Alaska Plant Materials Center

2000 Annual Report

Alaska Department of Natural Resources - Division of Agriculture

ALASKA PLANT MATERIALS CENTER

2000 ANNUAL REPORT

Prepared by:

Stoney J. Wright
Manager, Plant Materials Center

Dawnelle Sheaver
Secretary

William L. Campbell
Agronomist

Andrew S. Nolen
Agronomist

Nancy J. Moore
Agronomist

Gretchen Rector
Agronomist

Donald Ross
Agronomist

Michelle Schuman
Agronomist

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STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF AGRICULTURE

TONY KNOWLES, GOVERNO

CENTRAL OFFICE
1800 GLENN HIGHWAY, SUITE 12
PALMER, ALASKA 99645-6736
PHONE: (907) 745-7
FAX: (907) 745-71

NORTHERN REGION OFFICE
3700 AIRPORT WAY
FAIRBANKS, ALASKA 99709-4699
PHONE: (907) 451-2
FAX: (907) 451-2

PLANT MATERIALS CENTER
HC04 BOX 7440
PALMER, ALASKA 99645-9706
PHONE: (907) 745-4
FAX: (907) 746-1

LETTER FROM THE DIRECTOR

The Alaska Plant Materials Center (PMC) celebrated its 28th anniversary in 2000. Through the efforts of committed staff, the goal of providing quality service has been consistently accomplished. New contracts have made non-state funds available to strengthen PMC programs and operations. Improvements in operating methods and efficiency have allowed long-term service to the public.

Through a cooperative effort with the United States Department of Agriculture, funding was obtained for a plant quarantine facility, to be located at the PMC Nursery on Trunk Road. Also in 2000, USDA funding was acquired to rebuild the Alaska State Seed Laboratory at the original PMC facility. At the beginning of a new century, the Plant Materials Center continues to expand its original mission, which is to collect plant materials from sub-Arctic areas worldwide that can be propagated and distributed primarily within Alaska for agricultural, ornamental, and soil stabilization projects.

I am pleased to present the 2000 Annual Report and anticipate many successful Plant Materials Center endeavors in the future.

Sincerely,

Robert Wells
Director

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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 two major programs: Revegetation and Native Seed Production, and Potato Production. 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 on August 5, 1995. Scheduling conflicts did not allow an open house in 2000.

The majority of the Plant Materials Center's funding comes from non-state sources. In recent years, USDA has become the major funding source. The majority of the remaining operating monies are allocated from the Agriculture Revolving Loan Fund. The PMC no longer relies on the state general fund. The change occurred in fiscal year 1997. 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.

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 and to develop plant varieties and techniques for revegetation and erosion control and provide technical reclamation assistance to industry.

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 now included revegetation work, horticultural development, foundation seed production and disease-free potato seed stock production.

In 1987, the PMC's programs were consolidated into the two programs; the North Latitude Revegetation and Seed Production Project and the North Latitude Vegetable and Landscape Crop Improvement Project. To further streamline state operations, Forest Nursery operations were transferred to the Plant Materials Center from the Division of Forestry in 1993.

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

Continuing budget reductions have forced the PMC to drop programs. On December 15, 1995, the chronically under-funded Forest Nursery was closed. Prior to closure, seedlings produced in 1995 were shipped or placed in protective storage.

In November 1997, the PMC was notified that the U.S. Department of Agriculture granted the PMC to operate the Arctic Genetic Resources Unit. This includes an operating and capital grant. In 1998, the Germplasm Repository became a reality. The first USDA employee was hired and the state initiated designing of a screenhouse. We expect a long and productive cooperative effort with USDA.

In 1999, a grant from USDA Natural Resource Conservation Service (NRCS) allowed the PMC to expand its program in native seed production and commercialization. This program is expected to last five years.

North Latitude Revegetation & Seed Production Program

The Revegetation and Native 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 instate seed industry while providing state-of-the-art revegetation and erosion control information to the public.

Revegetation & Reclamation Efforts

The construction of the Trans Alaska Pipeline in the 70's 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.

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

The project follows seven basic steps to establish a resource of conservation plants for use in land reclamation, wildlife habitat improvement and erosion control. They are: 1) define and anticipate conservation problems and establish priorities; 2) research and assemble candidate plant materials; 3) conduct initial evaluations; 4) establish small scale seed or vegetative increases; 5) advanced and final testing and field evaluation plantings; 6) establish large scale seed or vegetative increases; and, 7) release of a variety or cultivar.

This program has gathered at least 275 plot years of information collected from sites around the state (Figure 1), developed 11 new cultivars for revegetation and reclamation and assisted scores of agencies and private companies in reclamation, erosion control and revegetation. Figure 2 represents a typical plot layout used in off-site evaluations.

This report outlines some of the present revegetation and reclamation research being conducted by the PMC and summarizes current activities at sites around the state. Additional information can be found in the individual reports that are listed in this report. Copies of these reports are available from the Alaska Plant Materials Center.

Figure 1

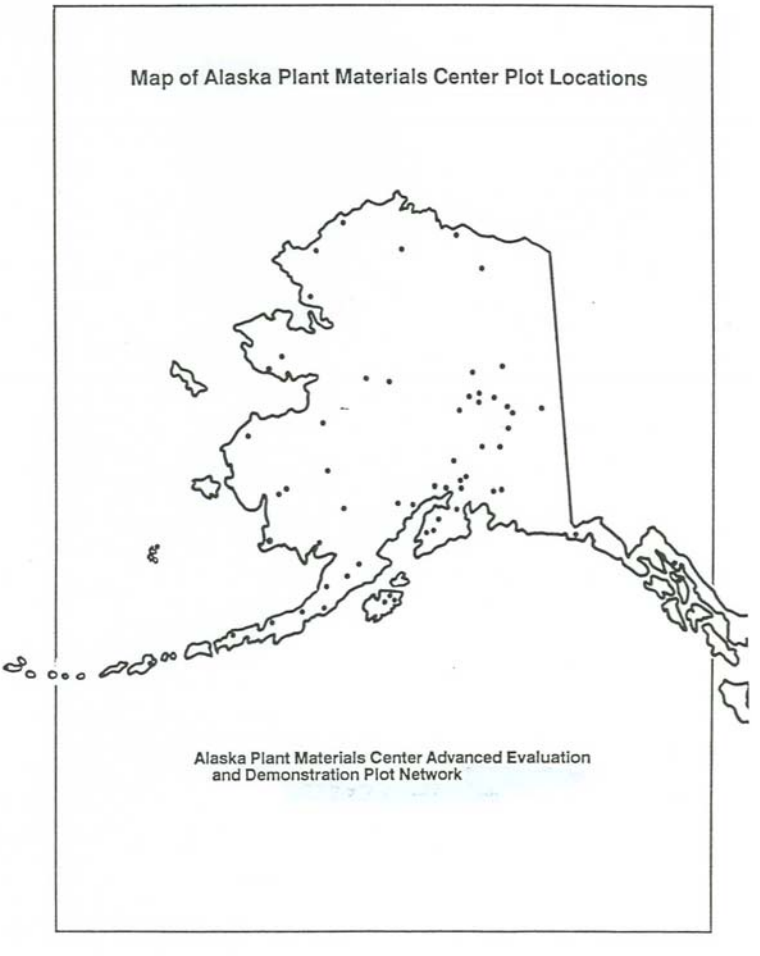

Map of Alaska Plant Materials Center Plot Locations
Alaska Plant Materials Center Advanced Evaluation
and Demonstration Plot Network

Figure 2 - Typical Plot Layout

Nugget Kentucky bluegrass	Merion Kentucky bluegrass
Park Kentucky bluegrass	Banff Kentucky bluegrass
Sydsport Kentucky bluegrass	Fylking Kentucky bluegrass
Service big bluegrass	Troy Kentucky bluegrass
Sherman big bluegrass	Canbar canby bluegrass
Tundra glaucous bluegrass	Reubans Canada bluegrass
Poa glauca T08867	Gruening alpine bluegrass
Agropyron subsecundum 371698	Sodar streambank wheatgrass
Nordan crested wheatgrass	*Agropyron subsecundum*
Fairway crested wheatgrass	*Agropyron violaceum*
Summit crested wheatgrass	*Agropyron boreal*
Critana thickspike wheatgrass	*Agropyron yukonese*
Fults alkaligrass	Vantage reed canarygrass
Climax timothy	Engmo timothy
Elymus arenarius	*Elymus sibiricus* 34560
Norcoast Bering hairgrass	*Elymus sibiricus* 2144
Sourdough bluejoint	Nortran tufted hairgrass
Meadow foxtail	*Calamagrostis canadensis*
Garrison creeping foxtail	*Alopecurus geniculatus*
Boreal red fescue	Arctared red fescue
Egan American sloughgrass	*Festuca scabrella*
Durar hard fescue	Pennlawn red fescue
Covar sheep fescue	Highlight red fescue
Kenai polargrass	Manchar smooth brome
Alyeska polargrass	Carlton smooth brome
Caiggluk tilesy sagebrush	Polar brome

Mass Aleutian Plant Collection Project

The PMC proposed to both the U.S. Navy and U.S. Air Force that a major effort be initiated to collect seed of species native to the Aleutians and Alaska Peninsula. Both agencies agreed with the concept, a full proposal was developed and by July 1993 an agreement was signed by each cooperator.

