Alaska Plant Materials Center

2008 Annual Report

Division of Agriculture
Alaska Department of Natural Resources

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Cover photo: Craig Tallman harvesting hairgrass with combine at the PMC.

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Pictures by PMC staff unless otherwise noted.

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Primary Activities

Conservation Plant Technology
Foundation Seed
Alaska Seed Growers' Assistance
Ethnobotany Research
High Latitude Germplasm
Education
Native Plant Evaluation
Certified Seed Laboratory
Revegetation
Invasive Species Management
Potatoes

This report is a brief summary of the 2008 activities at the PMC. For additional information on the studies, please contact us at the PMC.

Director's Letter

STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF AGRICULTURE

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January 13, 2009

PMC Annual Report Letter

The Alaska Plant Materials Center (PMC) continues to serve Alaska's needs in the production of foundation class seed of both traditional crops and Alaska native plants. The PMC provides leadership, innovation, and initiative in Alaska for revegetation, erosion control, and commercial crop and plant production in Alaska. The PMC has created and will continue to modernize a high quality facility for seed production, harvest, and cleaning.

During this reporting period the PMC has continued a tradition of producing quality plant material as well as new varieties for commercial production. Repairs to physical structures and the replacement of old farm equipment have greatly enhanced our capabilities.

Improvements and efficiency changes have enabled the PMC to remain on the leading edge of innovation in crop science and plant development. New horizons in land issues and erosion control will augment the PMC's role and purpose in Alaska.

The PMC is a strong asset to the state of Alaska and the Agriculture industry.

Sincerely,

Franci Havemeister

Franci Havemeister
Director

"Develop, Conserve, and Enhance Natural Resources for Present and Future Alaskans."

Introduction

The Alaska Plant Materials Center (PMC) is a section of the Division of Agriculture within the Department of Natural Resources. The Plant Materials Center's work advances applied plant research for northern latitudes through six major programs: (1) Revegetation and Native Seed Production, (2) Alaska Ethnobotany Research Project, (3) Foundation Seed Program, (4) Seed Growers Assistance Project, (5) Potato Seed Program, (6) Invasive Plants and Agricultural Pest Management. Each of these programs will be addressed in this report.

Often in late July or early August, the Plant Materials Center hosts an open house. The PMC staff is available to answer questions about the projects and give tours of the facilities. Over 300 people attended the last open house. Scheduling conflicts and construction activities have precluded an open house in recent years. However, in the near future the PMC's open house program will resume.

The majority of the Plant Materials Center's funding has come from non-state sources. In recent years, USDA has become the major funding source. The majority of the remaining operating monies have been allocated from the Agriculture Revolving Loan Fund (ARLF). In 2007 the PMC started getting General Fund monies to replace the ARLF as a funding source. That change reversed the fiscal year 1997 move to fund the division's activity with ARLF monies.

Additionally, the center brings in small amounts of revenue through cooperative projects with other agencies, the private sector, and through the sale of plant materials. All funds derived from outside sources can be used for direct operations of the Plant Materials Center.

PMC fields and irrigation

History

Early attempts to establish a federal Plant Materials Center in Alaska were unsuccessful because the U. S. Department of Agriculture believed that the centers at Pullman, Washington and Corvallis, Oregon could serve the needs of Alaska.

The Alaska Legislature was not discouraged, and at the urging of the University of Alaska, conservation groups, and farmers, prepared legislation that would establish the Alaska Plant Materials Center.

In 1972, Governor Bill Egan signed into law a bill creating the Alaska Plant Materials Center. This legislation directed the Plant Materials Center to fulfill several traditional agricultural responsibilities which included developing plant varieties and techniques for revegetation and erosion control plus providing technical reclamation assistance to industry.

PMC fields around 1978

Soon after the Plant Materials Center bill was enacted, a 285-acre tract near Palmer was selected for the center's site. An additional 120-acre parcel adjacent to the PMC was acquired through a land exchange with the Matanuska-Susitna Borough in 1982. This gave the PMC a total of 405 acres to accomplish its mandated duties which then included revegetation work, horticultural development, foundation seed production, and disease-free potato seed stock production.

In 1987, the PMC's programs were consolidated into two programs: the North Latitude Revegetation and Seed Production Project and the North Latitude Vegetable and Landscape Crop Improvement Project.

In 1994, the PMC assumed responsibility for the maintenance and production of breeder class seed of all University of Alaska developed grass varieties. The transfer of responsibility has placed the PMC in the position of being the repository and maintainer for Alaska-developed germplasm.

Oats growing in PMC fields

In November 1997, the PMC was notified that the U.S. Department of Agriculture granted the PMC the operation of the Arctic Genetic Resources Unit, which included an operating and capital funds grant. In 1998, the Germplasm Repository became a reality. The first USDA employee was hired and the state initiated the design of a screen house. The screen house was completed in 2001. The Arctic Genetic Resources Unit currently holds accessions of alpine, arctic and polar plants with a special emphasis on wetland species. The site also became instrumental at increasing germplasm held at other USDA repositories. A new short-term specific cooperative agreement was renewed in 2008.

Stoney Wright evaluating hairgrass

In 1999, a grant from USDA Natural Resources Conservation Service (NRCS) allowed the PMC to expand its program in native seed production and commercialization.

In the year 2000, an additional grant from NRCS allowed the PMC to expand a cold regions program. The program not only allows for the establishment of a supplemental plot network throughout Alaska, it funds additional circumpolar seed exploration/collection projects.

The Cooperative State Research, Education, and Extension Service Program of the USDA funds the research programs (channeled through Alaska's Land Grant University of Fairbanks). The funding for the Alaska Seed Grower's Research Project started in 2003 and ended in 2008. The funds for the Alaska Ethnobotany Research Project started in 2004.

New Potato Seed Lab

The major construction of a new laboratory, office remodeling, and safety upgrades have been completed at the PMC. In 2008 the new grow room and remodeled offices were put into use.

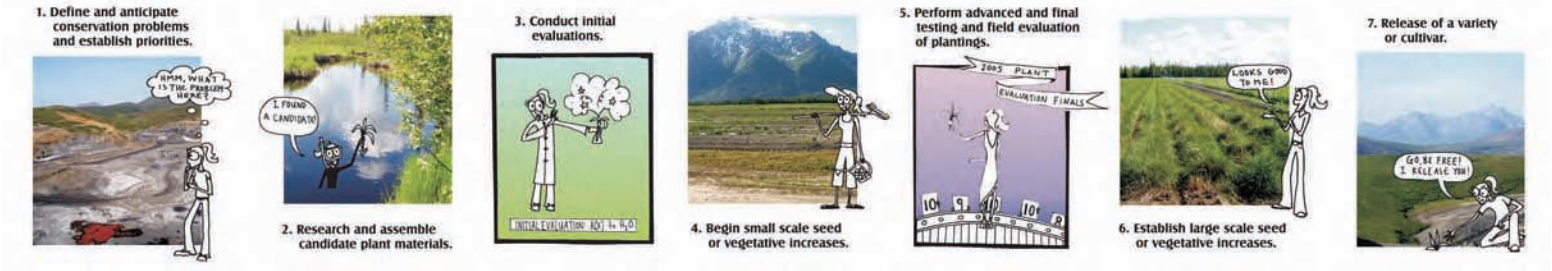
The PMC has been very aggressive in securing grants and federal funds. This trend is not expected to decline; in fact, the level of non-state funding is expected to increase.

