Alaska Plant Materials Center

Annual Report
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Alaska Department of Natural Resources - Division of Agriculture

STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF AGRICULTURE

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LETTER FROM THE DEPUTY DIRECTOR

Welcome to the Plant Materials Center's Annual Report of activities conducted during the calendar year 1991. The Center was established in 1972 by the Alaska Legislature. This section is located in the Division of Agriculture and is funded with General Fund money. Other funds are generated through the sale of plant materials and cost share with other agencies and private business.

As you will notice on the map of the plot locations, the Alaska Plant Materials Center is conducting work at Prudhoe Bay, Adak Island, and from Nome to Juneau. This is truly a state-wide program which responds to the needs of industry.

I would like to extend an invitation to each of you and your associates to attend the annual Plant Materials Center Open House scheduled in August.

We hope you find this report useful, and if there are questions that arise from reading it, please contact us.

Sincerely,

John W. Cramer

John W. Cramer
Deputy Director

ALASKA PLANT MATERIALS CENTER

1991 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 and 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, 285 acres near Palmer were selected for the center's site. An additional 120 acres were 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.

Within a dozen years after its founding, the program grew to include horticultural development and disease-free potato seed production projects. 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 Project

The Revegetation and Seed Production Project'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.

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 205 plot years of information collected from sites around the state (Figure 1), developed 7 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 elsewhere in this report. Copies of the reports are available from the Alaska Plant Materials Center.

Figure 1

Map of Alaska Plant Materials Center Plot Locations

Alaska Plant Materials Center Advanced Evaluation
and Demonstration Plot Network Representing
205 Plot Years as of 1989

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

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 is intended to be used for landscape plantings on Adak Naval Air Station. The PMC selected Barclay willow, Salix barclavii, 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 attempted.

Because Mountain Ash is nearly impossible to root, the original proposal also called for the collection of Siberian Mountain Ash seed from Attu. The seed was collected during September 1990 and was stratified for container planting in April 1991. This also failed to produce satisfactory results. In 1991, additional seed was collected and a series of stratification techniques was employed on the seed.

Initial willow plantings occurred on Adak in July 1990. The main planting effort was completed in May, 1991. Mountain Ash seedlings are scheduled for planting on Adak in 1992, provided solutions to the seed dormancy problems are found. One additonal attempt to root Mountain Ash cuttings will occur in 1992.

The Navy will reimburse 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 planting 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%.

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.

Aleutian Revegetation Assessment Project

The U. S. Navy appears to be well satisfied with Plant Materials Center activities. Following the original contact, the PMC has been awarded two additional projects.

The latest study, awarded in September 1990, was initiated in 1991 and involved a complete evaluation of revegetation activities on Adak, Amchitka, Shemya and Attu. This project evaluated native and introduced horticulture and landscape species used for the erosion control and reclamation on Adak and other military installations on the Aleutians. This project was completed in November, 1991. The results are available in the report, Assessment of Revegetation on the Aleutian Islands of Adak, Amchitka, Shemya and Attu.

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 in national defense. These trails that are no longer necessary for the efficient operation of NAS Adak, will be 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. One additional year of evaluation will occur after which plans for additional trail restoration will be developed.

Steese - White Mountain Mining District

In June, 1988, the Plant Materials Center (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; however, the following accessions performed the best: 'Gruening' alpine bluegrass, 'Norcoast' Bering hairgrass, 'Arctared' red fescue, and 'Manchar' and pumpelly brome. The final evaluation of the plots, scheduled for 1991, did not occur and is rescheduled for 1992. A final report will be prepared at that time.

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.

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 percent; the general vigor of these two varieties was greater than that shown by other varieties in the plot.

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 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 estabishment.

The plots were evaluated on September 14, 1989. All plots had become well established. The plot having high organic content supported a 65 percent 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.

These plots will continue to be monitored for one more growing season if travel funds are available. After the final evaluation, a final report will be prepared.

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' tilesy 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.

Fairbanks Division Of Mining Demonstration Plantings

The Plant Materials Center and the Fairbanks Office of the 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' tilesy sagebrush. The plots were fertilized with 20-20-10 fertilizer applied at a rate of 450 pounds to the 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 was untreated.

The seeded, fertilized and scarified plots exhibit 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. Various 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 was 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 highest plant cover had been seeded and fertilized. Caiggluk, Arctared and Norcoast dominated the seeded areas, and 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 were the least compacted and contained some fines.

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 deals with the establishment of willow along the margins of ponds constructed for fish habitat. At the time of this publication's preparation, the plan prepared by the Plant Materials Center has not been approved.

Valdez Oil Spill Grant

On April 20, 1989, the PMC was notified that Governor Cowper accepted a proposal to assess oil spill damage to Beach Wildrye communities in Prince William Sound. The proposed study would have identified damaged communities, rated damage and potential natural recovery, and if necessary, developed reclamation plans to restore these impacted communities.

Unfortunately, money was not released by the responsible state agency in a timely manner and the study was not attempted. It appeared that 1990 would be a repeat of 1989 as far as this study was concerned. However, on August 30, 1990, one of the PMC staff, at the request of the Department of Environmental Conservation (DEC), conducted a site visit to six beach segments. These segments were selected by DEC and were areas suspected of having Beach wildrye damage. The investigation indicated that only three segments would benefit from varying levels of restoration.

In 1991, a reimbursable services agreement was signed between the PMC and DEC. This agreement called for the PMC to train DEC beach walkers in assessing damage to beach wildrye communities and developing plans for restoration of affected communities. All work on this project was completed in June, 1991.

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 it was 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 Coast Guard was supplied with a site specific "How To" manual so 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 will occur in 1992.

Interior Alaska Evaluation & Demonstration Planting

Over the years, a variety of efforts have been made to establish an Interior Plant Materials Center (PMC). 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 has 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 Eielsen 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. Since not all of the varieties 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' tilesy 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.

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. A final evaluation is expected to occur in 1992.

Green's Creek Mine

Green's Creek Mine is within the boundaries of Admiralty 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. 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 exhibit a wide range of performance. The spring plots have been disturbed at least twice and some accessions have been completely destroyed.

The water line planting performed very poorly; only a few blades of grass were growing at that site. The upper fall planting has performed the best of all of the plantings. The lower fall planting is not growing well and appears to have been overseeded with the Green's Creek mix.

Despite these problems, we have been able to determine that 'Boreal' and 'Pennlawn' red fescue, 'Gruening' alpine bluegrass, 'Kenai' polargrass, and 'Norcoast' and 'Nortran' hairgrass are performing very well. Evaluations will continue for one more growing season and then a final report will be prepared.

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.

'Merion' Kentucky bluegrass, 'Boreal' and 'Pennlawn' red fescue, 'Carlton' smooth brome and 'Norcoast' Bering hairgrass performed the best at the office plot. The spring planting at the portal site is outperforming the fall planting. Only two cultivars, Merion and Pennlawn performed well in the fall plots.

