

Alaska Plant Materials Center

Annual Report 1992

Alaska Department of Natural Resources - Division of Agriculture



STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF AGRICULTURE/PLANT MATERIALS CENTER
... PRACTICAL PLANT TECHNOLOGY FOR THE NORTH

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FROM THE DIRECTOR

January, 1993

This annual publication of the Plant Materials Center's report is provided to help make you familiar with the Center's activities throughout Alaska. The different projects outlined in this report are accomplished with a dedicated staff of only seven full time and eight part-time employees.

The various needs of industry continues to be areas the Plant Materials Center strives to meet. With declining revenues, we are constantly looking at alternative sources for funding. We have been successful at a number of projects in securing cost share and reimbursable contract agreements to accomplish this task. We will continue to evaluate the most cost effective means in which PMC programs can be carried out, including privatization of some seed and seedling type production.

A renewed emphasis is going to be placed on bringing the Plant Introduction Station and the Germplasm Repository on line in the coming year. The Repository, when completely operational, will not only be responsible for long-term protective storage of Alaskan plant genetic stocks, but also act as a source of these materials for researchers throughout the circumpolar region.

The Plant Introduction Station will deal with the importation and clearing of non-restricted foreign plant material for use by industry. Matching federal funds are likely for the support and operation of these programs.

The contacts and clients we do business with are wide ranging; covering agriculture, mining, oil and gas, municipalities, transportation and the military. These resource groups solicit our assistance, which our team at the division are happy to meet.

Our hope is that you find the information contained in this report useful. The Plant Materials Center conducts an open house each summer at the farm in July or August, and we would like for you to attend, if possible. Should you have a need for any additional information, we would be happy to supply it.

Sincerely,

John W. Cramer
John W. Cramer
Director



ALASKA PLANT MATERIALS CENTER

1992 ANNUAL REPORT

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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 furthers applied plant research for northern latitudes through two major programs: Revegetation and Seed Production, and Vegetable and Landscape Crop Improvement. Each of these programs will be addressed in this report.

Funding for the Plant Materials Center comes from the state's general fund. 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.

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 it carries out today: the North Latitude Revegetation and Seed Production Project and the North Latitude Vegetable and Landscape Crop Improvement Project.

North Latitude Revegetation & Seed Production Program

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 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 70s 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 and erosion control. The use of dormant seedings to extend planting seasons, cost-effective and successful methods in willow planting, and wetland and coastal restoration are 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.

To date, this program has gathered 215 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.

Revegetation & Reclamation Efforts

The construction of the Trans-Alaska Pipeline in the 1970s triggered the current revegetation research activity in Alaska. However, since the pipeline, there has been a continued interest in revegetation and erosion control. Continued oil development, increased interest in natural resource management, and the need for revegetation and erosion control have caused renewed research activities to continue. "Revegetation" as defined by researchers, which in some cases has included the use of "traditional" plant material and planting technology.

The Alaska Plant Materials Center continues to lead Alaska in revegetation and erosion control. The use of dormant seedlings to establish plantings, cost-effective and successful methods in soil planting, and various and various revegetation are priorities for the Alaska Plant Materials Center.

The project follows seven basic steps to establish a revegetation or reclamation plan for use in land reclamation, wildlife habitat improvement, and erosion control. They are: 1) define revegetation or reclamation problem and establish priorities; 2) research and develop candidate plant materials; 3) conduct initial evaluation; 4) establish small scale test or demonstration plots; 5) advanced and final testing and field evaluation; 6) establish large scale test or demonstration plots; and 7) release of a variety of revegetation or reclamation plan to the user.

To date, this program has gathered 315 plots years of information collected from sites around the state (Figure 1). Developed in new cultivars for revegetation and reclamation and assisted workers of agencies and private companies in revegetation, erosion control and reclamation.

Figure 1

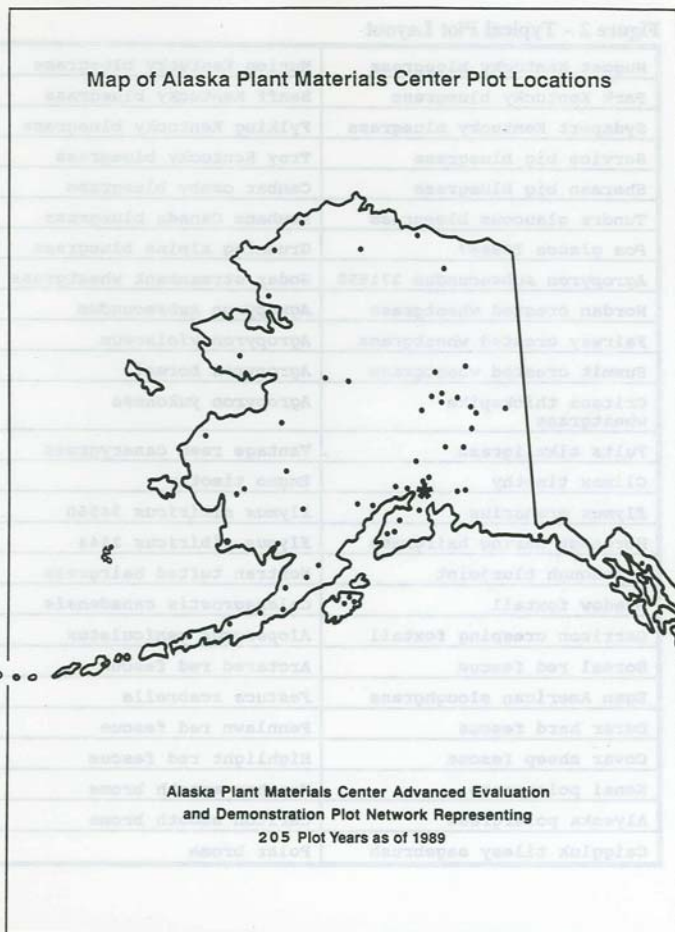


Figure 2 - Typical Plot Layout

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
<i>Poa glauca</i> T08867	Gruening alpine bluegrass
<i>Agropyron subsecundum</i> 371698	Sodar streambank wheatgrass
Nordan crested wheatgrass	<i>Agropyron subsecundum</i>
Fairway crested wheatgrass	<i>Agropyron violaceum</i>
Summit crested wheatgrass	<i>Agropyron boreal</i>
Critana thickspike wheatgrass	<i>Agropyron yukonense</i>
Fults alkaligrass	Vantage reed canarygrass
Climax timothy	Engmo timothy
<i>Elymus arenarius</i>	<i>Elymus sibiricus</i> 34560
Norcoast Bering hairgrass	<i>Elymus sibiricus</i> 2144
Sourdough bluejoint	Nortran tufted hairgrass
Meadow foxtail	<i>Calamagrostis canadensis</i>
Garrison creeping foxtail	<i>Alopecurus geniculatus</i>
Boreal red fescue	Arctared red fescue
Egan American sloughgrass	<i>Festuca scabrella</i>
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

Aleutian Native Plant Propagation Project

In 1990, the Navy requested that the Plant Materials Center (PMC) collect and propagate woody plants native to the Aleutian Islands. This material was intended to be used for landscape plantings on Adak Naval Air Station. The PMC selected Barclay willow (*Salix barclayii*) and Siberian Mountain Ash (*Sorbus sambucifolia*) for propagation.

In May 1990, 1,500 Barclay willow cuttings were collected at Dutch Harbor. In June 1990, willow and Mountain Ash cuttings were obtained from Attu. This material was then prepared for propagation at the PMC. The willow was rooted successfully; however, the Mountain Ash failed to root. Attempts to propagate Mountain Ash with tissue culture techniques and seed were also tried.

Because Mountain Ash is difficult to root, the proposal included a plan to gather Siberian mountain ash seed from Attu. The seed was collected during September 1990 and stratified for container planting in April 1991. Seeding also failed to produce satisfactory results. In 1991, additional seed was collected and stratified with various techniques. By June 1992, 50 seedlings of Siberian mountain ash were growing at the Plant Materials Center. These seedlings will be transplanted on Adak in 1993.

Initial willow plantings occurred on Adak in July 1990. The main planting was completed in May, 1991. By 1992, the willow plantings were only marginally successful. Plantings in protected areas exhibited an 80% survival rate, while only 12% survived in unprotected areas.

The Navy has reimbursed the PMC for all costs associated with this project.

Seasonal Beach Wildrye Planting Study

In 1990, the Plant Materials Center proposed to the Navy that a study be conducted to determine the actual transplanting season for beach wildrye (*Elymus arenarius*, *E. mollis*).

While previous studies on Shemya and Adak proved that the species could be successfully transplanted in May, June and August, a need still existed to determine the feasibility of July and September plantings. This continuous planting season would facilitate the use of the species in construction and reclamation activities.

It is interesting to note that the species has a very limited planting window (November to March) in the Pacific Northwest.

The project was funded and plantings occurred on Adak in July and September 1990. Initial evaluation of the July plantings indicated a 100% survival rate for the transplants. The September, 1990 plantings were evaluated in May and September, 1991, and exhibited survival in excess of 95%. By August 1992, the evaluation plots had grown together forming a stand of beach wildrye that appeared natural. The broad planting window that has been identified for the Aleutians contrasts sharply with the November to March planting window found in the Pacific northwest.

This study along with other current and future projects in arctic and western Alaska, will greatly enhance the knowledge regarding this species' potential in coastal restoration.

Amchitka Lupine Seed Collection Project

In 1992, The Plant Materials Center was contracted by the U. S. Navy to collect seed of Nootka lupine (*Lupinus nootkatensis*) for use on Adak. Normally, lupine in southcentral Alaska and on Adak are infested with grubs that destroy the seed. In 1991, during a site visit to Amchitka, it was noticed that the extensive lupine stands on that island were not affected by insect infestations. Plans were developed to utilize the naval facilities on Amchitka as a staging area for lupine collection in 1992. During a one-week period in September 1992, one PMC staff member collected 150 pounds of lupine pods on Amchitka. The material was cleaned in October 1992 producing 15 pounds of clean seed. During the winter of 1992-1993, the seed will be stratified and scarified for planting on Adak during the summer of 1993.

Shemya Air Force Base Road Close-Out

In 1991, the PMC received a request to assist the Air Force Base on Shemya to close out unnecessary roads. These roads crossed lands used for potable water collection. The Air Force was concerned that fuel spills could contaminate the water gallery area, so final and complete road closures seemed to be the most effective solution. Removal of road material was not practical due to communication wires buried in the road bed. Therefore, the roads were abandoned by placing excavated mounds of peat on the surface. These mounds required revegetation to prevent erosion and reduce negative visual impact.

However, the PMC recommended that the site be monitored for two years before starting a revegetation program, and a natural revegetation study was implemented in 1992. A back-up plan for reseeding has been developed if a satisfactory stand of vegetation has not become established by 1994.

Adak Abandoned Trail Restoration

In 1990, the PMC agreed to assist the Navy in developing a program to restore existing trails on Adak. Many of these trails were created when concerns for environmental damage were secondary to the needs of national defense. Those trails that are no longer necessary for the efficient operation of NAS Adak are being scheduled for rehabilitation.

The first demonstration planting occurred in June, 1990. Using a group of boy scouts from Adak, a portion of the Shagak Bay Trail was reseeded with a mix of red fescue and hairgrass. In 1991, the project was evaluated. Both hairgrass and red fescue produced excellent stands. The site is stable and erosion is minimal. In September 1992, trail plots were again evaluated. A well developed stand of hairgrass and red fescue was established on the trail. While the outline and portion of the trail is still obvious, the site is now well vegetated with the seeded grasses. Natural reinvasion is also occurring on the trail.