This program is possibly one of the more significant efforts undertaken by the PMC. If even partially successful, the native seed industry in Alaska will enter a new era of production and the local seed producers should benefit significantly. All production of these species will be limited to Alaska, eliminating the competition from producers in other regions. Some of the species collected will also have potential markets outside the state.

During the months of August, September and October, staff from the PMC conducted large scale seed collection at King Salmon, Dutch Harbor, Adak, Shemya and Attu. Sixty-four species were collected.

The species with the greatest potential were distributed to seed producers on the Kenai Peninsula in the spring of 1994, with first sales to the Air Force and Navy planned for the spring of 1996. The attempt to propagate the more difficult or obscure species was undertaken by the PMC.

In June 1994, 33 species were planted at the sites at Kenai and the PMC. All plantings produced stands. Several other species are still undergoing tests to determine requirements for germination. In 1995, the first production crop was harvested. Seed was collected from 30 species. Part of this seed will be used to increase production fields and the remainder will be sold to either the Navy or Air Force for use on Adak or Shemya. In 1996 and 1997, additional seed was collected from the production fields. Part of this will be increased at the PMC. Part has been or will be distributed to private growers. Commercial production of some of the species started in 1999 and continued in 2000. Full release documentation will be published in 2001.

Chugach Electric Wetland Rehabilitation Project

Chugach Electric Association, Inc. requested assistance in wetland rehabilitation from the Plant Materials Center. The project area involved a transmission line re-build from Girdwood to Twenty Mile River. The PMC developed specific revegetation and rehabilitation plans for the various sites. All revegetation relied on locally collected native species.

The PMC conducted the first Alaskan mechanical harvest of indigenous sedges and other wetland species. Over 200 pounds of locally native seed was available to Chugach Electric Association for use in the rehabilitation effort scheduled for 1995.

The seeding and fertilization program occurred during the four-day period in the first week of June 1995. The sites were periodically monitored during the summer of 1995. The final 1995 evaluation occurred on September 17. All the treated sites were supporting good to excellent stands of native wetland plant species. The PMC was awarded an extension to the project to assist with the restoration of an additional segment of powerline. An interim report was published in December 1995 and a final report was prepared in December 1996. Evaluation continued in 1997. In 1998, the PMC was awarded a second contract to assist with more site restoration and seed collection. This was accomplished in 1999. Observations will continue for two more years.

Alyeska Pipeline Floodplain Investigation

Alyeska Pipeline Service Company was facing the possibility of revegetating an active floodplain as a result of conditions attached to a permit. On August 9, 1994, Alyeska requested the opinion of a PMC staff member during a site visit. The conditions were rejected by the PMC as not being appropriate for either restoration or research. However, regulatory desires prevailed and Alyeska agreed to conduct a study on floodplain restoration. The study plan developed by the PMC relied on comparisons of scarification only, fertilizer with scarification, and native seed with and without fertilizer, in combination with scarification. Five species were identified as important floodplain colonizers. During August 1995, a collection effort was initiated to collect seed from these species. The collection effort centered on the area around Pipeline Mile Post 22 and the Franklin Bluffs Camp Pad. By September, sufficient seed to conduct the study was collected. The seed was cleaned in November/December 1995. Planting occurred on the Sagavanirktok River in July 1996. The site was evaluated in August 1996, 1997, 1998, 1999 and 2000. The final report was prepared in December 2000.

Red Dog Mine Revegetation & Demonstration Plots

This project grew out of a mutual need for information. The PMC required revegetation data from northwestern Alaska, and Cominco Alaska, Inc. needed information on species that would perform well in future mine revegetation programs. In 1987, Cominco agreed to provide the PMC with sites to establish evaluation and demonstration plots for at least four years.

In order to provide the best information for both the PMC and Cominco, three plot sites, representing different conditions were selected. A site selected near the port facility was a sandy, gravel beach area common to the region. The second plot was located at the original camp site's fuel bladder containment area. The third plot was similar to the camp area, but provided a site to compare spring and fall seedings.

This combination of plots was intended to supply data for revegetation species selection and planting windows for seeding. The port site was planted on July 6, 1987 and provided information regarding revegetation in the coastal portion of the mine project.

A dormant plot was seeded at the camp site on September 8, 1987. Because of space limitations, the plot dimensions were slightly reduced and 12 accessions were dropped from the plot. The accessions that were eliminated are species that have failed elsewhere in northern Alaska. Their elimination from the plantings did not compromise the value of the information obtained from the plots. On June 15, 1988, a plot was planted on gravelly soil similar to the surface that will exist when construction of the mine is complete.

A major demonstration planting was also established on June 14, 1988. This plot, located on an abandoned disposal site north of the facility, was recontoured and seeded entirely with native species. It was also evaluated for four growing seasons. The completion of the evaluation program occurred September 1990, at which time a final report was prepared for Cominco.

A complete listing of conclusions and recommendations can be found in 1990 Final Report of Data and Observations Obtained From the Red Dog Mine Evaluation and Demonstration Plots.

During September 1992 and 1993, these sites were again visited and evaluated. All of the plots and trials continued to perform very well. During the 1993 site visit, plans were developed for a new research effort planned for 1994. These plans were put "on hold" until 1996.

In 1996, a collection of native species occurred near the port site. This seed was cleaned at the PMC and returned to the mine operator. The 1997 site visit was not conducted because of scheduling conflicts. The areas were, however, evaluated in 1998. Additional evaluations occurred in 1999 and a new program is expected to be in place for the 2001 field season.

Department of Transportation Interior Seed Collection Project

In 1995, the PMC initiated a program for the Alaska Department of Transportation (DOT) to collect and commercially increase native species. The material collected will be used for future highway revegetation programs throughout the interior region.
The collection effort began on August 6, 1995 with a ten-day collection program in the Nome area and the surrounding road system. The collection program continued from Fairbanks to Tok along the Alaska Highway, as well as 50 miles south on the Parks, Richardson Highways and the Tok Cut-off. Additional collections occurred at Port Clarence. The collection effort ended on September 8, 1995. A total of 31 man-days were expended on the collection effort.

A total of 153 collections covering 72 species were made. The amounts of seed collected ranged from 1 to 2 grams to 12 to 15 kilograms. A total of 108 kilograms of seed was delivered to the PMC.

Seed cleaning was initiated in November 1995 and continued through February 1996. In June 1996, 22 species were planted at the PMC. By September 1997, 18 were harvested for increase and distribution to growers.

In June 1997, one of the seed collections, the native wheatgrass, *Agropyron pauciflorum*, was hydroseeded onto a DOT problem site, the embankments of the on-off ramps of the Johansen Expressway at Peger Road. The wheatgrass, a dry land species, grew very well and DOT was pleased with its performance. The plantings were monitored for winter survival and continued growth. The final report was prepared and distributed in December 1998. Large-scale seed increase occurred in 2000. Release documentation for the collection will be prepared in 2001.

Navy Germplasm Preservation Program

In September 1995, the PMC was awarded a three-year contract to collect and preserve Aleutian germplasm. This project is being funded by a Department of Defense Legacy Grant.

During the autumns of 1996 and 1997, collection programs occurred at Adak. Unlike the previous collection efforts, this program will preserve germplasm for future study. In September 1997, an extensive germplasm collection was made on Adak. Most of the collections were made along the road system; the remainder were collected along trails and during cross-country hikes. Nearly 420 collections were made representing 33 species. The collections have been cleaned and have been placed in storage. The 1998 effort scheduled on Attu was cancelled due to logistic problems.