Additional cultivars that grew well in the spring plots include 'Nugget' Kentucky bluegrass, 'Nortran' tufted hairgrass, 'Arctared' and Boreal red fescue, and pumpelly brome. Final evaluations will be conducted after the 1992 growing season, at which time a final report will be prepared.

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; while 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 on 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; 'Boreal' red fescue provided the greatest cover of any of the varieties in this plot. However, a seed mix containing alsike clover, 'Pennlawn' red fescue, 'Climax' timothy and annual rye had been broadcast by the municipality to stabilize the berms of the shooting range. The clover has become well established and appeared to be the best choice for revegetating the wood chips.

Evaluations were made in mid October and at that time four varieties were performing well at the Lost Joe Road, Fool's Inlet Road and Snowberry Shotrock Road sites. These varieties include: 'Merion' Kentucky bluegrass, 'Gruening' alpine bluegrass, 'Nortran' tufted hairgrass and Pennlawn. The plantings will continue to be evaluated for two more growing seasons, and at that time, a final report will be prepared outlining recommendations for revegetation of disturbances associated with logging.

Upper Susitna Demonstration & Evaluation Plots

The Plant Materials Center (PMC) 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, 'Gruening' alpine bluegrass, violet wheatgrass, 'Engmo' timothy, 'Norcoast' Bering and 'Nortran' tufted hairgrass, Arctared, 'Vantage' reed canarygrass and 'Caiggluk' tilesy sagebrush. Evaluations will be conducted for one more growing season, at which time, a final report will be prepared.

Fort Richardson Off-Road Vehicle Trail Restoration Project

This project, initiated in June 1988, was requested and funded by the U. S. Army at Fort Richardson and the Corps of Engineers Cold Regions Research Laboratory at Hanover, New Hampshire. The purpose of the project was to demonstrate alpine revegetation of a trail system damaged by unauthorized civilian off-road vehicles (ORV), and to select commercially available cultivars for large-scale, alpine revegetation.

Several sites were selected for planting that provided a wide range of conditions, with variations in slope, aspect, moisture and substrate. Limited off-road vehicle use continued in the project area and as a result a portion of the study site has been damaged. However, this damage has not severely impacted the study.

The final evaluation was conducted in August, 1991. 'Norcoast' Bering hairgrass and 'Arctared' red fescue continued to be the best performing cultivars. 'Gruening' alpine bluegrass also performed reasonably well, but the leaves continued to show signs of chlorosis. Results from the demonstration planting plot suggest that if further plantings are conducted, Nortran tufted hairgrass should be included.

Kenai Wetland Restoration Plots

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

The plan utilized a seed mix containing native species adapted for wet sites. The 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. At the time of this evaluation, a well established and flourishing wetland community was present. Sloughgrass and hairgrass, both seeded grasses, were performing exceptionally well.

Fish Creek Wetlands Restoration Project

In August 1990, Anchorage Water and Wastewater Utility (AWWU) requested 2that the Plant Materials Center submit a proposal for restoring wetlands 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 on the higher elevation sites. Low, flooded areas were planted with indigenous sedges, rush and arrowgrass transplants were harvested from adjacent donor communities. The area was examined to determine the best approach for final 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 ground off the dikes also received this treatment. In lower areas, wetland species including sedges and rushes were transplanted.

One additional planting program is planned for June, 1992.

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 to the municipality. The PMC developed a seed mix consisting of native species adapted to dry conditions. Plans were prepared for the PMC staff to seed the site. However, lack of a suitable truck to haul the hydroseeder and lack of labor prevented PMC involvement. The municipality then accepted responsibility for seeding the site. 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 cover was established. Evaluation will continue on the site for two more seasons.

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 the 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 hopes to evaluate this site one additional time in 1991.

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, and in 1992, a more detailed evaluation of the sites will occur.

Arctic Legume 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 started during the winter of 1991. The seeds were cleaned, sown in containers and stratified. After six weeks of cold stratification, the seeds were brought into the greenhouse for germination. Germination varied greatly between collections. The seedlings that were produced, were grown on and taken to Fairbanks for field planting. The seeds that did not germinate were placed back into cold storage for further stratification. Any additional germinants will be field planted in 1992.

The field plantings will be managed for seed production for four years if the project proceeds as planned.

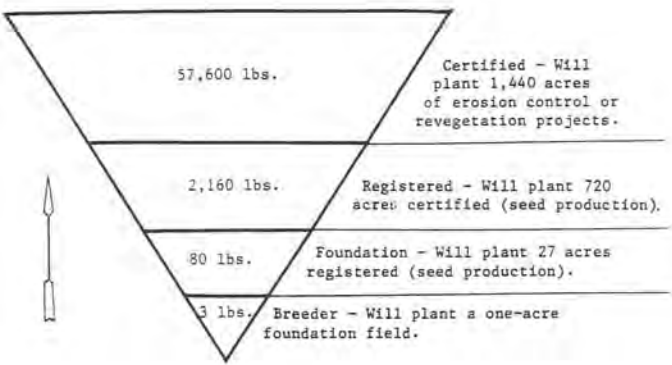
Foundation Seed Program

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.

1991 Season

For the second season in a row, drought conditions dominated spring and early summer. Precipitation totals for April, May and June combined were only 0.78 inches. All available irrigation equipment was utilized on the most important grass seed fields, leaving other areas dry and postponing establishment of new grass fields.

Three fields reached the end of their certification periods in 1991; 'Sourdough' bluejoint, 'Kenai' polargrass, and 'Norcoast' Bering hairgrass. Due to declining production, the 1987 'Nugget' Kentucky bluegrass field was disced under. A new field will be established in 1992.

A new management strategy implemented on 'Egan' American sloughgrass resulted in higher seed yields and reduced competition from undesirable grasses and broadleaf weeds. An earthen levee was constructed around the borders of the field to contain water pumped in by one large irrigation line. The resulting pond, sometimes covering the tops of sloughgrass, killed invading grasses and weeds, while increasing vigor in the flood-adapted sloughgrass. Before harvest, the pond was allowed to dry and one end of the levee was removed to allow access for the combine.

Despite the need for irrigation in the PMC's grass fields, fallow areas experienced flooding from the Matanuska River at levels similar to 1990 flooding. There are still approximately 120 acres of cleared land that are unuseable due to seasonal flood waters.

New foundation grass seed fields planted in 1990, were harvested for the first time in 1991; 'Arctared' red fescue, 'Nortran' tufted hairgrass and 'Service' big bluegrass. Also harvested for the first time was 'Reeve' beach wildrye. Reeve was planted in 1989 and takes two years to establish itself before producing seedheads.

