Alaska Plant Materials Center

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DEPARTMENT OF NATURAL RESOURCES

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LETTER FROM THE DIRECTOR

Occasionally, I am asked the question, "What does the Plant Materials Center do?"

This report is intended to give the reader an insight into the PMC's major activities during the calendar year 1990. The facility is constantly responding to questions and inquiries regarding seed production, horticulture, potato production, and erosion control and reclamation. The PMC is a repository of readily available information that cannot be matched anywhere in the state. The staff that has been assembled by the PMC is recognized as expert in their respective fields.

The PMC is much more than a cluster of state-owned buildings, along with a collection of farm equipment. As director of the Division of Agriculture, I take pride in the PMC and its staff. Without these individuals and their dedication the PMC would be just another collection of buildings and equipment.

Once the reader becomes familiar with the program, he will realize the state-wide importance of this resource. If you have further questions or a desire to visit the facility, you should call the Plant Materials Center. The staff is eager to address your needs and concerns.

Sincerely,

Frank G. Mielke

Frank G. Mielke
Director

Alaska Plant Materials Center

1990 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 162 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 184 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 Sage	Polar Brome

Adak Naval Air Station Erosion Control & Reclamation Project

As a result of the successful Shemya Air Force Base Beach Wildrye project, the U. S. Navy asked the PMC to assist in developing a Natural Resource Management Plan for Adak Naval Air Station.

The Navy project addressed all aspects of sand erosion control, lawn establishment, mine restoration and base landscaping.

As a result, several plots were established to evaluate species for the following purposes:

1. Beach stabilization using transplanted Beach Wildrye sprigs and the enhancement of natural stands of Beach Wildrye with fertilizer.
2. Landfill, quarry and World War II structure site restoration and land rehabilitation with grass species.
3. Landscaping for beautification and morale purposes using hardy species.
4. Additional plots were established to test new plant material being developed by the PMC. These plots include native trees, shrubs, forbs and grasses. The plots are located on a variety of sites on the base.

During May of 1988, 18 grass plots were established. Seven of the plots were advanced evaluation plots similar to the plots planted throughout Alaska (Figure 1). Six of these were planted on beach sand adjacent to a Navy structure. The other plot was established on a portion of a regraded solid waste disposal site. Four abandoned quonset hut sites were also used for evaluation plots to determine the effectiveness of a seed mix used elsewhere in the Aleutian Islands. This mix was also seeded on plots located in a gravel pit (Tuxedo Hill Quarry) and the landfill site.

A major portion of the study on Adak centered on the use and management of Beach wildrye (Elymus mollis). These studies accounted for an additional five plots.

In addition to the grass plots, one woody planting of willow was established in May, 1988.

Plot evaluations occurred on September 14, 1988; May 23, 1989; September 13, 1989; July 10, 1990 and September 21, 1990.

The results of this study provided useful revegetation information for Navy lands on Adak. The recommendations developed from this study are available in the publication Final Report and Data Obtained from the Adak Naval Air Station Evaluation Plot Network. The Navy reimbursed the Plant Materials Center $27,000.00 for the study.

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 barclayii, and Siberian Mountain Ash, Sorbus sambucifolia, for propagation.

In May 1990, 1,500 Barclay willow cuttings were collected at Dutch Harbor. In June 1990, willow and Mountain Ash cuttings were obtained from Attu. This material was then prepared for propagation at the PMC. The willow was rooted successfully; however, the Mountain Ash failed to root. We did not expect to be successful rooting the Mountain Ash, so we have also attempted to propagate Mountain Ash with tissue culture techniques.

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 is presently being stratified for container planting in April 1991.

Initial willow plantings occurred on Adak in July 1990. The main planting effort will be in 1991. Mountain Ash seedlings are scheduled for planting on Adak in 1991 and 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, we still needed 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 (May) 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 plantings will be evaluated in 1991.

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.

More Navy Contracts

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

The latest study, awarded in September 1990, will be initiated in 1991 and will involve complete evaluation of revegetation activities on Adak and Amchitka. This project will also evaluate native and introduced horticulture and landscape species for the beautification of Adak Naval Air Station.

Red Dog Mine Revegetation & Demonstration Plots

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

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

This combination of plots is intended to supply data for revegetation species selection and time of seeding. The Port Site plot was planted on July 6, 1987. This site will provide information regarding revegetation in the coastal portion of the mine project.

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

The evaluation process for these plots will be continued for a period of four growing seasons after planting.

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

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

Steese - White Mountan 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 mining 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 layout, 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 plots will be evaluated on an annual basis through 1991. At that time, a final report will be prepared and recommendations will be developed for the revegetation of mine tailings in the area.

The additional mine revegetation work begun in 1989 along the Nome Creek Maze area, was also evaluated at this time. Three treatments were tested on these mine tailings. Each treatment had been replicated three times. One treatment consisted of ten different revegetation varieties planted in adjacent plots. A seed mix containing these ten varieties was used for another treatment. All of the study sites were fertilized, and the third treatment consisted of fertilizer only.

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.

The plot was evaluated in September and very little germination had occurred. The summer had been very dry in Kenny Lake and the plot had not been irrigated. Germination may be delayed until the next growing season. The plants of those varieties that had germinated were very small, but hopefully were large and mature enough to survive the winter. The best establishment had occurred for 'Beaver', 'Vernal', 'Denali' and 'Alaska' (PI4488) alfalfa. Annual evaluations will occur for several years to determine long-term trends in performance.

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 establishment.

The plots were evaluated on September 14, 1989. All plots had become well established. The plot containing 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 can be expected during the winter of 1990-1991.

These plots will continue to be monitored for two more growing seasons. 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 developing 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 plantings were conducted between June 18 and July 3, 1990. Evaluations were conducted between August 16 and September 11, 1990. The performance of the plots varied greatly. The best performances were noted for the plots near Valdez and Birch Creek. The plots at Happy Valley and Franklin Bluffs had not germinated at evaluation time. These plantings will need to be evaluated for several years in order to be able to develop appropriate seed mixes for the different climatic regions and environmental conditions that occur along the right-of-way.

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 mining tailings in the Fairbanks area. Division of Mining selected two sites each with four to five acres that would remain undisturbed for several years.

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 continue to exhibit the highest plant cover. The existing vegetation in the fertilized, unscarified plot showed a pronounced increase in growth compared to the vegetation in the unfertilized plot.