New Seed Lab Grow Room

North Latitude Revegetation & Seed Production Program

Plant Material Acquisition, Evaluation, Increase, and Release

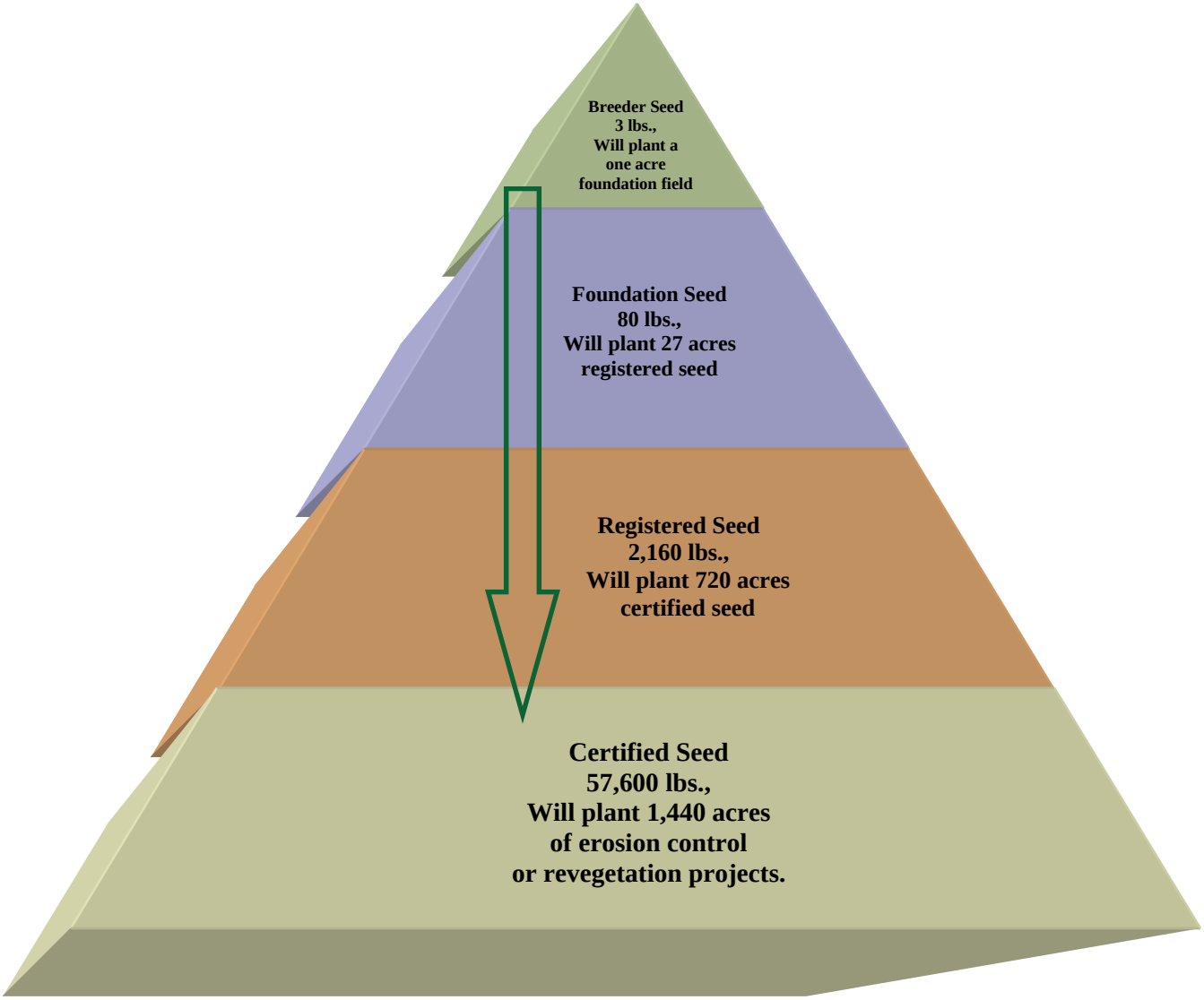
The Revegetation and Seed Production Program's products and methods are used to encourage a healthy seed industry and develop new plant materials and methods for land reclamation and erosion control. These two functions are complementary and are intended to promote an in-state seed industry while providing state-of-the-art revegetation and erosion control information to the public.



Design by Domo Colberg, PMC Intern

Seed Increase Pyramid

This diagram illustrates the increase of three pounds of breeder seed to a commercially useable quantity. Clean seed yield is based on 80 lbs./acre. The planting rate is based on 3 lbs./acre for seed production and 40 lbs./acre for revegetation purposes.



Northern Tomato Varieties Seed Increase

New to the PMC this year is a project to keep the germplasm of several northern tomato varieties viable. The PMC has this germplasm from many years past. The following varieties were increased:

Polar Baby—25.59 g
Alpha—19.57 g
Polar Gem—17.20 g

Expect more varieties and species in the next few years!

Tomato Seed Increase

Foundation Seed and Conditioning Program

Producing foundation class seed is of primary importance to the PMC. Foundation seed is the highest certified generation of seed available to producers for cultivar seed production. These plants and seed form the core plant materials for farmers, agencies, and private companies in Alaska. Foundation seed goes through seven basic steps to establish a resource of conservation plants. They are shown in the diagram on page 5.

During the summer and fall of 2008 much time was spent weeding, harvesting, cleaning, testing, and storing of this valuable seed.

'Wooding' Barley

In the fall, a newer variety *Hordeum vulgare* 'Wooding' (barley) was harvested at the PMC. This variety was released from The University of Alaska Fairbanks School of Natural Resources and Agricultural Sciences and has proved to be a good producer. Despite one of the coolest, cloudiest summers on record, the PMC was able to harvest successfully foundation-class seed of this promising barley cultivar. 'Wooding' barley matured well and was extraordinarily even in height, showing little evidence of late tillering.

Mike Keen harvesting 'Wooding' Barley

Flail Vac operated by Tom Klebasedel

Over a dozen varieties of grass and forb seed were harvested in September and early October. Combining, hand harvesting, and flail-vacuuming were the primary harvest methods used in 2008.

The PMC has also continued to clean seed from the PMC's fields, along with the Alaska Seed Growers Association's seed. The PMC has cleaned thousands of pounds of seed this year and will continue into the following year. A few varieties cleaned this year include: *Poa glauca* 'Tundra' (Glaucous bluegrass), *Poa pratensis* 'Nugget' (Kentucky bluegrass), and *Elymus trachycaulus* 'Wainwright' (Slender wheatgrass). These seeds will be used for revegetation and reclamation.

Linda Byers cleaning seed.

The less weeds in a field, the easier it is to harvest and clean the seeds.

Plant Material Acquisition

Chugach Forest

View of Chugach

Chugach National Forest requested the PMC to collect and increase native plant material from their lands for spot revegetation within the Forest. In 2006 three wild grasses were collected. In 2007 these grasses were increased, harvested, cleaned, and over two pounds of seed returned to Chugach. The harvest of wild seed continued in 2007—2008 (nine species of grass, one species of sedge, and four forb species). Seedlings were grown in the greenhouse and later transplanted out in the field. Seventeen different lots are being increased.

Seedlings from Chugach

Bureau of Land Management

A new agreement was signed with the BLM in 2008 to do a similar project (see Chugach Forest) on BLM lands for acquisition of and native plant increase.

Subarctic - Arctic Germplasm Collection Project

Iceland and Faroe Islands


Collection area near TJØMUVIK, Faroe Islands

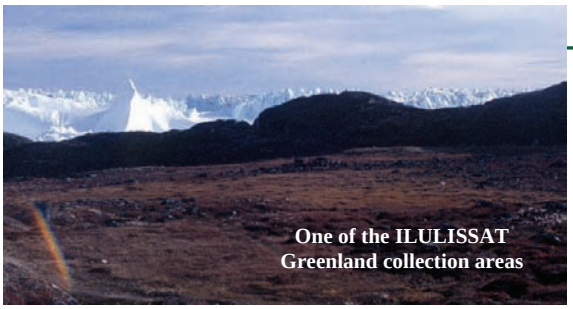
As a part of the Cold Regions Vegetation Project, the PMC initiated a seed collection project on Iceland and the Faroe Islands in 2001. The 123 accessions were first planted in the greenhouse and then the seedlings were field planted on the PMC land in 2002. Between 2003 and 2007 these plantings were evaluated three times per year. Those accessions showing good to excellent performance were harvested of seed. In September 2007 these plots were removed. Seed from the best performing accessions has been placed in storage. Advanced screening and comparisons will be scheduled in 2010.

Svalbard (Spitzbergen)


Collection area on Spitsbergen Island in the Svalbard Archipelago.

All the 212 accessions of seed from Svalbard were imported to the U.S. under a Norwegian phytosanitary permit and the general USDA import permit. No problems were encountered on return to the U.S. This seed was field planted at the PMC in June 2003. Evaluation of the plantings continued through 2006 and 2007 and were terminated in 2008. The best of these will also be included in the advanced screening efforts in 2010.

West and South Greenland


One of the ILULISSAT Greenland collection areas

In 2003 a seed collection project was conducted in west and south Greenland between September 5 and October 8, 2003. The seed collection project was very successful resulting in 403 collections, and included 31 species. This was at the time the largest collection the Plant Materials Center had ever made during a federally funded germplasm collection project. The volume (weight) and number of species exceeded the initial goal by at least sixty percent. This was in part due to the fact that grazing animals, primarily sheep, are well-managed and restricted in Greenland. Therefore, no competition for the resource existed. But more importantly, the suggested time of the collection project was perfect for the availability of the maximum amount of seed. This combined with the previous summer's weather contributed to very high quality seed. The collection conditions were nearly ideal with only a few days of rain.

The seed was planted at the PMC in June 2004 and evaluated by traditional techniques. The evaluations continued through 2005, 2006, and 2007 and terminated in 2008. Like the Iceland/Faroe and Svalbard material the best Greenland material will be put into advanced evaluation in 2010.