At the request of the University of Alaska, Fairbanks, two old varieties of winter wheat, 'Froid' and 'Norstar', were sown August 14 for harvesting in the fall of 1992. Although newer and better varieties of winter wheat on the market, interest in Froid and Norstar lies in their genetic resistance to snow mold. Two one-half acre fields were established to supply plant breeders and researchers with needed germplasm.

In March of 1991, the Plant Materials Center's Bill Lewis State Seed Laboratory moved out of the main office and into new roomier quarters in the PMC's Plant Introduction Station. Presently managed by the Alaska Seed Growers, Inc., the seed laboratory performs purity and germination testing for the state's seed growers and distributors.

TABLE 1. REVEGETATION AND TURF VARIETIES IN PRODUCTION IN 1991.

Variety	Class	Acres
'Arctared' Fescue	Foundation	1.4
'Kenai' Polargrass	Foundation	2.0
'Gruening' Alpine Bluegrass	Foundation	1.0
'Nortran' Tufted Hairgrass	Foundation	1.0
'Alyeska' Polargrass	Foundation	1.0
'Egan' American Sloughgrass	Breeder	1.0
'Gruening' Alpine Bluegrass	Breeder	1.0
'Caiggluk' Tilesy Sage	Breeder	1.0
'Service' Big Bluegrass	Breeder	0.5
'Reeve' Beach Wildrye	Foundation	0.5
'Benson' Beach Wildrye	Foundation	0.2

TABLE 2. CEREAL GRAIN SEED & OIL SEED VARIETIES IN STORAGE AT THE PLANT MATERIALS CENTER, DECEMBER, 1991.

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	5.0	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	5.2	Nogal	1.3	Golden Rain	0.1						
Datal	4.3	1397	0.5	Freedom	.07						
Finnaska	1.0	66116243 344	0.3	**Total**	8.5						
Pokko	0.6	Norstar	0.07								
Arra	0.3	Gasser	0.04								
Eero	0.2	Froid	0.03								
Edda	0.05	Rough-rider	0.03								
Paavo	0.03	**Total**	17.4								
Tibet Hulless	0.03										
Galt	0.01										
Otra	Trace										
Steptoe	Trace										
Total	38.6										

TABLE 3. GRASS AND REVEGETATION VARIETIES IN STORAGE AT THE PLANT MATERIALS CENTER, DECEMBER, 1991.

Variety	Pounds
'Engmo' Timothy	1,731
'Arctared' Fescue	1,269
'Nugget' Kentucky Bluegrass	784
'Polar' Brome	365
'Norcoast' Bering Hairgrass	305
'Alyeska' Polargrass	344
'Egan' American Sloughgrass	172
'Gruening' Alpine Bluegrass	355
'Sourdough' Bluejoint	51
'Nortran' Tufted Hairgrass	55
'Tundra' Glaucous Bluegrass	103
'Kenai' Polargrass	69
'Service' Big Bluegrass	197
'Caiggluk' Tilesy Sagebrush	112
'Reeve' Beach Wildrye	43
Total	5,955

TABLE 4. CEREAL GRAINS SALES & RECEIPTS, 1989 - 1991.

Type	1991	1990	1989
Barley	-0-	3,100 lbs	2,100 lbs
		$ 1,008.17	$ 653.24
Oats	1,000 lbs	1,500 lbs	1,600 lbs
	$ 355.90	$ 463.65	$ 486.15
Wheat	200 lbs	650 lbs	275 lbs
	$ 31.52	$ 204.57	$ 75.16
Rye	-0-	42 lbs	134 lbs
		$ 15.32	$ 30.72
Canola	-0-	-0-	180 lbs
Buckwheat	-0-	-0-	300 lbs
			$ 57.00
Total	1,200 lbs	5,292 lbs	4,589 lbs
	$387.42	$1,691.71	$1,302.27

TABLE 5. GRASS SEED SALES & RECEIPTS, 1989 - 1991.

Variety	1991	1990	1989
'Nugget' Kentucky Bluegrass	-0-	-0-	505 lbs
			$ 4,543.70
'Arctared' Red Fescue	-0-	149 lbs	60 lbs
		$ 2,015.79	$ 205.60
'Sourdough' Bluejoint	-0-	-0-	30 lbs
			$ 810.70
'Engmo' Timothy	-0-	-0-	25 lbs
			$ 75.50
'Alyeska' Polargrass	20 lbs	-0-	-0-
	$ 273.80		
'Gruening' Alpine Bluegrass	10 lbs	12 lbs	30 lbs
	$ 177.90	$ 193.92	$ 400.50
'Egan' American Sloughgrass	5 lbs	-0-	21 lb
	$57.65		$ 181.20
'Norcoast' Bering Hairgrass	89 lbs	80 lbs	20 lbs
	$ 1,028.84	$ 1,631.20	$ 221.80
'Nortran' Tufted Hairgrass	-0-	20 lbs	133 lbs
		$ 367.20	$ 2,169.23
'Polar' Brome	-0-	-0-	160 lbs
			$ 466.40
'Tundra' Glaucous Bluegrass	-0-	17.5 lbs	-0-
		$ 162.81	
Total	124 lbs	278.5 lbs	984 lbs
	$1,538.19	$ 4,370.92	$ 9,074.63

Sugar Beet Production Trials

In 1990, public interest lead the Plant Materials Center to conduct variety trials on 22 varieties of hybrid sugar beets. The five top performing varieties in yield and bolting resistance were compiled from 8the data and more seed of these varieties was obtained from the Holly Sugar Corporation in Sheridan, Wyoming. Due to drought conditions early in the growing season along with a broken irrigation pump, seeding was delayed past the "window" time period where reasonably reliable data could be collected. The seeds of these five varieties are in storage and will be planted in the spring of 1992.

Contract Seed Production

In June 1990, a foundation class field of 'Tundra' glaucous bluegrass was established by a private grower in the Eielson Agricultural Project southeast of Fairbanks. This field, grown under contract with the Plant Materials Center, yielded its first harvest on August 20, 1991. A first year yield of 91 pounds of cleaned seed is currently being analyzed for purity and germination and is expected to be made available for growers of registered and certified seed in March, 1992. The PMC thanks the grower for his conscientious management of this field which was subject to grasshoppers, drought, geese and weeds during its establishment. Tundra, protected by the Plant Variety Protection Act, is one of only a few revegetation grasses adapted for use on the north slope.

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 & small fruit; greenhouse and vegetable production segments of the industry.

The program is responsible for trials of vegetable, small fruit, and ornamental plants. Both introduced and native 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 meter square 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 predominate 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/m^2 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 25 June 1991, elemental nitrogen, phosphorous and potassium was applied at the rate of 10 g/m^2 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 growing season appear to have affected the 1991 yield more than the treatments (Tables 6 & 7). 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.