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.

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.

The seed mix consisted 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 plantings at these two sites demonstrate that a wide variety of substrates can support seeded grasses. Hopefully, these plantings will demonstrate that placer mine revegetation is possible with minimal effort.

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.

Evaluations conducted at the end of August 1990, after the first full growing season, did not indicate that the plants were experiencing any nutrient stress. However, the plants did appear that they had been stressed for moisture some time during the dry summer. Even so, most accessions in the revegetation test plots performed very well; 95 to 100 percent cover was recorded for most accessions and vigor ratings were very high. At least one more growing season will be necessary before any important differences in performance can be expected to appear.

The most interesting plant growth was noted in the demonstration planting where three different levels of fertilizer (0, 250 and 500 pounds/acre) were applied to 13 different accessions of legumes and grasses. Both 'Polar' and 'Manchar' brome and 'Sourdough' bluejoint performed reasonably well at all fertilizer levels. 'Boreal' red fescue provided a better plant cover with no fertilizer, whereas 'Arctared' red fescue 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' Kentucky bluegrass, but Nugget was the best seed producer. Evaluations will continue in order to determine long-term trends in performance.

Branching Out Into Southeast Alaska

The North Latitude Revegetation and Seed Production Project established evaluation plots in southeast Alaska in 1989. A cooperative agreement was developed with two mining companies in the Juneau area; Green's Creek Mine on Admiralty Island, and Echo Bay Mining Company in Juneau. These companies agreed to pay travel and per diem for PMC staff to establish spring and fall revegetation test plots and evaluate these plots for four years. The PMC provided seed and labor. Additional work in the southeast was initiated in 1990, in cooperation with the U. S. Forest Service in the Tongass National Forest on Wrangell Island.

Green's Creek Mine

Because 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 species indigenous to the island. As a result, the plots contained only 15 accessions compared to 48 to 50 accessions that are normally planted. Two spring plantings were established at one site. In the fall, three more plantings were established, two at different elevations, and the third was a small planting along the water line. All plantings were fertilized with 20-20-10 fertilizer at a rate of 450 pounds per acre.

The plantings are exhibiting a wide range of performance. The spring plots have been disturbed at least twice and some plantings have been completely destroyed. Despite these problems, we have been able to determine that 'Boreal' and 'Pennlawn' red fescue, 'Highlight' sheep fescue and 'Nortran' tufted hairgrass have performed the best thus far. Results from fall plantings should provide additional information on the most suitable species; however, only one of the three plots, the one at higher elevation, had any measurable growth. The varieties that were performing the best were 'Norcoast' Bering hairgrass and 'Gruening' alpine bluegrass. Other good performances were recorded for Calamagrostis canadensis Delta, 'Kenai' polargrass and Pennlawn red fescue. Continued evaluation is necessary to determine the appropriate revegetation recommendations.

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.

Numerous accessions performed very well at both sites. It will be necessary to continue evaluating the plots to determine the best accessions for these sites.

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 logging. One plot was planted on Snowberry Shotrock Road. This site was very gravelly and moderately compacted by logging trucks 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.

The plots were planted on June 5 - 7, 1990, and were evaluated on September 26, 1990. 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 and Arctared 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. By September, the clover had become well established and appeared to be the best choice for revegetating wood chips, at least after one growing season.

No preliminary recommendations should be made until the plantings have gone through at least one winter, preferably two or more. However it was interesting to observe that five varieties performed consistently well at the Lost Joe Road, Fool's Inlet Road and Snowberry Shotrock Road sites. These varieties include: 'Merion' Kentucky bluegrass, 'Gruening' alpine bluegrass, Pennlawn red fescue, 'Nortran' tufted hairgrass and 'Kenai' polargrass. The plantings will continue to be evaluated for two to three more growing seasons and at that time, a final report will be prepared outlining recommendations for revegetation of disturbances associated with logging.

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, a number 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. An additional grant application has been submitted by the PMC in cooperation with DEC for further assessment.

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.

The evaluation plots, consisting of 50 grasses and 1 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 hemp nettle. 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. The plots were evaluated on September 13, 1990 and were growing reasonably well. Five varieties were performing very well in the demonstration planting. They were 'Polar' brome, 'Boreal' red fescue, 'Merion' and 'Nugget' Kentucky bluegrass and 'Aurora' alsike clover. No differences were noted with the different fertilizer applications. Differences had been noted during the first year when the more heavily fertilized sections of grass had performed the best, and the legumes performed the best where there was no fertilizer or the medium level of fertilizer.

The performance of the accessions varied between the plots. Some of the best performances were recorded for 'Caiggluk' tilesy sagebrush, 'Nortran' tufted hairgrass, and 'Pennlawn' red fescue.

Weed problems were restricted primarily to one evaluation plot. Additional evaluations will be necessary to help develop seed mix recommendations for this area.

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 six 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. Evaluations of previous plantings continue. Additional studies will be developed annually.

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.

An effort will be made to evaluate the site in 1991.

Fish Creek Wetlands Restoration Project

In August 1990, Anchorage Water and Wastewater Utility (AWWU) requested the Plant Materials Center to 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 from undisturbed areas adjacent to the disturbance. The area was examined to determine the best approach for final restoration activities scheduled for spring, 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 has been given Coast Guard approval to direct and assist in the project. This project is now scheduled for June 1991, with a follow up visit in 1992.

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. Continued evaluation is expected in 1991. The August site evaluation suggests that the revegetation work should be successful.

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. These collections will be cleaned, tested for germination and used for future revegetation trials.

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 is to demonstrate alpine restoration of the trail system damaged by unauthorized civilian off-road vehicles (ORV), and to develop techniques for large-scale alpine revegetation with commercial grass cultivars.

The results of this study will be useful as Southcentral Alaska expands its winter recreation areas.

This project will provide results on alpine wetland revegetation and revegetation of extremely dry, gravelly, alpine sites. Limited off-road vehicle use has continued in the project area. A portion of the study site has been damaged, however, the study has not been severely impacted.

Evaluations in September 1990 show that the early trends in performance of the grasses continue. 'Norcoast' Bering hairgrass and 'Arctared' red fescue have the most consistent and best performing cultivars at all of the sites. 'Gruening' alpine bluegrass has also performed reasonably well, however, the leaves tend to be chlorotic. Results from the evaluation plot, which was planted with 50 different varieties, suggest that another species, 'Nortran' tufted hairgrass, should be included in future trials.

