soyfir - Deputy Director of the All Union Institute of Applied Molecular Biology and Genetics. Soyfir came across as a highly competent molecular biologist. His scientific speciality is the mutation process. He recently published a 125 page paper in Evolutionary Biology entitled "The Molecular Basis of Mutation." Dr. Soyfir presented us with a 208-page

paper-back book that treats the subject of molecular biology in a semi-popular fashion. The book was published in 1975. Soyfir is rather young scientist by Soviet Standards (probably in his early 40's), and he is anxious to establish contacts with western scientists.

Dr. Yuri Nikulin - a member of the US-USSR Secretariat in the USSR Ministry of Agriculture. Nikulin speaks English well and is involved exclusively in the administration of the US-USSR exchange agreement.

Mr. Alexander Golubev - An interpreter from the Ministry of Agriculture (Nikulin is his direct supervisor). Mr. Golubev served as our interpreter throughout the trip, and he served us very well. He has an excellent command of English, and has no apparent political and social axes to grind.

During this first meeting, our itinerary was firmed up. It included visits to the Timaryazev Plant Physiology Institute and the Main Botanical Garden in Moscow, the Williams fodder Institute (VIK) outside of Moscow, the All Union Institute of Plant Industry (VIR) and the Komarov Botanical Institute at Leningrad. We inquired whether arrangements had been made for us to see specific scientists, viz. F. Kh. Bakhteyev at the Main Botanical Garden, V. Jaaska at the Institute of Zoology and Botany in Tartu, Estonia, and N. N. Tzelev at the Komarov Botanical Institute in Leningrad. No contacts had been made despite the fact that our request to see these scientists had been submitted several months earlier. During the course of the trip, we were able to visit with only one of the three scientists, Dr. Tzelev.

We presented our plan to collect range forage species in the USSR in 1976. None of this group could foresee problems that would interfere with the collecting expedition, particularly if it were a joint US-USSR expedition. However, the Academy of Agriculture is not the agency that approves and administers plant collecting expeditions. This is a function of the Ministry of Agriculture via the US-USSR Agricultural Exchange Agreement.

Timaryazev Institute -Moscow

The afternoon of September 23 was spent at the Timaryazev Institute of plant physiology. We had not requested to visit this Institute, but the Soviets wanted us to see it. The Timaryazev Institute is affiliated with the USSR Academy of Science and it was probably the most impressive scientific facility that we visited. The Timaryazev Institute had an 80-year history, and it now employs a staff of 600, of which 150 are scientists. The Institute is organized into 15 departments or laboratories that concentrate on various aspects of basic and applied plant physiology.

We were conducted on a tour through the Institute by Prof. (Mrs.) Raiza Butenko, the chief of the Tissue-Culture Laboratory. She is a corresponding member of the USSR Academy of Science, a position of considerable prestige just under the rank of Academician. Her laboratory is staffed by 26 people, 20 of who are women. The Tissue-Culture Laboratory is the communist-world's center for tissue culture work. Several visiting scientists are students from East Germany and one from North Vietnam were working in Prof. Butenko's laboratory. The laboratory is heavily involved in pollen-culture studies, i.e. the rearing of haploid plants from pollen grains. They like may other laboratories, can rear mature plants of various Nicotiana species form pollen grains. A concentrated effort is underway to do the same thing with tomatoes. They have been able to obtain undifferentiated tissue from tomato pollen grains, but as yet they have not succeeded in raising haploid tomato plants. Dr. Butenko's laboratory is also heavily involved in somatic hybridization studies, particularly with Nicotiana. She showed us an 8-10 minute color movie on somatic hybridization using in vivo preparations. The film was impressive.

We came away from the Tissue- Culture Laboratory with the impression that they were doing quality work. The facilities and equipment appeared to be adequate but not elaborate. Dr. Butenko is an enthusiastic scientist who has excellent rapport with her staff. She is scheduled to come to the US in 1976 as a visiting scientist and lecture at Michigan State University.

We had hoped to visit several other laboratories at the Timaryazev Institute; particularly the laboratory dealing with salt and frost-tolerance; but the afternoon was gone by the time we got through the Tissue-Culture Laboratory.

