

# DEVELOPMENT OF NATIVE PLANT MATERIALS IN MONGOLIA

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## Introduction

Mongolian rangelands are biologically diverse and productive. They are ecologically similar to rangelands in the western United States. Plant communities have evolved and adapted to the pressures of grazing due to a sustained system of pastoral livestock production.

The economic and social conditions in Mongolia are changing, and intensive agricultural development and overgrazing are threats to plant diversity and range condition.

The Development of Native Plant Materials in Mongolia is a multi-phase project in cooperation with the Research Institute of Animal Husbandry in Ulaanbaatar. The project involves germplasm collection, evaluation of species adaptation and performance, and eventual seed increase to meet the needs for long-term, sustainable agriculture in Mongolia.



Forest steppe in the Hentei Mountains in northeastern Mongolia.



A semi-nomadic family and their livestock on the grasslands.

## Resource Problems

Mongolia is faced with degradation of their primary natural resource, the grasslands. Large herd size, uncoordinated herding patterns, abandoned croplands, and the development of mineral resources have all led to a reduction in plant vigor, species diversity, and increased soil erosion and weed infestation.

### Grassland Deterioration

More than 70% of Mongolia's land base is classified as grassland, and approximately 50% of the population relies on agriculture for their livelihood. The traditional belief that livestock herd size is a symbol of wealth has led to an increase in the total number of grazing animals and a negative impact on the forage resource.



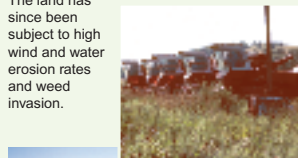
A variety of domestic livestock depend on grassland forage.



Heavily-impacted migration and transportation routes.

### Abandoned Cropland

The former ruling government was active in farming approximately 1% of Mongolia's landbase. In 1991, the leadership changed and most of the cropland in production and related equipment was abandoned. The land has since been subject to high wind and water erosion rates and weed invasion.



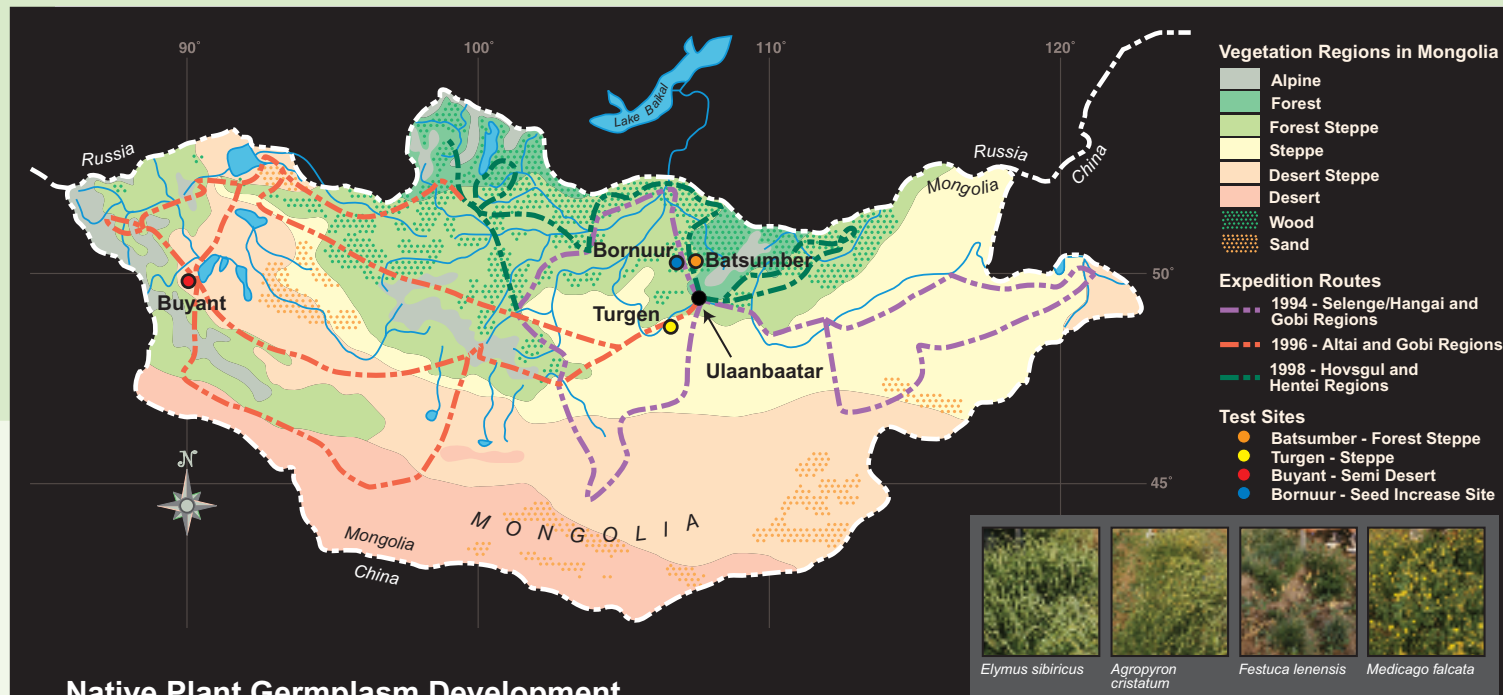
Farming equipment left idle in the field.