Steese - White Mountain Mining District

In June, 1988, the PMC in cooperation with the Bureau of Land Management (BLM) Steese-White Mountain Mining District, established revegetation test plots on recontoured mine tailings. Each plot consisted of 50 smaller plots containing 49 grasses and one forb.

The BLM selected three sites in the district that had been recontoured and should not be disturbed for several years. A total of four evaluation plots were planted; two replicates of the plots were planted at the Birch Creek site, Mile 98 of the Steese Highway. This site is visible and readily accessible from the highway and hopefully will serve to inform others of the possibilities for revegetation. Other plots were planted at Nome Creek and Hope Creek, both of which were several miles off the Steese Highway. Staff from the Fairbanks BLM office volunteered their time to help lay out, seed and fertilize the plots.

At the time of evaluation on August 29, 1990, the performance of the grasses had declined from the previous two years, and erosion had continued to destroy the Birch Creek #1 plot so that only 20 percent of the plot remained.

The performance of the accessions varied between varieties and sites. Observations indicate that some accessions performed well, including 'Gruening' alpine bluegrass, 'Norcoast' Bering hairgrass, 'Arctared' red fescue, and 'Manchar' and 'Pumpelly' brome. The final evaluation of the plots was scheduled for 1991, but did not occur and is rescheduled for 1993.

Additional mine revegetation work was initiated in 1989 in the Nome Creek Maze area. Three treatments were tested on the mine tailings. Each treatment was replicated three times. One treatment consisted of planting ten different revegetation varieties in adjacent plots. A seed mix containing these ten varieties was used for another treatment. Both of these treatments were fertilized. The third treatment consisted of fertilizer only.

These plots were also evaluated in late August, 1990. Qualitative evaluations indicated that the native vegetation responded favorably to the fertilizer. The willows showed an increase in current annual growth and plant cover was greater on the fertilized sites. Germination and establishment of the seed mix was localized and varied considerably with each site. The varieties that performed the best at the seed mix and plot sites included 'Arctared' red fescue, 'Nortran' tufted hairgrass, 'Norcoast' Bering hairgrass and 'Gruening' alpine bluegrass. These plantings will continue to be monitored at the same time that the Birch Creek, Hope Creek and Nome plots are evaluated.

Early winter conditions in the interior including a heavy snowfall made it impossible to conduct evaluations in the fall of 1992. Evaluations will be conducted in the late summer of 1993. A final report will be prepared at that time.

Adak Sand Pit Restoration

In 1992, the PMC was awarded a Navy contract to develop and monitor a restoration program for Pringle Hill Sand Pit on Adak. The 40-acre site will be restored with beach wildrye sprigs and seeded grasses over a three-year period starting in 1993. A management plan for surrounding vegetation will also be developed. The work force employed to do the project will be Navy Seabees. Initial plans were developed in 1992.

Kenny Lake Legume Evaluation

In June 1990, the Plant Materials Center, in cooperation with the Kenny Lake Conservation District, planted a legume evaluation test plot at the Kenny Lake Community Garden site. Six varieties of alfalfa, four varieties of clover and two varieties of vetch were planted and fertilized with 20-20-10 fertilizer.

When the plot was evaluated in September, 1990, very little germination had occurred. The summer had been very dry in Kenny Lake and the plot had not been irrigated. By late September, 1991, additional germination had occurred and differences in the varieties' performance were becoming apparent. Also, the plot was well covered with weeds, particularly fireweed and lambsquarter. Only two varieties, 'Denali' and Siberian alfalfa, exhibited plant cover greater than 50%; the general vigor of these two varieties was greater than that shown by other varieties in the plot.

This site was not visited in 1992 because of an early snowfall that obscured the plantings. The site will be evaluated in 1993.

Nome Mine Site Revegetation Plots

In 1989, the Soil Conservation Service (SCS) requested the PMC's assistance to establish evaluation plots at various mine sites in the Nome area. On June 21 and 22, 1989, three diverse sites were planted with 44-47 varieties that have been planted in other evaluation plots around the state. The sites varied in moisture regimes as well as soil substrate characteristics. One site contained a highly organic substrate, while the other two sites contained a more mineral substrate. All sites contained adequate fine material for plant establishment.

The plots were evaluated on September 14, 1989. All plots had become well established. The plot having high organic content supported a 65% moss and vascular plant cover in addition to the seeded grass species. The plots were evaluated again on September 6, 1990. During this evaluation, only two plots were accessible. Roughly 75% of the accessions had survived. This is normal for first winter recovery. However, the plots were in very poor condition and further die-out could be expected during the winter of 1990-1991. Due to lack of support from the SCS, the site was not evaluated in 1991.

Final evaluations occurred at these sites on September 1, 1992. 'Norcoast' Bering hairgrass, 'Gruening' alpine bluegrass, 'Arctared' and 'Boreal' red fescue, 'Sourdough' bluejoint, violet wheatgrass and 'Reeve' beach wildrye exhibited the best performance. The remainder of the material was either rated as poor, or it had died out. A final report will be prepared on the site during the winter of 1992-1993.

Yukon Pacific Corporation Evaluation Plots

In 1990, the Plant Materials Center and Yukon Pacific Corporation agreed to cooperate on establishing a series of ten revegetation test plots along the proposed gasline right-of-way. This project was made possible with assistance from the State Department of Transportation (DOT) which provided test sites and also project support along the route.

DOT provided disturbed sites in gravel pits, on unused airstrips and at abandoned oil pipeline camps. Sites were selected near Valdez, Thompson Pass, Glennallen, Isabel Pass, Birch Lake, Livengood, Pump Station 5, Chandalar Shelf, Happy Valley and Franklin Bluffs.

The size of the test plot was adjusted to fit the available space. The plot was subdivided into 36 smaller plots so that the individual plantings of twelve cultivars could be replicated three times at each site. These plots were unique because they tested only native revegetation material that would be commercially available for pipeline revegetation. The following cultivars were planted: 'Egan' American sloughgrass, 'Norcoast' Bering hairgrass, 'Nortran' tufted hairgrass, 'Alyeska' and 'Kenai' polargrass, 'Nugget' Kentucky bluegrass, 'Arctared' and 'Boreal' red fescue, 'Tundra' glaucous bluegrass, 'Gruening' alpine bluegrass, 'Sourdough' bluejoint reedgrass and 'Caiggluk' tiley sagebrush.

The plots were planted between June 18 and July 3, 1990. Evaluations in 1991 show a wide variety of plant growth at the different sites. The plantings at Franklin Bluffs and Happy Valley exhibit very little plant growth. Plantings at the more southern locations are growing better but growth is not exceptional. Many of the plots are located at harsh sites so growth is slow. Even so, useful information is being provided by these test plantings and evaluations should be continued.

Evaluations were not conducted in 1992. An early snowfall prevented the completion of late field season work. Evaluations will be conducted in 1993.

Fairbanks Division Of Mining Demonstration Plantings

The Plant Materials Center and the Fairbanks office of the Alaska Division of Mining (DOM) established demonstration revegetation plantings on recontoured mine tailings in the Fairbanks area. Division of Mining selected two sites, each with four to five acres that would remain undisturbed for several years. Selected areas at each site were seeded with a mix consisting of 'Arctared' red fescue, 'Gruening' alpine bluegrass, 'Norcoast' Bering hairgrass, 'Alyeska' polargrass, 'Sourdough' bluejoint and 'Caiggluk' tiley sagebrush. The plots were fertilized with 20-20-10 fertilizer applied at a rate of 450 pounds per acre.

The A. J. Taylor mine site was naturally divided into two segments by Flume Creek. Most of the site was scarified and then each segment was divided into three plots. Each plot received one of the following treatments: seed and fertilizer, fertilizer only, or no treatment at all. The unscarified area was divided into two plots, one of which was fertilized, the other untreated.

The seeded, fertilized and scarified plots exhibited the highest plant cover. The plots that were not seeded and not scarified showed a pronounced increase in plant growth of the invading species when fertilizer was applied.

The benefits of a seed mix are apparent at Flume Creek. Varying environmental conditions favor the growth of different components of the mix. Along the creek, Norcoast was growing profusely; Caiggluk was the dominant cultivar on the south-facing slope and Gruening was growing well on the north-facing, seeded area. Weedy species dominated an area that was fertilized, but not seeded or scarified.

The second site provided several diverse areas for the revegetation demonstration. The remnants of the settling pond contained a broad area of moisture-saturated mineral soil which was seeded with 'Egan' sloughgrass. However, floods occurred midsummer before the grass had become well established and eliminated any trace of the planting.

Another planting area was composed primarily of overburden. The area was divided into six plots; two were unscarified, one of which was fertilized, the other left untreated. The remaining four plots were scarified; one was seeded with no fertilizer, one was seeded with fertilizer, another was not seeded but fertilized, and the fourth plot was left untreated as a control.

Both native vegetation and the seeded grasses benefited from the fertilizer. The plots exhibiting the most plant cover had been seeded and fertilized. Caiggluk, Arctared and Norcoast dominated the seeded areas, and native bluejoint dominated the unseeded areas.

Additional isolated areas consisting primarily of mine tailings were seeded and fertilized. Plant growth varied on these sites; the best performances were observed in areas that had the least soil compaction and contained some fines.

Evaluations were not conducted in 1992. An early snowfall prevented the completion of late season field work. Evaluations will be conducted in 1993.

Atigun Pass Rehabilitation Project

In January 1991, the Plant Materials Center was approached by Alyeska Pipeline Service Company to assist in the development of a rehabilitation plan for land affected by construction of the Atigun Pass Reroute. The plan also attempted to incorporate mitigation measures required by regulatory agencies. The most significant aspect of the proposed plan dealt with the establishment of willow along the margins of ponds constructed for fish habitat. A plan calling for re-establishing willow was approved in May 1992.

Between June 24 and 28, 1992, two PMC staff members directed Alyeska crews in planting willow sprigs (which were collected in April 1992 and held in cold storage) and grass seed. The sites were evaluated in August 1992. The results surprised everyone involved. The survival and growth of willow was much higher than anticipated. Results of the 1992 field program are available in Atigun Pass Re-Route Rehabilitation Plan Interim Report, 1992. Additional evaluation will occur in 1993.

Evaluation of the Trans Alaska Pipeline Workpad

In September 1991, the Plant Materials Center began an evaluation of the Trans Alaska Pipeline workpad looking for any erosion problems and plant cover. This project was undertaken at the request of the State Pipeline Coordinator's Office.

One PMC staff person travelled the workpad by truck driven by Alyeska personnel. Stops were made at every mile, where two photographs were taken of the workpad, one to the north and another to the south. Plant cover was estimated and a quick list of species was recorded.

The evaluation continued well into October when snowfall made further evaluation impossible. Evaluations were resumed in June after a late spring break-up.

No major erosion problems were discovered on the workpad and any existing or potential problems were already being addressed by Alyeska Pipeline Service Company. Native species provided most of the plant cover along the workpad except for some sections of buried pipe where species from the original revegetation seed mix still persisted.

The photographs and data collected on this project were compiled into a three-volume document that is on file in the State Pipeline Coordinator's Office.