September 24:

Main Botanical Garden - Moscow

The Main Botanical Garden, like the Timaryazev Institute, functions under the auspices of the USSR Academy of Science; and as such, probably receives better support than those institutions administered by the Academy of Agriculture. The director of the Main Botanical Garden is Academician N. V. Tsitsin, the world renowned proponent of wide-hybridization as a means of evolution and plant improvement. We were welcomed by Dr. J. W. Sinadsky, Deputy Director. Dr. Sinadsky is trained as a forest entomologist.

The Main Botanical Garden is a relatively young institution with only a 30-year history; but a great deal has been done in those 30 years to make it one of the worlds important botanical gardens. It occupies 360 ha (890 acres), the largest botanical garden in Europe and possibly the entire world. The Botanical Garden has a staff of 800, and 167 of these are scientists. Their herbarium contains about 180,000 plant specimens, and 200,000 living specimens are maintained

in the garden.

The institution is organized into 11 departments, the largest of which is the Department of Distant Hybridization. This department is under the direct leadership of Academician Tsitsin. Dr. Tsitsin is a member of the Academy of Science and the Academy of Agriculture, and he wields great influence over USSR agricultural science. We made a special request to see Tsitsin and were told he could see us for 10 minutes. The actual visit took the better share of an hour. Dr. Tsitsin, although over 80 years old, is still active and alert. He still holds strong hopes for commercially competitive perennial wheats from Triticum-Agropyron hybrids. He says it is just 2-3 years away, but he has been saying this for more than 20 years. Considerable emphasis is being placed on Triticum-Elymus hybrids, especially those with E. mollis and E. giganteus. Dr. Tsitsin presented us with an autographed copy of a recent paper "The Origin of New Species and Forms of Plants." This paper was apparently given at the XII International Botanical Congress at Leningrad in July 1975. His ideas concerning wide hybridization are given in that paper, so we will not discuss its content here. One theory that Tsitsin discussed with us directly was that 10 to 12 generations are needed after a wide cross before the full variation is expressed. After the required number of generations, the variations virtually explodes in the population. Because of this lag in expression of variation, many wide-hybridization programs are discontinued before they have the chance to show their potential. We were unable to obtain an explanation of Tsitsin's theory of delayed expression of variation other than "that under remote hybridization you cannot be guided by the usual laws and notions about inheritance and segregation.". He may have a valid point.

Although Dr. Tsitsin is a remarkable scientist and had made significant scientific contributions, he is simply too old to give positive leadership to the wide-hybridization program. In addition to being Director of the Main Botanical Garden, he has jurisdiction over the 115 botanical gardens throughout the USSR. These responsibilities are obviously too much for a man in his 80's. Other people are apparently doing the routine work and making important decisions for Tsitsin. All of his support staff that we visited with were old-guard scientists. We came away with the feeling that new and younger scientific blood is needed in the wide-hybridization program. Dr. Tsitsin invited us to come back and see their field plantings in the spring. The true merits of Tsitsin's wide-hybridization work are hard to evaluate. We recommend that some type of exchange be negotiated that would permit a US plant breeder who is engaged in wide-hybridization and speaks Russian to spend a year working with Tsitsin's group in Moscow.

The Department of Distant Hybridization is in the process of being moved from the Main Botanical Garden to new facilities on the outskirts of Moscow. We asked to visit the new locations, but were denied that request. While at the Main Botanical Garden, we tried to arrange a meeting with Dr. F. Kh. Bakhteyev, a member of the Department of Distant Hybridization. We were told on separate occasions that 1) he was sick, 2) he was on vacation and 3) he was on a collecting trip to the Pamir mountains.

Following our visit with Dr. Tsitsin, we were taken on a tour of the botanical garden grounds by Drs. (Mrs.) N. A. Borodina and Dr. P. A. Rotov. The garden is arranged according to geographic areas. The garden is well maintained by a large staff of groundsmen (mostly women), and the grounds are open to the general public as a park. Many old people spend the day sitting on benches in the garden while tending young children of working mothers.