Canada - Nunavut, Nunavik, Newfoundland and Labrador

The seed collection project conducted from 2004 to 2005, in the Canada High Arctic (Nunavut) and Canada Sub-Arctic (Nunavik, Newfoundland, and Labrador) was very successful. The collection consists of 424 and 451 accessions respectively and includes a total of 27 species. The material collected will continue to be evaluated until the end of the 2009 season. In 2010 the best of this material will be placed in advanced evaluation.


Puvirnituq collection area in the Nunavik region of Quebec


GRISE FIORD, Ellesmere Island, Nunavut, Canada collection area

The Nunavik/Labrador collection along with the material from Nunavut, Greenland, Spitzbergen, Norway, Iceland, the Faroe Islands and of course Alaska, puts the Alaska Plant Materials Center in the unique position of having the largest Nordic or Arctic Germplasm collection under evaluation in North America.

U.S. Cold Regions Plot Evaluation

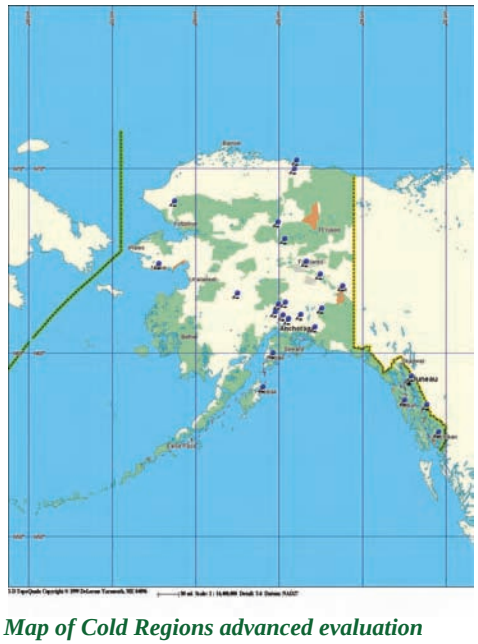
The PMC has established advanced evaluation plantings throughout its history as part of the mission of developing plant material for different uses within Alaska. This effort is funded by a grant from the USDA, NRCS.

Evaluation Plot

Advanced evaluation plantings are established to evaluate the performance of accessions that have previously performed well in initial evaluation plantings at the PMC and cooperating farms. Between 2003 and 2007 plots were planted and evaluated annually in Southeast, Southwest, Arctic, Interior, and Southcentral Alaska. The map to the right shows the locations of each plot.

In 2008 the data was compiled to show which plants did the best in each area. Plots are rated on percent stand and vigor. Each plot had approximately 52 different accessions ranging from turf and forage grasses to revegetation grasses and forbs.

The results were written up by Andy Nolen (who is no longer working at the PMC) and will be available in the publications section of the PMC website. This program will be revived in 2009.



Map of Cold Regions advanced evaluation

Native Plant Evaluation Project

King Salmon Germplasm northern goldenrod, *Solidago multiradiata*

The Native Plant Evaluation Project, once called the Alaska Native Plant Nursery, started in 1999 at the Trunk Road facility. This project has evaluated 204 species of native plants. Many short protocols were established to enable landscape and specialty growers to have success with these plants. During 2008, the PMC focused on evaluating and increasing those plants that are more suitable for revegetation. 2008 has seen production of many promising species at scales previously unrealized. Through these efforts, the PMC is achieving the goal of making available a broad range of native plants for conservation and landscape purposes.

Paxson Germplasm alpine sweet-grass, *Hedysarum alpinum*

Revegetation and Reclamation Studies and Accomplishments

The construction of the Trans Alaska Pipeline in the 1970s triggered the current reclamation research activity in Alaska. However, since the pipeline, ideas associated with revegetation have changed. Continued oil development, renewed interest in surface and placer mining, as well as new federal, state, and local regulations have caused applied research activities to address "reclamation" as defined by regulations, which in some cases has precluded the use of "traditional" plant material and planting technology.

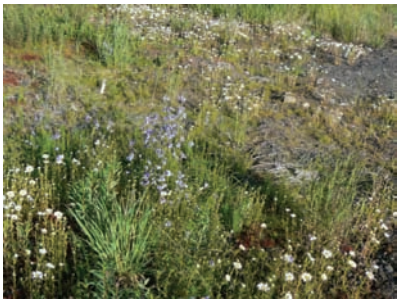
Coir log holds plants in place on steep slopes.

The Alaska Plant Materials Center continues to lead Alaska in reclamation, erosion control, research, technology transfer, and revegetation. The use of dormant seedlings to extend planting seasons, cost-effective and successful methods in willow planting, and wetland and coastal restorations are research priorities for the Plant Materials Center.

This program has gathered at least 275 plot years of information collected from sites around the state, developed 11 new cultivars, developed 33 new natural “Selected Class” germplasms, and continued to maintain 9 cultivars developed by the University of Alaska Fairbanks and Agriculture Research Service for revegetation and reclamation. The PMC has assisted scores of agencies and private companies in reclamation, erosion control, and revegetation.

Red Dog Mine Revegetation and Demonstration Plots

This project grew out of a mutual need for information. The PMC required revegetation data from northwestern Alaska, and Teck Cominco Alaska, Inc. needed information on species that would perform well in future mine revegetation programs. Three different sites were established in 1987 at Red Dog Mine - each with different soil compositions, but with the same plants. A demonstration planting to showcase the different plants was established in 1988. Results have been previously published and further sites and revegetation efforts have been made since the beginning.



Revegetation, natural and planned

This site was not visited in 2008, but will be monitored in the future. Weather conditions many times preclude site visits. The 2007 site visits showed that, as can be expected, some places have a high diversity of plants. Other places are continuously disturbed, which means that the plants have not been given the chance to survive. In many other places, natural revegetation is occurring.

Some places are growing well, others are not.

Abandoned Mine Lands Reclamation (AML)

The "Abandoned Mine Lands Program" is a program of the Division of Mining, Land, and Water (DMLW). The Alaska Plant Materials Center has collaborated with DMLW on many of their projects over the past 15 years. The PMC is responsible for the revegetation planning aspects of the reclamation effort, supervision of the installation of plants and fertilization, and follow-up monitoring and maintenance. Several sites were visited in 2008.

Upper Knob Creek and Jonesville Mine

In 2008, the PMC continued to work with the DMLW and their abandoned mine land program to monitor the revegetation progress on Upper Knob Creek and Jonesville Mine Phase 3, 4, and 5. Upper Knob Creek is divided into several pits of varying size totaling over 40 acres. The Jonesville Mine is across the valley from Upper Knob Creek. These sites were characterized by gravelly, rocky material mixed with finer particles of clay, silt or sand. When wet the substrate was slippery, sticky and easily eroded. When dry the substrate was crusty with cracks that formed as it dried.

Revegetation trials and tribulations at Jonesville Mine

Many trials, errors, and accomplishments accompany this revegetation project. Combinations of willow brush layers, bundles and live stakes along with transplants and seedings with native grasses and forbs were found to be the most appropriate techniques for revegetating sites with steep slopes and erosive soils. Timing, contour scarification, top soil, fertilizer, straw logs, availability of tractors with broadcast spreaders or an airplane - all of these need to be planned ahead of time, if possible, and adjusted as conditions change.

Kanuti Pit

The PMC, in cooperation with the DOT&PF, has overseen the implementation and monitoring of the revegetation of the Kanuti pit (material site 65-9-031-2) located at Milepost 105 of the Dalton Highway. Installation of the revegetation materials occurred in 2003. The site was contoured to create littoral wetlands fed from natural springs within the pit. Topsoil from another site was spread to improve the growing conditions. Seed and fertilizer applications were also applied as part of the reclamation plan. Monitoring has occurred during 2004-2007 and will continue until 2013. Information gleaned from this project will aid in the planning and implementation of future projects in the region.

Grass revegetation seems to be doing well.