Port Clarence Beach Restoration Project

The U. S. Coast Guard Loran Station at Port Clarence was required to revegetate the station's former solid waste disposal site. Traditional seeding methods failed because of poor soil conditions. A PMC staff member examined the site in September 1990 and determined that beach wildrye transplants would solve the problem. The area's small size and an available, eager work force convinced the Coast Guard that the approach was practical. The PMC was given Coast Guard approval to direct and assist in the project. The project was completed in June, 1991.

When the site was evaluated on September 5, 1991, a good stand of beach wildrye was observed. While not as robust or vigorous as stands on Adak or Shemya, the planting was rated as a success. The PMC supplied the Coast Guard with a site specific "How To" manual so that the planting technique can be used as a standard operating procedure as the landfill segments are restored on a yearly basis.

One final evaluation of the site occurred on September 2, 1992. At that time, the plantings were well established and formed a stand of beach wildrye indistinguishable from natural stands in the area.

Interior Alaska Evaluation & Demonstration Planting

Over the years, a variety of efforts have been made to establish an Interior Plant Materials Center. In lieu of developing an Interior PMC, the PMC, in cooperation with the Fairbanks Soil and Water Conservation District, decided to establish an evaluation and demonstration plot in the Eielson Agricultural Development. A farmer provided newly cleared and prepared land for demonstration and test plots which will evaluate revegetation plant materials.

In 1989, three revegetation evaluation plots and one demonstration plot were planted. The site was in excellent condition and by fall, the plantings had grown very well. The only areas that showed poor vigor were the edges of the plots where fertilizer was probably applied at a lower rate.

Evidently, the soils in the Eielson Agricultural Project are nutrient poor and crops are heavily dependent on fertilizer. Since our plots are fertilized at the time they are planted and then left without any further fertilizer applications, plant growth is expected to decline over the evaluation period.

In 1991, evaluations occurred in early September. At that time, there was no sign of drought stress and the plantings were performing relatively well. Cover and vigor had declined somewhat since the previous year and very few of the varieties were flowering. Evidently, as part of a weed control measure, the plots had been burned. Very few of the accessions had flowered and since not all of the accessions are tolerant to burning, some of the flower buds may have been damaged.

Most of the Kentucky bluegrasses continued to perform well, particularly 'Nugget' and 'Merion'. Two of the native wheatgrasses, *Agropyron boreale* and *A. violaceum*, which are being tested for commercial release performed very well. Other varieties that were vigorous and provided good ground cover included 'Arctared' and 'Pennlawn' red fescue, 'Kenai' and 'Alyeska' polargrass, 'Caiggluk' tiley sagebrush, 'Sourdough' bluejoint reedgrass and pumpelly brome.

No major differences were noticed in the demonstration plantings from the previous year.

Both 'Polar' and 'Manchar' brome and Sourdough performed reasonably well at all fertilizer levels. 'Boreal' red fescue provided a better plant cover with no fertilizer, whereas Arctared produced more seed than Boreal at the middle and high fertilizer levels. 'Park' and 'Merion' Kentucky bluegrass produced a better overall ground cover than Nugget, but Nugget was the best seed producer. Evaluations will continue for two more growing seasons before a final report is prepared. The legumes performed best at the lower fertilizer levels.

Evaluations were not conducted in 1992. An early snowfall prevented the completion of late field season work. Evaluations will be conducted in 1993.

Unocal Fuel Spill Restoration

In July 1990, the PMC assisted Unocal with restoration planning for a small fuel spill on the west side of Cook Inlet. The affected area was a wetland site adjacent to a major fish stream. The PMC developed a seed mix and suggested site preparation methods for the reestablishment of vegetation. By August 21, site clean-up was completed and the seedbed was prepared suggesting that the revegetation effort should be successful.

By September 11, 1991, a lush growth of grass covered the reseeded site. The ground cover was nearly 100% and the grass appeared to be well adapted to the site. No apparent signs of stress were observed in the planting.

The final evaluation of the site occurred on August 25, 1992. The revegetated areas supported nearly 100% ground cover; 'Norcoast' Bering hairgrass dominated the stand and 'Egan' American sloughgrass provided 20% plant cover. The entire stand exhibited excellent growth.

Green's Creek Mine

Green's Creek Mine is within the boundaries of Admiralty Island National Monument. The U. S. Forest Service limited the species that could be planted to those that are indigenous to the island. As a result, the plots contained 15 accessions compared to the 48 to 50 accessions that are normally planted. In 1989, two spring plantings were established at one location. In the fall, three more plantings were established at three different elevations. One of the plantings was placed along the water pipeline.

All plantings were fertilized with 20-20-10 fertilizer at a rate of 450 pounds per acre.

The plantings exhibited a wide range of performance. The spring plots had been disturbed at least twice and some accessions have been completely destroyed.

The water line planting performed so poorly that it was evaluated only once after the first growing season. The fall planting at the higher elevation performed the best of all of the plantings. The planting at the lower level was not growing well and appears to have been overseeded with the Green's Creek mix.

The final evaluation of these plantings occurred in October 1992. Evaluation results indicate that 'Boreal', 'Arctared' and 'Pennlawn' red fescue, 'Gruening' alpine bluegrass, 'Kenai' polargrass, and 'Norcoast' and 'Nortran' hairgrass are suitable cultivars to be included in a seed mix at Green's Creek Mine.

Echo Bay Mines

During the summer of 1989, a total of three plots, each containing 40 to 46 taxa, were established at Echo Bay Mine sites. Two spring plots and one fall plot were planted. One of the spring plots was planted at a sandy location near the office building. The other spring plot and the fall plot were planted near the mine portal in the Sheep Creek Valley. The Sheep Creek site was more gravelly than the office site.

Final evaluations conducted in October 1992 indicated that 'Merion' and 'Banff' Kentucky bluegrass, 'Boreal' and 'Pennlawn' red fescue, 'Carlton' smooth brome, 'Climax' timothy and 'Norcoast' Bering hairgrass grew the best at the office plot. Native plants, including wild beach pea and alder, are invading the plot. The spring planting at the portal site is outperforming the fall planting. Only three cultivars, Merion and Pennlawn red fescue and Banff Kentucky bluegrass performed relatively well in the fall plots. Additional cultivars that grew well in the spring plots include 'Sydsport' Kentucky bluegrass, 'Nortran' tufted hairgrass, Boreal red fescue and 'Kenai' polargrass. A combination of two to three of these cultivars would make a suitable seed mix for revegetation of disturbances related to development of the A. J. Mine. Planting in the spring appears to be preferable compared to fall planting.

Wrangell District U. S. Forest Service

In 1990, the Plant Materials Center began a cooperative revegetation study with the Wrangell District of the U. S. Forest Service. The PMC provided seed, travel and personnel. The Forest Service provided lodging, travel to the site, supplies at the site and personnel to assist in planting the plots.

The standard test plot containing 40 accessions was established at four different sites representative of the revegetation conditions encountered during and after logging. The plots were planted during June 5 - 7, 1990. One plot was planted on Snowberry Shotrock Road. This site was very gravelly and moderately compacted by logging traffic when the unit had been harvested. Two plots, Lost Joe Road and Fool's Inlet Road, were planted on relatively recent road cutbanks. These sites differed from each other in slope, aspect and physical location. The fourth site occurred on wood chip waste that was used to construct the municipal shooting range.

Although the performance of the plantings varied between sites, the most notable difference occurred at the shooting range. The substrate at this site was primarily wood chips in various stages of decay mixed with a small amount of sand. Cover was sparse; most accessions have died. However, the plot seeded with the Forest Service's seed mix containing alsike clover, 'Pennlawn' red fescue, 'Climax' timothy and annual rye was growing relatively well. The municipality also used this mix to stabilize the berms of the shooting range. The clover was well established on the berms and this mix, or at least the clover component, appears to be the best selection for revegetating the berms.

By the time the plots were evaluated in mid-October 1992, the plots at Fool's Inlet had been destroyed by logging activities. The test plantings at Snowberry Shotrock Road and Lost Joe Road sites have remained intact and several accessions were performing well, including 'Merion' and 'Fylking' Kentucky bluegrass, Pennlawn red fescue and 'Nortran' tufted hairgrass. These sites will be evaluated again in 1993 and a final report will be prepared at that time.

Upper Susitna Demonstration & Evaluation Plots

The Plant Materials Center and the Upper Susitna Soil and Water Conservation District established demonstration and evaluation plots near Trapper Creek in June, 1987. The former hay field was plowed and cultivated by the landowner and the plots were seeded and fertilized by staff from the PMC and the Palmer Soil Conservation Service.

Originally, the evaluation plots, consisting of fifty grasses and one forb planted in 4 x 10 foot areas, were replicated three times; a fourth plot contained rod rows, 20 feet long, of the same collection of plants as the broadcast plots. The demonstration plot consisted of 18 plant varieties recommended for the area by The Revegetative Guide for Alaska. These plantings were made in 20 x 60 foot plots. The 60-foot length was divided into three 20-foot sections, each fertilized at a different rate (0, 250, and 500 pounds/acre of 20-20-10).

The plants germinated and became well established, but in many cases the plants were obscured by timothy and hempnettle. In the spring of 1988, the plots were sprayed with 2,4-D, which was relatively ineffective in killing the broadleaf weeds. In July, the PMC decided to spray the entire plot with a broad spectrum herbicide and replant in June, 1989.

Prior to planting in June, 1989, the site was sprayed again with a broad spectrum herbicide and allowed to stand for one week before planting. Staff from the Palmer Soil Conservation Service and the PMC reseeded the site. Three evaluation plots and one demonstration plot were planted. The rod row plot (1987) was eliminated.

When the plots were evaluated on August 28, 1991, the plants were growing reasonably well, although weed problems were becoming more widespread. Five varieties were performing well in the demonstration planting. They were 'Polar' brome, 'Arctared' red fescue, 'Merion' and 'Nugget' Kentucky bluegrass and 'Aurora' alsike clover. No differences were apparent between the three fertilizer treatments. Differences had been noted during the first year when the more heavily fertilized sections of grass had performed the best, and the legumes performed better where there was no fertilizer or the medium level of fertilizer.

Some accessions performed consistently well in the three evaluation plots. Some of the highest cover values and vigor ratings were recorded for Nugget and Merion Kentucky bluegrass, 'Gruening' alpine bluegrass, violet wheatgrass, 'Engmo' timothy, 'Norcoast' Bering hairgrass, 'Nortran' tufted hairgrass, Arctared red fescue, 'Vantage' reed canarygrass and 'Caiggluk' tiley sagebrush. Evaluations will be conducted for one more growing season, at which time, a final report will be prepared.

Evaluations were not conducted in 1992. An early snowfall prevented the completion of late field season work. Evaluations will be conducted in 1993.

Kenai Wetland Restoration Plots

In April, 1989, the PMC was contacted by an engineering company and requested to assist with the restoration of illegal fill on a wetland. The PMC responded with a plan acceptable to both the U. S. Army Corps of Engineers and the Alaska Department of Fish and Game.

The plan utilized a seed mix containing native species adapted for wet sites. This mix relied heavily on 'Egan' American sloughgrass, a cultivar released by the PMC. Initial results appear promising. Unfortunately, during the scheduled evaluation in September, 1989, the Kenai River was running high and was covering the plots. The flooding prevented the plots from being evaluated satisfactorily.

This site was again evaluated on August 21, 1991 and June 18, 1992. At the time of the final evaluation, a well established and flourishing wetland community was present. Sloughgrass and hairgrass, both seeded grasses, were performing exceptionally well. Bluejoint was performing fair.