The plots will be evaluated again during the summer of 1991 and then a final report will be prepared.

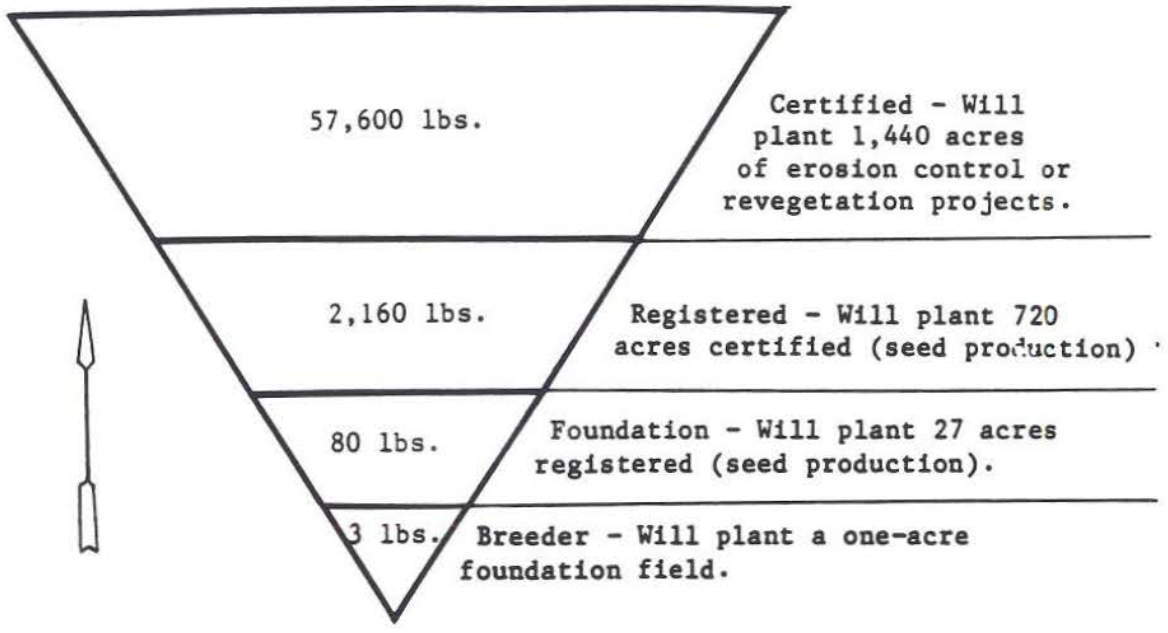
Foundation Seed Program

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 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.

Table 1 - Revegetation and Turf Varieties in Production in 1990

Variety	Class	Acres
'Nugget' Kentucky Bluegrass	Foundation	5.0
'Arctared' Fescue	Foundation	5.0
'Norcoast' Bering Hairgrass	Foundation	3.0
'Polar' Brome	Foundation	2.9
'Kenai' Polargrass	Foundation	2.0
'Sourdough' Bluejoint	Foundation	1.4
'Gruening' Alpine Bluegrass	Foundation	1.0
'Egan' American Sloughgrass	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

Table 2 - Cereal grain seed & oil seed varieties in storage at the Plant Materials Center, December, 1990

Barley		Wheat		Oats		Rye		Rapeseed		Buckwheat	
Variety	Tons	Variety	Tons	Variety	Tons	Variety	Tons	Variety	Tons	Variety	Tons
Lidal	15.0	Chena	9.1	Toral	5.5	Bebral	0.6	Candle	3.0	Oly	0.1
Otal	6.8	Ingal	5.2	Ceal	2.1						
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	66II6243344	0.3	**Total**	10.0						
Pokko	0.6	Norstar	0.07								
Arra	0.3	Gasser	0.04								
Eero	0.2	Froid	0.03								
Edda	0.05	Roughrider	0.03								
Paavo	0.03	**Total**	17.5								
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, 1990

Variety	Pounds
'Engmo' Timothy	1,734
'Arctared' Fescue	1,207
'Nugget' Kentucky Bluegrass	784
'Polar' Brome	365
'Norcoast' Bering Hairgrass	394
'Alyeska' Polargrass	382
'Egan' American Sloughgrass	221
'Gruening' Alpine Bluegrass	354
'Sourdough' Bluejoint	60
'Nortran' Tufted Hairgrass	70
'Tundra' Glaucous Bluegrass	12
'Kenai' Polargrass	125
'Service' Big Bluegrass	205
'Caiggluk Tilesy Sage	139
Total	6,052

Table 4 - Cereal Grains Sales & Receipts, 1988 - 1990

Type	1990	1989	1988
Barley	3,100 lbs	2,100 lbs	3,750 lbs
	$1,008.17	$ 653.24	$1,074.09
Oats	1,500 lbs	1,600 lbs	1,278 lbs
	$ 463.65	$ 486.15	$ 355.40
Wheat	650 lbs	275 lbs	300 lbs
	$ 204.57	$ 75.16	$ 70.82
Rye	42 lbs	134 lbs	-0-
	$ 15.32	$ 30.72	
Canola	-0-	180 lbs	-0-
Buckwheat	-0-	300 lbs	-0-
		$ 57.00	
Total	5,292 lbs	4,589 lbs	5,250 lbs
	$1,691.71	$1,302.27	$1,500.31

Table 5 - Grass Seed Sales & Receipts, 1988 - 1990

Variety	1990	1989	1988
'Nugget' Kentucky Bluegrass	-0-	505 lbs	550 lbs
		$4,543.70	$4,547.60
'Arctared' Red Fescue	149 lbs	60 lbs	100 lbs
	$2,015.79	$ 205.60	$ 936.00
'Sourdough' Bluejoint	-0-	30 lbs	6 lbs
		$ 810.70	$ 209.94
'Engmo' Timothy	-0-	25 lbs	50 lbs
		$ 75.50	$ 151.00
'Alyeska' Polargrass	-0-	-0-	-0-
'Gruening' Alpine Bluegrass	12 lbs	30 lbs	10 lbs
	$ 193.92	$ 400.50	$ 130.20
'Egan' American Sloughgrass	-0-	21 lbs	2 lbs
		$ 181.20	$ 17.58
'Norcoast' Bering Hairgrass	80 lbs	20 lbs	-0-
	$1,631.20	$ 221.80	
'Nortran' Tufted Hairgrass	20 lbs	133 lbs	-0-
	$ 367.20	$2,169.23	
'Polar' Brome	-0-	160 lbs	-0-
		$ 466.40	
'Tundra' Glaucous Bluegrass	17.5 lbs	-0-	-0-
	$ 162.81		
Total	278.5 lbs	984 lbs	718 lbs
	$ 4,370.92	$ 9,074.63	$5,992.32

Growing Season - 1990

Break-up came later than normal in 1990, delaying planting of foundation class 'Ingal' wheat until May 14. However, favorable weather in May and June allowed rapid growth. Three foundation class seedling grass fields were established in June: 'Arctared' red fescue, 'Nortran' tufted hairgrass and 'Service' big bluegrass.

