Identify Resilient Characteristics and Develop Wear Resistant Plant Cultivars for Use on Military Training Lands

Conservation
CS-1103

Background:
Wear-resistant plants are needed to mitigate environmental impacts, maintain training realism, and improve the use of military training lands. Prior to this project, there was little or no research on the genetics or resiliency of low-maintenance rangeland plants.

Objective:
The objective was to develop more wear-resistant plants and to enable native plants to establish more rapidly, thereby returning the land more quickly to military use.

Process/Technology Description:
Working with the U.S. Department of Agriculture, this project developed wear-resistant plant cultivars, evaluated plant resiliency to tracking activities, and developed improved methods for establishing native plants. Plant materials were examined for desirable resilient characteristics using random amplified polymorphic deoxyribonucleic acid (DNA) technology as well as more traditional screening methods. Clones were selected based on parental and progeny performances, and the resulting experimental strains were subjected to a range of environmental conditions. Field evaluation trials at Yakima Training Center, WA, Fort Drum, NY, and Fort Carson, CO examined plant establishment, plant response to injury by tracking, and the establishment of diverse native stands from selected seed mixes. A workshop held in 2002 demonstrated the new germplasms and seeding methodologies to federal land managers and commercial seed producers.

Results:
Plant-breeding improved traits related to resiliency and establishment in introduced and native species of rangeland grasses. Germplasms were selected for early spring growth, increased seedling vigor, improved tiller and rhizome development after disturbance, and resistance to abiotic and biotic stresses. Two grass cultivars and two grass germplasms were registered and released via publications in *Crop Science*. The native P-7 bluebunch wheatgrass germplasm has been widely accepted by federal land managers for its increased genetic diversity. The improved plant materials are ecologically compatible at northwestern military sites because they were developed from collections of species native to or previously seeded at these sites.

With advances in relating molecular markers to plant characteristics and in using DNA fingerprinting techniques, tools are now available to assess the genetic differences and similarities in commercial and natural seed sources. Land managers can select the most cost-effective seed sources that will ensure genetic compatibility with existing populations.

Tank traffic studies showed that naturalized, introduced species are more tolerant and recover more rapidly under repeated tracking than native plants. However, two native species, the western and Snake River wheatgrass, showed promise as stabilization species because of their ability to colonize damaged areas. "Ecological-bridge" studies confirm that seed mixtures of selected native and introduced species establish more rapidly than all-native mixes, allowing earlier land use for training and ultimately leading to healthy and persistent stands of native plants. The **Final Report** for this project is available in the SERDP and ESTCP Online Library at **http://docs.serdp-estcp.org/**.

Tracking grass evaluation plots at Yakima Training Center.

Benefits/Implications:
This project provided the Department of Defense with guidance for mitigation methods and developed more resilient plant species that will increase opportunities to train on existing lands. The Environmental Security Technology Certification Program (ESTCP) is funding continued demonstrations of the new germplasms and seeding methods, release of eight additional germplasms or cultivars, and establishment of seed contracts to insure availability to land managers. (Project Completed-FY 2003)

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