September 25:

All Union Institute of Plant Industry (VIR) - Leningrad

After a night train ride from Moscow to Leningrad, we met with the following official delegation from VIR:

Dr. E. V. Mazhorov - Head, Department of Scientific Information and Coordination. He seemed to be the leader of the delegation.

Prof. P. A. Lubenets - Head, Department of Forage Crops. His particular specialty is alfalfa.
Dr. (Mrs.) N. A. Mukhina - Senior Scientific Worker, with a specialty in red clover.

Dr. (Mrs.) Z. P. Shutova - Senior Scientific Worker, specializing in grasses (Poa, Agrostis, and Festuca).

Dr. U. I. Kirillov - Senior Scientific Worker specializing in grasses (Phleum and Festuca).

Dr. (Mrs.) A. V. Bukhteeva - Scientific Worker Specializing in grasses (Agropyron and Elymus).

The Director of VIR Academician D. D. Breshnev, was on vacation, so we never met him. The Deputy Director, Academician K. Z. Budin, did not meet with us at this time, but he did meet with us later.

VIR is part of the All Union Academy of Agriculture (VASKHNIL) system, and it is one of the Academy's most respected institutions. VIR was established in 1924 and currently has a staff of 2000, with 5 Academicians, 50 Prof. Dr's, and 350 Dr's. These staff numbers apparently include the personnel that operate the laboratories and experiment stations at 17 locations in addition to the headquarters at Leningrad.

Our chief purpose in visiting VIR was to determine what seed collections of range forages were maintained there, but we were unable to obtain this information to our satisfaction. They spoke of having extremely large collections, but we found that most of the collections were stored elsewhere. A seed storage facility similar to our National Seed Storage Laboratory at Ft. Collins, CO. is being built at the Kuban Station in the Krasnodar area, and they claimed that most of their seed collections are stored there. We gave the Soviet delegation the seed inventory from the

Pullman Plant Introduction Station and Dewey's personal seed inventory, and we received a 1972 seed catalog from the Soviets. Their catalog, which contained a list of seed available for exchange, had 3086 entries; but their stocks of range forage grasses were insignificant. The list included 13 collections of crested wheatgrass (Agropyron desertorum, A. fragile, and A. pectiniforms). No other Agropyron species were listed, nor were any Elymus or perennial Hordeum. The Soviets obviously have more seed collections than those available for exchange, but we were unable to get specific answers as to their number, where they are stored, and how we might obtain them.

September 26:

Pavlosk Station, near Leningrad

Visited the Pavlosk Experiment Station 30 km outside of Leningrad. We were told that this 600 ha station has 25,000 living collections, primarily fruits, berries, and forages. We were accompanied by U. I. Kirillov, the director, of the station and Mrs. A. V. Bukhteeva, the wheatgrass breeder. The Pavlosk Station serves as the introduction and quarantine nursery for all introductions from northern latitudes. In this regard, it serves somewhat the same function as our Plant Introduction Stations. They attempt to maintain the genetic purity of cross-pollinated collections by isolating each collection under cloth-covered cages.

Some grass breeding is done at the Pavlosk Station by Dr. Kirillov, whose major breeding interest lies with tall fescue. He is very anxious to obtain tall fescue germplasm and literature from sources outside of the Soviet Union. Some breeding work is being done with orchardgrass, Timothy, and Kentucky bluegrass as well as with red clover, white clover, and alsike clover. A sizeable collection of Trifolium ambiguum is maintained at the Pavlovsk Station.

The laboratory and office facilities that we saw at the Pavlovsk Station were grossly inadequate by US standards. The buildings were old and run down and poorly equipped. The breeding work that we saw appeared to be substandard. Their nurseries were poorly maintained, and the breeding populations were rather small. Simple mass selection for forage yield seemed to be their only selection criterion.

No Agropyron or Elymus species are maintained at Pavlovsk or anywhere in the vicinity of Leningrad, yet the Agropyron and Elymus breeder (Dr. A. V. Bukhteeva) is stationed at Leningrad. Mrs. Bukhteeva spends each May and June in the Kazakstan Republic where she takes notes and makes selections. One is left wondering how a 2-month per year breeding program can be very effective. Nevertheless, two cultivars of E. junceus were released in 1975. Both were bred for use in the Kazakstan Republic in precipitation zones of about 180 mm.