All available irrigation equipment was pressed into service in July and August as drought conditions prevailed. Grass fields not accessed by irrigation became stressed and susceptible to capsus bug infestations. As a result, seed yields from these fields were much lower than average.

The warm, dry weather pushed harvest times forward seven to ten days allowing the wheat to be harvested August 24, the earliest on record. Three grass fields were plowed under following harvest, having reached the end of their certification periods; '86 Nortran hairgrass, '87 Arctared fescue and '87 'Polar' brome.

While some fields suffered from drought conditions, other fields nearby were under standing or flowing water from the continuing flooding problems on the Matanuska River. Only two out of seven 40-acre fields were spared the effects of the flooding. Some fields were completely inundated, while others became saturated during the flooding peak. Approximately 125 acres of previously productive PMC farm land are currently not utilized due to seasonal flood waters.

Foundation seed sales for 1990 totaled $6,062.63; down from 1989 sales of $10,376.90. Grass seed sales dropped from 984 pounds in 1989 to 278 pounds in 1990. Cereal grain sales totaled 5,292 pounds; up from 4,589 pounds in 1989.

Sugar Beet Production Trials

Public interest in the feasibility of sugar beet production led the Foundation Seed Program to conduct growth trials on 22 varieties of F-1 hybrid sugar beets. With adequate irrigation and fertilization, beet growth was good with some varieties at harvest yielding "football-size" beets. Bolting was a problem with some varieties, and sugar content for all beets was in the 10-11% range; however, commercial sugar beet processors require contracted beets to have sugar contents above 13.0%. Top growth die-back from a killing frost may increase sugar content. Further trials are planned.

Contract Seed Production

In anticipation of large-scale capital projects such as a natural gas pipeline, it is expected that demand for proven revegetation grasses will increase. For the first time, in 1990 the foundation Seed Program initiated contract growing of foundation seed by a private grower.

In June, a foundation class field of 'Tundra' glaucous bluegrass was established from breeder seed furnished by the PMC. This field, located in the Eielson Agricultural Project southeast of Fairbanks, should supply sufficient quantities of foundation Tundra bluegrass seed to supply certified seed growers for the next decade.

Past attempts to grow Tundra bluegrass, particularly suited for revegetation on the north slope, have met with failure in southcentral Alaska. However, when grown in the interior, Tundra proves to be vigorous, competitive and free from fungal diseases.

North Latitude Vegetable & Landscape Crop Improvement Project

The North Latitude Vegetable and Landscape Crop Improvement Project is comprised of two programs. They are the Horticulture Development Program and the Potato Disease Control Program. The combination was made to streamline PMC operations. For clarity, the activities of each project are reported separately in the annual report.

Horticulture Development Project

This 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 may also be evaluated. The project co-sponsored the Alaska Greenhouse and Nursery Conference and Polar Grower Trade Show with the University of Alaska Cooperative Extension Service and Alaska Horticultural Association.

During August 1990, the horticulturist had the opportunity to travel to the Soviet Union through an exchange with the University of Alaska Fairbanks, Agriculture and Forestry Experiment Station. Dr. Patricia Holloway and Catherine Wright traveled to V. I. Lenin All-Union Academy for Agricultural Sciences horticultural research stations in Siberia. An account of their trip is included in the annual report.

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 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.

In 1990, elemental nitrogen, phosphorous and potassium was applied at the rate of 10 gm per meter square inch 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 wipe applicator.

Harvests were made on 26 July 1990 at the Montana Creek sites (Table 6) and 25 July 1990, 15 and 22 August 1990 at the Talkeetna sites (Table 7). A low percentage of the blueberries at the Talkeetna site were ripe on the first harvest day, while at the Montana Creek sites the blueberries ripened more uniformly.

The percent stand of blueberries and the Vaccinium species varies with each plot. Vaccinium uliginosum, V. caespitosa and V. ovalifolium are growing at the Talkeetna site. The Montana Creek west site consists of V. ovalifolium and V. uliginosum, and both V. ovalifolium and V. uliginosum are growing in the Montana Creek north site. A more detailed description of each site can be found in the interim report of the blueberry study.

The data is reported here, but no consistent trends are apparent at this time. Because of the many variables involved and the perennial nature of Vaccinium, yield data may not reveal consistent trends for several years.

Table 6 - Montana Creek Blueberry AARA Sites 1990 Harvest

West Site

Date Harvested	No Fertilizer Not Pruned Total Harvest g	No Fertilizer Pruned Total Harvest g	Fertilized Not Pruned Total Harvest g	Fertilized Pruned Total Harvest g
07/26/90	448 gm	237 g	630 gm	599 gm

North Site

Date Harvested	No Fertilizer Not Pruned Total Harvest g	No Fertilizer Pruned Total Harvest g	Fertilized Not Pruned Total Harvest g	Fertilized Pruned Total Harvest g
07/26/90	71 gm	106 gm	107 gm	131 gm

Table 7 - Talkeetna Blueberry AARA Site 1990 Harvest

Date Harvested	No Fertilizer Not Pruned Total Harvest g	No Fertilizer Pruned Total Harvest g	Fertilized Not Pruned Total Harvest g	Fertilized Pruned Total Harvest g
07/25/90	10	84	84	28
08/15/90	11	77	49	9
08/22/90	95	653		
	116 g	814 g	133 g	37 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, two red currant varieties, thirteen raspberry varieties and three half-high blueberry varieties. One raspberry variety, 'Heritage', did not perform well in 1988 and was replanted in 1989, with replacement plants from the supplier.