Chistochina River Wetland Restoration
Tok Cutoff 30E Project

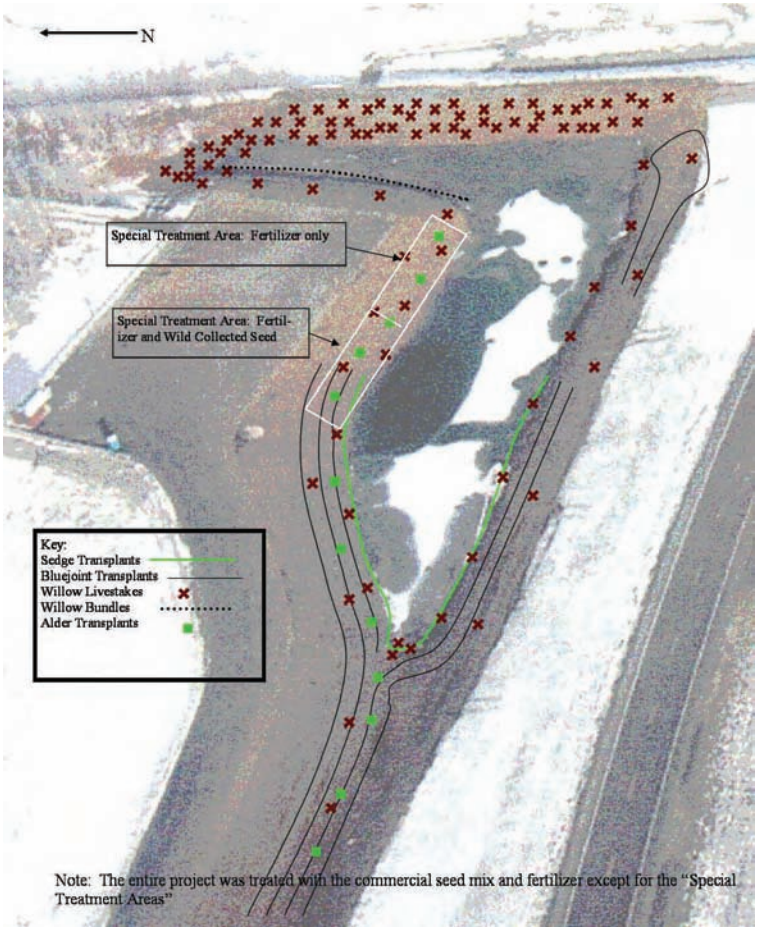
Revegetation of three newly created wetlands along the Chistochina River was implemented by the PMC as part of the Tok Cutoff 30E project for Alaska's Department of Transportation and Public Facilities (DOT&PF). The wetlands were created in conjunction with the roadway realignment and bridge replacement aspects of the project.

Revegetation treatments including seed and fertilizer applications, dormant willow cuttings, and transplants of wild collected grasses and sedges were selected as suitable methods for achieving the restoration goals of the project. Streambank Revegetation and Protection: a Guide for Alaska (2005) provided the restoration techniques utilized for willow live stake and bundle preparation and installation. Two special treatment areas were also included to evaluate performance of a few different restoration techniques.

Plant materials necessary to complete the goals of the project were acquired through commercial sources as well as wild collections. Collection of seed occurred in the fall of 2004 and 2005. Willow cuttings were collected in March of 2006. Revegetation treatments were installed at the site June 19–21, 2006.

Photo point pictures and installation of a permanent transect were completed as part of the ongoing revegetation monitoring of the treated site.

Initial establishment of the revegetation plant material installed on this project has progressed as expected.

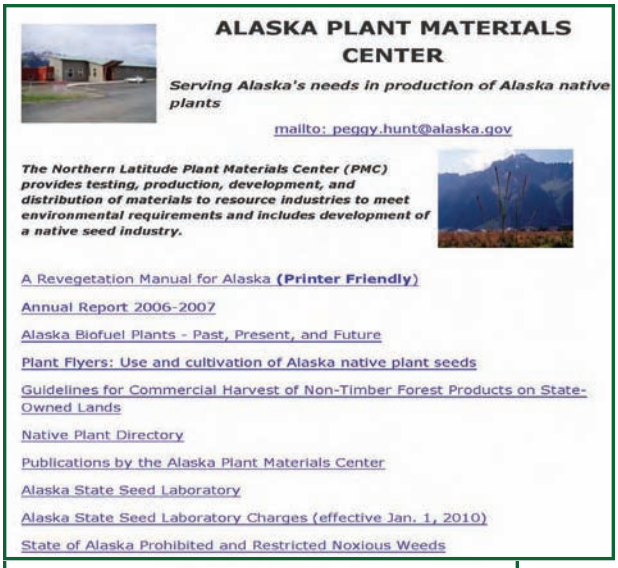


Seeded and transplanted grasses and sedges appear to be thriving. Willow bundle and live stake installations also appear successful though the true level of survival will not be able to be judged until follow up monitoring occurs in the summer of 2009.

Alaska Seed Growers Project

Alaska native seed growers benefit from this project economically by learning which native plants are needed for commercial projects and how to produce them—thus growers can practically plan for the future. By growing native plants which can out-compete invasive, non-native weeds, Alaska will be fulfilling a national mandate to revegetate with native plants. The educational component of this project reaches throughout Alaska, infusing commercial, agency, and individuals with the capacity to make a difference in the environment.

Outreach, Training, Tours


ALASKA PLANT MATERIALS CENTER

Serving Alaska's needs in production of Alaska native plants

mailto: peggy.hunt@alaska.gov

The Northern Latitude Plant Materials Center (PMC) provides testing, production, development, and distribution of materials to resource industries to meet environmental requirements and includes development of a native seed industry.

A Revegetation Manual for Alaska **(Printer Friendly)**
Annual Report 2006-2007
Alaska Biofuel Plants - Past, Present, and Future
Plant Flyers: Use and cultivation of Alaska native plant seeds
Guidelines for Commercial Harvest of Non-Timber Forest Products on State-Owned Lands
Native Plant Directory
Publications by the Alaska Plant Materials Center
Alaska State Seed Laboratory
Alaska State Seed Laboratory Charges (effective Jan. 1, 2010)
State of Alaska Prohibited and Restricted Noxious Weeds

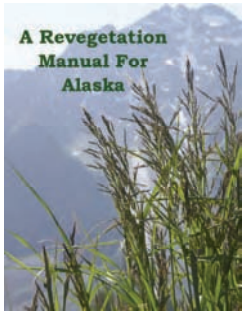

DIRECTORY OF
Alaska Native Plant Sources
6th Edition

This Native Plant Source Directory is updated whenever a grower is ready to sell their plants to the public. Please contact us to add yourself to the Directory.

Introduction
Alaska Grass
Alaska Wildflowers
Alaska Trees and Shrubs
Revegetation Resources

This Project has produced 52 interpretive plant publications, "A Revegetation Manual for Alaska", and the "Directory of Alaska Native Plant Sources, 6th Edition"—all of which can be found on our website. Because of dissemination of information via our newly designed, professional website (www.dnr.state.gov/ag/ag_pmc.htm), the number of web hits from 2006 to 2008 drastically increased on the PMC's homepage by 215 percent, on the plant flyer's webpage by 227 percent, and with an up-to-date Directory, up 191 percent.

By understanding the reasons for revegetating with native Alaskan plants, growers, farmers, interested rural and urban citizens are given information to have success in their endeavors. Agency personnel now have the means to specify a variety of plants for revegetation or landscape needs. When the specifications state that only Alaska native seed can be used for various projects, then the bidders contact the PMC to find out where to purchase the required seed. This has caused an upswing in the economic base and an incentive for more people to grow Alaskan seed.



Changes in knowledge and actions have occurred with programs provided by this project on plants in Alaska. Some teachers have started native plant raingardens at their schools and actively manage these areas with their students. These gardens are ways to showcase the need for native plants to be grown. Several people are working on ways to combine the many efforts of small, rural, and ethnic gardeners into a brokerage or farmer's market venue to sell native plants and seed. Other entrepreneurs have listed themselves on the Directory as businesses that can harvest needed seed for revegetation purposes—as long as they have enough adequate notice. Still other growers are cultivating native plants for landscape use with techniques provided by the Project.


Homer Future Farmers of Alaska learning to clean seed.


Peggy Hunt providing a workshop for teachers with "The Alaska Agriculture in the Classroom Educator Institute".

Professional and educational presentations were provided for several conferences, school students, specialty groups, and teachers with "The Alaska Agriculture in the Classroom Educator Institute". Workshops, classroom activities, and outreach were all delivered with hands-on, minds-on activities and with inquiry as the basis for the activities. Services for the public, schools, and farmers were provided on many topics – ranging from raingardens, revegetation, landscapes, harvest protocols, seed cleaning, invasive and noxious plants, seed testing, and general information. One intern was advised and mentored in this Project in 2008. Community events, such as the State and County fairs, provided venues to counsel and empower Alaskans to grow native plants.

Alaska Seed Growers Research

Research in 2008 continued to evaluate previous results from 2006 and 2007. We were looking at formulating easily established, diverse, and dependable native seed mixes to out-compete weeds. This provides an incentive for farmers to grow crops of selected forbs and grasses for the Alaska native seed market, which supplies contractors and agencies specifying seed mixes for revegetation.