Other factors that have affected the yield include weather and percent of blueberry plants in each plot. In addition, cattle had disturbed the north Montana Creek plots in 1990, and the west Montana Creek plots in 1991. They appeared to prefer the cleared plots more than the adjacent uncleared areas.

TABLE 6. Montana Creek Blueberry AARA Sites 1990 & 1991 Harvest

West Site

	No Fertilizer, Not Pruned, Harvest g	No Fertilizer, Pruned, Harvest g	Fertilized, Not Pruned, Harvest g	Fertilized Pruned, Harvest g
1990 Total	448 g	237 g	630 g	599 g
1991 Total Harvested	2 g	8 g	10 g	18 g

North Site

	No Fertilizer, Not Pruned, Harvest g	No Fertilizer, Pruned, Harvest g	Fertilized, Not Pruned, Harvest g	Fertilizer Pruned, Harvest g
1990 Total	71 g	106 g	107 g	131 g
1991 Total Harvested	220 g*	46 g	94 g	100 g

* Since the corner markers of this plot had been disturbed, they were reset in 1991.

TABLE 7. Talkeetna Blueberry AARA Site 1990 & 1991 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

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; two red currant, Ribes, varieties; thirteen raspberry, Rubus; varieties and three half-high blueberry, Vaccinium, varieties. One raspberry variety, 'Heritage', did not perform well in 1988 and was replanted in 1989, with replacement plants from the supplier. This variety did not perform well in 1990.

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 (Table 8). The plants in this study will be observed for five years. A final report will be prepared upon completion of the study.

TABLE 8. 1991 Results of Applied Agricultural Research Account Small Fruit Trials

Varieties	Anchorage Avg Yield g/plant	Kenai Avg Yield g/plant	Palmer Fairgrounds Avg Yield g/plant	Palmer PMC Avg Yield g/plant	Wasilla Avg Yield g/plant	Talkeetna Avg Yield g/plant	Trapper Creek Avg Yield g/plant
Amelanchier - Serviceberry							
'Honeywood'*	NA	350	2,548	508	NA	30	235
'Northline'**		>50	6	4		0	115
'Pembina'**		>50	0	3		0	310
'Smoky'*		10	1,240	34		9	155
'Thiessen'*		27	808	116		8	575
Ribes - Black Currant							
'Boskoop'*		1,480		9,335		3,276	5,895
'Consort'*		0		2,956		0	2,710
'Swedish Black'		180	1,030	2,750		643	4,275
'Willoughby'*		0		1,714			3,600
Ribes - Red Currant							
'Holland Long Bunch'		250	5,864	0		646	110
'Honeywood'*		0	4,416	0		10	220
'Viking'**		135	720	0		0	380
Rubus - Raspberry							
'Anelma'*		less than 50 g/plant	1,593	22		6	30
Continued on Page 39							

Varieties	Anchorage Avg Yield g/plant	Kenai Avg Yield g/plant	Palmer Fairgrounds Avg Yield g/plant	Palmer PMC Avg Yield g/plant	Wasilla Avg Yield g/plant	Talkeetna Avg Yield g/plant	Trapper Creek Avg Yield g/plant
'Autumn Bliss'*		fruit not weighed because there was less than 50 g/plant	111	0		0	0
'Blackhawk'**			3	0		0	0
'Boyne'*			4,271	13		0	0
'Festival'*			3,760	203		0	72
'Heritage'*			0	0		0	0
'Heritage'**			0	0		0	0
'Jewel'*			0	0		0	20
'Kiska'*			2,823	310		13	24
'Red Wing'**			207	0		0	20
'Reveille'*			3,379	2		0	0
'Royalty'**			637	0		0	80
'Ruby'**			372	0		0	0
'Titan'**			0	0		0	0
Vaccinium - Blueberry							
'North Blue'*		produced less than 50 g/plant	3	0			0
'North Country'			5	0			0
'North Sky'*			1	0			0

* Planted in 1988
** Planted in 1989
NA Not Available

Tomato Variety Observations

John Holms, a Fairbanks nursery grower, also breeds cold-hardy tomato varieties. In 1990, he offered the Plant Materials Center seed of some of his hardier varieties to be tested in the Palmer area. The same varieties grown in 1990 were tested again in 1991 with the addition of two new varieties from Mr. Holms, 5 varieties from Russia and 1 new variety recommended by a vegetable grower in Fairbanks.

Seeds of all varieties were sown on 19 April 1991. The seedlings were transplanted at the first true leaf stage into four-inch square pots on 16 May 1991. 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 10 June 1991. 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 in 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, over-head sprinkler system. All of the varieties became well established and flowered. However, flowering and harvest occurred later in 1991 than in 1990, and fewer varieties produced ripe fruit (Table 9). The first harvest was made on 11 Auguts 1991, as compared to 2 August 1990.
In 1991, the Alaska developed varieties continued to produce the most ripe fruit. None of the Russian varieties produced ripe fruit under field conditions, even though they had been seen growing in the field in the Novosibirsk region in 1990.

The complete summary of the results of the observation trials is available in the Results of 1991 Tomato Variety Observations, published by the Alaska Plant Materials Center.

TABLE 9. 1991 Tomato Variety Yield and Harvest Dates

Variety	Source	First Harvest Date	Ripe Yield lb/plant	Green Yield lb/plant
Polar Baby - plastic	1	8/11	0.94	0.01
Polar Baby - open	1	8/11	0.61	0.49
Alpha - plastic	1	8/27	0.18	0.01
CA x D_{F1} - plastic	1	8/27	0.22*	1.15
Glacier - plastic	2	8/27	0.18*	0.01
Stupice - open	3	8/27	0.07	0.00
Alpha - open	1	8/29	0.12	0.12
CA x D_{F1} - open	1	8/29	0.33*	0.11
1-15 Krasnoobsk - plastic	4	8/29	0.00	0.23
Polar Beauty - plastic	1	8/29	0.00	0.25
Polar Gem - plastic	1	8/29	0.14	0.01
Polar Gem - open	1	8/29	0.00	0.15
Polar Star - plastic	1	8/29	0.00	0.01
Sub-Arctic Maxi - plastic	2	8/29	0.00	0.01
Sub-Arctic 24 - open	1	8/29	0.00	0.01
Sub-Arctic 25 - plastic	1	8/29	0.00	0.25
Sub-Arctic Maxi - open	2	8/29	0.00	0.42

* Total Harvested

Sources:

1) John Holms, Fairbanks, Alaska
2) Wayne Leiser, Dimond Greenhouse, Anchorage, Alaska
3) High Altitude Gardens, Ketchum, Idaho
4) Patricia Holloway, University of Alaska Fairbanks and Catherine Wright, Alaska Plant Materials Center, Palmer, Alaska

Annual Alaska Greenhouse and Nursery Conference

The past year was a busy one for the Alaska Greenhouse and Nursery Conference. Two conferences were held in 1991. The 10th Annual Alaska Greenhouse and Nursery Conference was scheduled and held in the early spring as with past conferences. It was later decided to try holding the Alaska Greenhouse and Nursery Conference and Agriculture Symposium in the same week as an agriculture week. The first Alaska Agriculture Week was held in Fairbanks, November 19-23, 1991. A conference for the Master Gardeners was also held during that week.