Information collected by the cooperators in this study includes winter hardiness rating, date of bud break, bloom and harvest dates and yields. The 1990 hardiness rating and yield information (Table 8) indicates that in southcentral Alaska each variety's performance varies depending upon the site. The plants in this study will be observed for five years. A final report will be prepared upon completion of the study.

Table 8 - 1990 Results of Applied Agricultural Research Account Small Fruit Trials

Varieties	Anchorage Hardiness*	avg yield /plant gm	Kenai Hardiness	avg yield /plant gm	Palmer Fairgrounds Hardiness	avg yield /plant gm	Palmer PMC Hardiness	avg yield /plant gm	Wasilla Hardiness	avg yield /plant gm	Talkeetna Hardiness	avg yield /plant gm	Trapper Creek Hardiness	avg yield /plant gm
Amelanchier														
'Honeywood' +	0.6	154.0	0.6		1.0	86.8	0.5	8.8	N/A		N/A		N/A	89.0
'Northline' ++	0	52.0	1.2				2.6							
'Pembina' ++	0		0		0		4.2							
'Smoky' +	0		1.0		0		0							
'Thiessen' +	0	97.2	0		0.75	70.0	0.6	3.2						10.2
Ribes - Black														
'Boskoop' +	0	246.0	0	174.0	0	1591.4	0	194.8				3063.0		248.0
'Consort' +	0	5.0	0		0.6	194.0	0	3.2						13.2
'Swedish Black'	0	201.2	0	48.0	0.3	315.7	0	33.6				208.4		104.0
'Willoughby' +	0	147.4	0		0.2	215.0	0.6	6.4						34.4
Ribes - Red														
'Holland Long Bunch'+	0	2.0	0		0	8.0	0							
'Honeywood' +	0	20.0	0		1.0	23.6	1.25							
'Viking' ++	0		0	12.0	1.0		1.8							
Rubus														
'Anelma' +	1.2		3.0		0.2	9.2	2.0					36.5		48.8
'Autumn Bliss' +	2.0		1.0		0.8									17.2
'Blackhawk' ++	0		1.0											6.0
'Boyne' +	1.0	70.0	1.0		0	31.8	2.0	0.2				3.2		40.5
'Festival' +	0.8	147.0	1.8		1.0	12.4	2.0	6.0				33.8		70.5
'Heritage' +	4.0	3.0					2.0							5.4
'Heritage' ++			1.0		1.0									
'Jewel' ++	0.4		0											
'Kiska' +	0.2	223.2	0		0.6	45.8	0.2	11.6				11.6		14.0
'Red Wing' ++	0		1.0											4.0
'Revelle' +	2.0	25.0	1.0		0	6.2						7.2		4.8
'Royalty' ++	0		0		0							4.6		
'Ruby' ++	0		0											
'Titan' ++	0		1.0											
Vaccinium														
'North Blue' +	1.0		0		1.0	0.4	1.6							
'North Country'	0		0		0.8	1.0	1.4							
'North Sky' +	0		0		0.8	0.4	1.0							

+ Planted in 1988
++ Planted in 1989

N/A - Data not available.

Hardiness Rating*
An average of the plants rated
0 = no apparent damage from winter injury.
1 = less than 25% of the plant injured, injury present, but slight, recovery assured.
2 = 25-50% of plant injured, injury moderate, recovery probable.
3 = 50-75% of plant injured, injury severe, recovery questionable.
4 = More than 75% of the plant injured, injury extreme, recovery not likely.
5 = Whole plant is dead.
6 = Top of plant is winterkilled, but roots or crown survived.

Tomato Variety Observations

John Holms, a Fairbanks breeder of cold-hardy tomato varieties, offered the Plant Materials Center seed of some of his hardier varieties to be grown in the Palmer area. Seeds or transplants obtained from Wayne Leiser, Dimond Greenhouse; Dawn Nugen, Perennial Gardens; and the Far East Soviet Union were also planted in the observations.

Seeds of all varieties except 'Sub-Arctic Maxi' were sown on 18 April 1990. The seedlings were transplanted at the first true leaf stage into 4-inch square pots on 18 May 1990. The 'Sub-Arctic Maxi' seedlings were obtained from Dimond Greenhouses and seedlings with 2-3 true leaves were transplanted into 4-inch pots on 18 May 1990.

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 8 June 1990. Plants were spaced two feet apart in the row with rows six feet apart to allow for mechanical cultivation between the rows. All plants were staked to a three-foot stake one week after transplanting.

All of the varieties became well established and flowered. However, not all of the varieties produced ripe fruit. Ripe fruit or fruit which had begun to show color was harvested three times per week. The final harvest of ripe fruit and a single harvest of green fruit was made on 13 September 1990.

The Alaska developed varieties produced the highest yield of ripe fruit (Table 9). None of the varieties from the Soviet Union produced fruit mature enough to harvest. The three varieties appeared more suited to greenhouse production and did not have the cold tolerant characteristics for which the Siberian tomato is known.

Table 9 - Tomato Variety Yield and Harvest Dates From the PMC Plots

Variety	Source	Harvest	lb./plant	Yield lb/plt
Polar Baby - plastic	1	08/02/90	3.58	1.22
Polar Baby - open	1	08/05/90	2.78	2.40
Polar Gem - open	1	08/05/90	2.32	1.95
Alpha - plastic	1	08/14/90	3.07	3.75
Alpha - open	1	08/14/90	2.53	3.45
Polar Beauty - open	1	08/16/90	0.73	2.15
Sub-Arctic Maxi - open	3	08/16/90	0.80	5.95
Glacier - open	2	08/19/90	0.53	1.00
Glacier - plastic	2	08/19/90	0.58	0.55
Polar Beauty - plastic	1	08/19/90	0.71	1.80
Polar Gem - plastic	1	08/19/90	1.92	4.55
Sub-Arctic 25 - plastic	1	08/19/90	0.72	4.65
Sub-Arctic 25 - open	1	08/19/90	0.80	3.30
Sub-Arctic Maxi - plastic	3	08/19/90	0.40	4.95
Denali - open	1	N/A	0.36*	1.60
Denali - plastic	1			2.05
Siberian - plastic	2			1.60
Siberian - open	2			2.30
USSR #1	4			
USSR #2	4			
USSR #3	4			

* Total pounds harvested.

