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Report on exploration for leafy spurge and associated plant pathogens and insects in Russia

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The purpose of the foreign exploration was to collect leafy spurge genotypes and associated insects and plant pathogens from plant communities in Russia. I was responsible for collecting leafy spurge specimens, Anthony Caesar, Plant Pathologist, USDA-ARS, Bozeman, MT was responsible for collecting pathogens, and Luca Fornasari, Entomologist, USDA-ARS, Montpellier, France surveyed and collected insects.

The highlights of the foreign exploration were the successful accomplishment of the exploration objectives and continued development of a very good working relationship with scientists affiliated with the Zoological Institute, Russian Academy of Sciences in St. Petersburg. The joint expedition occurred from June 15 through July 14, 1993 and specimens were evaluated along a 2,500-mile route through south central Russia [Table 1 (not available)]. Plants, pathogen, and insect specimens were collected and surveyed from June 17 through June 29, 1993 starting near Mineralnye Vody and then following a route through Kropotkin, Krasnodar, Tuapse, Maykop, Armavir, Stavropol, Elista, Volgograd, Kamyshin, and Saratov.

Tony Caesar departed from Saratov for St. Petersburg on June 30 and continued on to the European Biological Control Laboratory at Montpellier, France on July 3. This departure was necessary because of the extreme perishability of the pathogens that Tony had collected and the need to culture and isolate specimens. I also returned to St. Petersburg to resolve a problem with my visa. I returned to Saratov on July 3 to continue the joint exploration. From July 4 through July 9, 1993 plant and insect specimens were collected and surveyed along a route that originated from Saratov through Bozioglebsk, Tambov, Pensa, and back to Saratov.

Plant pathogens were collected or surveyed at 15 locations and plant and insect specimens were collected or surveyed from 32 locations during the expedition. The exploration route was traveled by truck and AEROFLOT was the airline used to fly from St. Petersburg to Mineralnye Vody on June 17, 1993 and from Saratov to St. Petersburg at the end of the expedition on July 9, 1993.

In the grasslands explored in the region south of Stavropol, *Euphorbia steposa* was the most common euphorb with *E. virgata*, *E. parillius*, *E. seguiriana*, and *E. iberica* encountered less frequently. Populations of *E. virgata* and *E. seguiriana* were found more frequently in the drier and more temperate grasslands north of Stavropol. *Euphorbia seguiriana* was the dominant euphorb found as the expedition continued into xeric grassland communities northeast of Stavropol to Elista. *Euphorbia virgata* was the dominant euphorb as the expedition continued north of Elista into more mesic grasslands north of Volgograd along the Volga River to Saratov. *Euphorbia virgata* and *E. esula* were the most common euphorbs found in pastures and roadsides along the route followed west of Saratov.

There was a great amount of variation in leaf shape and size and plant height of the *Euphorbia* spp. specimens collected. This high degree of variability in morphological traits underscores the need for basic research to determine information on the genetic variability among leafy spurge genotypes in North American and Eurasia. Root/crown fragments were collected from 510 individual plants during the expedition. These plant propagules have been planted and are currently being maintained along with several North American and Eurasian leafy spurge biotypes in a nursery at the University of Nebraska in Lincoln, Nebraska. These plants will be used in research to determine the Eurasian origins of North American leafy spurge and will be made available to other scientists interested in working with leafy spurge.

Specific identity of pathogens and insects collected from populations of *Euphorbia* is currently being determined by Tony Caesar and Luca Fornasari, respectively. Tony found *Rhizoctonia solani* on 90% of diseased *Euphorbia* spp. specimens collected. Flea beetle adults (possibly belonging to *Aphthona* genus) were the most common insects found in sweep net surveys conducted by Luca Fornasari. Insects that formed galls in the shoot apices and fruits of euphorbs were collected from a number of sites. Larvae feeding on the roots of *Euphorbia* species were found at 3 locations sampled near Stavropol. Dr. Nartshuck, Entomologist, Zoological Institute at St. Petersburg, determined that the larvae were dipterans and belonged to the family, Sciáridae. A large number of Hyles euphorbia larvae were found feeding on leafy spurge foliage at a site near Balashov. Larvae and pupae of an insect (Pegomyid) that formed a gall in the stems of *E. virgata* were collected near Bozioglebsk. Pathogens collected by Tony Caesar are being evaluated and maintained under quarantine at facilities in Bozeman, MT and Frederick, MD. Insects collected by Luca Fornasari are being evaluated and maintained at the USDA-ARS, European Biological Control Laboratory in Montpellier, France. These scientists can be contacted directly for additional information on specimens collected.

Recommendations:

1. Exploration activities by USDA-ARS scientists in Russia and other members of the Commonwealth of Independent States (CIS) should be expanded and intensified. Russia and other CIS countries contain the native environments for many plants that are exotic noxious weeds in the United States. The CIS countries are resources of great potential for insects and pathogens that can be used in USDA-ARS biological control research pro-

grams and ultimately in federal and state government efforts to control noxious weeds on North American rangelands.

2. Exploration for potential leafy spurge biological control organisms should be expanded in Russia to include the region north of Stavropol, west to Voronezh, north to Orel, and east to the Volga River. Exploration in the region east of a line that runs north from Elista to Samara and into the Kazakhstan should be expanded. This region contains large expanses of xeric grasslands that are similar in appearance and climate to plains grasslands commonly found in western Nebraska, North and South Dakota and in eastern Montana, Wyoming, and Colorado.

3. Decrease cost and increase efficiency of biocontrol research by strengthening ties with Russian institutions and increasing participation of Russian scientists in conduct of research. The Russian scientists that I worked with in 1992 and 1993 were very capable and fundamentally competent in their respective disciplines. I believe that scientists with the Zoological Institute could conduct preliminary investigations, such as literature reviews and identification of locations for survey and collection of potential biological control organisms. Russian scientists could also perform field surveys and collections of biocontrol agents and conduct experiments (i.e., life history, behavior, and host range studies) to determine suitability of collected agents as candidates for use in biological control programs.

4. Increase opportunity and funding for Russian scientists that are collaborating in joint biocontrol research projects to visit the United States so they can become familiar with American scientists, research institutions, agricultural production systems, and rangeland weed problems.

Conclusion

My experience in Russia this summer was extremely rewarding and enriching, both professionally and personally. I was able to successfully accomplish my defined mission. I found my Russian colleagues to be hardworking, capable, and honest. See Table 2 (not available) for information on how to contact Russian scientists I worked with during the summer of 1993. They were always attentive to my requests and those of Tony Caesar and Luca Fornasari. I feel that the USDA-ARS has an excellent opportunity to cultivate and establish a long-term collaborative relationship that is based on cooperation and mutual respect with the Zoological Institute. Such a relationship will greatly benefit biological control efforts in the United States and bolster the Zoological Institute through the difficult times that currently exist in Russia. I look forward to participating in future joint research efforts with the Zoological Institute.