September 27 and 28:

All of the VIR offices and laboratories close for the weekend, so we spent these days in sightseeing around Leningrad.

September 29-30:

VIR Institute Leningrad

Returned to the VIR Institute to discuss plant collecting and introduction procedures with the staff of the Division of Forage Crops. Dr. P. A. Lubenets, the Chief of this division, described their plant-collecting and record-keeping procedures. All new collections that are brought into the forage crop division are recorded by hand in a large record book. Apparently Lubenets records the entries himself. We asked for a copy of their seed stocks of range forage species stored at Leningrad, but they had no copies other than the original hand-written record book. We were shown a storage room that contained alfalfa seed lots. The storage room had no refrigeration capacity nor humidity control. The seed was stored in metal boxes on shelves. Each box had several cloth sacks with varying quantities of seed. We had suspicions that it would be very difficult to locate a specific seed lot because we could see no system of storing and retrieving individual seed collections.

The Soviets appear to be making a greater effort than we are to maintain the genetic purity of cross-pollinated introductions. Isolation is achieved either spatially or by cloth of plastic-covered cages. We were told that they had 300 isolation plots separated 350-1000 m apart in a forested area near their Maikop Station in southern USSR. Purity of alfalfa collections is maintained by caging bees with each accession.

Dr. Lubenets was critical of and disenchanted with seed exchanges with the US. He claimed that he had freely given germplasm, but had received little if any in return. We hoped to remedy this dissatisfaction and promised to send samples of recently developed alfalfa varieties. The promise we fulfilled on October 28 when we sent seed of 13 alfalfa varieties via Howard Hyland, and asked for samples of 12 Agropyron species in return. As yet, we have received no response from Lubenets.

In a discussion of new and promising germplasm, Dr. Lubenets commented that he things Trifolium ambiguum is the forage crop of the future, as is Kochia prostata. They have collections of unusually vigorous Phalaris junceus have leaves carried high on the stems, in contrast to the usual collections with almost entirely basal leaves. A smooth-leaved collections of E. giganteus has been obtained, whereas all other E. giganteus has rough scabrous leaves. We were unable to get a commitment from Lubenets to give us seed of any of these unusual collections. Hopefully,

he will when and if we can establish a more positive seed-exchange relationship with him.

We asked about the status of the formerly prominent Academician T. D. Lysenko. We were told that Lysenko is living in Moscow. He still retains the title of Academician, but he has been stripped of any administrative authority. Lubenets was mildly apologetic about Lysenko and his views on genetics. Apparently Lysenko is free to conduct some small-scale research of his own, but he has no influence on other geneticist and plant breeders.

Our proposed plant-collecting expedition was discussed with Dr. A. I. Ivanov, former Chief of the Priaralsky Station in Kazakstan, and now Chief of Plant Collecting in Kazakstan. Dr. Ivanov impress us as being a capable plant collector. He is a native of Kazakstan and has an excellent knowledge of the Kazakstan flora. He pointed out that our original itinerary was too extensive and that it passed through several areas where foreigners are not permitted. This may be one reason why our original proposal for plant collecting was received so coolly by the Soviets.

After considerable discussion with Ivanov and Lubnets concerning germplasm we hoped to collect, they recommended that most of the collecting be done in the Kazakstan Republic. With their aid, we developed the following itinerary, which avoids the sensitive Soviet space centers and border areas.

Date Collecting Area

July 15-August 15 Southern Kazakstan and a small part of Uzbekistan. Establish a base headquarters at the VIR station at Tashkent. Collect from Tashkent to Alma Ata and return via Djambul and Chimkent.

August 16-October 1 Northern Kazakstan. Establish a base headquarters at the VIR station at Priaralsky. Collect from Uralsk to Ust-Kameonogorsk via Aktyubinsk, Tselinograd, Sempalatinsk, Leningorsk, and Serebryanka.