Sources:
1) John Holms, P. O. Box 71196, Fairbanks, Alaska 99707
2) Dawn Nugen, Perennial Gardens, P. O. Box 770106, Eagle River, Alaska 99577
3) Wayne Leiser, Dimond Greenhouse, 1050 W. Dimond Blvd., Anchorage, Alaska 99502
4) Nancy Moore, Alaska Plant Materials Center, HC 02 Box 7440, Palmer, Alaska 99645

There was some variation in fruit size among the varieties with Polar Gem, Alpha and Polar Beauty producing the largest fruit. The smaller fruited varieties tended to produce a lower percentage of fruit with growth cracks. All of the ripe fruit produced had a good flavor.

The complete summary of the results of the observation trials is available in the Results of 1990 Tomato Variety Observations, published by the Alaska Plant Materials Center.

Off-Site Plant Trials

The PMC has established plant trials throughout Alaska. Trials are located in Fairbanks, Delta, Kenai, Kodiak, Trapper Creek, the Manillaq area and Nenana. Most of the Unalaska planting was destroyed before hardiness information could be collected. Cooperators assisting with the trials include the Cooperative Extension Service, individual cooperators, local governments and native corporations. Ornamental trees and shrubs and small fruits have been evaluated at these sites.

In 1990, five varieties of Larch were added to the major sites. Lawyers Nursery, Plains, Montana, provided plants of Larix decidua, L. gmelinii gmelinii, L. gmelinii 'Olgensis', L. gmelinii 'Principis-Ruprechtii', and L. occidentalis for the off-site plant trials. 'Tower' poplar was also planted in 1990 at the sites. A typical list of plants being evaluated at most trial sites is listed in Table 10.

Table 10 - Typical Plant List of Off-Site Plant Trial

Alnus incana, Alder
Caragana arborescens, Siberian Pea Shrub
Clematis tangutica, Clematis
Cornus stolonifera, American dogwood
Cornus stolonifera, American dogwood
Forsythia ovata 'Nakai', Forsythia
Physocarpus opulifolius var. intermedius, Ninebark
Potentilla 'Hallman's Dwarf', Potentilla
Potentilla x Friedrichsenii, Potentilla
Rosa 'John Cabot', Rose
Rosa Woodsii, Rose
Rubus arcticus, Nagoonberry
Viburnum edule, Highbush Cranberry

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

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

Larix decidua, Larch
Larix gmelinii gmelinii, Larch
Larix gmelinii olgensis, Larch
Larix gmelinii 'Principis Ruprecht' Larch
Larix occidentalis, Larch
Malus baccata, Siberian Crabapple
Prunus besseyi, Sand Cherry
Prunus maackii, Amur Cherry
Populus 'Tower', Tower Poplar
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

Annual Alaska Greenhouse and Nursery Conference

The 9th Annual Alaska Greenhouse and Nursery Conference was held February 1 and 2, 1990, in Soldotna, at the Central Peninsula Sports Center. The conference was co-sponsored by the Alaska Plant Materials Center, University of Alaska Cooperative Extension Service (CES) and Alaska Horticultural Association. One hundred fifty people from throughout Alaska, Canada and the lower 48 attended the conference. This was the first time the conference had been held on the Kenai Peninsula.

Mr. Lloyd Hausher, a Fruit Crops Specialist with Alberta Agriculture, was the keynote speaker. He made presentations on "Fruit Crops: Site Selection and Marketing," "Strawberry Production" and "Raspberry and Saskatoon Production." Kenai Peninsula growers were also featured speakers at the conference. Presentations included such topics as hanging basket production, plug production, bedding plant production, commercial composting and the Kenai Beautification Program. Results of the Kenai turf management trials and an update of horticulture research and education in Alaska were also presented. Copies of the proceedings of the conference are available from the CES office in Anchorage.

Fourteen commercial exhibits and three non profit exhibits comprised the Polar Grower Trade Show (PGTS) held in conjunction with the conference. Commercial exhibitors came from Alaska, Montana, Washington, Idaho and Canada to participate in the PGTS.

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.

Table 11

Variety	1989	1990
'Holland Long Bunch' Currant	75 1-0 plants	
	$375.00	
'Swedish Black' Currant	75 1-0 plants	
	$375.00	
'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
'Skwenta' Strawberry	100 plants	150 plants
	$ 45.00	$ 60.00
'Talkeetna' Strawberry	100 plants	150 plants
	$ 45.00	$ 60.00
'Long' Barclay Willow	120 cuttings	
	$120.00	
'Oliver' Barrenground Willow	100 cuttings	
	$100.00	
'Rhode' Feltleaf Willow	120 cuttings	
	$120.00	
'Roland' Pacific Willow	100 cuttings	25 cuttings
	$100.00	$ 62.50
'Wilson' Bebb Willow	100 cuttings	
	$100.00	

UAF/PMC Soviet Exchange

During August 1990, Dr. Pat Holloway and Catherine Wright travelled to the Soviet Union through an exchange with the University of Alaska Fairbanks, Agriculture and Forestry Experiment Station and the V. I. Lenin All-Union Academy for Agricultural Sciences (VASKHNIL). Goals of the trip included exchanging horticultural information and plants which might grow well in our respective countries.

The trip began with a stay at the VASKHNIL institute in Krasnoobsk, near Novosibirsk. This VASKHNIL institute is the center for much of the agriculture research done in the Siberian region of the Soviet Union. While at Krasnoobsk, we met with our counterparts who travelled to Alaska as part of the exchange during August 1990. We discussed vegetable production and disease resistance problems and exchanged vegetable seeds with those scientists who work with vegetable crops. We met with the staff of the VASKHNIL Dendrology Park and toured their plantings of woody plant materials which have been collected from temperate regions worldwide. We also toured the Siberian Botanical Garden in Novosibirsk and collected seeds of trees and shrubs from both locations to put into trials in Alaska.

While in Novosibirsk, we travelled to the nearby village of Berdsk to tour the Novosibirsk Zonal Fruit and Berry Research Station. The director was breeding raspberries and developing production techniques for raspberries, currants, mountain ash, and oblepeka or seabuckthorn. He had designed several pieces of equipment to reduce the labor involved in berry production. One piece of equipment pruned young raspberry canes with high pressure water and another piece of equipment was designed to lay down raspberry canes and young trees for overwintering.