The 10th Alaska Greenhouse and Nursery Conference was held in Anchorage, on February 7 and 8, 1991, at the Anchorage Hilton Hotel. The conference was co-sponsored by the Alaska Plant Materials Center, University of Alaska Cooperative Extension Service (CES) and the Alaska Horticultural Association. One hundred ninety-eight people from throughout Alaska, Canada and the lower 48 attended the conference.

Dr. Ron Adams of Ball Seed Company, and Ms. Julie Martens, Managing Editor for "Grower Talks" magazine, were invited speakers from outside of Alaska. Dr. Adams spoke on "Media for Container Growing", and "Meeting Nutrition Needs of Greenhouse Crops". "Horticultural Trends in the United States", and "Horticulture Trends in Europe" were the topics of Ms. Martens' presentations.

Presentations by Anchorage area growers and landscape architects were also valuable to the conference's success. Their presentations ranged from the "Challenges Facing New Greenhouse Operations", "Impact of New Pesticide Laws on Your Business", "Color in the Landscape", "Successful Grounds Maintenance Techniques", "Landscape Design for the Environment" and "Cross Merchandising; How to Tie in Hard Goods Sales with Green Goods".

Twenty-two exhibits comprised the Polar Grower Trade Show (PGTS) held in conjunction with the conference. Five of the seventeen commercial exhibits were participating in the conference for the first time.

The 11th Alaska Greenhouse and Nursery Conference was held on November 19 and 20, 1991 in Fairbanks, at the Westmark Hotel. This conference was also co-sponsored by the Alaska Plant Materials Center, University of Alaska Cooperative Extension Service (CES) and the Alaska Horticultural Association. The conference was attended by 127 people.

Dr. Dick Biamonte of Grace/Sierra Horticultural Products, Mr. Donn Sharp, Sharp and Son, and Mr. Sven Madsen, GROmaster, traveled to Fairbanks to participate in the conference. "Bedding Plant Nutrition", "Greenhouse Heating, Ventilation and Temperature Controls", and "Advantages of Ebb & Flow Subirrigation" were the titles of their respective presentations.

Dr. Meriam Karlsson, University of Alaska Fairbanks, spoke on her research on primula flower formation, and Dr. Jenifer McBeath spoke on biological control of plant diseases in the greenhouse. Both scientists are from the University of Alaska Fairbanks. Growers from Fairbanks, Nenana and Anchorage also made valuable presentations at the conference. Their topics included patio planters and container gardening, urban planting design, tree farming in interior Alaska, turf management, fruit trees of interior Alaska, nursery stock care, and trees & shrubs for Alaska.

The Polar Grower Trade Show was a popular addition to the conference in November with 16 exhibitors participating. At this show, four of the exhibitors were new to the trade show.

The combination of the conferences was a success. Many of the Greenhouse and Nursery Conference participants stayed and participated in both the Master Gardener Conference and the Agricultural Symposium. Plans are being made to continue the joint Agricultural Week for 1992.

Copies of the proceedings of the Greenhouse and Nursery Conferences are available for a small fee from the CES office in Anchorage. The proceedings have been published since the 1983 conference and remain popular today.

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. Table 10 is a list of the plants which are currently growing in the trial sites. Those plants which have not survived at a majority of the sites are not listed here.

TABLE 10. Typical Plant List of Off-Site Plant Trial

Currants:
Ribes 'Holland Long Bunch'
Ribes sp. 'OG#1'
Ribes 'Swedish Black'
Ribes 'Viking'
Ribes 'Willoughby'

Raspberries:
Rubus 'Indian Summer'
Rubus 'Kiska'
Rubus 'Latham'
Rubus 'Reveille'
Rubus 'Trent'

Ornamental Plants:
Alnus incana, Alder
Caragana arborescens, Siberian Pea Shrub
Clematis tangutica, Clematis
Cornus stolonifera, American dogwood
Cotoneaster racemiflorus, Cotoneaster
Forsythia ovata, Forsythia
Larix decidua, European Larch
Larix gmelinii gmelinii, Dahurian Larch
Larix gmelinii 'Olgensis', Larch
Larix gmelinii 'Principis-Ruprecht', Larch
Larix occidentalis, Larch
Malus baccata, Siberian Crabapple
Physocarpus opulifolius var. intermedius, Ninebark
Populus 'Tower', Tower Poplar
Potentilla davurica, Potentilla
Potentilla 'Hallman's Dwarf', Potentilla
Potentilla x Friedrichsenii, Potentilla
Prunus besseyi, Sand Cherry
Prunus maackii, Amur Cherry
Rosa 'John Cabot', Rose
Rosa, 'Lac Majeau', Rose
Rosa rugosa, Rose
Rosa woodsii, Rose
Rubus arcticus, 'Kenai Carpet' Nagoonberry

TABLE 10. Continued

Salix alexensis 'Rhode', Rhode Feltleaf Willow
Salix barclayi 'Long', Long Barclayi Willow
Salix bebbiana 'Wilson', Wilson Bebb Willow
Salix brachycarpa 'Oliver', Oliver Barrenground Willow
Salix lasiandra 'Roland', Roland Pacific Willow
Sorbus sp., Mountain Ash
Viburnum edule, Highbush Cranberry

Adak Naval Air Station Horticultural Demonstration Plantings

At the request of the U. S. Navy the PMC developed the horticultural demonstration plantings. The 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. The mean monthly temperature varies 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 this past summer with plastic barriers. At the end of September, many of the plants were still growing and had survived the first summer on Adak. Evaluations on the survival of the plants through their first winter on Adak will be made in 1992.

Plant Sales & Distribution

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 11). 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.

Two new items were added to the horticultural plant sales in 1991. Plants of 'Kenai Carpet' Nagoonberry were made available to commercial growers. The second new item was seed of four tomato varieties. These tomato varieties were developed by John Holmes of Fairbanks.