Additional seed collection did occur in 1999 on Attu. In 2000, all seed was incorporated into the collection of the Arctic Genetic Resources Unit.

U. S. Army Integrated Training Area Land Management Project

In 1997, the PMC was awarded a significant five-year contract to assist the Army in Alaska. The Integrated Training Area Management Project (ITAM) is designed to maintain realistic and natural training lands on Army installations. Vegetation management and erosion control are the predominate areas of interest.

Over a five-year period, the PMC could be awarded as much as $1,250,000. Much of this, however, will be redistributed as contractual awards to other entities or the private sector. In 1998, the Anchorage, Palmer, Fairbanks and Delta Soil and Water Conservation Districts were called on to assist with the project. In 2000, all programs in Alaska were completed. The final report was developed and submitted to the Army.

Lower Knob Creek Abandoned Mine

In 1996, the Division of Mining contacted the Plant Materials Center (PMC) to request assistance with the revegetation of the Lower Knob Creek abandoned mine. The revegetation plan needed to address special habitat needs for ruffed grouse, in addition to balancing plantings for erosion control and the natural process of plant colonization.

The 43-acre project was divided into three major sections that exhibited slightly different combinations of site conditions. The site generally is harsh with rocky soils and steep south-facing slopes that are exposed to the winter winds. Snow tends not to accumulate in this area. The treatments consisted of several components: scarification, use of woody plants in brush layering, bundles and live staking techniques, fertilizing with bio-organics and seeding with willows, aspen, native grasses and forbs.

All accessible acreage was scarified. Some locations, particularly around the ponds and along the stream, were too wet for the equipment. Plants were colonizing these unscarified areas when moisture was not limiting. In addition to scarifying eight to ten inches deep, holes approximately five feet deep were created in order to catch water and develop additional microsites for native plant establishment.

Three revegetation techniques with woody plants were used at the mine site. The brushlayering was installed on the harshest sites with the greatest exposure to wind and sun. The bundles were planted on north-facing slopes of Areas 1 and 2 and in gullies that were forming on a south-facing slope. The bundles were used to attempt to slow the surface erosion that occurred during periods of high rainfall. Live stakes were planted in moist soils found in Areas 1 and 2.

Area 3 was used to test fertilizers, including bio-organics. The area was divided into four relatively equal-sized sections; one was designated a no-seed fertilizer zone. The other three sections were seeded with native grasses and forbs and each was treated with either 20-20-10, Biosol or Fertil-fibers. A portion of the three fertilized plots was also treated with a liquid amendment, Kiwi Power. No apparent differences were noted at the end of the 1997 growing season, however differences in plant growth may be noticeable during the 1998 growing season.

Two methods of broadcast seeding were used at the site. One seeding method involved cutting willow and aspen branches containing catkins that were beginning to disperse seed. These branches were carried around the areas with moist soils and waved in the air to help disperse the seed. Cyclone seeders were used to broadcast native grass and forb seed over most of the ground in all three areas. Two mixes were used, one for drier soils, the other for more moist conditions. The seeding rate was light and designed to encourage establishment of native plants. These seedings were fertilized with a mineral fertilizer. All of the plantings were growing at the end of the 1997 growing season. The performance of these plantings continued to be monitored over the next few years.

Plantings at Lower Knob Creek continued to grow well in 1998. The brushlayers had all been browsed at the same height, approximately 18 inches from the ground, but they recovered.

No negative effects were apparent as a result of the browsing activity. Most of the bundles recovered and continued to grow throughout the 1998 growing season. Bundle mortality occurred on the south-facing slope of Area 2 where the bundles had been used to slow erosion along an ephemeral stream. The dead bundles had been undercut and the roots were exposed.

Over 50 percent of the live stakes survived. Some were lost due to erosion, particularly in Area 1, and some apparently died due to lack of water. Site scarification appeared to benefit the establishment of woody plant seedlings. A fairly high density of naturally recruited and seeded woody plants were growing well in the furrows particularly in the northeast section of Area 2. Some seedlings were eight inches tall.

The fertilizer-bioorganic test area established in Area 3 needs more time for evaluation. General observations suggest that Kiwi Power, the liquid supplement that was used on a portion of the three fertilizer treatments, Biosol, Fertil Fibers and 20-20-10, did not enhance the performance of the Biosol treated area. Kiwi Power was designed specifically for use with Fertil Fibers. In 2000, no appparent differences were noted between the Fertil Fibers and 20-20-10 treatments. They continue to be performing better than the Biosol treatment.

Overall the plantings continue to perform well. The brush layering continues to grow and be browsed by moose. A small amount of extra seed from the 1999 Upper Knob work was broadcast on some bare areas of the upper east side of Area 1.

Although most of the revegetation work for 2000 occurred at the Jones Mine, extra willow bundles and Driwater, a gel that delivers water through the growing season, were installed at the Lower Knob Area 1.

Areas on the east slope that lacked vegetation and were showing some minor signs of erosion were selected for planting with the willow bundles. Driwater was installed adjacent to many of the bundles.

Driwater was purchased to test on the Jones mine 2000 planting. This gel product is designed to slowly deliver water to plantings. Driwater is a product that has been used in dry areas in the lower '48 and typically lasted approximately 30 days. In some cases at the mine some of the gel remained after 60 days and was still present when temperatures began falling below freezing. This product could reduce if not eliminate the need for a water truck. Photos will continue to be taken at the various photo points over the next couple of years.

Upper Knob Creek and Jones Mine

In 1998, the Plant Materials Center continued to work with the Division of Mining and their abandoned mine land program to revegetate two additional sites, Upper Knob Creek and Jones Mine Phase II. Upper Knob Creek is divided into several pits of varying size totalling over 40 acres. The Jones Mine is a 15- acre area 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.

Past revegetation efforts have demonstrated that planting combinations of brushlayers, bundles, live stakes, transplants and seeding with native grasses and forbs are appropriate techniques for revegetating sites with steep slopes and erosive soils.

These techniques were used at Upper Knob Creek and Jones Mine Phase II sites. Also, soil that had been salvaged was spread over a relatively small area on the upper slopes of the Jones Mine.

The Jones Mine contains both cut and fill slopes. After the area was graded to contour, most of the area was scarified. Some areas on the middle and upper portions of the cut slope could not be scarified because large rocks would be pulled to the surface and disturb the site too much. Several terraces were created on the lower section of the mine to reduce slope length.

Transplants salvaged from Phase III of the Jones Mine restoration were placed on the terraces. In addition to transplants, numerous brush layers were scattered over the slope. Bundles were strategically placed in areas where rilling had begun to occur and in other locations that appeared to be prone to erosion.

Plots were also established to evaluate three alternative fertilizers, Biosol, Fertil-fibers and Humazyme. Three large plots were set up on the southeast facing slope and three smaller plots were set up on a northeast facing slope. The products were applied according to manufacturer's directions. The site was seeded with native grasses and forbs and the area outside of the fertilizer study plots was fertilized with 20-20-10 fertilizer.

The timing of activities is important and this project reminded us of this point on several occasions. The site was well scarified and then a backhoe was used to move transplants and install brushlayers. The substrate where the backhoe had traveled became compacted and smooth. The benefits of scarification were lost and the soils became more vulnerable to erosion.

During this first growing season, plants were grown from seed collections made by the PMC staff over the last several years. Seed of nine wetland species and 20 upland plants were sown. Different growing media were used to address the growing requirements of the various species.

This initial growing season was an experiment to begin identifying cultural requirements for the different species. There was no attempt to involve growers at this early stage.

The plants produced from these first seedings were planted in a variety of locations for demonstration and evaluation. The dryland plants such as the Oxytropis, *Potentilla multifida, Plantago canescens* and Dryas were planted into droughty sites.

The remainder of the upland species was planted at a school, the PMC fields and the outside production beds at the PMC Nursery. The wetland species were planted into a newly created wetland and a production bed at the PMC Nursery. Any seed produced at these sites will be harvested.

Additional seed collections were made from native plants in the Southcentral Region for production and hopefully distribution to growers during the 2001 growing season. During June 2000, a seven-acre section of Phase III of the Jones Mine was revegetated. The site was scarified and planted with willow bundles and a few brush layers. A large quantity of willows had been purchased for the 2000 planting season with the idea that more of Phase III would be ready for revegetation. Since only a total of seven acres was available, the site was planted heavily. Excess material was used on selected areas in Lower Knob Creek.

