10 Years of Testing Indigenous Plant Material on Drastically Disturbed Mineland in Western Montana.

Susan R. Winslow and Mark E. Majerus USDA-NRCS Plant Materials Center, Bridger Montana; Shannon Majerus, Deer Lodge Valley Conservation District, Deer Lodge, Montana.

Mining and smelting activities were the major industries around the Butte-Anaconda area in Montana for nearly 100 years. The smelter stack emissions blanketed a 300-square-mile region with particulates high in sulfides and heavy metals such as arsenic, cadmium, copper, lead, and zinc. Acidic mine tailing sediments and smelter waste carried overland by surface erosion, streams, and irrigation ditches was deposited on floodplains and agricultural lands. These emissions and sediments caused local soils to become extremely acidic, which resulted in large-scale plant die-off and increased wind

Ongoing reclamation efforts on this vast, severely degraded watershed have relied almost exclusively on commercial seed from non-local sources. There has been a relatively low plant establishment success rate due to many factors, most of which stem from the use of material that is not adapted to survive the locally severe conditions nor the regional climate of western Montana.



D. Seed and Plant Release

The best performing accessions are further tested by comparison to other accessions of the same species with unrelated origins. Results of field trials will determine the selection of superior material. The final selections are then released through the Montana Seed Growers Association's Pre-Varietal Release program.

There are presently three releases of acid/heavy-metal tolerant plant species: Selected class of Washoe Germplasm basin wildrye and Prospectors Germplasm common snowberry, and Sourcedentified class of Old Works Germplasm fuzzytongue penstemon. The Bridger Plant Materials Center maintains Generation 1 (G1) material, which is equivalent to Foundation class, and distributes seed to qualified growers.

Several other native indigenous species that have performed very well in the evaluation trials are scheduled for release in 2006.



Pseudoroegneria spicata



Silverleaf phacelia Phacelia

Many other species have shown potential and will be considered for future release.







The Deer Lodge Valley Conservation District, in cooperation with the Natural Resources Conservation Service's **Bridger Plant Materials** Center, initiated this project in 1995 to test and select locally adapted plant materials that demonstrate superior tolerances to acidic/heavy-metal contaminated soils. The goal is to provide a reliable supply of qualit seed that is adapted to the intermountain climate of western Montana and to soils impacted by mining and smelting. The use of locally adapted, superiorproven seed will increase plant establishment and cover, thereby decreasing wind and water erosion. improving soil structure, nutrient cycling, plant community dynamics,

wildlife habitat, water

quality, and fisheries.

B. Evaluation and Test Plots

Since the inception of

the project, there have

been eight study plots

established as Initial

Evaluation Plantings

(IEP) or Comparative

Evaluation Plantings

(CEP) at six distinct

locations to test locally

ecotypes obtained from

collected material and

commercial sources. Entries were evaluated for percentage survival vigor, height, and

reproductive potential. The best performing

accessions were

increase.

identified for seed





prowing on land affected by aerial sition of heavy metals from past





C. Seed Increase at the Bridger Plant Materials Center

effective methods of production.







Cone-tainers™ of seedlings grown for transplanting to field.





Containers of silver buffaloberry Shepherdia



Seed is stored and periodically tested for



Phacelia hastata and fuzzytongue penstemon Penstemon eriantherus.

- Atlantic Richfield Company · Environmental Protection Agency, Mine Waste Technology Program (MSE Technology Applications Inc.)
- Montana Department of Justice, Natural Resource Damage Program

III.Acknowledgements

through generous funding from the

Conservation, Reclamation

and Development Grants

This project was made possible

Montana Department of

Natural Resources and

following sources:

Program





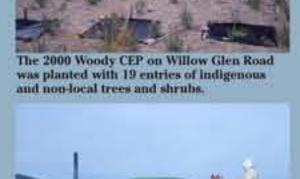




The 1999 CEP on Willow Glen Road was seeded with 85 entries on a site with a pH of 4.5 and contaminants in the upper few inches



Study tested 70 seeded entries in contaminated media from the Anaconda

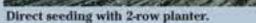




The 2003 Stuckey Ridge Motocross CEP is evaluating the performance of 42 single species entries and 4 seed mixtures.

Only a relatively small amount of seed can be collected from wild plant populations. The need for further onsite testing and eventual seed distribution to commercial seed growers requires a consistently large supply of seed. To accomplish this, seed production of the best performing accessions is under way at the Bridger Plant Materials Center. Seed production is conducted through direct-seeding in the field and transplanting of container-grown material. Proper cultural treatments are determined for each species to sustain cost-







Slender wheatgrass Elymus trachycaulus seed production field.



Furrow irrigating seed production field of silverleaf phacelia *Phacelia hastata*.



argentea ready for field planting.



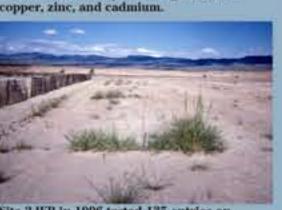


areas in western 75 species was collected from a wide range

Location of field test sites on the Anaconda

Superfund Site.

Site I IEP in 1995 tested 140 entries in an area that has a 5.5 pH and high levels of



Site 2 IEP in 1996 tested 135 entries on the Opportunity Tailings Ponds. This area has a 3.0 pH and has high salt loading and extremely high metal levels.



The 2001 Mill Creek Lowland Species Mixture CEP tested 4 local and 4 non-local seed mixes for adaptation and interspecies