Fish Creek Wetlands Restoration Project

In August 1990, Anchorage Water and Wastewater Utility (AWWU) requested that the Plant Materials Center submit a proposal for restoring a wetland disturbed during a construction project. Because the request occurred late in the growing season, the PMC suggested that the project be delayed until spring, 1991. The landowner agreed. AWWU, however, wanted to demonstrate to the landowner that restoration would be attempted; therefore, a study area was established.

On August 23, 1990, PMC staff established a demonstration planting at the Fish Creek site. Sprigs of Beach wildrye which were obtained from the PMC were transplanted onto the higher elevation portions of the site. Low, flooded areas were planted with indigenous sedges, rush and arrowgrass transplants that were harvested from adjacent donor communities. The area was examined to determine the best approach for full-scale restoration activities scheduled for spring, 1991.

In May 1991, work resumed on the site. Three dikes were planted with beach wildrye sprigs and seeded with a hairgrass mix. Additional higher elevation areas off the dikes also received this treatment. In lower areas, wetland species including sedges and rushes were transplanted.

In 1992, areas needing additional work were delineated. On June 3, 1992, these areas were planted. Areas subject to flooding by high tides were planted with seedlings of greenhouse grown sedges, plantain and arrowgrass. One dike was rototilled to reduce compaction and additional sprigs of beach wildrye were planted. The dike area also received an additional seeding of 'Norcoast' Bering hairgrass. Monitoring and data collection continued through September 1992. Performance of vegetation and the extent of high tides on the site were documented. Evaluation of this site will continue through 1993. This project is important since few coastal wetland rehabilitation projects have been attempted and results from this project will greatly enhance our knowledge regarding revegetating wetlands.

80th and Lake Otis Cut Slope

Early in 1991, the Municipality of Anchorage requested assistance from the PMC in revegetating a cut slope near 80th Avenue and Lake Otis Parkway. The slope was exceptionally dry and was a chronic problem for the municipality. The PMC developed a seed mix consisting of native species adapted to dry conditions. Plans were initiated for the PMC staff to seed the site. However, lack of a suitable truck to haul the hydroseeder and lack of labor prevented the PMC from becoming involved. The municipality then accepted responsibility for seeding the site. All materials needed to complete the project were supplied by the PMC.

On August 21, 1991, the site was evaluated. Performance was excellent; erosion was abated and an outstanding growth of vegetation was established.

On September 10, 1992, the site was again evaluated. 'Arctared' red fescue and 'Norcoast' Bering hairgrass are the dominant grasses at the site.

Drift River Terminal Dike

In 1990, the PMC was requested to develop a seed mix for the operators of the Drift River Oil Terminal on the west side of Cook Inlet. The eruption of Mt. Redoubt caused the river to change course. As a result, the terminal operators constructed an earthen dike to protect the facility from flooding. The unarmored portions of this dike were seeded with grasses for protection. The mix, adapted to saline, sandy soils, was applied during the summer of 1990.

Early in the summer of 1991, the PMC was again contacted because of what appeared to be poor performance of the grass. These concerns were alleviated when the mid-summer rains came in July, 1991. Presently, the operators of the terminal are pleased with the performance of the red fescue, hairgrass, sloughgrass and alpine bluegrass.

The PMC was unable to visit this site during 1992, but hopes to evaluate the site one additional time in 1993.

Kuparuk Arctic Pendant Grass Study

In 1985, the Plant Materials Center and ARCO Alaska, Inc., established a cooperative agreement to evaluate revegetation techniques with an emergent grass species, *Arctophila fulva*. During the past seven field seasons, two PMC staff members have spent two to three weeks each season in the Kuparuk Field wetlands, transplanting *Arctophila* and evaluating the success of the plantings. Various planting locations and planting techniques have been tested and have met with a wide range of success.

During 1987 and 1988, general laborers conducted the plantings while being supervised by PMC staff. An ARCO contractor supplied laborers the first year, and the PMC supplied four laborers from their staff during 1988. This phase of the study evaluated the ability of general laborers to harvest and transplant *Arctophila*. The primary focus of the investigation has centered on the issue that if *Arctophila* can be transplanted successfully, then is it economically feasible, and/or what is the cost of transplanting *Arctophila* with an unskilled labor force?

The initial *Arctophila* studies have been completed and a report has been submitted to ARCO, Alaska, Inc. entitled Revegetation With *Arctophila fulva*--a Final Report 1985-1989.

In 1990, the initial studies were expanded. A greater emphasis was placed on the management of harvest sites and the effects of fertilizer on transplants. In 1991, all of the study sites were photographed to document any changes. No additional evaluations have occurred to date, however, the sites will probably be evaluated in 1993.

Arctic Forb Seed Collection

At the end of July 1990, the Plant Materials Center, in cooperation with ARCO, Alaska, Inc. and Alaska Biological Research, collected legume seed along the Dalton Highway from Milepost 341 to 369.5. Numerous single plant collections were made of *Oxytropis* sp., *Hedysarum* sp. and *Astragalus* sp.

Germination tests for the legumes were begun in 1991. The seeds were cleaned, sown in containers and stratified. After stratification, the seeds were germinated in the greenhouse. The seedlings were grown on and taken to Fairbanks for field planting. An early snowfall in 1992 prevented evaluation of the 1991 plantings after their first full growing season. The plantings will be evaluated in 1993.

Additional seed collections of legumes and other forbs were made in August 1992. The seed will be stratified, tested for germination and field planted in 1993.

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 and 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 area 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. The third plot, planted on June 15, 1988, was placed 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, 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 comprehensive 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.

On September 1, 1992, these sites were again visited and evaluated, at which time all the plots and trials continued to perform very well.

Alyeska Ski Area Revegetation Study

In 1992, the PMC was asked to assist Alyeska Resort in developing a seeding program relying on native species. During a June 1992 site visit, various options including commercially available seed mixes were discussed. Alyeska Resort was committed to locally harvested species being used in conjunction with commercially purchased native grasses.

During the next three site visits, local collection sites were identified and seed collecting techniques were relayed to Alyeska Resort personnel. When the final 1992 visit occurred on September 10, 1992, the year's collection program was nearly over. The PMC will assist Alyeska in developing seed cleaning techniques during the 1992-1993 winter.

In 1993, the PMC has been asked to establish evaluation plots at the site and determine the feasibility of commercially producing the species collected during 1992.

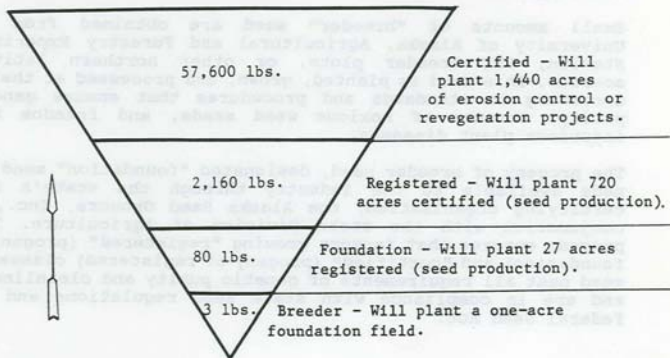
Foundation Seed Program

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

Small amounts of "breeder" seed are obtained from the University of Alaska, Agricultural and Forestry Experiment Station, PMC breeder plots, or other northern latitude sources. This seed is planted, grown, and processed at the PMC according to standards and procedures that ensure genetic purity, absence of noxious weed seeds, and freedom from injurious plant diseases.

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.

Figure 3 - Seed Increase Pyramid



This 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.

1992 Growing Season

The early part of the growing season was cooler and wetter than in 1991. However, by the end of May, rainfall dropped below normal and remained there for the rest of the growing season. Total precipitation for April through September was only 5.18 inches, 1.18 inches less than last year.

Summer irrigation became necessary for the foundation grass fields, especially during the critical "seed filling" growth stage. Harvesting began July 7 with 'Gruening' alpine bluegrass, and ended August 27 with 'Weal' barley. While most harvests were average, 'Nortran' tufted hairgrass yielded a high 178 lb./acre from its second harvest season. With only 0.53 inches of August rain, winter wheat and barley ripened especially well, allowing an early harvest.

Two new foundation fields were planted in 1992: 'Caiggluk' tiley sagebrush and 'Norcoast' Bering hairgrass. A new charcoal banding technique was tried for the first time to assess seedling-year weed control. In addition to the sagebrush and hairgrass, two new fields were planted to *Agropyron macrourum* and *Poa alpina*. These two grasses were collected in Denali National Park. Seed harvested in the future from these two fields will be specifically utilized for revegetation projects within the park.

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 southcentral Alaska, primarily the Matanuska and Susitna Valleys. In 1992, five growers requested inspections of eight certified seed fields. Also, twelve seed lots were sampled for testing, while eleven lots were sampled during the last months of 1991.

TABLE 1. REVEGETATION AND TURF VARIETIES IN PRODUCTION IN 1992.

Variety	Class	Acres
'Arctared' Fescue	Foundation	1.4
'Gruening' Alpine Bluegrass	Foundation	1.0
'Nortran' Tufted Hairgrass	Foundation	1.0
'Egan' American Sloughgrass	Breeder	1.0
'Gruening' Alpine Bluegrass	Breeder	1.0
'Caiggluk' Tilesy Sage	Breeder	0.5
'Service' Big Bluegrass	Breeder	0.5
'Reeve' Beach Wildrye	Foundation	0.5
'Benson' Beach Wildrye	Foundation	0.2
'Egan' American Sloughgrass	Foundation	1.0
'Norcoast' Bering Hairgrass	Foundation	1.0

TABLE 2. CEREAL GRAIN SEED & OIL SEED VARIETIES IN STORAGE AT THE PLANT MATERIALS CENTER, DECEMBER, 1992.

Barley		Wheat		Oats		Rye		Rapeseed		Buckwheat	
Variety	Tons	Variety	Tons	Variety	Tons	Variety	Tons	Variety	Tons	Variety	Tons
Lidal	15.0	Chena	9.0	Toral	4.0	Bebral	0.6	Candle	3.0	Oly	0.1
Otal	6.8	Ingal	5.2	Ceal	1.0						
Thual	5.1	Vigal	1.9	Nip	2.3						
Weal	6.2	Nogal	1.3	Golden Rain	0.1						
Datal	4.3	1397	0.5	Freedom	.07						
Finnaska	1.0	66116243-344	0.3	Total	7.5						
Pokko	0.6	Norstar	0.07								
Arra	0.3	Gasser	0.04								
Eero	0.2	Froid	0.07								
Edda	0.05	Rough-rider	0.03								
Paavo	0.03	Total	17.5								
Tibet Hulless	0.03										
Galt	0.01										
Otra	Trace										
Steptoe	Trace										
Total	39.6										

TABLE 3. TURF, FORAGE, AND REVEGETATION VARIETIES IN STORAGE AT THE PLANT MATERIALS CENTER, DECEMBER, 1992.

Variety	Pounds
'Alyeska' Polargrass	340
'Arctared' Fescue	1,025
'Caiggluk' Tilesy Sagebrush	105
'Egan' American Sloughgrass	180
'Engmo' Timothy	1,730
'Gruening' Alpine Bluegrass	285
'Kenai' Polargrass	65
'Norcoast' Bering Hairgrass	260
'Nortran' Tufted Hairgrass	195
'Nugget' Kentucky Bluegrass	449
'Polar' Brome	364
'Reeve' Beach Wildrye	100
'Service' Big Bluegrass	190
'Sourdough' Bluejoint	40
'Tundra' Glaucous Bluegrass	40
Total	5,368

TABLE 4. CEREAL GRAINS SALES & RECEIPTS, 1990 - 1992.

