

Final Results

FW00-050

Propagation of Alaska Native Plants for Restoration and Landscape Use

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Project Coordinator:

Michael Emers
Rosie Creek Farm
P.O. Box 181
Ester, Alaska
(907) 479-3642

rosie-ck@mosquitonet.com**Technical Advisors:**

Michele Hebert
University of Alaska
Cooperative Extension
Fairbanks, AK 99775
(907) 474-2423
ffmah@uaf.edu

Torre Jorgenson
Senior Scientist
ABR Inc.
P.O. Box 80410
Fairbanks, AK 99708
(907) 455-6777
tgorgenson@abrin.com

Patricia Holloway
Associate Professor
College of Natural
Resources
University of Alaska
Fairbanks, AK 99708
(907) 474-5651
ffpsh@uaf.edu

OBJECTIVES

This project seeks to assess propagation of Alaska native plants for use in landscaping and for restoring natural landscapes disrupted by human activity. To accomplish this, it will:

1. Assess methods to improve germination rates to optimize seed use
2. Evaluate cost and effectiveness of direct seeding and containers
3. Determine seed production rates per plant and unit area
4. Assess insect infestations
5. Evaluate weeds and weed control
6. Determine costs of small-scale production, extrapolating cost estimates for larger scale production

ABSTRACT

Demand for native plants is high for both restoration and landscape use. Most revegetation typically uses a mixture of native grass cultivars that are readily available and relatively inexpensive. To maintain long-term productivity and sustainability requires nitrogen-fixing species such as legumes. However, no commercial source exists in interior Alaska for native legume seed.

In 2000, the project team began to develop a protocol for seven legume species deemed important for revegetating oil fields on Alaska's North Slope. There were three related experiments: 1) a germination study examining the role of two germination media and three seed treatments; 2) a container growing study comparing two growing media; and 3) a field growing study.

Results for the first study showed that a silt-sand-peat mixture was better for germination than a commercial soil-less mixture, but the best seed treatment was species specific. Results from the container study showed that plants grew better in the commercial potting soil but survived better in the silt-sand-peat mixture.

Michael Emers, project coordinator, said that transplanting the legume species to the field would provide information on seed production rates and cost effectiveness of growing them for seed production. The percentage of plants flowering ranged from only 2 to 16%, depending on species.

"We found that two growing seasons was too short a time for these slow-growing arctic species to produce seed," says Emers. "Although we have gained important information and developed protocols for germinating and subsequent container growing of these species, more time is needed to determine the effectiveness of growing these plants in the field."

SPECIFIC RESULTS

ABR Inc., a Fairbanks environmental consulting firm with a contract for revegetating North Slope oil field pads and one of the technical advisors in the project, supplied seed for the herbaceous legumes: 1) *Astragalus alpinus*, 2) *Hedysarum alpinum*, 3) *Oxytropis deflexa*, 4) *O. campestris*, 5) *O. viscida* and 6) *O. maydelliana* and 7) *O. borealis*.

Seedlings began emerging four days after sowing and continued until 14 days. Time of emergence did not vary by germination medium, but it did by seed treatment. Acid scarified seeds typically emerged first, followed by sandpaper scarified seeds, then the control. Seedlings survived better in the silt-sand-peat

mixture. In the commercial seed-starting mix, the seedlings began to die after 10 days.

Recommendations for seedling germination: For all seeds, germinate in a well-drained soil mix rather than a commercial mix. Use mechanical scarification (sandpaper) for *O. campestris*, *O. maydelliana* and *O. viscida*; no treatment for *Astragalus alpinus* and *Hedysarum alpinum*; and acid scarification for *O. Deflexa*.

The number of leaflets produced during the first growing season was greater in the commercial potting soil than in the silt-sand-peat mixture in all species except for *O. Deflexa*. Most species averaged one to two more leaflets grown in the potting soil, and *Astragalus alpinus* averaged almost four more leaflets. However, after the first winter in those same pots, survival was much greater in the silt-sand-peat mixture.