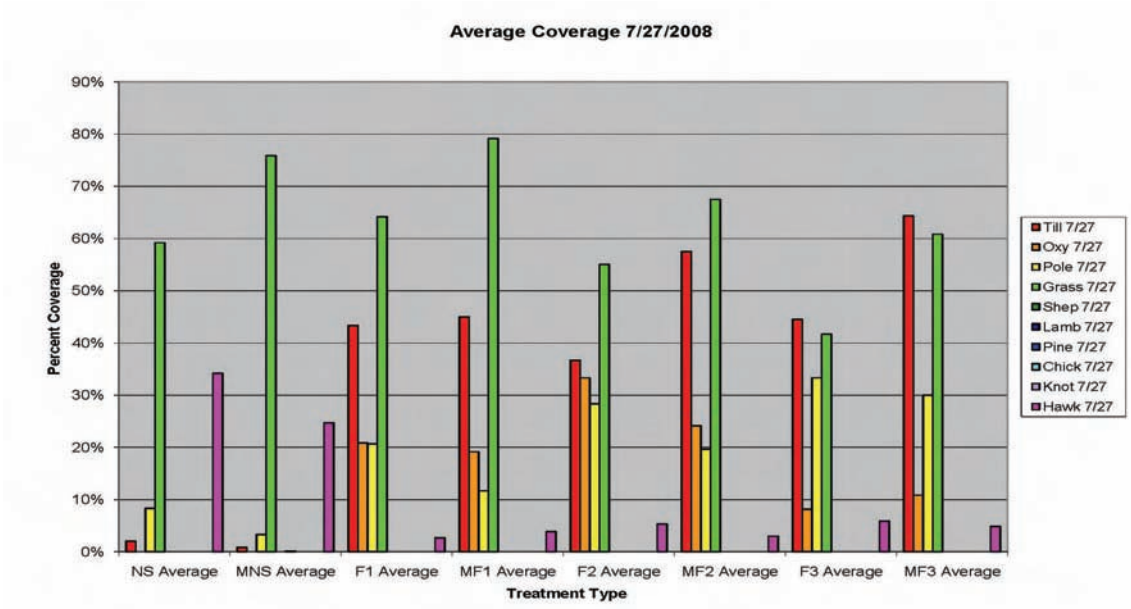
The study involved three combinations of forbs and grasses in different ratios planted in randomized (triplicated) plots with and without a mycorrhizal inoculant. Annual weeds quickly created a cover crop in every plot in 2006. In 2007, the forbs and grass took over, with little weed interference. In 2008, a pattern seems to be emerging.

Weeds were suppressed by the grass and forb mixture. The six species combined equally seem to create a more diverse result than if more forbs were added than grass.

Demonstration plot without Mycorrhizae

In these demonstration plots, pictures taken from the same sides seem to show that adding mycorrhizae inhibited the vigor of both grasses and forbs. These will be evaluated again in 2009.

Demonstration plot with Mycorrhizae



Till = Caiggluk, *Artemisia tillesi*
Oxy = Black Rapids, *Oxytropis campestris*
Pole = Butte, *Polemonium pulcherrimum*
Grass = all three of the grasses sown (Gruening, *Poa alpina*; Nortran, *Deschampsia caespitosa*; Wainwright, *Elymus trachycaulis*.)

The others are weeds, Shepherd's Purse, Lambsquarters, Pineapple Weed, Chickweed, Knotweed, and Hawksbeard.

NS represents no seed. The added M means the plots were given mycorrhizal inoculants. F1 represents an equal amount of forbs and grass seed were planted. F2 means that 2 x the amount of forbs were planted with grass seed. F3 means that 3 x the amount of forbs were planted with grass seed.

Blueberry Survey

Large stands of Devil's Club made access for Kathy Wiess to get blueberry sites almost impossible.

The Mental Health Trust requested the PMC to survey their lands for potential commercial blueberry harvesting. Sites visited included Livengood, Anderson, Healy, Chickaloon, and Seldovia and were chosen based on accessibility and vegetation cover.

Highbush blueberry

Vaccinium uliginosum (lowbush blueberry) and *Vaccinium ovalifolium* (highbush blueberry) were located on the sites, but due to uneven terrain and ease of access, mechanical harvesting of blueberries would not be feasible.

During the survey other factors came into play when determining the feasibility of commercially harvesting blueberries. Managing blueberry production is a labor intensive and continuous operation involving pruning, irrigation, weed and pest control, mulching, fertilizing, harvesting, and processing. In Alaska bird netting and fencing would need to be established to keep out bears, birds, and other species.

Terrain, in this case, makes travel viable only with a helicopter.

Also noted were the blueberry species in Alaska vary greatly compared to the species in the Lower 48 both in size and distribution of the berry on the plant. The varieties in Alaska do not produce as many berries per plant compared to the blueberries in other regions. As a result of this survey it was determined that if mechanical harvesting ever would be used in Alaska, even terrain and accessibility would be essential for a successful commercial production of blueberries.

Alaska Biofuel Plants Research

Many willows are good for revegetation

Funded by a seed grant from the Matanuska-Susitna Borough, the PMC and the University of Alaska Fairbanks, School of Natural Resources and Agricultural Sciences (UAF), joined together in 2008 to investigate the feasibility of growing willows and poplars for an alternative fuel source. This has been successfully done in other areas, but the research has not been done in Alaska. Past research trials in the lower 48, Sweden, Canada, etc. have found that biomass of certain plants can be processed into liquid fuel, burned to create electricity, compressed into pellets, combined with coal to produce and entirely different fuel, or chemically converted into a syn-gas.

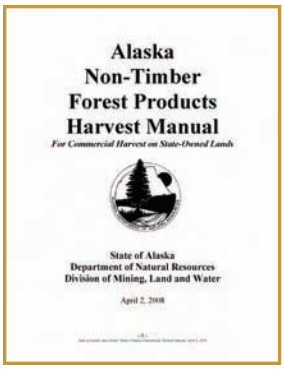
These plants do not grow in Alaska. Thus, this research is starting with well-known woody shrubs that have been used for revegetation along stream banks. Many questions need to be answered. How is the best way to plant them, which species grow best for this purpose, how close should they be planted, how often can they be sustainably pruned, is the chemical composition good for the BTU's required, how can the plants be utilized without compounding air pollution, can the product be feasibly delivered to outlying areas, can rural villages grow the plants and process them effectively?

The Willow Stomp by John Lemay and Gary Baldwin.

During the spring whips of River Willow, Feltleaf Willow, and Poplar were harvested by PMC folk in our 35 year old willow plantation. They were placed in a cooler and then planted in 4 replicated plots at intervals determined by UAF. The shrubs were measured weekly for growth, leaf production, and vigor. They were watered and fertilized. Before snowfall a large fence was constructed around them to keep the moose from eating these tasty morsels.

Next year we will be monitoring their growth again, as well as working with UAF to investigate their chemical constituents and biomass. This is not a one time investigation. It needs years of research to be able to say which plants may be a good alternative fuel source.

Alaska Ethnobotany Project



Harvest Manual and State Law

In a state as unique and diverse as Alaska, many considerations have to be weighed in managing a broad and newly recognized resource such as non-timber forest products (NTFP). The cultural and spiritual significance of many of the species of plants, the dependence on them for personal and subsistence lifestyles, and their potential development into commercially viable products have to be balanced by the State.

By developing the Alaska Non-Timber Forest Products Harvest Manual and changing the State's regulations to incorporate the Harvest Manual as law, the State is now making headway in developing a user-friendly program "to develop, conserve and enhance natural resources for present and future Alaskans" (Department of Natural Resources mission statement).

To research harvest affects on blueberries, exclosures were placed in the Hatcher Pass area to exclude harvesters and to enable the PMC to evaluate the differences between the blueberries in the exclosures and those from nearby harvested areas. Unfortunately the blueberry production was poor this year. Here Teresa Nix, John LeMay, and intern, Jaimie Wharton are constructing the exclosures with Don Ross. Don also wrote a monograph on Blueberries which is on our website.

A massive harvest of conks on State lands—no permit.

Without the Ethnobotany Project this would not have been possible. The Harvest Manual is a cornerstone for the State. It defines the line between small-scale, low-impact commercial harvests and large-scale, potentially damaging commercial harvests. It describes how to sustainably harvest many Alaskan plants. This document will impact thousands of people, inspiring some to realize there is a market for native plants, protecting the subsistence and personal use harvesters, and enabling the State to effectively and knowledgably manage its land.

As of summer, 2008, the Harvest Manual and legal changes to the State's regulations were made into law (11 AAC 96.035). Three different sections of the State of Alaska's government joined together to create this Harvest Manual for use in managing commercial harvest of NTFP's on State land. The State's Division of Mining, Land, and Water (DMLW) is the permitting agency for commercial harvesting on state-managed land. DMLW Natural Resource Managers and Specialists provided the input for the regulations they felt were needed in the Harvest Manual. The PMC is the knowledge base for the State's plants, with Agronomists who researched and evaluated native plant ecology, growth, and health and work with NTFP's on a regular basis. Many other people and groups contributed to the Harvest Manual including Alaska natives. The State's Department of Law provided guidance about how other states regulate commercial harvests and researched the legality of the regulation changes proposed for the State.