Type	1990	1991	1992
Barley	3,100 lbs	-0-	-0-
	\$ 1,008.17		
Oats	1,500 lbs	1,000 lbs	1,100 lbs
	\$ 463.65	\$ 355.90	\$382.91
Wheat	650 lbs	200 lbs	-0-
	\$ 204.57	\$ 31.52	
Rye	42 lbs	-0-	100 lbs
	\$ 15.32		\$ 36.50
Total	5,292 lbs	1,200 lbs	1,200 lbs
	\$1,691.71	\$387.42	\$419.41

TABLE 5. GRASS SEED SALES & RECEIPTS, 1990 - 1992.

Variety	1990	1991	1992
'Nugget' Kentucky Bluegrass	-0-	-0-	335 lbs
			\$ 3,870.80
'Arctared' Red Fescue	149 lbs	-0-	375 lbs
	\$ 2,015.79		\$ 3,404.26
'Sourdough' Bluejoint	-0-	-0-	10 lbs
			\$ 527.60
'Alyeska' Polargrass	-0-	20 lbs	-0-
		\$ 273.80	
'Gruening' Alpine Bluegrass	12 lbs	10 lbs	80 lbs
	\$ 193.92	\$ 177.90	\$ 1,426.60
'Egan' American Sloughgrass	-0-	5 lbs	40 lbs
		\$57.65	\$ 728.00
'Norcoast' Bering Hairgrass	80 lbs	89 lbs	40 lbs
	\$ 1,631.20	\$ 1,028.84	\$ 749.20
'Nortran' Tufted Hairgrass	20 lbs	-0-	72 lbs
	\$ 367.20		\$ 1,450.66
'Polar' Brome	-0-	-0-	-0-
'Tundra' Glaucous Bluegrass	17.5 lbs	-0-	75 lbs
	\$ 162.81		\$ 1,103.75
'Caiggluk' Tulesy Sagebrush	-0-	-0-	2 lbs
			\$ 17.22
Total	278.5 lbs	124 lbs	1,029 lbs
	\$ 4,370.92	1,538.19	\$ 13,278.09

NORTH LATITUDE VEGETABLE AND LANDSCAPE CROP IMPROVEMENT PROJECT

Horticulture Development Project

The horticulture industry has been a strong component of Alaska's agriculture industry for several years. The 1990 Alaska Railbelt Horticulture Industries Survey states that in 1989 and 1990 the industry made up over 50% of the state's total agricultural cash receipts. In 1990, Alaska grown products accounted for 70% of the live plant sales. The industry has the greatest economic impact throughout the Railbelt area and provides a significant number of jobs in the area. Over 1,800 people were employed by the horticulture industry in 1990.

The Horticulture Development Program provides assistance for the continued expansion of this industry. The efforts of this portion of the Vegetable & Landscape Crop Improvement Project target the ornamental and small fruit, greenhouse and vegetable production segments of the industry.

The program is responsible for trials of vegetable, small fruit, and ornamental plants. Both native and introduced plants are evaluated in the trials. Cultural and production techniques are also evaluated.

This project benefits the greenhouse production industry the most by co-sponsoring the Alaska Greenhouse & Nursery Conference and Polar Grower Trade Show. Other co-sponsors of the conference and trade show are the University of Alaska Cooperative Extension Service and the Alaska Horticulture Association.

The basic steps used to establish a data base of information and a resource of horticulture plants for use by the industry are as follows: 1) define and anticipate horticulturally related problems with the assistance of the industry; 2) establish priorities; 3) research solutions to the problems; 4) collect plant materials for trials; 5) conduct initial evaluations; 6) conduct off-site and advanced evaluations; 7) propagate the plants to be released to the industry; and 8) formally release the cultivar.

Blueberry Applied Agricultural Research Account (AARA) Grant Study

Several growers have requested information on techniques to improve the fruit production of native stands of blueberries. In 1988, the project received an AARA Grant to investigate cultural techniques to increase the fruit production in wild stands of blueberries. Three trials, each consisting of four 10-meter by 10-meter plots were established. One trial is located in the Bartlett Hills Agricultural Project near Talkeetna and two are located on a farm in the Montana Creek area.

All of the plots, plus a 1-meter band around the perimeter of each plot, were cleared of trees and other shrubs. One plot of each trial was used as a control and received no additional treatment. The other three plots received a combination of fertilizer and pruning treatments. Ten grams of elemental nitrogen, phosphorus and potassium per square meter were applied to the fertilized plots. A weed whip modified with a triangular sawblade was used to prune the plots. Data was collected on cover, density and current annual growth.

The percent stand of blueberries and the *Vaccinium* species varies with each site. Alpine blueberry (*Vaccinium uliginosum*), dwarf blueberry (*V. caespitosum*), and early blueberry (*V. ovalifolium*) grow at the Talkeetna site. The predominant species at the west Montana Creek site is early blueberry, *V. ovalifolium*. Both *V. ovalifolium* and *V. uliginosum* grow at the north Montana Creek site.

In 1990, elemental nitrogen, phosphorous and potassium was applied at the rate of 10 gm/m² to each of the fertilized plots early in the season. At that time, undesired trees and shrubs were cut back to ground level and grasses were treated with a 20% solution of Roundup applied with a hand-held wiper applicator.

On June 25, 1991, elemental nitrogen, phosphorous and potassium were applied at the rate of 10 g/m² to each of the fertilized plots. The amount of precipitation received at all of the sites had been very low during May and June. The blueberry and other competing plants at the sites showed signs of drought stress. Dwarf blueberry was the only blueberry species in bloom at that time. Most plants were beginning to wilt and there was very poor fruit set on the other species.

The weather conditions during the 1991 growing season appear to have affected the yield more than the treatments (Table 6). The season began with a long dry period that lasted through June. The sites with the highest yields appeared to have the best moisture conditions early in the season.

In 1992, the Montana Creek sites were not monitored because they were required for other farm activities. A late cold spring followed by a dry period again impacted the yield in 1992. Yield was up in both fertilized plots, but lower in the unfertilized plots. Grasses, trees, shrubs and other forbs continue to encroach the plots and provide competition for the blueberries.

Table 6 - Talkeetna Blueberry AARA Site 1990 - 1992 Harvest

	No Fertilizer, Not Pruned, Harvest g	No Fertilizer, Pruned, Harvest g	Fertilized, Not Pruned, Harvest g	Fertilized Pruned, Harvest g
1990 Total	116 g	814 g	133 g	37 g
1991 Total Harvested	5 g	97 g	9 g	5 g
1992 Total Harvested	-0-	>1 g	28.5 g	108 g

Small Fruit Applied Agricultural Research Account (AARA) Grant Study

The Small Fruit AARA grant is a cooperative project with the University of Alaska Fairbanks, Agriculture and Forestry Experiment Station. This study's goal is to systematically evaluate small fruit varieties in 13 locations in the railbelt area. The PMC is responsible for seven sites in southcentral Alaska. The trials planted in 1988 and 1989 include six varieties of *Amelanchier* or serviceberry, four black currant varieties (*Ribes* spp.), two red currant (*Ribes* spp.) varieties, 13 raspberry (*Rubus* spp.) varieties and three half-high blueberry (*Vaccinium* spp.) varieties. One raspberry variety, 'Heritage', did not perform well in 1988 and was replanted in 1989, with replacement plants from the supplier. This variety has died in most of the sites.

Information collected by the cooperators in this study includes winter hardiness rating, date of bud break, bloom and harvest dates and yields. The 1991 yield information indicates that in southcentral Alaska each variety's performance varies depending upon the site. Results from two sites are given in Table 7. The plants in this study will be observed for five years. A final report will be prepared upon completion of the study.

Table 7. 1992 Results of Applied Agricultural Research Account Small Fruit Trials

Varieties	Palmer PMC Avg Yield g/plant		Talkeetna Avg Yield g/plant	
	1991	1992	1991	1992
<i>Amelanchier</i> - Serviceberry				
'Honeywood'*	508	99	30	0
'Northline'**	4	0	0	0
'Pembina'**	3	43	0	0
'Smoky'*	34	11	9	79
'Thiessen'*	116	181	8	0
<i>Ribes</i> - Black Currant				
'Boskoop'*	9,335	3,039	3,276	3,412
'Consort'*	2,956	2,609	0	0
'Swedish Black'	2,750	1,473	643	888
'Willoughby'*	1,714	951	0	0
<i>Ribes</i> - Red Currant				
'Holland Long Bunch'	0	3,153	646	1,848
'Honeywood'*	0	1,428	10	32
'Viking'**	0	3	0	0
<i>Rubus</i> - Raspberry				
'Anelma'*	22	281	6	0
Continued on Page 40				

Table 7. Continued

Varieties	Palmer PMC Avg Yield g/plant		Talkeetna Avg Yield g/plant	
	1991	1992	1991	1992
'Autumn Bliss'*	0	0	0	0
'Blackhawk'***	0	0	0	0
'Boyne'*	13	1,045	0	2
'Festival'*	203	1,412	0	2
'Kiska'*	310	1,751	13	265
'Jewel'*	0	0	0	0
'Red Wing'***	0	0	0	0
'Reveille'*	2	218	0	0
'Royalty'***	0	89	0	0
'Ruby'***	0	1	0	0
'Titan'***	0	39	0	0
Vaccinium - Blueberry				
'North Blue'*	0	49	0	0
'North Country'	0	0	0	0
'North Sky'*	0	0	0	0

* Planted in 1988

** Planted in 1989

NA Not Available

Tomato Variety Observations

John Holm, a long-time Fairbanks nursery grower and former Alaska legislator, has also been a successful breeder of cold-hardy tomato varieties. His tomato varieties have been producing ripe fruit in Fairbanks gardens for several years. One of his first varieties, 'Sub Arctic 25', has remained a popular variety for northern locations and been used as a parent for other commercial varieties.

In 1990, he offered the Plant Materials Center (PMC) seed of some of his hardier varieties to be tested in the Palmer area. Several of his varieties and additional varieties suggested by other growers have been tested at the PMC since 1990. Varieties grown in the 1992 test include the following Holm's varieties: 'Alpha', CA x JD F₁, 'Denali', 'Polar Baby', 'Polar Beauty', 'Polar Gem', 'Polar Star', 'Sub Arctic 25' and an unnamed F₁. Additional varieties grown were 'Glacier', 'Presto', 'Siberian', 'Stupice', and 'Sub Arctic Maxi'.

Seeds of all varieties were sown on April 16, 1992. The seedlings were transplanted at the first true-leaf stage into four-inch square pots on May 13, 1992. Transplants were fertilized with 150 ppm Nitrogen using a 14-17-26 fertilizer each time they were watered.

Single row plots were transplanted by hand with guard rows on each edge of the entire trial, and guard plants on the end of each variety row on June 9, 1992. Plants were spaced two feet apart in the row, with rows six feet apart to allow for mechanical cultivation between the rows. Each variety was grown under two different treatments. In one treatment, they were grown in an open field situation, and for the second treatment, under a plastic mulch.

The trial was irrigated with a hand-moved, overhead sprinkler system. All of the varieties became well established and flowered. The first harvest occurred eight days earlier than in 1991 (August 3, 1992), and one day later than in 1990. The last harvest for the 1992 season was on September 10. The first variety harvested in all three years was 'Polar Baby'.