We travelled from Novosibirsk to the Lisavenko Research Institute of Horticulture in Siberia located in Barnaul. The institute is now a branch of the VASKHNIL system. At the institute, tree fruits including apples, pears and plums are bred for hardiness and disease resistance. Breeding and research on hardiness and disease resistance is also conducted on raspberries, strawberries, currants and oblepeka. The institute has an extensive ornamental woody plant collection in their Dendro Park which we toured. Several collections of raspberry, apple, pear, oblepeka and ornamental seeds were made for trials in Alaska.

The institute also maintains two research stations in Gorno-Altaisk and Chamal which we had the opportunity to visit. Both of these stations conduct research on tree fruits, raspberries and currants. The Gorno-Altaisk station also had an extensive breeding program for herbaceous perennials. Again, we were able to make collections of fruits and herbaceous plants for trials in Alaska.

The plants grown from the seeds collected will be grown in the plant trials at the University of Alaska Fairbanks and at the Plant Materials Center. Depending upon the amount of seed available and growth rate of the plants, additional trials will be set up at the off-site locations. The best performing plants will be made available to the commercial nursery industry for production.

Potato Disease Control Program

Potatoes have been grown and sold in Alaska since prior to the establishment of the Matanuska Colony. Alaska grown potatoes had a cash value of $ 3,500,000 in 1989 and an average annual value exceeding $ 2,000,000 through the last decade. Alaska's production of quality potatoes has kept over $ 20,000,000 from being exported during the last ten years.

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.

Diseases are capable of causing severe losses. Many of the diseases affecting the potato are carried in or on the potatoes themselves. The use of seed in which diseases are absent or at low levels, has been proven to greatly reduce the risk of losses caused by disease. Inspections for disease incidence are the function of the certification program.

Seed quality is judged primarily on the amount and types of diseases present. Seed-borne diseases were significantly reducing the Alaskan growers' yields during the late 1970s. Seed potatoes of the varieties preferred by Alaskan growers which had low levels of disease were not available locally. Importing seed from outside the state carries with it the potential to introduce pests and diseases not now known to occur in Alaska. The Potato Disease Control Project was initiated to help overcome these problems and increase the profit potential. The project assists the industry by producing seed potatoes free from diseases and monitoring the health of the seed and commercial fields. The maintenance of a prosperous potato industry is accomplished by providing quality seed, monitoring disease incidence and education.

Figure 4

TUBER INTRODUCTION

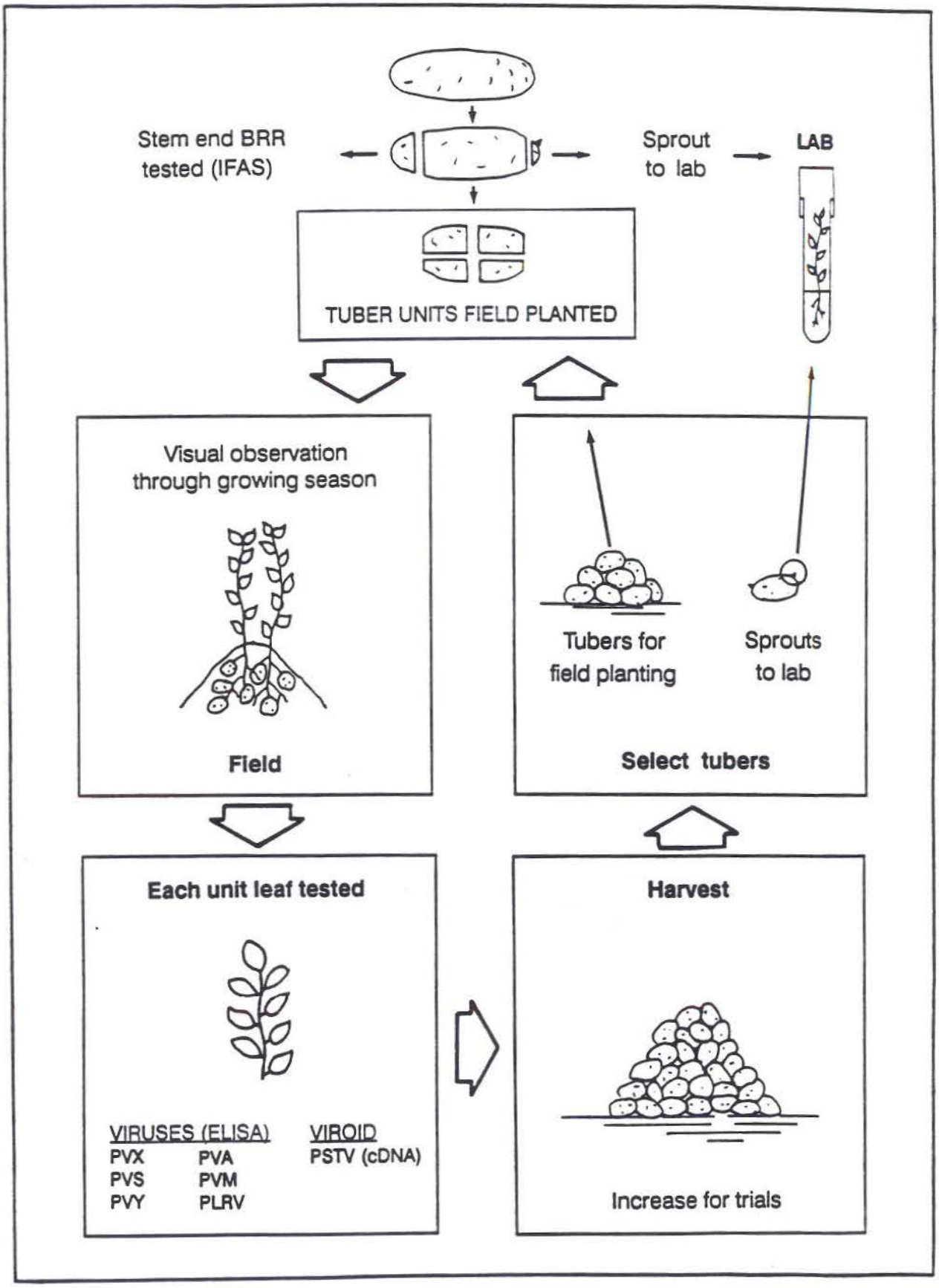
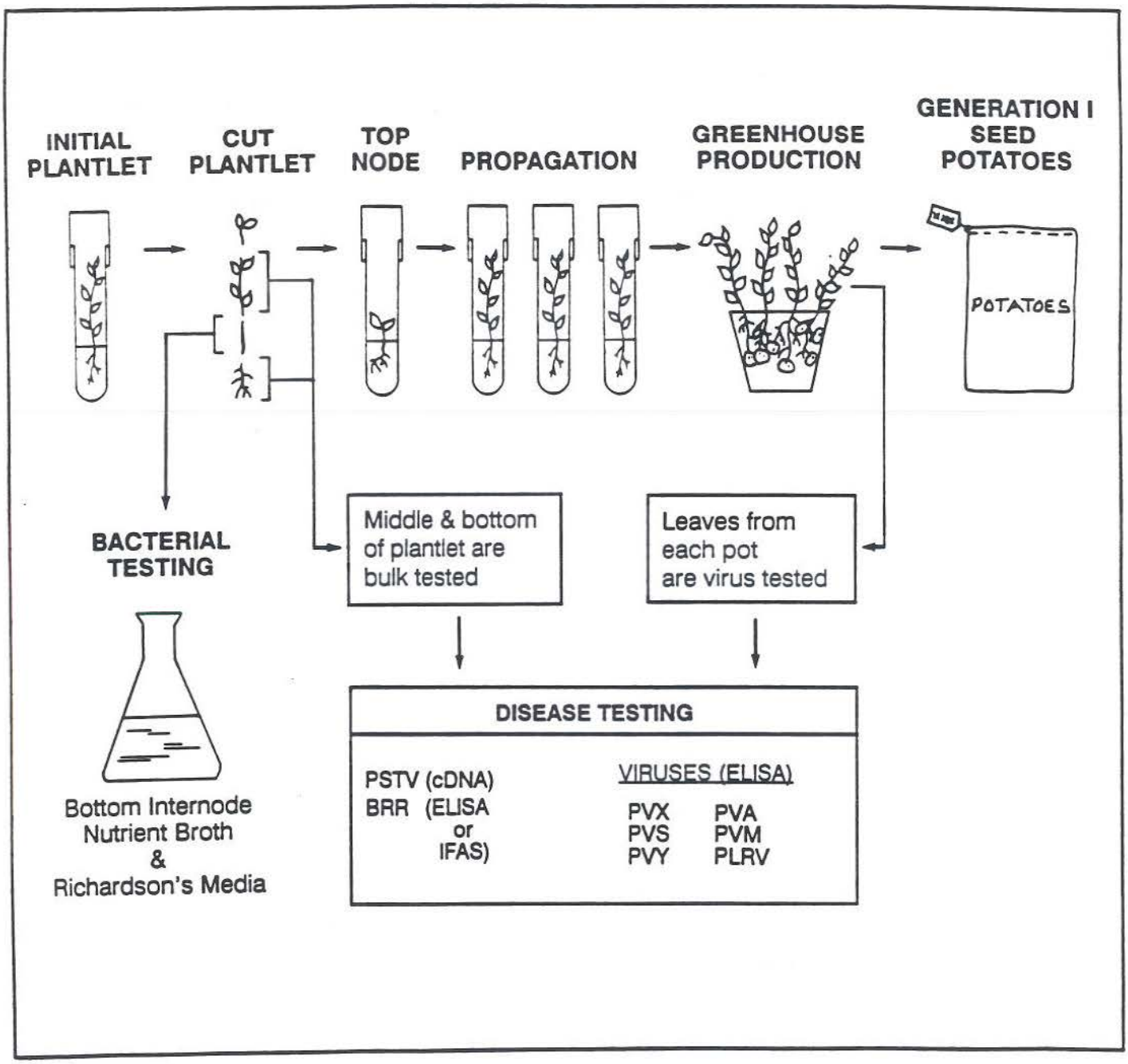