How many spruce tips can sustainably be harvested?

After the Harvest Manual and the regulations were approved by the Deputy Commissioner of Natural Resources, they went out for public comment, the comments were reviewed and incorporated where pertinent, and then the final version was sent to the legislature for approval. To review the Harvest Manual go to the PMC's website: http://dnr.alaska.gov/ag/pmc_NTFP.htm. To review the legal changes and the permits go to http://dnr.alaska.gov/mlw/hottopics/.

The PMC is continuing to research and write monographs on Alaskan plants. These monographs include part harvested, harvest techniques, regeneration and recovery after harvest, traditional uses, and areas of concern. Native Alaskan People are involved in the process and given credit for their knowledge. The PMC continues to monitor the permitting process and the amount of plants being harvested. This gives the state a better understanding of what is happening in the field and starts a data base for future use.

Garbage bags full of fiddleheads are harvested annually from Hatcher's Pass State Park. Are they for personal use or for sale? What amount can be harvested from one fern without the fern dying?

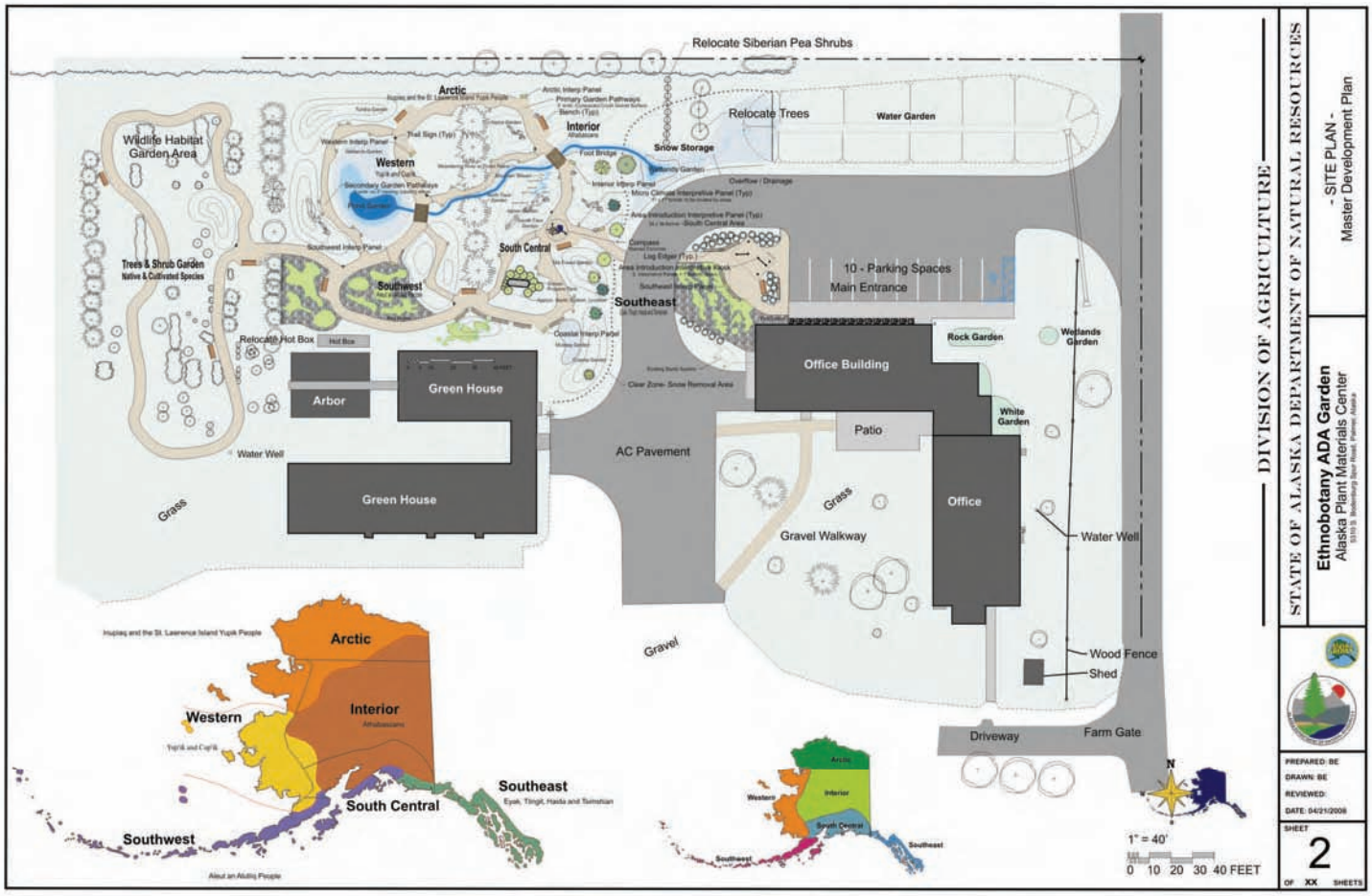
Ethnobotany ADA Garden

The PMC started an ADA accessible Ethnobotany Garden for education and plant increase for other cultural centers in summer, 2008. This garden was designed by Bill Evans, an interpretive landscape architect from the State Division of Parks and Outdoor Recreation. He used the cultural and ecological regions of Alaska to design the garden. We now have Denali, the Yukon, Aleutian Islands, an arctic, interior, southcentral, and southeast Alaska constructed! These regions represent cultural areas historically lived in by Eyak, Tlingit, Haida, Tsimshian, Athabascans, Iñupiak, Yup'ik, Cup'ik, Aleut, Siberian Yupik, and Alutiiq Peoples. The plants that will be in the garden are ones traditionally and presently used for food, medicine, and other uses—the knowledge about these plants are publicly printed in various books and papers. By the end of fall, 2008, about 50 different species of plants have been transplanted into the garden. This fall agronomists selected about 45 different plants to research and prepare growth protocols and propagate for spring planting. Interpretive signage is being created. Many people and groups are excited about coming to learn about Alaskan plants, culture, ecology, and landscape use of native plants.

The work begins!

What a change! This shows Southcentral in the foreground and Denali in the back. Many of the transplants are going dormant since it is fall.

The muskeg bog.



Invasive Plants and Agricultural Pest Management Project

Spraying an infestation of Orange Hawkweed in Kodiak

Invasive weeds and agricultural pests are an emerging issue in Alaska. In recent years experts from around the state have discovered increasing size and frequency of invasive weed infestations. Some of these weeds such as orange hawkweed, purple loosestrife, white sweetclover, and narrowleaf hawksbeard have spread from cultivation or disturbed areas to natural areas where they have the potential to seriously impact ecosystem services.

Lambsquarters

Producers of agricultural products are also experiencing pressure from invasive weeds. New introductions and spread of invasive weeds and agricultural pests is expected with increased commerce, development and growing industries such as tourism. Coordinated response to invasions and working to prevent invasions is critical to maintaining viable agricultural economies and ecosystems that support natural resources such as salmon, wildlife, and berries.

The new Invasive Plants and Agricultural Pest Management program at the PMC was enabled by AS 03.05.027. The statute directs the Department of Natural Resources to do a variety of tasks related to coordination, information sharing, education, and research and planning for control and prevention of invasive plants and agricultural pests. Chief amongst these tasks are development of a state strategic plan for invasive plants and agricultural pest management, and to review and make recommendations for regulation and policy changes for prevention and management of invasive plants and agricultural pests.

Tansy, as well as many other invasive weeds, is a very beautiful plant. They just want to take over!

Gino Graziano, Coordinator of this program, evaluates Tansy at the PMC.

The Invasive Weeds and Agricultural Pest Coordinator started the job on October 1, 2008. The Coordinator immediately traveled to Yukon Invasive Species Conference to provide a presentation about coordination efforts in Alaska for invasive species, and learn about efforts in the Yukon. The Coordinator participates with the Alaska Committee for Noxious and Invasive Plant Management (CNIPM), and the Alaska Invasive Species Working Group (AISWG) in coordination and implementation of an annual conference. The conference was held in Anchorage, October 21-23.

Work towards developing a strategic plan for invasive weeds and agricultural pest management is ongoing, and will involve coordination with stakeholders in early 2009. Recommendations for revisions to regulations and policies of departments will come from stakeholders and research by Division personnel. The Coordinator is involved with several subcommittees of CNIPM to help with these tasks. Those subcommittees include; Gravel, Weed Free Forage Certification, Early Detection and Rapid Response, and the Alaska Exotic Plant Information Clearinghouse.