Again in 1992, the Alaska developed varieties continued to produce the most ripe fruit. The varieties 'Polar Baby' and 'Polar Star' produced the most ripe fruit. No fruit was harvested from 'Denali', 'Presto', and 'Sub Arctic Maxi'.

A complete summary of the results of the trials is available in the Results of 1992 Tomato Variety Observations, published by the Alaska Plant Materials Center.

Annual Alaska Greenhouse and Nursery Conference

The Alaska Greenhouse and Nursery Conference, Master Gardener Conference and Agriculture Symposium were held together again for the second year. The Central Peninsula Sports Center in Soldotna was the site for the second Alaska Agriculture Week, November 10-14, 1992.

Co-sponsors of the Alaska Greenhouse and Nursery Conference included the Alaska Plant Materials Center, the University of Alaska Cooperative Extension Service (CES) and the Alaska Horticultural Association. Additional contributions to support the conference were received from the following businesses and organizations: WeHoP, Kent, Washington; Skagit Gardens, Mt. Vernon, Washington; McConkey Company, Sumner, Washington; Northwest Landscape, Anchorage, Alaska; Far North Garden Supply, Wasilla, Alaska; P & M Garden Services, Eagle River, Alaska; Steuber Distributing Company, Snohomish, Washington and the University of Alaska Fairbanks, School of Agriculture & Land Resources Management (SALRM).

One hundred people from 16 different communities in Alaska attended the Greenhouse and Nursery Conference. The number of Alaskan and Canadian communities represented at the conference during each past five years has ranged from 16 to 22 communities.

The Polar Grower Trade Show continues to be an integral component of the conference. Fifteen businesses and organizations participated in the Trade Show this year.

Alaska growers and business people, University of Alaska Fairbanks CES and SLARM personnel, and national business representatives made informative presentations at the conference. Jeannine Bogard, Goldsmith Seeds, Inc., spoke on "Trends of the Horticulture Industry" and Nanci Hollerith, Skagit Gardens, spoke on "Herbaceous Perennial Varieties". "Looking to the Future of Alaska's Agriculture" was presented by Ron Sexton, Trinity Greenhouses. Ron was a member of Governor Hickel's Agricultural Task Force. Trinity Greenhouses was well represented at the conference as Dan Sexton also made a presentation on "Container Growing of Hybrid Roses".

Other topics covered on the first day included greenhouses for northern climates, new record keeping requirements for pesticide applicators, and nutrient toxicities.

Topics the second day concentrated on the nursery and landscape industry and promoting the use of native plants for landscape and revegetation purposes.

Verna Pratt, author of Field Guide to Alaskan Wildflowers and Wildflowers Along the Alaska Highway, spoke on "Using Native Plants in Landscaping" which included a slide show of Alaska native plants. Marcia Ward, Ward Landscaping, and Dick Baldwin, Baldwin Seeds, represented the Kenai Peninsula's horticulture industry speaking on "New Ideas in Successful Techniques in Landscape Plant Installation" and "Wildflower Production", respectively. "Tree Growing Techniques" was presented by Ed Baker of Baker's Acres Nursery. For the first time, an Alaskan utility company representative made a presentation at the conference. Mark Malin from Golden Valley Electric Association spoke on planting the right tree in the right place.

Each year a proceedings of the Greenhouse and Nursery Conference presentations is compiled by the CES. Copies are available for a small fee from the CES office in Anchorage. The proceedings have been published since the 1983 conference and have provided a useful tool for people interested in the greenhouse and nursery industry in Alaska.

Off-Site Plant Trials

The Horticulture Development Program has established plant trials throughout the state. Trials have been located in Fairbanks, Delta, Homer, Kenai, Kodiak, Nenana, Trapper Creek and the Manillaq area. A planting in Unalaska was destroyed before hardiness and growth information could be collected.

A new site was established in Copper Center at the public library in 1991. The volunteers who work at the library planted the site and will care for the trial. Other cooperators assisting with the trials include the University of Alaska Cooperative Extension Service, individual cooperators, local governments and native corporations.

Ornamental trees and shrubs, and small fruits are being evaluated at these sites. Plants which have performed well in trials or in the nursery at the PMC farm, are propagated and planted in the off-site trials. Plant materials may also be selected from plant exchanges for Kodiak which may not perform as well in Palmer or interior Alaska. Data collected for each plant grown at the sites includes growth rate, winter hardiness and disease and insect resistance. Evaluations are generally made at the trial sites on an annual basis. Due to the early fall, the trial sites were not evaluated in 1992.

Adak Naval Air Station Horticultural Demonstration Plantings

The PMC developed the horticultural demonstration plantings at the request of the U. S. Navy. Plantings were designed to demonstrate which introduced and native plants are suitable for landscaped or garden areas around the Naval Complex, Naval Air Station (NAS) facilities and residential housing units. A comprehensive list of ornamental plants and plants native to other areas of Alaska which will survive on Adak has not been compiled. The results of these plantings can be used in the formation of such a list.

The maritime climate of Adak Island (51° 45' N, 176° 45' W) is characterized by high winds, overcast skies and very cool summers. Despite the relatively long frost-free period for the Aleutian Islands (130 to 190 days), the mean annual temperature on Adak is relatively low. Mean monthly temperatures vary from a low of 32.9° F in February, to a high of 51.3° F in August. The mean monthly temperature is above 50° F for only one or two months each year. This climate creates challenging growing conditions.

Trees were first planted on Adak 50 years ago during World War II. This project differed from previous ones in that shrubs, herbaceous perennial plants and bulbs were included in the plantings. Very few tree species were planted with this project. The location of the planting sites in this project also varied from past projects. Planting sites were located near Naval facilities rather than away from the buildings in open habitats.

Plants were selected the basis of the probability of their survival on Adak. Twenty-eight different trees or shrubs were planted. The majority of the woody species planted in the project were mid to low growing shrubs.

Thirty-four different herbaceous plants were planted in this project. Native and introduced flowering herbaceous plants are grown around several of the residences on Adak. They are popular because of the color and form they contribute to the landscape. On Adak, perennial and annual herbaceous plants help to add an element of landscape design provided by woody trees and shrubs in other areas.

Tulip and daffodil bulbs are also grown by the residents of Adak. Daffodils and tulips were in bloom in local gardens in late May. Thirty-two varieties of bulbs were planted in September on Adak. There are many different genera of bulbs which potentially may grow on Adak.

Crocus, ornamental onions (*Allium*), autumn crocus (*Colchicum*), and Glory-of-the-Snow (*Chionodoxa*) were planted in addition to tulips, daffodils and narcissus. Use of a greater variety of bulbs could expand the length of time flowers are in bloom around the developed areas of Adak.

Many of the woody plants were protected from the wind during the first summer with plastic barriers. Evaluations on the survival of the plants through their first winter on Adak were made between October 10-13, 1992.

The various bulbs bloomed in the spring and were such a success that the Self Help Store ordered more bulbs for distribution in October 1992. The survival and performance of the woody plants varied greatly from one location to another. Among the best performing woody plants were cotoneaster, Hansa rose, Prince of Wales juniper, Blue Carpet juniper, *Potentilla* varieties and Regent serviceberries. Asters, lupine, yarrow, columbine, anemone and veronicas are the perennials which performed the best.

Horticulture and Revegetation Plant Sales & Receipts

In order to develop commercial horticulture production, several types of plants have been sold by the PMC to commercial growers since 1979. Plant materials for both horticultural and revegetation uses are sold. These plants have been promoted for use in Alaska by the University of Alaska Agriculture and Forestry Experiment Station and the PMC. Growers purchasing plants agree to use them as stock plants or for food production. The demand for the plants varies each year depending upon the commercial availability of the varieties (Table 8). The Alaska Horticultural Association receives 25% of the plant sales receipts for handling the plant sales, and the PMC uses the remaining 75% of the receipts to pay for the publication of the PMC reports.

Table 8. Horticulture and Revegetation Plant Sales and Receipts

Variety	1990	1991	1992
'Holland Long Bunch' Currant			
'Swedish Black' Currant			
'Kenai Carpet' Nagoonberry		275 plants	75 plants
		\$550.00	\$150.00
'Friedrichsenii' Potentilla	25 plants		
	\$62.60		
'Kiska' Raspberry	100 plants		12 plants
	\$200.00		\$28.80
'Pioneer' Strawberry	150 plants		50 plants
	\$60.00		\$30.00
'Sitka' Strawberry	300 plants		25 plants
	\$135.00		\$15.00
'Skwentna' Strawberry	150 plants		25 plants
	\$60.00		\$15.00
'Talkeetna' Strawberry	150 plants		50 plants
	\$60.00		\$30.00
'Long' Barclay Willow		40 cuttings	20 cuttings
		\$48.00	\$25.00
'Oliver' Barrenground Willow		40 cuttings	
		\$48.00	

Table 8. Continued

Variety	1990	1991	1992
'Rhode' Feltleaf Willow		40 cuttings	
		\$48.00	
'Roland' Pacific Willow	25 cuttings	40 cuttings	20 cuttings
	\$62.50	\$48.00	\$25.00
'Wilson' Bebb Willow		40 cuttings	20 cuttings
		\$48.00	\$25.00
Feltleaf Willow			200 cuttings
			\$235.00
Pacific Willow			100 cuttings
			\$125.00
'Alpha' Tomato		9 g Seed	15 g Seed
		\$18.00	\$30.00
'Denali' Tomato		15 g Seed	6 g Seed
		\$30.00	\$12.00
'Polar Baby' Tomato		36 g Seed	28 g Seed
		\$72.00	\$56.00
'Polar Gem' Tomato		28 g Seed	12 g seed
		\$56.00	\$24.00
'Polar Star' Tomato			6 g Seed
			\$12.00

Russian Mission Village Farm Project

In 1991, the Kuskokwim Economic Development Council (KEDC) requested the Plant Materials Center assist in the development of a farm project for Russian Mission. One goal of the project is to provide fresh vegetables and fruits for the village. During the spring of 1992, PMC staff assisted in the development of the project by ordering and procuring small fruit plants for the project, providing information about equipment required and providing cabbage transplants for a variety trial for the project. Assistance was also provided to help train the farm manager, and lay out and plant the project.

Thirty different small fruit varieties (Table 9) were purchased by KEDC from eight local nurseries for the trials. Twenty cabbage varieties grown for trials in Palmer were also transplanted in the Russian Mission trials (Table 10).

Three trial or garden sites were established in or near the village. They were developed by the local farm manager. The manager and PMC staff were assisted in planting by village students and children. Students assisted in the maintenance throughout the summer.

It was reported that the fruit plants became well established this summer and hardiness information on the varieties can be collected in the spring of 1993. Cabbage was harvested in addition to broccoli and potatoes which were also planted in the farm project.

The farm project will also include a trial to study the effects of pruning and fertilizer on native berry stands. Sites were identified to begin the initial fertilizer and pruning study. The farm manager was unable to apply the treatments to the plot this past summer. Plans are for the study to continue in 1993.

Table 9. Plant List for Russian Mission Farm Project, 1992.