Driwater, the gel slow release watering product described in the Lower Knob Creek section, was used at this site also. The product was installed late in the season when the rains were beginning and it is not apparent that it provided a benefit. In dry years it may be very beneficial. This site will be monitored for several years.

The Upper Knob Creek site contained four pits. The primary revegetation effort focused on slowing surface water erosion. Bundles, and to a limited extent, brushlayers were placed in areas that had begun to show signs of rilling in Pits 6 and 7. After a very heavy thundershower, the importance of timing became apparent again. Many of the bundles had just begun to leaf out when they were buried by sediment resulting from the erosion caused by the intense rainfall. The young new shoots required careful excavation by hand. Despite the weather conditions, the woody plantings became well established.

All of the pits were seeded with native grasses and forbs and fertilized with 20-20-10 granular fertilizer. With the exception of Pit 6, seed and fertilizer was broadcast by hand. The fertilizer for Pit 6 was applied with an airplane.

The 1998 plantings will be evaluated early in the spring of 1999. Pit 6 is particularly susceptible to erosion and additional soil stabilization and erosion control work may need to be done next spring. In 1999, additional willows and grass seed were planted at Pits 6 and 7 at Upper Knob Creek. Considerable erosion had occurred at these pits late in the 1998 growing season. Intensive willow plantings using brushlayering, bundles and gully plantings addressed these erosion areas. A light seeding of grass was also broadcast on bare areas.

The 1999 plantings appeared to be growing well at the end of growing season. Some of the woody plantings were not completed until mid-July, nearly two weeks after the recommended cutoff date. A survey of the plantings in 2000 indicated that the late planted willows survived.

Evaluations of all of the revegetation work conducted on the abandoned mine lands over the last few years will continue over the next two to three years.

Anchorage Water & Wastewater Utility (AWWU)

In 1996, AWWU contacted the Plant Materials Center for assistance ir revegetating the upland portion of the Fort Richardson Right-of-Way (ROW) for Phase I of the Anchorage Loop Water Transmission Main. Ft. Richardson (the land owner) wanted the ROW to be revegetated with willow specifically to recreate moose habitat. A contract was developed between AWWU and the PMC for five years to design and implement a revegetation plan.

The contract also provided for annual evaluations of plant growth and any additional plantings in future years required by the regulatory agencies.

The revegetation plan identified five locations for planting approximately 500 live willow stakes, special plantings at the stream crossing, and a light seeding of native grasses, willow and aspen seed. Initially, most of the plantings were going to occur in the spring before July 1. However, after the initial planting efforts encountered exceptionally dry conditions, the decision was made to postpone planting.

The dry weather conditions forced us to consider fall plantings even though there has been limited experience with them. The live stake plantings were eventually completed in the late summer - early fall after the willows were dormant and before the ground was frozen. The creek plantings were also delayed until fall.

The willow/aspen seeding was dictated by the timing of natural seed dispersal. As feltleaf and bebb willow and aspen began to disperse seed, staff harvested branches containing catkins that were dispersing seed.

The branches were taken to the ROW where the staff walked the ROW while waving the branches in the air and dispersing seed to the site. Unfortunately, seed dispersal coincided with the dry weather conditions that did not favor seedling establishment, particularly for these short lived seeds.

The grass seeding was delayed as long as possible hoping that the rains would arrive. A light seeding of native grass was finally broadcast in early August.

The last activity of the 1997 growing season measured plant cover, noted plant species and determined species frequency along the ROW. These measurements were taken late in the season. Many plants had died back, some species probably were not observed, and plant cover measurements were also underestimated.

Plant growth along the ROW was evaluated in the spring 1998. A high percentage of the fall planted willows were growing very well. The few live stakes that had been planted in the spring of 1997 were growing well except in the southern end of the ROW where total plant cover is high and the grasses are competing with the willows. Relatively few seedlings of birch, willow and alder are becoming established. The seeded grasses are maintaining a relatively sparse cover and clover is the primary species growing where wood chips are the heaviest.

The only additional seeding that occurred in 1998 was made with bebb willow. The same seeding technique that was used in 1997 was used again in 1998. At the end of the growing season, it was not apparent that the seeding effort recruited any new willow seedlings.

Again, evaluations occurred late in the season after many species had completed their summer life cycle and had died back. Despite the late season evaluation, efforts were made to record total plant cover, plant cover for each taxa, and determine frequency for each taxa along 16 transects established along the ROW.

At the end of the 2000 growing season, plant cover along the ROW had increased considerably. Many transects had 100 percent cover while others had a more sparse plant cover. Transects with less than 100 percent plant cover were selected for continuing monitoring. Monitoring and evaluations of the ROW will continue for at least another growing season.

South Atlantic Cooperation Project

In 1996, the PMC was contacted by the Falkland Islands Department of Agriculture, requesting seed of PMC developed cultivars and pre-cultivars. Seed was exchanged and discussions continued regarding land restoration and seed production. In January 1998, one PMC collector traveled to the Falkland Islands to collect seed. This project was funded by the USDA Plant Exchange Office through a cooperative grant. A total of 366 seed collections were made on the Falkland Islands. The seed was returned to Alaska after USDA inspection. During the summer of 1998, initial field evaluations began on the accessions.

The results of the 1998 Falkland Project led to a second collection effort on South Georgia Island. This occurred between December 2, 1998 and January 18, 1999. A total of 441 collections were made on South Georgia Island. Upon arrival in Los Angeles International Airport, the APHIS inspectors promptly lost the entire seed collection. The collection effort on South Georgia Island was rescheduled for January 2000. Between January 2, 2000 and January 29, 2000 the second effort in south Georgia and the Falkland Islands resulted in 103 collections. The seed arrived in Alaska without problem.

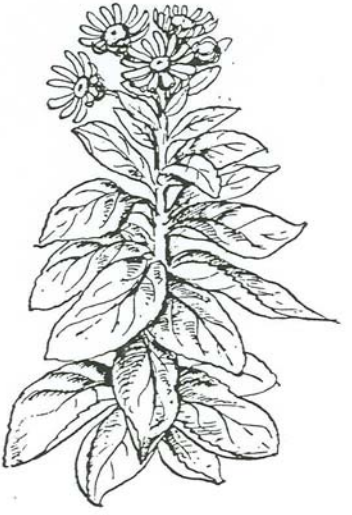
An additional collection effort has been funded for 2001. This project wil concentrate on the Chilean islands of Cape Horn and Diego Ramirez.

Commercial Native Plant Production Project

In 1999, the PMC was awarded a federal grant to initiate a project of commercializing native plants in Alaska. The $350,000 grant is intended to fund additional collection efforts and hire employees and purchase equipment. The project is intended to last five years with continued grants of an equal size. This project also allows for the re-use of the Alaska Forest Nursery. The project is funded by the U. S. Natural Resources Conservation Service.

One of the first accomplishments of this project was to produce the second edition of the Directory of Alaska Native Plant Sources in January 2000. This document is very useful as a marketing tool for our native plant growers and suppliers.

By April of 2000, the project was fully staffed with 2 Agronomists, a Maintenance Mechanic and 2 Laborers. By mid-April planting was well underway.



Seabeach Senecio

Foundation Seed Program

This section of the North Latitude Revegetation and Seed Production Project increases and preserves cereal grain and grass varieties developed for the special growing conditions prevalent in Alaska and other northern latitude countries.

In the past, "breeder" seed of grasses and grain were obtained from the University of Alaska, Agricultural and Forestry Experiment Station (AFES). The Alaska Plant Materials Center was given the responsibility for producing breeder seed of the numerous varieties of grasses in 1994. Small blocks of breeder seed have been established and will be maintained. Breeder seed of the numerous grain varieties developed and released by the AFES are still provided.

The progeny of breeder seed, designated "foundation" seed, is made available to the industry through the state's seed certifying organization, the Alaska Seed Growers, Inc., in conjunction with the state Division of Agriculture. This process ensures that farmers growing "registered" (progeny of foundation) and "certified" (progeny of registered) classes of seed meet all requirements of genetic purity and cleanliness, and are in compliance with state seed regulations and the Federal Seed Act.