Potato Disease Control Program

Potatoes are among the most valuable crops grown on Alaskan farms, creating a net value over 3 million dollars annually. Diseases can cause significant losses reducing yield and quality, therefore seed tubers free from disease are required to assure high yields with good quality.

The potato is vegetatively propagated and as a consequence, has unique production problems. Many economically important diseases and pests can be carried in or on the tubers used as seed. The use of seed potatoes having little or no disease is basic to any management plan. Seed production systems have been created world wide to incorporate seed production systems and inspection programs to minimize this risk. Planting certified seed with manageable disease levels reduces the risk of losses caused by disease. It is for this reason that the production of disease free seed is a primary goal of the PMC.

Diseases can cause significant losses.

Seed produced at the PMC is sold annually to growers who increase the original allotment over the next several years. Seed potatoes are produced under strict protocols and subjected to inspections to assure compliance with the low disease tolerances required of certified seed. This system enables the grower to annually replace older diseased seed with clean seed that helps maintain high quality.

Colors add to the harvest

The importation of seed from outside the state has the potential to introduce pests not known to occur in Alaska. The inadvertent introduction of these diseases or pests can cause major problems which we saw when late blight appeared in Alaska in 1995, 1998, and 2005. The importation of seed is therefore discouraged. Growers who wish to try new varieties are encouraged to obtain clean seed stock from the PMC.

Pathogen Testing

The focus of the potato program is to provide quality seed potatoes to commercial seed growers. The seed provided by the PMC is used as the initiating stock for the ensuing multiple year certified seed production scheme. The initial seed, therefore, must be of the highest quality possible since any disease introduced at this point would be multiplied during each successive year of seed increase. To this end, all production is rigorously tested and retested for disease prior to sale.

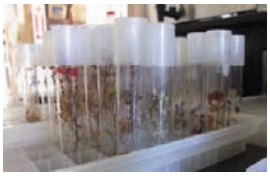
The diseases of primary importance are Bacterial Ring Rot (BRR) and the viruses Potato Leafroll Virus (PLRV), Potato Virus Y (PVY), Potato Virus X (PVX), Potato Virus S (PVS), Potato Virus A (PVA), Potato Virus M (PVM), Potato Moptop Virus (PMTV) and the viroid, Potato Spindle Tuber Virus (PSTV).

All newly acquired germplasm and each mother plant used for the in vitro propagation of the greenhouse stock are tested prior to production and again prior to harvest. The field grown materials are visually inspected during the growing season with laboratory testing performed prior to harvest.

Harvest: digging green vines

Monitoring the health of the potato stocks at the PMC is a critical function. Understanding and accurately performing the disease test procedures, as well as interpreting the results, is essential. The PMC participates in the Potato Association of America Certification Section Standardization Project. This exercise provides participating labs the opportunity to test their materials and methods against a standardized series of antigens, and thereby developing a level of credibility. The PMC has been successful in detecting very low antigen levels as well as various strains found in North America.

Disease-Tested Seed Potato Production



Potatoes being grown from tissue cultures.

Disease-tested potato plants are mass propagated in a sterile environment. The PMC produces tubers from these plants in greenhouses. Growers place orders for these seed tubers the winter prior to production. This provides the time necessary to propagate the thousands of plants required for planting the greenhouse which produce the tubers that are distributed the following spring. The process takes 18 months from start to finish. Stock material, if not on hand, is typically obtained from other similar programs in the US or Canada. In some instances, the only source is a diseased tuber, so radical treatments are used by the PMC to create the initial disease-free stock. The PMC maintains a disease-tested collection of 150 cultivars as field grown stock or as tissue cultures.

The commercial growers have shifted from white-skinned to russet-skinned varieties during the last ten years. Gardeners who purchase a considerable amount of certified seed, have broadened their desire to include many novelty varieties having unique color, flavor or shape. Many of these recently introduced varieties are now found in the farmers markets.

The 2006 greenhouse crop was found to be contaminated with virus and was destroyed. In 2007 the greenhouse crop produced 1822 pounds and was comprised of 150 varieties. All stock tested clean. The 2008 greenhouse crop was comprised of 51 varieties and yielded 650 lbs. Five tubers from each variety from the 2007 greenhouse crop were field planted to confirm identity and to verify health status.

Potatoes in the greenhouse

Seed Potato Certification

State of Alaska Seed Regulation 11 AAC 34.075 (J) requires that all potatoes sold, offered for sale or represented as seed potatoes be certified. This regulation highlights the importance of quality seed.

The Seed Potato Certification Program is designed to provide growers with potato seed stock that is varietally pure and relatively free from disease causing organisms. These results are achieved by the voluntary compliance of seed growers to the certification regulations. Growers manage their seed production to limit the possible exposure to diseases, but re-infection can occur from soil or other sources. Certification is designed to identify and remove from use as seed those seed lots which have become too diseased or are otherwise of reduced value for use as seed.

Potato Disease

Diseases are capable of causing severe losses. Many of the diseases affecting the potato are carried in or on the potatoes themselves. The use of seed in which diseases are absent or at manageable levels has been proven to greatly reduce the risk of losses caused by disease. Certified seed has been inspected twice during the growing season and has met low levels of disease tolerances allowed for seed. Certified seed potatoes produced in Alaska are far superior to seed produced outside of the state. The importation of potatoes carries with it the risk of introducing diseases which are capable of having severe consequences to Alaskan growers. The local availability of disease-tested seed reduces the potential of introducing diseases which could become endemic.

Bill Campbell, the potato guru

The Alaska Certification Program is a "limited generation system" in which the initiating seed lot, called Generation 0 (G-0), can be field planted only a limited number of years; i.e., eight years. The rationale of a limited generation system is that the disease level of seed stocks increases with each replanting and exposure to the environment. If the older seed stock is continually removed from the system and replaced with new stock, the probability that pathogens will build up to problem levels is reduced. This system has been very effective in reducing, and in some cases, eliminating virus diseases from Alaska's farms.

Field of Shepody at the Butte

Seed fields are inspected for diseased plants twice during the growing season and once while in storage. Seed lots in which excessive amounts of disease are found are not allowed to be sold as certified seed. Alaska's Certified Seed Program is administered by the Alaska Seed Growers, Inc. The inspections are conducted by the PMC's Potato Disease Control Program. Certified seed potatoes were grown in the Matanuska Valley, Fairbanks, Nenana, and Delta Junction. Each lot was inspected according to certification standards for disease and varietal purity.

In 2006 the 240 acres of certified seed produced was comprised of 145 seed lots of 47 varieties. In 2007 the 258 acres of certified seed produced was comprised of 139 seed lots of 47 varieties. 232 acres were planted in 2008 for seed production and was comprised of 290 lots of 150 varieties. One seed grower planted G0 seed of 130 different varieties obtained from the PMC. This is an unusual event that has that has skewed the statistics. Early frost eliminated 100 acres and yields were down due to poor weather conditions.

Novel Shapes and Colors

Variety Development

The search for improved varieties is an on-going process. Alaska's farmers are looking for a potato that bulks earlier, has more and better disease resistance, requires less fertilizer and tastes better. To this end the PMC cooperates with Alaskan farmers, UAF and USDA to look for new varieties by producing pathogen tested seed of new and upcoming varieties for trials.

There are thousands of potato cultivars in the world today. Each year, millions of dollars are spent on breeding programs in the search for better potatoes. Since the early 1900s, Alaskans have planted and observed hundreds of different potato varieties. Certain varieties have had their day, with improved varieties making the older ones obsolete, and yet sentiment or special circumstances create a desire to keep replanting heirloom varieties.

There are many varieties of potato beyond the mainstream russets, whites, and reds. A veritable cornucopia of shape, size, color, texture, and flavor await those willing to explore. As new and unusual potato varieties are requested and obtained by the PMC, they are tested for diseases, purified, and then propagated. Observations are made of horticultural characteristics, plant type, flower color, tuber shape and color, yield, and storage characteristics. Novelty potatoes have been promoted in several gardening magazines and are prized by some Alaskan growers. The PMC maintains these cultivars to provide an in-state source to help eliminate the necessity of importing seed potatoes which could introduce exotic diseases.

2008 Projects

Bacterial Ring Rot (BRR) is among the most serious of potato diseases. BRR was found on three non-seed potato farms in 2007. Efforts were made to eliminate this disease from these farms by disposing all potatoes from the farm, sanitizing all equipment, and starting with new seed. The PMC advised the growers of sanitation practices and inspected the farms during the growing season in an effort to confirm the effectiveness of the clean-up procedures. No symptoms of BRR were found during 2008.

The PMC performed Late Blight monitoring in potato fields in the Mat Valley, Kodiac, Fairbanks, and Delta areas. No Late Blight was observed in 2008.