October 2-October 15 Collect in the vicinity of Smarkand and visit the Karakul Sheep Station in Uzbekistan. Collect in the vicinity of Ashkabad and visit the Desert Institute in Turkmenia.

The proposed expedition would involve US and USSR collectors. Dr. Ivanov is the logical Soviet collector, and he expressed a willingness to accompany us if it can be arranged. He provided us with detailed maps of Kazakstan which will be a great help to us. Logistical support

must be provided by the Soviets from their VIR Stations at Tashkent and Priaralsky. Two 4-wheel drive vehicles, one truck and one jeep, will be needed to carry the personnel, supplies, and equipment. Many of the collecting sites are so remote and dry that we must carry water for several days use. AS now visualized, the expedition would consist of 2 Soviets drivers, 1 Soviet plant collectors, 1 interpreter, and 2 US collectors. A more detailed account of the proposed collecting expedition is attached as an appendix to this report.

Following the development of the above itinerary, we met with Academician K. Z. Budin, Deputy Director of VIR, and Dr. E. T. Meshcherov, Chief of the Plant Introduction Division of VIR. Both men are very personable and left a good impression on us. We presented our plans for a joint US-USSR collecting expedition to Kazakstan. They stated that they agreed in principle with the expedition, but the approval must first come from the USSR Ministry of Agriculture in Moscow.

The identification of taxonomy of the crested wheatgrass was discussed with Dr. Bukteeva, and it soon became apparent that the US treatment of crested wheatgrass differs markedly from the Soviets treatment. For instance, our Fairway A. cristatum = their A. pectinatum and our A. sibiricum = their A. fragile.

October 1

VIR Herbarium Leningrad

We attempted to advance our schedule one day and go to the Komarov Institute herbarium a day early, but we couldn't overcome the red tape to make such a schedule change. Consequently, we spent the day at the VIR herbarium, which is under the direction of a Dr. Nikitin, an Academician of the Turkmen Academy of Agriculture. Nikitin is an old man who is a specialist on the arid deserts of southern USSR. He is not a taxonomist by training, yet he is in charge of the herbarium.

We examined several hundred plant specimens to obtain information on their identification and distribution. Photographs were taken of a few interesting specimens. Not much was accomplished at the VIR herbarium; the Komarov herbarium is much larger and better curated.

October 2-7

Komarov Botanical Institute - Leningrad

Four fruitful working days were spent at the herbarium of the Komarov Botanical Institute, which is part of the USSR Academy of Science. The Botanical Institute has a long interesting history beginning with Peter I in 1714. The early directors of the Institute were imported from Europe because of the scarcity of capable Soviet scientists. Such prominent botanists as F. E. L. Fischer, K. B. Trinisu, C. A. Meyer, E. L. Regel, and E. R. Trautveter have served as directors. The Institute consists of a large botanical library, 24 laboratories representing all botanical disciplines, a sizeable botanical garden (but much smaller than the Main Botanical Garden in Moscow), and the world's second largest herbarium.

All of our time was spent examining and photographing range forage specimens, particularly the grasses of the Triticeae tribe. We are deeply indebted to Dr. N. N. Tzevlev, curator the European Russia section of the herbarium. We encountered no obstructions of any kind, and Dr. Tzevlev had all the specimens we asked for delivered to us. This was strictly a working visit, with not meetings with Institute officials. The only inconvenience we experienced was the absence of facilities to photograph specimens. We did all of our own photography of the specimens on a window while standing on a radiator. The set-up was satisfactory except that the light was so poor that we couldn't take photos on dark cloudy days. Even on bright days, we had to use the camera diaphragm almost wide open, which gave poor depth of field. Nevertheless, we took thirteen 20-exposure rolls of Extachrome-X film. Most photographs were of type specimens of Agropyron, Elymus, and Hordeum species. A 2-3 month visit to the Komarov Institute by USDA taxonomists from Beltsville would materially enhance the capability of our botanists to identify plant materials introduced from Asia.

