Native Plant Development and Restoration Program for the Great Basin, USA

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The Great Basin Native Plant Selection and Increase Project , organized by the USDA Bureau of Land Management , Great Basin Restoration Initiative and the USDA Forest Service , Rocky Mountain Research Station in 2000 as a multi-agency collaborative program (http ://www .fs .fed .us/rm/boise/research/shrub/greatbasin .shtml) , has the objective of improving the availability of native plant materials and providing the knowledge and technology required for their use in restoring diverse native plant communities in the Great Basin of the western United States . Lands within this 55 million ha region have been heavily impacted over the last 150 years by harmful grazing practices , invasion of exotic annual grasses , primarily *Bromus tectorum* , and changing fire regimes . Guidance for this project is provided by Executive Orders , Congressional direction , and the National Fire Plan , including the Emergency Stabilization and Rehabilitation Program , to increase , where feasible and practical , the use of native plant materials , particularly native forbs . More than 20 federal , state and private cooperators in 10 states are involved in this project .

Land managers , wildlife biologists , botanists and others with experience in plant materials development and restoration ecology select species with potential for use in revegetation . Individual cooperators take the lead in developing plant materials , seed technology , cultural practices for seed production , and strategies and equipment for establishing the species on wildlands . Genecologists are examining intraspecific variability and defining seed transfer guidelines for individual species . Researchers with expertise in a wide range of plant biology specialties collaborate to solve problems related to seed production of grass and forb species in agricultural settings . Topics of concern include breeding systems , pollination biology , seed technology , insect predators , plant diseases/predators , stand establishment , and cultural practices such as seeding systems , weed control and irrigation . Techniques for increasing and sustaining seed yields of selected wildland shrub stands are also being investigated . Researchers share results and identify problem areas that require further study . State seed certification personnel assist in resolving issues related to the production of native plant materials . Private growers with native plant experience are involved in increasing seed of these materials . Project cooperators interact with the growers to provide technical advice and assist with unforeseen problems .

The focus of the program is now expanding to include application strategies and technologies to improve establishment of diverse native seedings . Recently developed materials are being incorporated into these studies . This research falls into three categories : (1) Seedbed requirements and seedling establishment : Conditions required for germination and successful establishment of new restoration species are determined through greenhouse and small plot studies ; (2) Species interactions : Facilitation and competition among native restoration species and between these species and exotic invasives are evaluated to aid in formulation of effective seeding mixes ; and (3) Operational level seedings : Evaluations of rangeland drills , equipment modifications and appropriate native seed application rates are being conducted at several locations across the Great Basin . Techniques to increase native plant diversity in introduced grass seedings and strategies for improving establishment of *A rtemisia tridentata* from seed are also priority research objectives .

Examples of additional project outputs include the Revegetation Equipment Catalog (http ://reveg-catalog .tamu .edu/) , manuals , online databases , seed testing protocols , propagation guidelines , demonstration areas , equipment development , ex situ and in situ germplasm conservation , field tours , and symposia . The Great Basin Native Plant Selection and Increase Project also serves as a prototype for other regional native plant projects . Progress , successes and failures , and annual reports are shared with researchers and managers responsible for developing similar programs in other areas of the western United States . The Project has provided spin-offs in terms of methods of plant materials development and agricultural seed production and restoration strategies that can be applied elsewhere . Similarly , online databases and synthesis papers on topics such as revegetation equipment , native seed predators and their management , and seed zone delineation can be used and expanded by other regional projects . Approaches have been adaptive and interdisciplinary . For example , strategies for plant materials development and seed certification are evolving from agricultural and forestry prototypes . Researchers are devising means of addressing issues such as invasive species and climate change as part of the selection process . Results of this project are contributing to the ability of land managers to obtain and use native plants on rehabilitation and restoration projects within the Great Basin . The ultimate goal of this and related regional efforts is to improve our ability to create functional and diverse sustainable native landscapes on arid lands of the western United States and elsewhere .