### Reclamation of Minelands

The mining of copper, gold, and coal are the primary mineral extraction activities in Mongolia. Other disturbances such as exploring for silver, oil, and gas are increasing. These are land disturbances known to have negative impacts on soil and water resources.



Mining activities in Mongolia.



### Vegetation Regions in Mongolia

- Alpine
- Forest
- Forest Steppe
- Steppe
- Desert Steppe
- Desert
- Wood
- Sand

### Expedition Routes

- 1994 - Selenge/Hangai and Gobi Regions
- 1996 - Altai and Gobi Regions
- 1998 - Hovsgul and Hentei Regions

### Test Sites

- Batsumber - Forest Steppe
- Turgén - Steppe
- Buyant - Semi Desert
- Bornuur - Seed Increase Site



## Selection of Superior Performing Material

Of the hundreds of species included in the study, results indicate that several different species performed well and have the potential to be included in the future seed increase phase. These selections may be used to solve conservation problems related to improving degraded ecosystems.



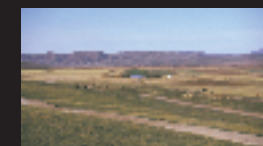
Growth and development of Allium and Bromus species at the Turgén-steppe site.

### Promising Species

- |                     |                         |
|---------------------|-------------------------|
| Agropyron cristatum | Poa pratensis           |
| Bromus inermis      | Psathyrostachys juncea  |
| Elymus dahuricus    | Puccinellia macranthera |
| Elymus gmelini      | Allium species          |
| Elymus sibiricus    | Astragalus adsurgens    |
| Festuca lenensis    | Medicago falcata        |
| Stipa capillata     | Polygonum divaricatum   |
| Stipa krylovii      |                         |

## Phase III. Initial Seed Increase

If funding can be obtained, the final phase of the project will focus on the production of seed of the most promising accessions and the subsequent development of a forage seed industry in Mongolia.



Future site of the seed increase phase at Bornuur, Mongolia.



Seed increase field of 'Bozoiisky-Select' Russian wildrye at Batsumber, Mongolia.

## Native Plant Germplasm Development

Mongolia is equivalent in size to Alaska, with an area of more than 1.56 million square hectares. It has six major vegetation zones, and the continental climate is typically dry, with sharp seasonal fluctuations in temperature.

Due to the vast area, extreme climatic variability, and difficulties in travel, it was necessary to institute a multi-year, multi-phase approach to the project.

The project consists of three phases which include seed collection (1994 - 1998), species evaluation (2000 - 2003), and future seed increase (2004 and on).

### Phase I. Collection Expeditions

Teams composed of scientists from Mongolia and the United States traveled approximately 20,000 kilometers to collect more than 1,300 seed samples. This material represents a wide variety of native grasses, forbs, legumes, and shrubs found in the major ecological zones of Mongolia.



Cataloging the daily seed collections.



Hand-harvesting seed of native plants.



Drying the harvested material.

### Phase II. Initial Evaluation Plantings

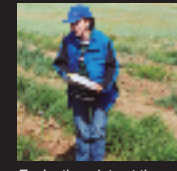
The plant materials were evaluated for adaptation and performance at three test locations under dryland and irrigated conditions. More than 3,000 plots were established and maintained over the last three years. The forage germplasm evaluation studies were funded from the PL-480 Program through the Foreign Agriculture Service to test plant performance in three Mongolian environments.



Planting plots at the Turgén steppe site.



Transplanting seedlings at the Turgén steppe site.



Evaluating plots at the Turgén steppe site.



Seedlings in the greenhouse facility at the Research Institute of Animal Husbandry.



Site preparations at the Batsumber forest steppe site.



Evaluating plots at the Batsumber forest steppe site.

## Scientific and Technical Exchange 2001

The Mongolian research scientists traveled to the United States to learn about seed production, seed processing, and plant germplasm genebank storage. Scientists from the United States have visited Mongolia to offer advice on the establishment and evaluation of replicated study plots. Mongolian and American scientists cooperated in the publication of a bilingual (Mongolian - English) field plant identification book.



RIAH scientists at the Bridger PMC.



Collaborating scientists at Turgén, Mongolia evaluation plots.



Front cover of "Forage Plants in Mongolia".

## Summary

Great progress has been made in securing representative seed samples of native plant germplasm, and in testing the performance and adaptation of important forage species in Mongolia. Scientific evaluations conducted at the different environments resulted in the selection of several top-performing species. The country now needs to increase the seed supply of selected species in order to resolve an ever-increasing number of conservation problems.

The development of a seed production industry will allow the Mongolians to become self-sufficient in meeting their country's needs for plant materials that will produce forage and also conserve natural resources.

## Acknowledgements

The authors would like to thank the following cooperators for their generous support and encouragement on the project:

- Research Institute of Animal Husbandry
- Mongolian State Agricultural University
- Foreign Agriculture Service
- Agriculture Research Service
- Natural Resources Conservation Service
- Plant Materials Program