TABLE 11. Plant Sales

Variety	1989	1990	1991
'Holland Long Bunch' Currant	75 1-0 plants		
	$375.00		
'Swedish Black' Currant	75 1-0 plants		
	$375.00		
'Kenai Carpet' Nagoonberry			275 plants
			$550.00
'Friedrichsenii Potentilla'	30 plants	25 plants	
	$75.00	$62.60	
'Kiska' Raspberry		100 plants	
		$200.00	
'Pioneer' Strawberry	50 plants	150 plants	
	$22.50	$60.00	
'Sitka' Strawberry	50 plants	300 plants	
	$22.50	$135.00	
'Skwentna' Strawberry	100 plants	150 plants	
	$45.00	$60.00	
'Talkeetna' Strawberry	100 plants	150 plants	
	$45.00	$60.00	
'Long' Barclay Willow	120 cuttings		40 dormant c.
	$120.00		$48.00
'Oliver' Barrenground Willow	100 cuttings		40 dormant c.
	$100.00		$48.00
'Rhode' Feltleaf Willow	120 cuttings		40 dormant c.
	$120.00		$48.00

Table 11. Continued			
Variety	**1989**	**1990**	**1991**
'Roland' Pacific Willow	100 cuttings	25 cuttings	40 dormant c.
	$100.00	$62.50	$48.00
'Wilson' Bebb Willow	100 cuttings		40 dormant c.
	$100.00		$48.00
'Alpha' Tomato			9 g Seed
			$18.00
'Denali' Tomato			15 g Seed
			$30.00
'Polar Baby' Tomato			36 g Seed
			$72.00
'Polar Gem' Tomato			28 g Seed
			$56.00

Potato Disease Control Program

Potatoes have been grown and sold in Alaska since prior to the establishment of the Matanuska colony. It is documented that 150 tons of potatoes were shipped down the Tanana and Yukon Rivers to the Iditarod mining district in 1910 from Manley Hot Springs.

Potatoes remain the fourth most important food crop worldwide and the most valuable crop grown on Alaskan farms. The total value of the crop produced in 1990 was $2,677,000.00; down almost 1 million dollars from the 1989 crop, due to the fact that 250 less acres were harvested. Most of the lost acreage was caused by the disease Bacterial Ring Rot, which made harvesting, storing and marketing these diseased fields uneconomical. Even with this loss, the average value of Alaskan grown potatoes has exceeded $2,000,000.00 over the last decade.

Commercial potato production is highly capital intensive. High yields of good quality potatoes are required to assure a fair return on investment. Many production problems that would limit yield, such as untimely frost or rain, are beyond grower control. A successful grower manages the production factors which are under his control. Planting high quality seed can make the difference between a good harvest and a poor one. Seed quality is judged primarily by the amount and types of diseases found in the seed. Inspection for disease incidence is the function of the Certification Program.

Diseases are capable of causing severe losses as we saw with the loss of 30% of the planted acres in 1990. 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.

Alaska has a quarantine against seed potatoes from the states of Washington and Idaho; and the counties of Humbolt in Nevada; Siskiyou and Modoc in California; and Morrow Umatilla, Klamath, Lake and Malheur in Oregon. The quarantine was enacted to prevent the introduction to Alaska of Meloidogyne chitwoodi, the Northern Root-Knot Nematode.

The Potato Disease Control Program was initiated at grower request. The program supplies small quantities of disease-free seed of standard commercial varieties, as well as other cultivars, for on-farm trials. Heirloom varieties which are in demand from gardeners have been treated to remove diseases and released to seed growers for increase and sale through commercial outlets.

The program assists the potato industry by providing quality seed and monitoring the health of seed and commercial fields. These efforts are reinforced with educational materials and demonstrations.

Figure 4

TUBER INTRODUCTION

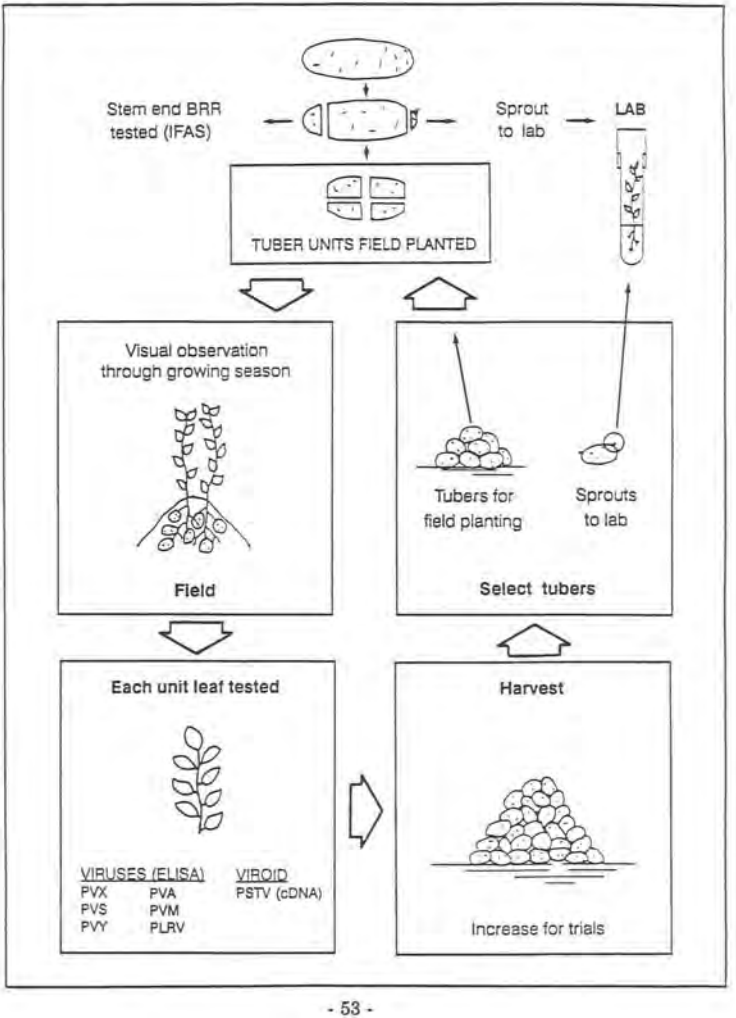
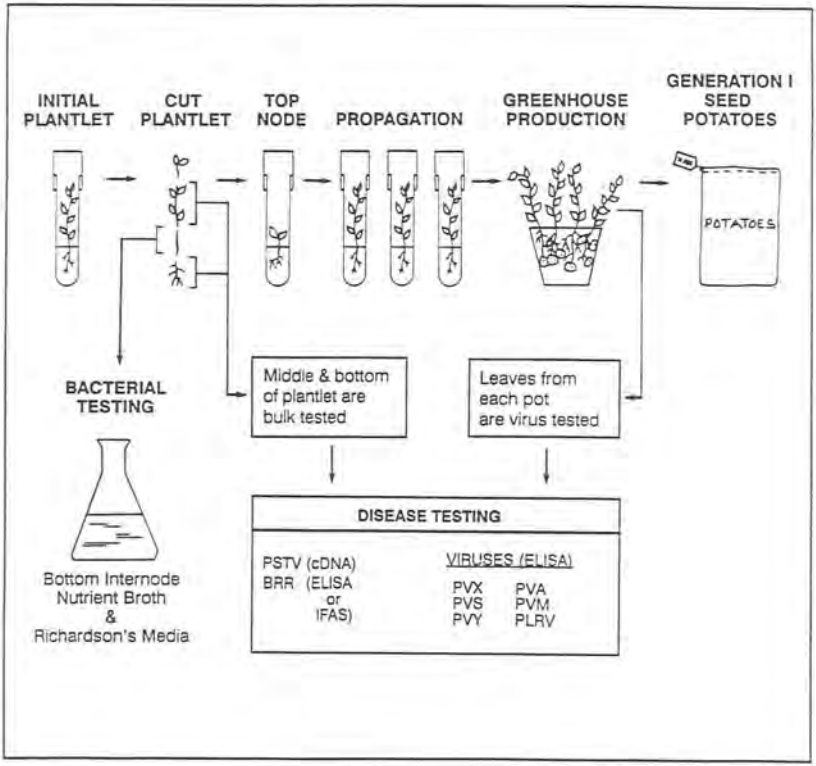