Our study at the Komarov herbarium confirmed that information we received at VIR, that the Kazakstan Republic does indeed have the richest source of arid range forage plants in the USSR. Particularly large populations of crested wheatgrass and Russian wildrye grow naturally in Kazakstan. We saw crested wheatgrasses different from anything we have seen in the US. Some crested wheatgrasses, not necessarily from Kazakstan, had long rhizomes and grew in very sandy soils; other had culms with bulbous bases; and others had distinctive spikes with distantly spaced spikelets that were arranged at right angles to the rachis. After seeing these variations, the futility of preparing a taxonomic treatment of crested wheatgrass from North American introduced material was more than apparent.

As a result of this visit, identification errors of perennial Triticeae grasses introduced from Asia should be greatly reduced. Dr. Tzevlev has prepared a taxonomic revision of the Triticeae tribe in 1973, and most of his proposed taxonomic realignments are consistent with cytogenetic and phylogenetic data obtained in the US. Tzevlev is in the process of preparing a complete taxonomic treatment of Soviet grasses, which will include keys and descriptions. We saw his draft manuscript, which he hopes to publish within a year. We await his treatment with great anticipation. We arranged an exchange of reprints and future publications with Tzevlev. He also agreed to identify any specimens of Triticeae grasses that we have questions about.

Although the Komarov herbarium is exceptionally large and valuable as a taxonomic resource, the working facilities are poor. The herbarium is so poorly lighted that specimens must be examined near a window. The temperature was so low inside the herbarium that we worked with our coats on. Simple equipment items, such as lamps, were old and sometimes non-functional.

October 8

USSR Ministry of Agriculture - Moscow

Another midnight train ride brought us back to Moscow. Fortunately the US-USSR Joint Committee on Cooperation in Agriculture was in Moscow negotiating the exchange agreement of 1976, and we were invited to meet with them and present our case for a plant collecting expedition to the USSR in 1976. The Chief Soviet negotiator, Mr. Yuri Cheraonov, was reluctant to even discuss the matter, but we finally were able to present our case to him in company with Dr. C. F. Lewis (the chief US negotiator), Mr. T. W. Edminster (the ARS Administrator), and Dr. Paul A. Vander Myde (Deputy Assistant Secretary of Agriculture).

Mr. Cheraonov was adamant in his opposition to the proposed expedition. He contended that the expedition was unnecessary because the Soviets had already collected all of the useful germplasm in Kazakstan. We were able to refute this position as a result of our earlier visits to VIR and to the Komarov Botanical Institute. Mr. Cheraonov was obviously concerned about our collecting in the vicinity of the Soviet space center and other sensitive areas. We assured him that our itinerary would deliberately avoid such areas. He concurred with the idea that any collecting expedition be manned by both US and USSR collectors.

Dr. Lewis repeatedly attempted to place the expedition in the 1976 exchange agreement, but Cheraonov insisted that the necessary arrangements could not be made before 1977. We were asked to prepare a new proposal outlining our itinerary and timetable for this expedition. That new proposal is attached as the Appendix to this report. Our delegation invited a Soviet plant collecting team to collect range forage species in the western US. The US would provide a plant collector to accompany that expedition. The Soviets did not appear overly enthusiastic about collecting in the western US. The whole matter was left with the understanding that it would be discussed again at the next meeting of the US-USSR Joint Committee in May 1976.

October 9

Williams All-Union Fodder Institute - near Moscow

Spent the entire day visiting the facilities of this Institute, which is part of the USSR Academy of Agriculture. We met with the following delegation, who outlined the mission and accomplishments of the Institute:

Dr. V. G. Iglovikov - Deputy Director of the Institute. The Director, Dr. Smurygin, was on vacation. We delivered a US road atlas from Dr. C. F. Lewis to be given to Director Smurygin on his return.

Dr. (Mrs.) A. S. Novaselova - Chief of the Breeding Center.

Prof. (Mrs.) A. M. Konstantinova - Alfalfa breeder, a rather old lady.

Dr. Y. M. Piskovatsky - alfalfa breeder.

Dr. V. S. Malashenko - red clover breeder.

Dr. N. S. Bekhtin - grass breeder.

Prof. M. A. Filimonov - seed production and technology.