When the PMC began operations in 1973, the Foundation Seed Program began increasing newly released varieties of barley, oats, and wheat. These varieties, bred by the University of Alaska, Agricultural Experiment Station, became the primary crops of the agricultural projects of the late 1970s and early 1980s. At the same time, new varieties of grasses for revegetation and turf gradually became available. As production from the large projects wound down, interest increased in revegetation varieties. Today, the Foundation Seed Program raises over a dozen varieties of grasses and forbs bred for revegetation and reclamation throughout the state. In addition, new seed collections from throughout the state are planted and evaluated. Promising species are increased at the PMC and made available for new revegetation projects.

Seed quality is a prime essential to successful farming. A grower needs to know that the variety will perform, has acceptable germination and is free from contaminants.

Plant breeders explore the genetic potential of a variety. Varieties are selected based on the intended use as food, fiber, an ecological niche or its chemistry.

Successful growers understand the requirement for good germination and vigor from their seeds. The Federal Seed Act requires that seed offered for sale meet minimum germination standards.

Contaminants in seed include broken seed, chaff, dust, weed seed and pathogenic organisms. The higher the purity of clean seed, the less the possibility of introducing unwanted pests. The introduction of weeds or diseases in the seed increases the production costs and reduces yields not only in the present, but in future years as well.

As a member of the Association of Official Seed Certifying Agencies, the PMC's Foundation Seed Program, along with the Alaska Seed Growers, Inc., joins 43 other states in insuring that in-state and interstate purchasers have access to high quality, genetically pure seed.

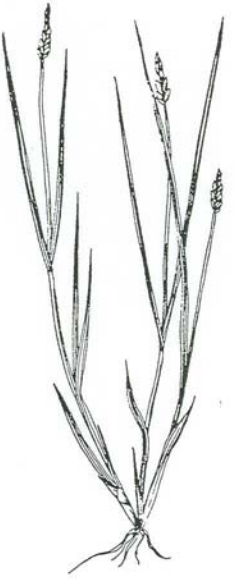
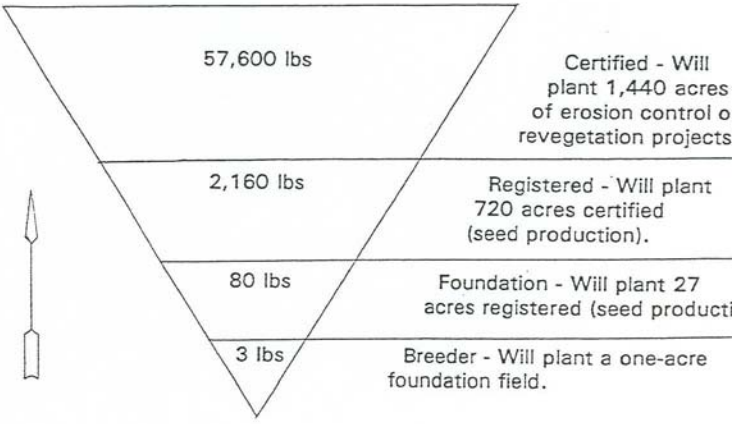


Figure 3 - Seed Increase Pyramid



This diagram illustrates the increase of three pounds of grass 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 reclamation purposes.

2000 Growing Season

The 2000 growing season started out generally warm and dry. Harvest of grains was delayed and made difficult by a cool, wet September. Yield and quality were also hampered by the fall weather. Irrigation was maintained through June.

Inspection and Sampling

A service formerly delegated to the Division of Agriculture's main office has been reassigned to the PMC's Foundation Seed Production Program - inspection of certified seed fields and official sampling of seed lots for germination and purity testing. The area of responsibility is south central Alaska, primarily the Matanuska and Susitna Valleys. Seed lots were sampled for testing as required.

Table 1. Revegetation and Turf Varieties in Production in 2000.

Variety	Class	Planted	Acres
'Nogal' Wheat	Breeder	00	2
'Nip' Oats	Common	00	2
'Nugget' Kentucky Bluegrass	Breeder	94	5
'Nugget' Kentucky Bluegrass	Breeder	96	2
'Sourdough' Bluejoint	Breeder	97	.5
'Arctared' Red Fescue	Breeder	97	1
'Norcoast' Bering Hairgrass	Breeder	00	2
'Nortran' Tufted Hairgrass	Breeder	97 & 00	3
'Service' Big Bluegrass	Breeder	97 & 00	2
'Caiggluk' Tilesy Sagebrush	Breeder	95	.5
'Bebral' Rye	Foundation	97	5
'Reeve' Beach Wildrye	Foundation	90 & 00	2
'Datal' Barley	Breeder	00	2
'Toral' Oats	Breeder	00	2
'Alpine' Bluegrass	Breeder	98 & 00	1

Table 2. Cereal Grain Seed & Oil Seed Varieties in Storage at the Plant Materials Center, December 2000.

Barley		Wheat		Oats		Rye	
Variety	lbs	Variety	lbs	Variety	lbs	Variety	lbs
Lidal	17,000	Ingal	1,800	Toral	5,000	Bebral	1,
Otal	6,000	Nogal	3,000	Ceal	900		
Thual	3,200	Froid	150	Nip	3,400		
Weal	8,000			Golden Rain	2000		
Datal	3000						
Pokko	400						
Arra	650						
Eero	500						
Total	38,750	**Total**	4,950	**Total**	11,300	**Total**	1,000

Table 3. Cereal Grains Sales & Receipts, 1995 - 2000.

Type	1995	1996	1997	1998	1999	2000
Barley	500	1,000	1,500	150	13,000	500
	$184.25	$420.00	$533.00	$60.00	$2,600.00	$170.0
Oats	500	1,500	4,500	3,000	6,600	1,100
	$140.65	$224.00	$1,700.00	$600.00	$1,980.00	$390.0
Wheat	0	0	700	1,300	1,500	400
	0	0	$221.00	$278.00	$330.00	$133.7
Total	1,100 lbs	2,500	6,700	4,450	21,000	2,000
	$324.90	$644.00	$2,454.00	$938.00	$4,910.00	693.7

Table 4. Grass Seed Sales & Receipts, 1995 - 2000.

Variety	1995	1996	1997	1998	1999	
'Nugget' Kentucky	20 lbs	25 lbs	0	40 lbs	0	
Bluegrass	$239.40	$300.00	0	$480.00	0	$
'Arctared' Red	0	0	0	0	200 lbs	
Fescue	0	0	0	0	$2,600.00	
'Sourdough'	0	3 lbs	0	0	0	
Bluejoint	0	$75.00	0	0	0	
'Alyeska'	0	0	0	0	0	
Polargrass	0	0	0	0	0	
'Gruening' Alpine	12 lbs	0	0	0	0	
Bluegrass	$232.20	0	0	0	0	
'Kenai' Polargrass	0	0	0	0	0	
'Egan' American	0	0	0	20 lbs	0	
Sloughgrass	0	0	0	$291.00	0	$
'Norcoast' Bering	0	25 lbs	110 lbs	0	0	
Hairgrass	0	$476.00	$2,140.00	0	0	
'Nortran' Tufted	75 lbs	10 lbs	0	0	100 lbs	
Hairgrass	$930.10	$1,578.20	$205.60	0	$1,500.00	
	0	0	0	0	0	
'Polar' Brome	0	0	0	0	0	
'Tundra' Glaucous	8lbs	10 lbs	0	0	10 lbs	
Bluegrass	$150.61	$130.00	0	0	$130.00	
'Caiggluk' Tilesy	0	0	40 lbs	0	0	
Sagebrush	0	0	$1,560.00	0	0	
	115 lbs	73 lbs	150 lbs	60 lbs	310 lbs	
Total	$2,200.41	$1,186.00	$3,700.00	$772.00	$4,230.00	$

Potato Disease Control Program

Potatoes are among the most valuable crops grown on Alaskan farms. Commercial potato production is highly capital intensive. High yields with good quality are required to assure a fair return on investment. Diseases can cause significant losses reducing yield and quality factors.

The potato is a vegetatively propagated plant 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. Planting certified seed 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 Plant Materials Center.

Seed produced at the PMC is sold to growers who increase the original allotment over the next several years. Seed potatoes are subjected to strict certification inspections to assure minimal disease incidence. The volume of certified seed produced in this fashion enables a grower to replace older diseased seed with clean seed.

Alaska is unique in that many disease and insect pests common to North America which require chemical control do not occur here. 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 would cause major problems. 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 major focus of the potato program is providing quality seed potatoes to commercial seed growers. Low levels of disease are required of quality seed because diseases can negate a crop's usefulness as seed. The seed provided by the PMC is used as the initiating stock for the ensuing multiple year certified seed production scheme. This 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.