Figure 5 **Alaska Seed Potato Production & Disease Testing**



Disease-Tested Seed Potato Production

In 1991, the project produced 10,000 disease-tested plants of 35 varieties. Seven varieties accounted for 60% of this total. The varieties most in demand were Green Mountain, Shepody, Bake-King, Iditared, Russet Norkota, Superior and Belrus.

Approximately 500 plants were made available to five growers for production of Generation 1 (G1) seed. The remaining plants were grown in greenhouses at the Plant Materials Center (PMC), and produced 1,200 pounds of G1 seed to meet the orders placed in 1990.

Disease-tested seed amounting to 3,000 pounds of nine white-skinned varieties were field grown to provide seed for trials to be conducted by the Cooperative Extension Service in 1991.

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.

Seed Potato Certification

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.

Diseased plants typically appear different from healthy plants, however the symptoms of some diseases can be masked or obscured by growing conditions such as physiological maturity, fertility levels, and cool temperature. The particular variety's resistance to a disease also plays a part in symptom expression.

The term "latent" is used to describe the situation where a disease is present, but symptoms are not expressed. The idea that a disease can be present and go undetected is cause for concern. The use of laboratory tests for the detection of Potato Virus X, which can be latent, has been shown to be an effective procedure for indicating the relative infection level of the disease. Laboratory procedures which would allow the detection of latent Bacterial Ring Rot are being developed but are not commonly being used.

Alaska's Certified Seed Program is administered by the Alaska Seed Growers, Inc. The inspections are conducted by the Potato Disease Control Program. Inspections were performed during the growing season on 170 lots planted to 58 acres. There were 39 varieties grown as certified seed. The six varieties; Shepody, Alaska 114, Superior, Bake-King, Denali and Green Mountain, comprised the majority of certified seed acreage. Certified seed potatoes were grown in the Matanuska Valley, Tanana 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.

Fifty third and fourth grade students from Pioneer Peak Elementary School 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 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.

A group of approximately 60 sixth grade students from Anchorage was given a tour of the facilities at the PMC in early May. The tour consisted of explanations of equipment and its usefulness to farmers as well as an introduction to botanical science.

The tissue culture methods used to propagate the disease-free seed potatoes are useful in propagating many other plants. Ten students enrolled in horticulture classes at the Matanuska Susitna Community College were presented information on the theoretical and practical applications of tissue culture techniques. A mock lab was established in the classroom and the students were given the opportunity to experiment with cloning techniques. The students were grateful for the hands-on experience.

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.

Potato Variety Scab Resistance Evaluation

Soil-borne potato diseases, primarily Potato Scab, Silver Scurf, and Pinkeye, account for significant economic losses estimated at over $ 200,000 annually to Alaska's growers. A reduction of these losses would be of great benefit to the potato industry. Potato varieties differ in their tolerance to disease.

A plot was established in a field on the Wiederkehr farm near Palmer to evaluate the response of fourteen cultivars to scab. Rows in a field which typically produces scabby potatoes were planted May 24 with four tubers of each cultivar. The plot was hand dug September 18, and the potatoes were rated for scab resistance on a scale of 1 to 5. All cultivars had some infection sites on tubers. A rating of three would make U. S. #1 grade. A rating of 5 had scab lesions on greater than 50% of the tuber surface.

TABLE 12. Potato Scab Plot Cultivar Evaluation

Cultivar	Rating	Cultivar	Rating
Alaska Red	4.5	Krantz	1
Avon	2.0	Norking	1.5
Bake-King	5.0	Reddale	2.0
Cherokee	2.5	Russet Norkota	5.0
Chieftain	4.0	Superior	3.0
Coastal Russet	4.0	Yankee Supreme	5.0
Iditared	5.0	Yellow Finn	5.0

Rated by visual inspection:

1 - little or no scab lesions
3 - acceptable for U. S. #1
5 - greater than 50% of tuber surface infected

The variety 'Green Mountain', planted in adjacent rows, would have rated a 5 if it had been included in the plot.

Copper River Native Association Trials

Seed of eight varieties was planted at the Copper River Native Association plots in Copper Center. Observations of quality and total production were recorded by the Copper River Agriculture Specialist. The varieties Mirton Pearl, Norland and Frontier Russet produced the largest total yields. Approximately 40 people in the Copper Center area benefited from this program.

TABLE 13. Average Total Potato Yield Per Row Foot.

Variety	Yield	Variety	Yield
Mirton Pearl	3.5	Avon	2.2
Norland	3.0	Shepody	2.2
Frontier Russet	2.5	Yukon Gold	2.2
Reddale	2.4	Arran Victory	1.6

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.

APPENDIX A

CURRENT & HISTORICAL BUDGET INFORMATION

CALENDAR YEAR 1990 AUTHORIZATIONS, EXPENDITURES, AND PROGRAM RECEIPTS

Authorizations

Authorization FY 91 PMC Total	$ 556,600.00
North Latitude Revegetation & Seed Production Project	
Project Total	320,800.00
Personal Services	260,400.00
Travel	2,800.00
Contractual	38,200.00
Supplies	15,400.00
Equipment	4,000.00
North Latitude Vegetable & Landscape Crop Improvement	
Project Total	245,800.00
Personal Services	219,600.00
Travel	3,900.00
Contractual	17,900.00
Supplies	4,400.00
Equipment	-0-
Authorization FY 92 PMC Total	$ 620,900.00
North Latitude Revegetation & Seed Production Project	
Project Total	341,500.00
Personal Services	273,500.00
Travel	3,800.00
Contractual	40,400.00
Supplies	12,400.00
Equipment	11,400.00
North Latitude Vegetable & Landscape Crop Improvement	
Project Total	279,400.00
Personal Services	246,300.00
Travel	3,900.00
Contractual	16,500.00
Supplies	4,800.00
Equipment	7,900.00

General PMC Operating Budgets for the Past Ten Fiscal Years

	FY 82	FY 83	FY 84	FY 85	FY 86	FY 87	FY 88	FY 89	FY 90	FY 91	FY 92
Authorization	743,100	725,900	912,300	863,400	888,500	733,700	596,700	556,100	566,100	566,600	620,800
Personnel	21	21	25	19	19	17	16	16	16	16	16
Full Time	10	10	12	10	10	9	7	7	7	7	7
Part Time	11	11	13	9	9	8	9	9	9	9	9

When comparing personnel figures listed for FY 92 to those in FY 82, bear in mind that the Potato Disease Control Project and the Horticultural Development Project were added in FY 84 and FY 82 respectively. The Plant Materials Center is now performing basically the same duties at nearly the same level it did in 1988 with 1/4 million fewer dollars.