Flowers are unusual too!

The PMC cooperated with the USDA sponsored colored potato program by helping to evaluate the production of trial plantings. Approximately 4000 individual plants having pedigrees prone to produce purple, red or yellow flesh tubers were evaluated for agronomic traits.

Collage of colors

Certified Seed Laboratory

Overview:

The Alaska State Seed Laboratory at the Alaska Plant Materials Center (PMC) is an official seed testing laboratory, certified by the national seed testing organization, Association of Official Seed Analysts (AOSA). It has been an official laboratory since 1998 and is the only one in the state of Alaska.

Essential services the laboratory provides are purity and germination tests, noxious weed seed examinations, tetrazolium testing, and grain moisture testing. The seed lab tested over 900 seed lots in 2008, exceeding 2,000 individual tests this year. Clients include individual growers, the Alaska Seed Growers Association, retail sales people, conservation and natural resource industries, and other agencies such as Agriculture Research Service (ARS), Department of Transportation and Public Facilities (DOT&PF), U.S. Forest Service, and Division of Forestry (DOF). PMC grown seed intended for use by the above is also evaluated.

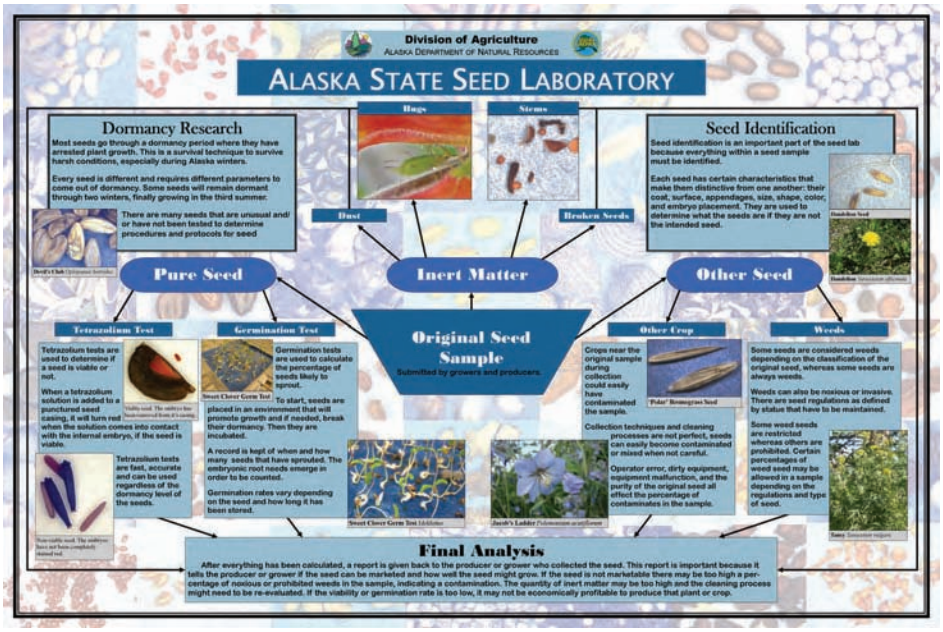


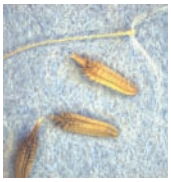
Exhibit designed by Jaimie Wharton, Intern in 2008

Teachers from across the State learn about seeds at the Seed Laboratory with certified Seed Analyst, Kathi VanZant and Agronomist, Lyubo Mahlev.

In 2008, the seed laboratory evaluated over 600 lots of seed in the ARS seed collection.

Test reports are a valuable tool for end users of seed. Contaminants such as inert matter, weeds and other crop seeds are reported, as well as germination potential. Required by federal law for interstate commerce and state regulations, seed offered for sale must have current and accurate testing and labeling.

In addition, the seed lab regularly researches laboratory germination and dormancy breaking techniques of understudied native species that are being considered for crops in Alaska.



Dandelion Seed

The seed lab also assists other state agencies and individuals in research on various projects including seed upgrade and viability enhancement, propagation techniques, and invasive weed seed vigor. In 2008, the seed lab propagated *Deschampsia* seedlings for ARS, was made available to a grad student for study of *Melilotus alba* vigor, hosted teachers for Agriculture in the Classroom, and set up several workshops for students involved in Future Farmers of America (FFA) and Wasilla Soil and Water Conservation District.

The Alaska State Seed Laboratory continues to train and educate additional personnel in seed exams for continuity of service. Also, development of a complete seed herbarium is ongoing.

State of Alaska Forestry

The PMC has had a long standing cooperative relationship with the Division of Forestry. The PMC cleans, tests, and stores tree seed for Forestry and also has worked with several experimental viability upgrade efforts. These ongoing efforts are mutually beneficial.

New Selected Class Releases

The following germplasm are ready to be released by the Alaska Plant Materials Center for commercial seed production as Selected Class Pre-certified Germplasm seed.

The information about each plant can be found on the PMC's website: http://dnr.alaska.gov/ag/ag_pmc.htm.

King Salmon Germplasm northern goldenrod, *Solidago multiradiata*
Norton Sound Germplasm alpine milkvetch, *Astragalus alpinus*
Sutton Germplasm northern geranium, *Geranium erianthum*

King Salmon Germplasm northern goldenrod

Norton Sound Germplasm alpine milkvetch

Sutton Germplasm northern geranium

Alaska Plant Materials Center From The Sky

New Presentations, 2008

Campbell, William L. Alaska Certified Seed Potato Production. Alaska Potato and Vegetable Conference. February 12 – 13, 2008. Palmer, AK.

Graziano, Gino. Pulling Together Against Invasive Plants: An overview of the Alaska Committee for Noxious and Invasive Plants Management. Yukon Invasive Species Symposium. October 8-10, 2008. Yukon, Whitehorse

Graziano, Gino. Invasive plants that threaten salmon habitat in Alaska. Mat-Su Basin Salmon Science & Restoration Symposium. October 14-15, 2008. Wasilla, Alaska.

Graziano, Gino. Alaska's Early Detection and Rapid Response Reporting Pamphlet: results from the first year. Committee for Noxious and Invasive Plant Management 2008 Annual Meeting. October 21-23, 2008. Anchorage, Alaska.

Graziano, Gino. CNIPM 2007-2008 Annual Board Report. Committee for Noxious and Invasive Plant Management 2008 Annual Meeting. October 21-23, 2008. Anchorage, Alaska.

Graziano, Gino. The new State Weeds Coordinator and Alaska's next steps in invasive plant management. Committee for Noxious and Invasive Plant Management 2008 Annual Meeting. October 21-23, 2008. Anchorage, Alaska.

Hunt, Peggy. Willow Identification and Cutting Willows for Revegetation Projects. Teeland Middle School Students. March 5-6, 2008. Plant Materials Center, Palmer, Alaska.

Hunt, Peggy and Kathi VanZant. Educational Activities on Native Plants and Agriculture for Elementary Students. Alaska Agriculture in the Classroom Education Institute. August 7, 2008. Palmer, Alaska.

Hunt, Peggy. Plants for Biofuel Research at the PMC. Matanuska-Susitna Borough Advisory Board Members. July 30, 2008. Plant Materials Center. Palmer, Alaska.

Hunt, Peggy, Kathy Wiess, Kathy VanZant, Lyubo Mahlev. Seeds, Seed Cleaning, and Native Plants. Homer Future Farmers of Alaska. November 13, 2008. Plant Materials Center. Palmer, Alaska.

VanZant, Kathy. Seeds. Teeland Middle School Students. March 5-6, 2008. Plant Materials Center, Palmer, Alaska.

Wright, Stoney J. Native Plants in Municipality of Anchorage Revegetation Projects. Corps of Engineers/Municipality of Anchorage Planning Meeting. Jan. 18, 2008. Anchorage, Alaska.

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Wright, Stoney J. Long-term Monitoring of Dune Stabilization on the Eareckson AFS Lateral Clear Zone on Shemya Island, Alaska. American Society of Agronomy Annual Meeting. October 6, 2008. Houston, Texas.

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Hunt, Peggy. 2008. *Alaska Biofuel Plants—Past, Present, and Future.* State of Alaska, Department of Natural Resources, Plant Materials Center (APMC), Palmer, AK. 4 pp. http://dnr.alaska.gov/ag/AlaskaBiofuelPlants.pdf.

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Wright, S.J. 2008. *Domestication of native plant species for seed production and planting in Arctic and sub-arctic Alaska.* In Proceedings from Multifunctional Grasslands in a Changing World, XXI, International Grassland Congress and VIII International Rangeland Congress, Guangdong Peoples Publishing House, Guangzhou, Peoples Republic of China, p. 457.

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