Testing for the presence of diseases is performed in the PMC laboratory on all the initial seed stocks (Figure 4). 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), 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 (Figure 5).

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.

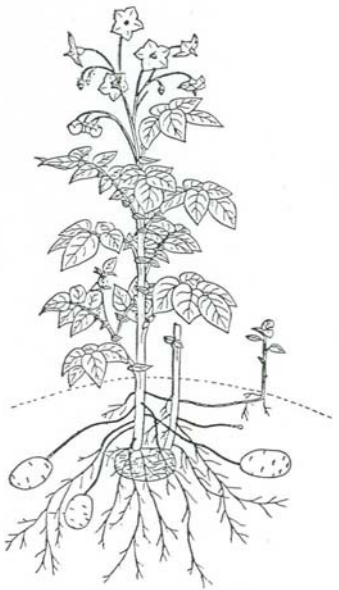
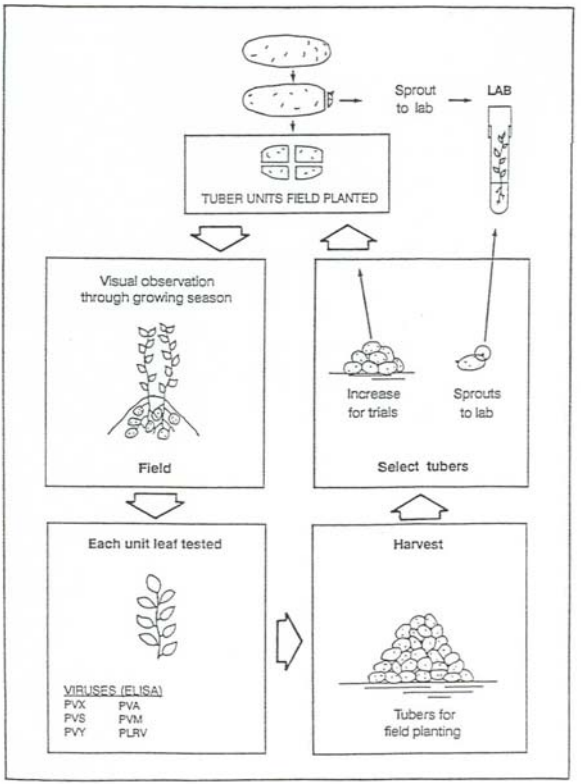


Figure 4. TUBER INTRODUCTION



Alaska Seed Potato Production & Disease Testing

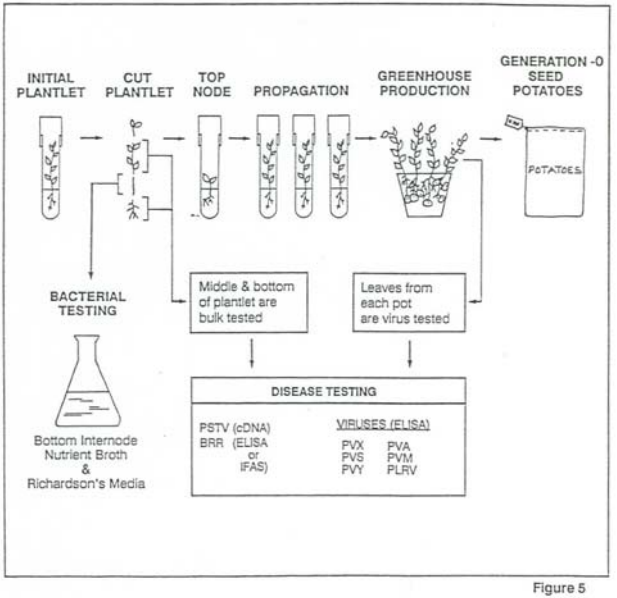


Figure 5

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.

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 reinfection can occur from soil or other sources. Certification is designed to identify and remove from use as seed those seed lots which have become diseased or are otherwise of reduced value for use as seed.

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 low levels has been proven to greatly reduce the risk of losses caused by disease. Certified seed has been inspected during the growing season and has met low levels of the 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 not presently found in Alaska through imported seed.

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 contamination of seed stocks by tuber-borne pathogens increases with each replanting. 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.

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 are grown in the Matanuska Valley, Fairbanks, Bartlett Hills, Nenana, Delta Junction and Kodiak. Each lot was inspected according to certification standards for disease and varietal purity.

Table 5. Certified Seed Potatoes

Year	# Growers	# Varieties	# Lots	Acreage
1996	12	204	362	126
1997	17	204*	402	125
1998	17	212*	233	105
1999	17	44	188	123
2000	14	238*	180	122

*Includes PMC variety bank.

Educational Program

The University of Alaska Cooperative Extension Service holds an Annual Potato Conference to update growers on research projects and innovations pertaining to potato production. Presentations were made outlining potato diseases found in Alaska. Various control measures were discussed focusing primarily on using quality seed as a management tool.

Scab Resistance Trial

Potato scab is caused by the bacteria *Streptomyces scabies*. It causes brown, circular lesions on the potato skin. The lesions can be raised or sunken and detract from the appearance of the potato. Peeling removes the affected area. Recent work has demonstrated that a chemical (Thaxtomin) produced by this organism can cause lesions to form on tubers in the absence of the live pathogen. The amount of the phytotoxic chemical produced has been shown to correlate with the severity of the pathogenicity of various isolates of the causal organism.

Planting cultivars known to be resistant to scab coupled with production practices that help reduce disease severity is central to integrated pest management systems.

Variety Development

The search for improved varieties is an on-going process. Finding a potato that bulks earlier, has more and better disease resistance, requires less fertilizer and tastes better are but a few of the traits we seek. The new horizon opened with the advances in biological technology appears limitless. Perhaps, a potato that would sprout legs and climb into the sack is the next level.

Breeding programs perform controlled cross-pollination between promising parental material in the hope of creating improved cultivars. The PMC has obtained true seed from several breeders. The seed was planted in the greenhouse and transplanted to the field. One or two small tubers were harvested from each plant. These will be field planted using wide spacing and single hills, which will be observed for yield, skin color and tuber shape. The few hills that meet the minimum requirements will be harvested and replanted for further observations. True seed will be obtained from several potato breeding programs to extend the types of families for testing.

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

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 collected by the PMC, they are tested for diseases, purified and then planted. Observations are made of horticultural characteristics, plant type, flower color, tuber shape and color, yield, and storage characteristics; the end result being a variety description.

Several novel varieties lacking this type of database have been cleansed of virus and offered for production as "experimental" varieties. These novelty potatoes have been promoted in several gardening magazines and are prized by some Alaskan growers. The PMC maintains these cultivars to provide an instate source to help obviate the necessity of importing seed potatoes which could introduce exotic diseases.

Disease-Tested Seed Potato Production

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 tubers which are distributed the following spring. The process takes 18 months form start to finish. Stock material, if not on hand, is typically obtained from other similar programs. 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 more than 200 cultivars as field grown stock, while 40 are maintained in culture and are ready for propagation.

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.

Table 6. Seed Potato Production

Year	Number of Varieties	G-0	G-1	Plantlets
1995	48	1,520	0	1,015
1996	55	1,400	0	420
1997	80	1,456	1,200*	2,400
1998	42	1,800	1,100*	2,200
1999	50	1,877	1,000	550
2000	72	1,200	687	2,880

* Due to a shortage of certified seed potatoes, the Plant Materials Center sold field grown seed.

Virus Disease Expression Plot

A small plot was established to examine viral disease symptom expression. Four seed pieces each of known virus-infected materials were planted May 30th. The diseases were Potato Leafroll Virus (PLRV), Potato Virus Y (PVY), Potato Virus M (PVM), Potato Virus X (PVX), Potato Virus S (PVS), and very small tubers harvested from a plant having Witches Broom symptoms.

Symptoms of virus infection, except PVS, were apparent throughout the season for all viruses beginning a few days after emergence. The Witches Broom material did not emerge until mid August. It appeared healthy until late September when a light marginal chlorosis could be observed on the newer expanding leaves.

Weather Monitoring

In March, the PMC purchased a computerized weather monitoring station as a commitment to continuing a long history of meteorological monitoring. The Davis Groweather system was installed May 12 and has been collecting data mostly uninterrupted since then. The summary reports for 2000 are in Tables 7, 8 and 9.