1991 Calendar Year Monthly Expenditures to the Nearest Dollar

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
PMC Totals	41,407	42,097	41,724	32,418	57,525	42,722	29,532	71,025	63,381	42,322	51,417	42,800
Personal Services	36,163	32,342	31,639	27,325	53,151	40,049	26,390	64,308	54,953	36,901	43,136	35,195
Travel	77	193	124	130	-0-	-0-	1,066	1,470	1,389	305	1,382	1,393
Contractual	3,735	7,366	4,044	4,948	6,020	3,400	1,883	3,395	3,921	3,467	6,364	3,762
Supplies	337	1,005	5,916	246	10	-0-	194	1,336	3,118	1,650	535	2,150
Capital Outlay	1,095	1,191	-0-	-0-	119	-0-	-0-	516	-0-	-0-	-0-	300
North Latitude Revegetation & Seed Production Project												
Total Expenditures	21,506	23,748	25,470	14,474	30,171	28,009	13,451	36,499	29,359	19,103	28,321	19,560
Personal Services	17,964	16,097	16,639	10,961	28,276	24,168	12,172	31,963	25,557	16,387	22,135	15,446
Travel	77	74	66	72	-0-	-0-	276	954	95	-0-	1,382	298
Contractual	2,057	5,380	2,854	3,437	3,639	3,661	1,004	2,229	2,650	2,242	4,528	2,464
Supplies	314	1,005	5,911	235	10	361	-0-	837	1,056	941	276	1,052
Capital Outlay	1,095	1,191	-0-	-0-	119	-0-	-0-	516	-0-	-0-	-0-	300
North Latitude Vegetable & Landscape Crop Improvement												
Total Expenditures	19,901	18,349	16,254	17,944	27,354	14,713	16,081	34,526	34,022	23,219	23,096	23,240
Personal Services	18,199	16,245	15,000	16,364	24,875	15,881	14,218	32,345	29,396	20,514	21,001	19,749
Travel	-0-	119	58	58	98	-0-	790	516	1,294	772	-0-	1,095
Contractual	1,678	1,986	1,190	1,511	2,381	-0-	879	1,166	1,271	1,225	1,836	1,298
Supplies	23	-0-	5	11	-0-	-0-	194	499	2,062	709	259	1,098

Program Receipts
Calendar Year 1991

Contracts, Reimbursable Service Agreements and Grants

Source	Awarded	Actually Collected
U. S. Navy	25,000	24,584
Municipality of Anchorage	11,305	10,606
ARCO Alaska	17,300	8,112
Alyeska Pipeline Service Co	17,519	9,870
State Pipeline Coordinator's Office	25,000	9,370
Dept Environmental Conservation	2,400	1,200
National Park Service	6,850	6,850
Greens Creek Mine	500	-0-
Echo Bay Mine	500	-0-
Yukon Pacific Corporation	2,345	2,345
Seed,Potato & Plant Sales	9,262	6,229
	117,981	79,166

Program Receipts
In Kind Assistance

Source	Estimated Value
U. S. Coast Guard	3,200
Alaska Seed Growers, Inc.	500
U. S. Air Force	800
Unocal	200
Alaska Dept. of Fish & Game	850
	5,550

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 agressive 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 acreation 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

PUBLICATIONS

Campbell, W. L. 1987. Potatoes Alaska! Spudman. January and February 1987. 4 pp.

Campbell, W. L. 1988. Potato Disease Control Technical Report 1984-1988. State of Alaska, Division of Agriculture, Plant Materials Center. 14 pp.

Campbell, W. L. and D. W. Bagley. 1989. Sucrose Analysis and Chipping Ability of Twenty Alaska Grown Potato Varieties. State of Alaska, Division of Agriculture, Plant Materials Center. 12 pp.

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Campbell, W. L. Potato Disease Overview. 1991 Alaska Potato and Vegetable Conference, Palmer, Alaska. February 20-21, 1991.

Moore, N. J. Revegetation Plant Materials: Techniques for Handling, Processing and Planting Seed and Vegetative Material. Course lecture for ARLF 393 Ecology of Disturbed Lands, 1991.

Moore, N. J. Riparian Vegetation and Revegetation. Bureau of Land Management's Coordinated Riparian Area Management Course, Fairbanks, Alaska, June, 1991.

Moore, N. J. Selection of Revegetation Plant Materials. Alaska Miner's Association Short Course on Placer Mine Revegetation. 1991.

Wright, C. I. Gardening With Alaska Wildflowers, Mat-Su Community Schools, Colony Middle School, March 25, 1991.

Wright, C. I. Edible Landscaping With Fruit, Extension Garden Week, April 8-13, 1991, Cooperative Extension Service, Anchorage, Alaska. April 13, 1991.

Wright, C. I. How Horticuluture Helps the World, Alaska Science Fair, Anchorage, Alaska. April 13, 1991.

Wright, C. I. Small Fruits for Your Garden, Palmer Kiwanis, Palmer, Alaska. April 16, 1991.

Wright, C. I. Potential Plant Introductions & Growing Techniques from the Soviet Far East, 11th Alaska Greenhouse & Nursery Conference, Fairbanks, Alaska. November 19 & 20, 1991.

Wright, C. I. Trees & Shrubs for Alaska - Plant Materials Center Trials, 11th Alaska Greenhouse & Nursery Conference, Fairbanks, Alaska. November 19 & 20, 1991.

Wright, C. I. Edible Landscaping, Alaska Master Gardener Conference, Fairbanks, Alaska. November 21, 1991.

Wright, S. J. Assessing Potential Damage to Beach Wildrye Communities in Areas Affected by the Exxon Valdez Oil Spill. DEC Training Program. Anchorage, Alaska. May 14, 1991.

Wright, S. J. Using Native Seeded Species for Landscaping and Trail Restoration on Naval Air Station Adak. Annual Meeting at the American Society of Agronomy, Denver, Colorado. October 28, 1991.

Wright, S. J. Case Studies of Mine Reclamation in Alaska. Alaska Miners Association Annual Meeting, Anchorage, Alaska. November 8, 1991.

APPENDIX D

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