Plant Variety	Plant Variety
Serviceberry:	<i>Ribes</i> 'Red Lake', red currant
<i>Amelanchier alnifolia</i> 'Regent'	<i>Ribes</i> 'Swedish Black', black currant
<i>Amelanchier alnifolia</i> 'Smokey'	<i>Ribes</i> 'Holland Long Bunch', red currant
Chokeberry:	Raspberry:
<i>Aronia melanocarpa</i>	<i>Rubus</i> 'Mammoth Red Thornless'
Strawberry:	<i>Rubus</i> 'Golden Amber'
<i>Fragaria</i> 'Chief Bemidji'	<i>Rubus</i> 'Yellow Rasp'
<i>Fragaria</i> 'Ogallala'	<i>Rubus</i> 'Trent'
<i>Fragaria</i> 'Matared'	<i>Rubus</i> 'Hilton'
<i>Fragaria</i> 'Susitna'	<i>Rubus</i> 'Canby'
<i>Fragaria</i> 'Toklat'	<i>Rubus</i> red raspberry
<i>Fragaria</i> 'Honeyoye'	<i>Rubus</i> 'Heritage'
<i>Fragaria</i> 'Gloscap'	<i>Rubus</i> 'Latham'
Nanking Cherry:	<i>Rubus</i> 'Kiska'
<i>Prunus tomentosa</i>	<i>Rubus</i> 'Boyne'
Currant & Gooseberry:	
<i>Ribes</i> 'Consort', black currant	
<i>Ribes</i> 'Pixwell', gooseberry	
<i>Ribes</i> 'Captivator', black currant	
<i>Ribes</i> 'Crandall', black currant	
<i>Ribes</i> 'Wilder', red currant	

Table 10. Cabbage Varieties Transplanted in Russian Mission Farm Project.

Variety	Seed Source	Expected Days to Maturity ¹	Type
Apex	Johnny's	95	Late Fresh or Storage
Autoro	Seedway	115	Red, Long Term Storage
Bently	Seedway	120	Long Term Storage
Carlton	Seedway	90	Storage
Castello	Stokes	68	Fresh, will hold
Chief	Seedway	100	Short Term Storage
Cicero	Seedway	115	Red, Long Term Storage
Dakota	Seedway	103	Mid Term Storage
Felix	Seedway	115	Long Term Storage
Fieldgoal	Seedway	90	Fresh, will hold
Fieldsport	Seedway	65	Fresh, will hold
Gideon	Seedway	78	Long Term Storage
Hinova	Seedway	100	Short Term Storage
Impala	Seedway	120	Long Term Storage
National	Seedway	115	Long Term Storage
Perfect Ball	Johnny's	87	Late Fresh or Storage
Predena	Seedway	90	Short Term Storage
Sombrero	Seedway	90	Red, Short Term Storage
¹ number of days to first harvest in this trial			
¹ number of days to maturity listed by seed companies			

Yield data for each variety was to be collected from the center two rows of each plot. An inconsistent stand development resulted in yield data being collected from some inside guard rows for five varieties. Most of the varieties in one replication planted in a low area in the field did not mature and were not harvested. Therefore, the data cannot be statistically analyzed. General characteristics of each variety can be gathered from the information that was collected (Table 12).

No disease symptoms were found in the varieties 'Impala', 'Hinova', and 'Gideon'. The variety 'Gideon' appeared to have the most promise for commercial production of the new varieties.

Replication	Yield (kg/ha)	Yield (kg/ha)	Yield (kg/ha)	Yield (kg/ha)
1	110	110	110	110
2	110	110	110	110
3	110	110	110	110
4	110	110	110	110
5	110	110	110	110
6	110	110	110	110
7	110	110	110	110
8	110	110	110	110
9	110	110	110	110
10	110	110	110	110
11	110	110	110	110
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91	110	110	110	110
92	110	110	110	110
93	110	110	110	110
94	110	110	110	110
95	110	110	110	110
96	110	110	110	110
97	110	110	110	110
98	110	110	110	110
99	110	110	110	110
100	110	110	110	110

Table 11. Cabbage Varieties Grown at Gold Nugget Farm, 1992, Their Source, Days to First Harvest and Expected Days to Maturity.

Variety	Seed Source	Days to 1st Harvest in Alaska ¹	Expected Days to Maturity ²	Type
Apex	Johnny's	Not harvested	95	Late Fresh or Storage
Autoro	Seedway	Not harvested	115	Red, Long Term Storage
Bently	Seedway	Not harvested	120	Long Term Storage
Carlton	Seedway	110	90	Storage
Castello	Stokes	86	68	Fresh, will hold
Chief	Seedway	Not harvested	100	Short Term Storage
Cicero	Seedway	Not harvested	115	Red, Long Term Storage
Dakota	Seedway	Not harvested	103	Mid Term Storage
Felix	Seedway	Not harvested	115	Long Term Storage
Fieldgoal	Seedway	80	90	Fresh, will hold
Fieldsport	Seedway	80	65	Fresh, will hold
Gideon	Seedway	110	78	Long Term Storage
Hinova	Seedway	110	100	Short Term Storage
Impala	Seedway	122	120	Long Term Storage
National	Seedway	Not harvested	115	Long Term Storage
Perfect Ball	Johnny's	Not harvested	87	Late Fresh or Storage
Predena	Seedway	100	90	Short Term Storage
Sombrero	Seedway	122	90	Red, Short Term Storage
¹ number of days to 1st harvest in this trial				
² number of days to maturity listed by seed companies				

Table 12. General Characteristics of Cabbage Varieties in Trial.

Variety	Average Head Weight, lbs.	Average Head Diameter, in.	Average Core Length, in.
Impala	3.72	6.84	3.92
Sombrero	6.12	7.78	3.98
Carlton	2.74	6.66	2.61
Hinova	3.11	6.67	3.36
Gideon	2.96	6.15	2.94
Predena	3.49	6.4	3.55
Fieldsport	2.49	5.56	2.63
Fieldgoal	2.14	6.59	2.62
Castello	3.09	6.15	2.94

Potato Disease Control Program

Potatoes are the most valuable crop grown on Alaskan farms. The value of the 1991 crop was \$2,380,000.00. The potato crop has averaged an annual value of almost \$2.5 million over the last ten years. The potato has been successfully grown in Alaska since its introduction by Russian traders in the late 1700's and it is mentioned as a staple of the gold seekers in the early 1900's.

Commercial potato production is highly capital intensive. High yields of good quality potatoes are required to assure a fair return on investment. Diseases affecting the potato are capable of destroying entire crops. Many of these diseases are carried in or on the potato itself and for this reason potatoes used for seed are subjected to strict inspections. Planting high quality seed can make the difference between a profitable harvest and going broke.

Alaska's potato production accounts for 70% of the local table stock market. The lack of processing facilities precludes any competition with imported frozen or other processed product. The use of new potato cultivars and upgraded packaging facilities has the potential of increasing this market share.

Alaska is unique in that many diseases and insect pests that require the application of chemicals for control do not occur in the commercial production areas. The inadvertant introduction of these diseases or pests would cause major problems, and for this reason the importation of seed is discouraged.

Disease-Tested Seed Potato Production

In 1992, the project produced 10,000 disease-tested plants of 23 varieties. Five varieties accounted for 76% of this total. The varieties most in demand were Green Mountain, Shepody, Bake-King, Iditared, Russet Norkota, Superior and Belrus.

Approximately 1,000 plants were made available to three growers for production of Generation 1 (G1) seed. The remaining plants were grown in greenhouses at the Plant Materials Center (PMC), and produced 1,000 pounds of G1 seed to meet the orders placed in 1991.

Disease-tested seed amounting to 6,000 pounds of three russet-skinned varieties were field grown to provide seed for trials to be in 1992.

The potato project performed over 8,000 tests to ascertain the health of the materials produced. Each mother plant was tested for Bacterial Ring Rot, six potato viruses (X, S, Y, A, M, LR) and Potato Spindle Tuber Viroid prior to propagation. Tests for virus infection were also conducted at harvest.

Figure 4

TUBER INTRODUCTION

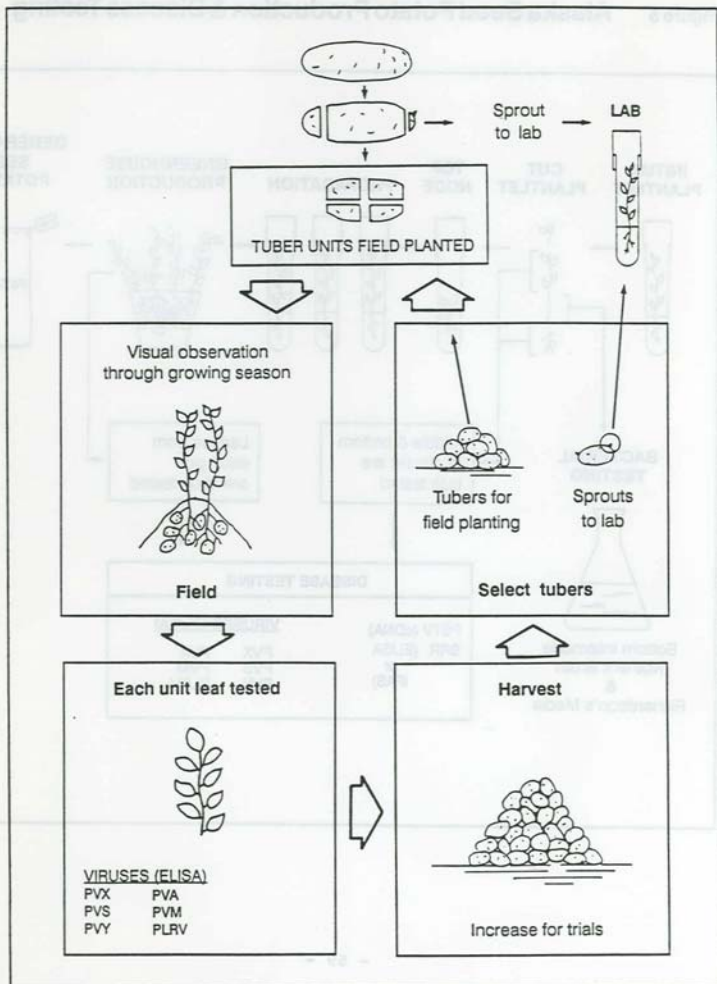
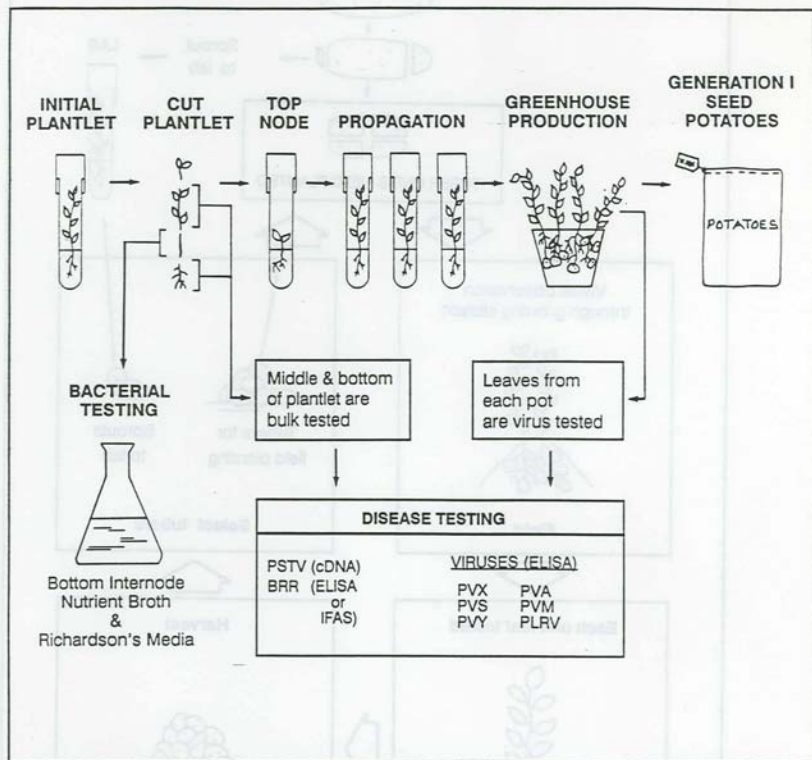


Figure 5

Alaska Seed Potato Production & Disease Testing



Seed Potato Certification

State of Alaska Seed Regulations 11 AAC 34.075 (J) require that potatoes sold, offered for sale or represented as seed potatoes be certified. Potato seed certification programs are important to the health of the potato industry. Disease-free seed can quickly become infected with disease when exposed to pathogens. Growers manage their seed production to limit possible exposure to diseases, but reinfection from soil or other sources can occur. Certification is designed to identify and remove from use as seed those seed lots which have become diseased, or otherwise are of reduced value for use as seed. This is accomplished by inspection for diseases in potato fields.