Dr. Kashmanova - legume pathologist.

Dr. Putsa - nematologist.

Dr. A. G. Yartiev - grass breeder and plant introduction.

The Williams Fodder Institute is a unique facility in that it is a self-contained scientific community of about 3000 persons. The entire professional and support staffs live at the center, which has its own stores, schools, etc. The Institute is organized into four departments - Forage, Production, Technology and Utilization, Forage Crop Breeding Center, and Research Organization (Information and planning etc.). Our visit was confined to the activities of the Breeding Center.

The Williams Institute is the main forage breeding center in the USSR, and it coordinates the activities of another 17 breeding centers throughout the USSR. Grasses are being bred at seven locations, but shrub breeding and selection appears to be restricted to one center at Smarakand. Crested wheatgrass and slender wheatgrass are being bred at a location in Kazakstan. We couldn't determine whether the crested wheatgrass program was the same program that the VIR Institute had in Kazakstan. We learned that the Soviets are deliberately breeding quackgrass (Agropyron repens) at the Dedinovsk Floodplain Grassland Experiment Station in the Moscow Region.

The relationship between the Williams Institute (VIK) and VIR was not made clear. Apparently much of the original germplasm comes from VIR; however, VIK does much of its own plant collecting. Although some of the staff at the VIR Institute are doing forage breeding, the breeders at VIK called the VIR breeding work "amateur".

Following our general meeting with Deputy Director Iglovikov, Dr. Novaselova showed us through the laboratories, greenhouses, and the nearby field plots. The facilities and personnel at VIK were considerably more impressive than those of Pavlovsk station at VIR, where similar breeding work is being conducted. The VIK Institute compares favorably with many US land-

grant university experiment stations. The breeders at VIK receive support from physiologists and cytogeneticists in a multidisciplinary team effort. The VIK library is small, and the Agronomy Journal and the Journal of Animal Science were the only US periodicals in it. However, a much larger library of the Ministry of Agriculture in Moscow is also available.

The alfalfa and clover programs appeared to be the most advance. Dr. Novaselova is in charge of the red clover work and she has developed an autotetraploid cultivar by colchine-induced polyploidy. She and several students are actively pursuing a wide-hybridization program in the clovers.

We delivered an ASA Alfalfa Monograph from Dr. C. F. Lewis to Dr. K. Masur, alfalfa breeder. Dr. Masur was overjoyed to receive it. Much of Masur's alfalfa work is centered on male sterility, and he readily admits that he is encountering difficulties with it. He is also breeding for improved salt tolerance in alfalfa.

A new tissue-culture program has been launched at VIK. The student working on this project is attempting somatic hybridization between Trifolium and Lolium, but so far without success. This work is being coordinated with the Timaryazev Institute of Plant Physiology in Moscow.

We were too late in the year to see much work in the field, but we walked through some of their nurseries. The plots were well maintained and gave evidence of careful attention. The research being conducted at VIK appears to be of good quality.

October 10:

We returned to the Academy of Agriculture to give a report of our trip to the same delegation that received us on September 24. Although this final meeting was on the itinerary prepared for us by the Ministry of Agriculture, our arrival at the Academy was unexpected. Our interpreter was finally able to locate Dr. S. S. Kusmin, Deputy Chief of the Foreign Relations Department. Kusmin apologetically explained that all members of the Academy were at a special celebration commemorating the 250th anniversary of the USSR Academy of Science. He told us that our meeting with the Academy of Agriculture was really an unnecessary formality. Dr. Kusmin was somewhat embarrassed over the incident so he promised to send us a car later in the day to show us around Moscow. The car never arrived. We telephoned Kusmin about the car, and he promised to send one the next day (Saturday). The car never arrived.

October 11: Toured Moscow (via subway).

October 12: Traveled from Moscow to New York City.

October 13: Traveled from New York City to Logan.

APPENDIX

PLANT EXPLORATION PROPOSAL

by

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I. TITLE: A JOINT US-USSR COLLECTING EXPEDITION FOR PERENNIAL TRITICEAE GRASSES, LEGUMES, AND SHRUBS IN KAZAKSTAN SSR AND SURROUNDING AREAS.