Recommendations for container growing: Project members recommend growing these species in a well-drained soil mix, similar to that recommended for germination.

Growth of plants in the field depended on species, but all plants, regardless of species, performed better in well-drained areas of the fields. However, the project team found that the plants grow too slowly to produce seed by the second season. With no information on seed production, no recommendations are currently being made on field production. However, the continued experimentation on soil texture and fertilizer regimes may provide information upon which to base recommendations down the road.

The study did encounter some aphid infestations by the third year, probably the result of excess soil nitrogen. With the native legume seedlings being so small and growing so slowly, they were easily overwhelmed by fast growing annual weeds. Neither the insects nor weeds were appropriately addressed in this study, but will be in the next phase.

POTENTIAL BENEFITS

The results of this project will likely interest the greenhouse industry, which sells plants to the general public, and the agencies and industries mandated to revegetate Alaska roadsides and other disturbed landscapes.

While demand for native plants in landscapes is increasing, little information exists on their propagation compared with ornamental species and cultivars, which may not survive as well in Alaska's harsh climate.

"Already in the container perennial portion of our business we cannot keep up with demand for many of the species we propagate," says project coordinator Michael Emers. "Having the opportunity to develop protocols for germinating and growing these species in containers is incredibly useful to us and other producers."

As for revegetation, some of the species being tested have been grown in other areas but not in interior Alaska, and previous attempts to propagate these species have relied on sowing seed into the field and hoping the plants survive to produce seed.

"With this new knowledge on germination requirements and conditions necessary for container production," says Emers, "we can now grow seedlings, hold them in containers until they are large enough to complete with weeds and then plant them into the field. We feel that this will help us produce both healthier plants and produce a crop of seeds more rapidly than other methods."

The project team hopes that, although propagation of seed is a long-term enterprise, the protocols developed through this project may enable Alaska farmers to diversify into a crop with economic potential.

FARMER ADOPTION AND DIRECT IMPACT

Other farmers or greenhouse operators have yet to produce any of the legumes being tested, but interest in them is high.

"We feel that by setting an example of what is possible," says Emers, "they will follow the lead of our efforts."

Meanwhile, potential customers of the native seed or seedlings (Alaska Department of Transportation, Bureau of Land Management, National Park Service, oil industry and landscapers) have expressed considerable enthusiasm, offering encouragement and suggestions for other species as well as queries for product information and price lists.

FUTURE RECOMMENDATIONS OR NEW HYPOTHESES

A pilot study in 1999 and the SARE-funded study in 2000 and 2001 have shown differing survival and growth rates in the field, depending on species and soil texture and drainage. Based on these observations, it is the project team's hypothesis that optimal growth will benefit from soils with better drainage than the current soil (almost pure glacial silt) and use of a low N, high P fertilizer to reduce competition from weeds and reduce insect outbreaks.

Learning that plant growth in the field takes two or three years, the project team has applied for and received a SARE-funded continuation of this grant to develop a field protocol for the seven North Slope species in the original study as well as several other species that should be useful for interior Alaska projects.

DISSEMINATION OF FINDINGS

The project team promotes the use of native plants through several venues, including the Tanana Valley Farmers Market and direct farm sales. Growing native plants for restoration and landscape has prompted two television news features and segment on Alaska Public Radio. Other dissemination efforts include:

- A feature article for the regional SARE newsletter
- Listing in the Alaska Directory of Native Plants
- A presentation at the Alaska Rare Plant Forum
- Five farm tours over the last two growing seasons
- Numerous phone visits and phone calls (around two calls a week) during the spring and summer about use or propagation of Alaska native plants.

With results of the study in hand, the project team hopes to publish them in *Agroborealis*, the University of Alaska's agricultural journal, and in *Native Plant Journal*. The team will also present findings in a SARE newsletter and during the 2002 state greenhouse conference.

PRODUCER INVOLVEMENT

Rosie Creek Farm is the only producer directly involved in the project, but about 20 other producers have visited Rosie Creek or attended farm tours.