Table 7.

ANNUAL CLIMATOLOGICAL SUMMARY

NAME: PMC1 CITY: Palmer STATE: Alaska
ELEV: LAT: 61° 31' 37" N LONG: 149° 4' 50" W

		TEMPERATURE (°F)													
YR	MO	MEAN MAX	MEAN MIN	MEAN	DEP. FROM NORM	HEAT DEG DAYS	COOL DEG DAYS	HI	DATE	LOW	DATE	MAX >=90	MAX <=32	MIN <=32	MIN <=0
0	1														
0	2														
0	3														
0	4														
0	5	56.5	36.7	47.8	0.0	334	0	64.9	29	28.5	13	0	0	4	0
0	6	65.2	44.0	55.5	0.0	313	0	75.0	5	34.3	11	0	0	0	0
0	7	63.3	49.2	56.1	0.0	251	0	71.8	12	42.6	7	0	0	0	0
0	8	62.0	43.5	52.8	0.0	367	0	72.9	12	29.8	26	0	0	1	0
0	9	53.3	37.2	44.8	0.0	591	0	59.6	19	23.8	30	0	0	8	0
0	10	39.9	25.8	32.6	0.0	849	0	50.5	16	8.9	28	0	5	21	0
0	11	35.4	21.0	28.0	0.0	1103	0	48.5	10	6.5	4	0	12	26	0
0	12	35.3	18.5	26.1	0.0	957	0	49.4	20	4.7	15	0	9	25	0
		51.6	34.9	43.2	0.0	4765	0	75.0	JUN	4.7	DEC	0	26	85	0

Table 8.

PRECIPITATION (in)

YR	MO	TOTAL	DEP. FROM NORM	MAX OBS. DAY	DATE	DAYS OF RAIN OVER .01	.1	1
0	1	0.00	0.00	0.00	1	0	0	0
0	2	0.00	0.00	0.00	1	0	0	0
0	3	0.00	0.00	0.00	1	0	0	0
0	4	0.00	0.00	0.00	1	0	0	0
0	5	0.83	0.00	0.43	20	6	2	0
0	6	0.99	0.00	0.39	29	10	2	0
0	7	2.21	0.00	0.44	5	13	6	0
0	8	2.31	0.00	0.52	14	12	7	0
0	9	2.82	0.00	0.75	25	14	8	0
0	10	0.39	0.00	0.11	23	5	1	0
0	11	0.58	0.00	0.20	11	4	3	0
0	12	2.13	0.00	0.74	29	9	6	0
		12.26	0.00	0.75	SEP	73	35	0

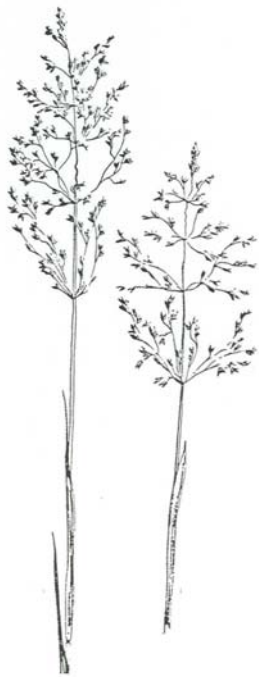
Table 9.

WIND SPEED (mph)

YR	MO	AVG.	HI	DATE	DOM DIR
0	1				
0	2				
0	3				
0	4				
0	5	2.8	25.0	18	WNW
0	6	3.5	32.0	7	SE
0	7	2.3	26.0	16	SE
0	8	2.7	35.0	2	SE
0	9	2.1	48.0	21	SE
0	10	3.3	46.0	25	SE
0	11	4.8	52.0	13	SSE
0	12	2.7	45.0	20	ESE
		3.0	52.0	NOV	SE

APPENDIX A

CURRENT & HISTORICAL BUDGET INFORMATION



CALENDAR YEAR 2000 AUTHORIZATIONS, EXPENDITURES, AND PROGRAM RECEIPTS

ARLF Authorizations

Authorizations FY 2000 PMC Total	485,903
Alaska Plant Materials Center	
Project Total	485,903
Personal Services	416,973
Travel	2,900
Contractual	45,646
Supplies	14,584

PMC Operating Budgets for the Past Sixteen Fiscal Years

		FY 86	FY 87	FY 88	FY 89	FY 90	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96	FY 97	FY 98	FY 99	FY 00
Author-ization in Thous-ands	PMC	733.7	596.7		556.7	566.1	566.1	620.8	608.9	585.6	595.3	433.3 100.0*	522.9*	508.6*	511.1	485.9*
	Forest Nursery									180.0	95.2	95.2	0	0	0	0
Personnel		17	16		16	16	16	16	16	17	17	15	14	15	19	22
Full Time		9	7		7	7	7	7	7	7	7	6	5	6	5	6
Part Time		8	9		9	9	9	9	9	10	10	9	9	9	14	16

* Indicates Agriculture Revolving Loan Fund source.

When comparing personnel figures listed for FY 00 to those in FY 86, bear in mind that the Plant Materials Center is now performing basically the same duties at nearly the same level as it did in 1986 with 402,600 fewer dollars. The PMC has started generating operating money from federal and private grants to cover needed operations. These funds are in the form of short-term contracts that must continually be renewed. Money to hire and keep labor support staff has been the most critical issue facing the PMC. In the last three years, reductions in supplies and contractual (utilities) have also become areas of constant concern. These funds are now being supplemented with program receipts.

Program Receipts
Calendar Year 2000

Contracts, Reimbursable Service Agreements and Grants

Source	Face Value of Contr Awarded in 200
USDA Agricultural Research Service (Germplasm Repository)	22
USDA Agricultural Research Service (Screen House)	6
USDA Agricultural Research Service (Plant Exploration)	
USDA Natural Resources Conservation Service	24
USDA Natural Resources Conservation Service	30
USDA Forest Service	
U.S. Army	8
U.S. Navy	1
Alyeska Pipeline Service Company	
Alaska Dept. of Transportation	3
Alaska Division of Mining and Water Management	2
Anchorage Water & Wastewater Utility	
State Pipeline Coordinators Office	
Total	$ 1,01

RSA, Program & Federal Receipt Values Since CY 1990

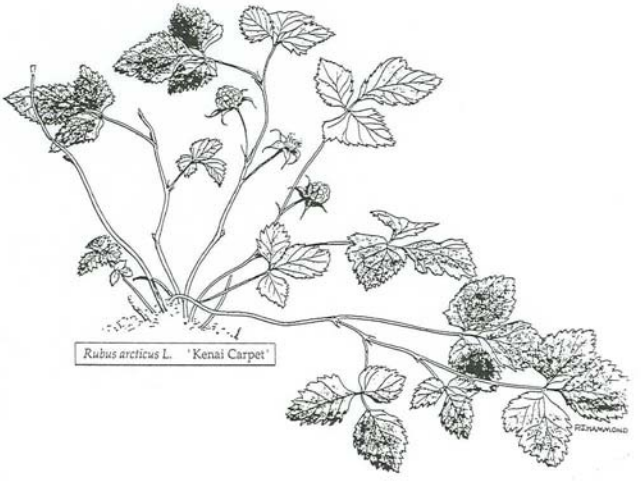
Prior to 1988, Program Receipts and contracts were not sought by the Plant M Center.

1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2(
58, 417	117, 981	126, 071	202, 886	377, 161	334, 200	212, 800	304, 200	1,086, 000	928, 400	1,(2

2000 Calendar Year Monthly Expenditures of ARLF Funds to the Nearest Dollar												
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
PMC Totals	39,561	3,193	36,374	31,897	13,024	49,915	28,500	64,224	63,764	43,609	37,482	29,573
Personal Services	34,563	-0-	29,807	29,108	5,699	47,869	27,505	57,331	58,576	39,489	33,618	23,564
Travel	19	-0-	-0-	-0-	1,123	-0-	-0-	179	787	-0-	-0-	-0-
Contractual	3,837	3,488	5,956	2,765	5,964	1,144	352	2,527	3,288	2,463	3,654	3,808
Supplies	1,143	1,288	611	24	239	902	643	4,187	1,113	1,656	210	2,201

APPENDIX B

CROP RELEASES



CROP CULTIVARS DEVELOPED AND ADVANCED BY THE ALASKA PLANT MATERIALS CENTER

'Long' Barclay Willow, *Salix barclayi* - This attractive, fast growing native willow was released for commercial production in 1985. This cultivar will be used for reclamation, landscaping and shelter belts.