II. JUSTIFICATION: The Kazakstan Republic of the USSR is climatically similar to the arid and semi-arid regions of the Western US. The Kazakstan Republic is particularly rich in grass species that have proven particularly valuable on Western US rangelands, e.g. Agropyron cristatum and its relatives, and Elymus junceus. Numerous other Agropyron, Elymus, and Hordeum species occur in Kazakstan; and many of these have never been evaluated in the US. In addition, many potentially useful range shrubs and forbs in the Chenopodiaceae, Rosaceae, Compositae, and Leguminosae families are found in Kazakstan.

The N.I. Vavilov All Union Institute of Plant Industry (VIR) at Leningrad and its affiliated institutes and research stations have sponsored many collecting expeditions to Kazakstan and other Republics of the USSR. The emphasis of these expeditions has generally been on collections of species for use on arable lands, whereas our primary interests lie in species and collections for non-arable wild lands. Comparison of the seed stocks available at VIR with the native grass and shrub vegetation of Kazakstan (determined from herbarium specimens at the Komarov Botanical Institute) indicates a wide gap between currently available seed stocks and the total forage germplasm resource of Kazakstan.

With few exceptions, foreign plant collecting expeditions have not been manned by collectors from both countries. The weakness of such an arrangement are obvious. We strongly recommend that US collectors be accompanied by at least one Soviet collector. A similar arrangement would be essential for Soviet collectors operating in the US. Traditionally, Soviet plant collectors have shown little interest in forage plants of the Western US. We feel that the Soviets are overlooking

a valuable forage germplasm resource from the Western US, and we encourage an exchange of collecting teams. The route of a Soviet collecting expedition in the Western US should be developed in consolidation with US collectors in the same fashion that the Soviets assisted the US collectors in developing the route in the current proposal. The exact route and itinerary of a Soviet expedition to the Western US could be conveniently developed during the US expedition to Kazakstan.

III. EXPLORATION AREAS, ROUTES, AND DATES

a. Southern Kazakstan: July 15 - August 15

Tashkent to Chimkent to Kjambul to Alma Ata and return to Tashkent via the same or similar route, with side trips up to 200 km on either side of the main route.

b. Northern Kazakstan: August 16 - September 30

Uralsk to Aktyubinsk to Tselinograd to Semipalatinsk to Ust-Kamengorsk to Leninogorsk to Serebruanka to Ust-Kamenogorsk, with side trips up to 200 km on either side of the main route.

c. Samarkand and Ashkabad: October 1 - October 15

1) Grasses - All perennial species of the Triticeae tribe including Agropyron (Roegneria, Elytrigia), Elymus (Leymus, Aneurolepidium, Psathyrostachys) and Hordeum.

2) Shrubs and forbs in the Chenopodiaceae, Rosaceae, Compositeae, and Leguminoseae families.

V. LOGISTICAL SUPPORT:

Soviet cooperation is essential in outfitting the expedition, which will largely involve land travel. The VIR Research Station at Tashkent can equip the 30-day expedition in southern Kazakstan, and the Priaralsky Station of VIR can support the 45-day expedition in northern Kazakstan.

Two 4-wheel drive vehicles, one cargo-carrying truck and one passenger-carrying jeep, will be needed. Exploration into sparsely inhabited remote regions will require the transport of food, water, and camping gear in addition to the usual supply of plant presses, collecting envelopes,

and personal gear. The Soviet side should be responsible for supplying all items except personal gear.

Support of the collecting effort around Samarkand and Ashkabad will be less complicated. The research institutes at each location should provide one vehicle and driver to permit collecting within a 200 km radius. We should be able to return each night to the research stations.

VI. PERSONNEL

Two U.S. Collectors - D. R. Dewey and A. P. Plummer

One Soviet Collector - A. I. Ivanov

One Interpreter - Soviet

Two Drivers - Soviet

Canada has expressed a desire to attach a plant collector, T. Lawrence, to the expedition. Whether such an arrangement can be made will depend on negotiations between the three countries.