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 the disease tolerances allowed for seed. Certified seed potatoes produced in Alaska are far superior to seed produced outside of the state. Alaska's commercial production areas are free from the diseases Late Blight, Potato Leafroll Virus (PLRV), and Potato Virus Y (PVY). These are diseases that growers in other areas can only control with an arsenal of pesticides. The importation of potatoes carries with it the risk of introducing these and other diseases which are capable of having severe consequences to Alaskan growers. The local availability of disease-free seed reduces the potential of introducing diseases not presently found in Alaska.

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. Inspections were performed during the growing season on 173 lots planted to 55 acres. There were 38 varieties grown as certified seed. The varieties Bake-King, Shepody and Green Mountain comprised the majority of certified seed acreage. Certified seed potatoes were grown in the Matanuska Valley, Fairbanks and Bartlett Hills area near Talkeetna. Each lot was inspected according to certification standards for disease and varietal purity.

Educational Program

The educational component of the program at the PMC allows interaction with wide ranges of interested groups from elementary school children to life-long experienced farmers.

Eighty fourth grade students from Pioneer Peak Elementary School near Palmer were escorted on a field trip to a potato field near their school. A discussion of food production methods and problems faced by farmers indicated a level of understanding one would not expect from such a young group. A feast of french fries made with potatoes gathered from the field was delightful.

Four Houston first grade classes were shown a variety of different types of potatoes. Round, oblong, flat, white, red, russet, yellow and purple potatoes helped generate questions concerning food production from the children. The idea of a plant's life cycle and it's association with garden plants was discussed.

Through the Anchorage School District Community Resource Program, four classes at the Susitna Elementary School were presented with a collection of a variety of variously colored potatoes along with a discussion of diseases affecting the potato and various disease control strategies.

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.

The 1992 Alaska State Fair in Palmer provided an opportunity to present information on potato varieties grown in Alaska. A one-hour time slot was provided at the Erwin Building through the Fair's Demonstration Program. Approximately 60 people attended.

Presentations were made at the 76th Potato Association of America held in Fredericton, N. B. They were "An Overview of Potato Production in Alaska" and "Heirloom Varieties: How Can They Be Certified?"

A presentation was made at the 1st Circumpolar Agriculture Conference held in Whitehorse, Yukon Territory.

Table 13. Potato Scab Plot Cultivar Evaluation

Cultivar	Rating	Cultivar	Rating	Cultivar	Rating
Alaska 114	5	Green Mountain	6	Redsen	3
Alaska Red	4	Jemseg	4	Rideau	2
Alaska Sweetheart	5	Krantz	1	Rote Erstling	5
Amisk	3	Lemhi	2	Russet Norkota	7
Atlantic	5	Mirton Pearl	3	Saginaw Gold	4
Bake King	7	Nipigon	3	Sangre	4
Belle de Fontenay	3	Norking	3	Shepody	6
Belmont	5	Norland	4	Sunrise	5
Epicure	6	Reddale	4	Superior	5
Eramosa	3	Red Lasoda	4	Trent	4
Frontier Russet	2	Red Pontiac	5		

Rated by visual inspection and scored 1-12:

1 - little or no scab lesions

3 - acceptable for U. S. #1

7 - greater than 50% of tuber surface infected

Copper River Native Association Trials

Seed of fourteen varieties was planted at the Copper River Native Association plots in Copper Center on June 8th, and harvested September 7, 1992. This was the shortest season recorded by the CRNA Agriculturalist. Observations of quality and total yield were recorded. The varieties Mirton Pearl, Red Pontiac, Norland, Yankee Supreme and Snowchip produced the highest yields. Mirton Pearl and Red Pontiac yielded well in previous trials at this location. Approximately 40 people in the Copper Center area benefited from this program.

Table 14. Average Total Potato Yield Per Row Foot.

Variety	Actual lbs/45 row feet	Extrapolated cwt/ac
Bake King	67	216
Butte	24	77
Cherokee	70	226
Jemseg	78	251
Mirton Pearl	113	365
Nipigon	70	226
Norland	108	348
Red Lasoda	90	290
Red Pontiac	111	358
Rhinered	30	97
Sangre	42	136
Snowchip	100	323
Warba	50	161
Yankee Supreme	107	345

Cooperative National Plant Pest Survey

The Potato Disease Control Project joined the National Plant Pest Survey Program in 1984. The project assists the survey program by reporting the incidence of potato diseases found during inspections. The program is designed to promote disease surveys and improve methods used in the detection of important plant pests. The inspection data is entered into a computer system and is accessible by program participants. The information will facilitate research, extension and regulatory agencies in making decisions concerning plant pests.

Table 10. Average Total Potato Yield for New York

Year	Average Total Potato Yield (lb/acre)	Standard Error (lb/acre)
1984	107	10
1985	108	10
1986	109	10
1987	110	10
1988	111	10
1989	112	10
1990	113	10
1991	114	10
1992	115	10
1993	116	10
1994	117	10
1995	118	10
1996	119	10
1997	120	10
1998	121	10
1999	122	10
2000	123	10
2001	124	10
2002	125	10
2003	126	10
2004	127	10
2005	128	10
2006	129	10
2007	130	10
2008	131	10
2009	132	10
2010	133	10
2011	134	10
2012	135	10
2013	136	10
2014	137	10
2015	138	10
2016	139	10
2017	140	10
2018	141	10
2019	142	10
2020	143	10

APPENDIX A

CURRENT & HISTORICAL BUDGET INFORMATION

CALENDAR YEAR 1992 AUTHORIZATIONS, EXPENDITURES, AND PROGRAM RECEIPTS

Authorizations

Authorization FY 92 PMC Total \$620,900

North Latitude Revegetation & Seed Production Project	
Project Total	341,500
Personal Services	273,500
Travel	3,800
Contractual	40,400
Supplies	12,400
Equipment	11,400

North Latitude Vegetable & Landscape Crop Improvement Project	
Project Total	279,400
Personal Services	246,300
Travel	3,900
Contractual	16,500
Supplies	4,800
Equipment	7,900

Authorization FY 93 PMC Total 608,900

North Latitude Revegetation & Seed Production Project	
Project Total	307,700
Personal Services	246,300
Travel	5,500
Contractual	32,100
Supplies	12,400
Equipment	11,400

North Latitude Vegetable & Landscape Crop Improvement Project	
Project Total	301,200
Personal Services	275,500
Travel	4,200
Contractual	10,200
Supplies	3,400
Equipment	7,900

General PMC Operating Budgets for the Past Ten Fiscal Years

	FY 83	FY 84	FY 85	FY 86	FY 87	FY 88	FY 89	FY 90	FY 91	FY 92	FY 93
Authorization	725, 900	912, 300	863, 400	888, 500	733, 700	596, 700	556, 100	566, 100	566, 600	620, 800	608, 900
Personnel	21	25	19	19	17	16	16	16	16	16	16
Full Time	10	12	10	10	9	7	7	7	7	7	7
Part Time	11	13	9	9	8	9	9	9	9	9	9

When comparing personnel figures listed for FY 93 to those in FY 83, bear in mind that the Plant Materials Center is now performing basically the same duties at nearly the same level as it did in 1984 with 1/4 million fewer dollars.

1992 Calendar Year Monthly Expenditures to the Nearest Dollar

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
PMC Totals	41,406	39,925	42,586	44,563	46,343	38,529	30,420	72,165	65,662	61,253	51,277	49,275
Personal Services	34,814	34,432	37,498	39,680	40,743	31,718	30,420	60,322	58,152	49,447	45,272	42,116
Travel	-0-	146	-0-	169	166	-0-	-0-	2,965	1,223	913	-0-	939
Contractual	5,632	4,120	4,640	4,062	2,873	3,512	-0-	3,664	5,023	3,525	4,777	5,511
Supplies	959	268	1,824	652	2,569	3,299	-0-	5,214	1,264	4,598	1,229	1,831
Capital Outlay	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	-0-	2,770
North Latitude Revegetation & Seed Production Project												
Total Expenditures	21,521	20,175	22,384	23,323	21,869	17,190	14,313	34,246	31,854	31,426	26,505	24,955
Personal Services	17,339	17,003	18,639	19,950	17,255	12,927	14,313	26,193	26,934	22,585	22,636	20,549
Travel	-0-	146	-0-	-0-	166	-0-	-0-	1,096	806	325	-0-	523
Contractual	3,611	2,781	3,298	2,756	1,879	2,520	-0-	2,335	3,351	2,692	3,121	2,758
Supplies	570	245	482	617	2,569	1,743	-0-	4,622	763	3,054	748	1,125
North Latitude Vegetable & Landscape Crop Improvement												
Total Expenditures	19,885	18,791	20,202	21,240	24,474	21,339	16,107	37,919	33,808	29,827	24,772	24,320
Personal Services	17,475	17,429	18,859	19,730	23,488	18,791	16,107	34,129	31,218	26,862	22,636	21,567
Travel	-0-	-0-	-0-	169	-0-	-0-	-0-	1,869	417	588	-0-	416
Contractual	2,021	1,339	1,342	1,306	994	992	-0-	1,329	1,672	833	1,656	1,631
Supplies	389	23	-0-	35	-0-	1,556	-0-	592	501	1,544	481	706

Program Receipts Calendar Year 1992

Contracts, Reimbursable Service Agreements and Grants

Source	Contracts Awarded During 1992	Monies Collected During 1992
U. S. Navy	64,500	14,500
Municipality of Anchorage	2,850	2,850
ARCO Alaska	15,000	-0-
Alyeska Pipeline Service Co	11,500	11,500
State Pipeline Coordinator's Office	-0-	-0-
U. S. Forest Service	4,800	815
National Park Service	3,149	3,149
Greens Creek Mine	500	510
Echo Bay Mine	500	510
Kuskokwim Development Corporation	1,895	1,895
Seed, Potato & Plant Sales	<u>21,377</u>	<u>16,023</u>
	126,071	51,752

Program Receipts In Kind Assistance

Source	Estimated Value
U. S. Coast Guard	3,600
Alaska Seed Growers, Inc.	500
U. S. Air Force	1,500
Unocal	200
Cominco Alaska	<u>875</u>
	6,675

APPENDIX B

CROP RELEASES

CROP CULTIVARS DEVELOPED 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 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 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 allow for more species diverse 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.

'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.

'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.

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 1993 - 1994.

APPENDIX C

LIST OF PUBLICATIONS AND PRESENTATIONS

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APPENDIX D

ACKNOWLEDGEMENTS

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