'Roland' Pacific Willow, *Salix lasiandra* - Roland was released in 1985 and is probably the most attractive willow selected by the PMC to date. This cultivar will be used for landscaping, stream protection and revegetation throughout most of Alaska.

'Wilson' Bebb Willow, *Salix bebbiana* - This willow has a dense growth form and has many potential uses for screening, windbreaks and living fences. Because of the species' wide range of adaptability, it is also expected to be utilized for reclamation activities. Wilson is a 1985 release.

'Oliver' Barren Ground Willow, *Salix brachycarpa* - Oliver was released for commercial production in 1985. This cultivar's interesting growth form will lend itself well for incorporation into hedges. Additional uses range from reclamation to windbreaks.

'Rhode' Feltleaf Willow, *Salix alaxensis* - Rhode was also released for commercial production in 1985. This species occurs throughout Alaska and is listed as a preferred wildlife species. This cultivar will find uses in habitat restoration, reclamation, streambank protection and shelter belts.

'Egan' American Sloughgrass, *Beckmannia syzigachne* - Egan was released for commercial seed production in 1986. This cultivar has performed well at most test sites. Its expected uses are wetland restoration and waterfowl habitat enhancement. In 1991, Egan was registered as a crop cultivar with the Crop Science Society of America.

'Gruening' Alpine Bluegrass, *Poa alpina* - This selection of alpine bluegrass was released for production in 1987. A native species, alpine bluegrass has shown extreme hardiness throughout Alaska and it is well adapted to harsh sites such as mine spoil. In 1991, Gruening was registered as a crop cultivar with the Crop Science Society of America.

'Caiggluk' Tilesy Sagebrush, *Artemisia tilesii* - Caiggluk tilesy sagebrush is a native collection of sagebrush. It was placed in commercial production in 1989. The expected uses range from mine reclamation to restoration of sites contaminated with toxic metals. The cultivar will add diversity to seed mixes. This is the first native broadleaf species brought into commercial production in Alaska. In 1991, Caiggluk was registered as a crop cultivar with the Crop Science Society of America.

'Service' Big Bluegrass, *Poa ampla* - This accession of big bluegrass was derived from a collection made in the Yukon Territories. During the PMC evaluation process, the collection out-performed 'Sherman' big bluegrass (the only known cultivar of big bluegrass) in all categories. Service is expected to find use in dry land revegetation projects in Alaska south of the Yukon River.

'Reeve' Beach Wildrye, *Elymus arenarius* - Reeve beach wildrye was developed from a seed collection obtained from Norway. During the evaluation process, it was determined that this accession was capable of producing commercially viable amounts of seed. This was of extreme interest, as beach wildrye is notorious for not producing seed. Further evaluation indicated that the accession also had hardiness and adaptive traits making it useful in coastal revegetation and reclamation. In 1991, Reeve was released for commercial production. Reeve was registered as a crop cultivar with the Crop Science Society of America in 1994.

'Benson' Beach Wildrye, *Elymus mollis* - This accession was released for commercial production in 1991. Unlike Reeve, Benson was released for vegetative production only. This extremely aggressive and hardy, local collection does not produce seed in any appreciable amounts, therefore, commercial propagation can only be accomplished by vegetative means. This cultivar will find use in transplanting projects where erosion and accretion are beyond the capabilities of any seed species. Benson will become an important cultivar in coastal dune stabilization and restoration in Alaska. In 1994, the cultivar Benson was registered with the Crop Science Society of America.

'Kenai Carpet' Nagoonberry, *Rubus arcticus L.* - 'Kenai Carpet' nagoonberry was selected from a native collection made on the Kenai peninsula. This vigorously growing ground cover has been tested at various trial sites since 1985. It is best suited for use in large areas where an alternative to turfgrass or a mulch is desired. Kenai Carpet nagoonberry spreads by rhizomes and often out competes the surrounding vegetation. A minimal amount of fruit is produced by this cultivar. It was named and released for commercial production in 1991.

'Peanut' syn. 'Swede' Potato. This fingerling potato traces back to the Matanuska Valley in the 1930s. The tubers are small and resemble a peanut in shape and have yellow flesh. Desirable qualities include good yield under adverse conditions and a long dormancy.
'Rote Erstling' syn. 'Rode Eerstling' Potato. European variety promoted by Dr.

Donald Dinkel, University of Alaska Fairbanks (retired). Round, red with yellow flesh. Early maturing.

'Alaska Sweetheart' Potato. Germplasm provided by Jayson Dearborn. Round, red with pale pink flesh.

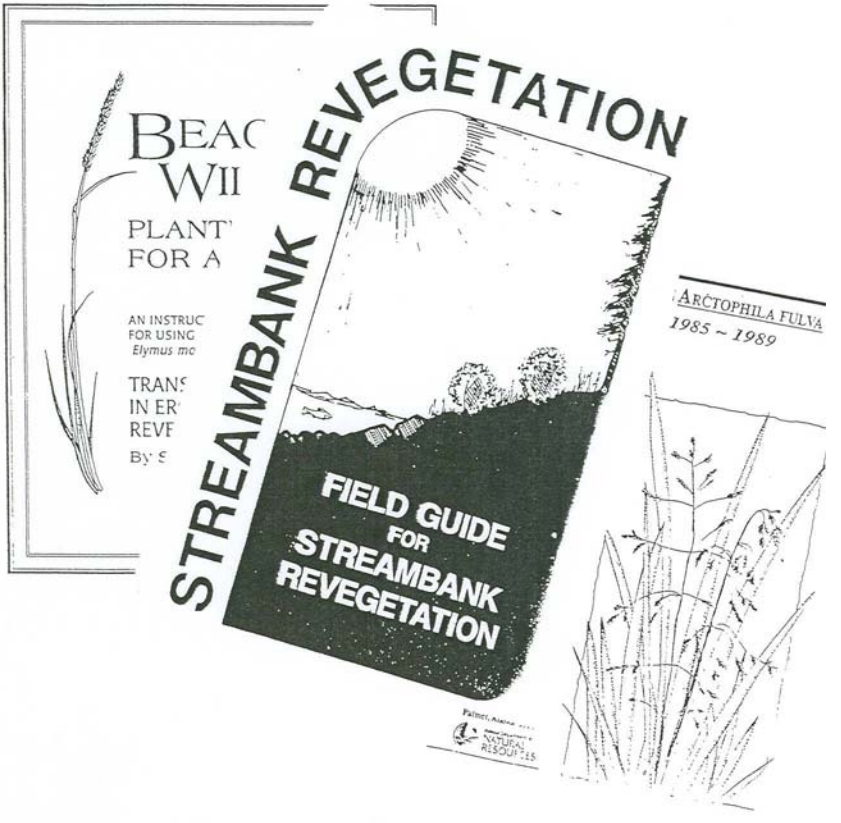
Pending Releases

Violet Wheatgrass, *Agropyron violaceum* - This native accession has undergone evaluation by the PMC since 1979. It has exhibited superior hardiness throughout Alaska, especially on dry, gravelly sites. Release is expected in 1999.

Fifteen new native plant releases will occur in 1999. These are products of the recent collection efforts.

APPENDIX C

LIST OF PUBLICATIONS AND PRESENTATIONS



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Campbell, W. L. Alaska Potatoes. Master Gardener Conference, Juneau, Alaska, May 5-6, 2000.

Campbell, W. L. Seed Update. Potato Day, Wasilla, Alaska, March 10, 2000.

Moore, N. J. Streambank Revegetation Techniques. Ravenwood Elementary School, 4th Grade, May 2000.

Wright, S. J. Initial Tussac Grass Research Results in Palmer, Alaska, Dept. of Agriculture, Stanley, Falkland Islands, January 27, 2000.

Wright, S. J. The Alaska Plant Materials Center, University of Alaska Palmer, Palmer, Alaska, February 9, 2000.

Wright, S. J. Commercializing Native Plants, Native Plant Conference, Wasilla, Alaska, February 24, 2000.

Wright, S. J. Native Seed Production in Alaska, Alaska Garden Show, Anchorage, Alaska, March 17,2000.

Wright, S. J. Results of 1999-2000 Germplasm Collection Project on South Georgia Island, American Society of Agronomy, Minneapolis, Minnesota, November 5, 2000.

APPENDIX D

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