Figure 5 Alaska Seed Potato Production & Disease Testing



Disease-Tested Seed Potato Production

In 1990, the project produced 9,000 disease-tested plants of 26 varieties. Six varieties accounted for 60% of this total. The varieties most in demand were Shepody, Bake-King, Iditared, Superior, Alaska 114 and Green Mountain.

Approximately 1,500 plants were made available to six growers for production of Generation 1 (G1) seed. The remaining plants were grown in greenhouses at the Plant Materials Center (PMC), and produced 900 pounds of G1 seed to meet the orders placed in 1989.

Disease-tested seed amounting to 3,000 pounds of nine russet-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 176 lots planted to 65 acres, a 35% increase over 1989. 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.

Second 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 group of approximately 50 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 University of Alaska, Anchorage and twenty students at 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 to explain the methodology used in producing disease-free seed potatoes at the PMC as well as the potential for Alaska to export virus-free seed potatoes.

Seed potato production was included in topics presented at the Thirteenth Annual Alaska Agricultural Symposium held in mid November in Anchorage.

Potato Variety Scab Resistance Evaluation

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

Plots were established in potato fields having a history of producing scab infected potatoes. The tubers were harvested in early September and visually inspected for scab lesions. The varieties Bake-King and Katahdin are reported to be susceptible to scab and were covered with lesions as expected. The varieties Reddale and Avon, reportedly with high resistance to scab, had higher lesion counts than were expected. The tubers produced would be considered eligible for U. S. No 1 for the following varieties: Avon, Cariboo, Conestoga, Jemseg, Reddale, Sable, Superior, Yankee Supreme and Yukon Gold. Tubers severely infected were Bake-King, Katahdin and Shepody.

Copper River Native Association Trials

Seed of 15 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 Shepody, Yukon Gold, Red Pontiac, and Mirton Pearl produced the largest total yields. Approximately 40 people in the Copper Center area benefited from this program.

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 90 PMC Total	$ 556,600.00
North Latitude Revegetation & Seed Production Project	
Project Total	320,800.00
Personal Services	260,400.00
Travel	2,600.00
Contractual	47,200.00
Supplies	10,600.00
Equipment	-0-
North Latitude Vegetable & Landscape Crop Improvement Project	
Project Total	245,800.00
Personal Services	219,600.00
Travel	3,900.00
Contractual	19,100.00
Supplies	3,200.00
Equipment	-0-

Authorization FY 91 PMC Total	$ 566,600.00
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	
Project Total	245,800.00
Personal Services	219,600.00
Travel	3,900.00
Contractual	17,900.00
Supplies	4,400.00
Equipment	-0-

General PMC Operating Budgets for the Past Ten Fiscal Years

	FY 81	FY 82	FY 83	FY 84	FY 85	FY 86	FY 87	FY 88	FY 89	FY 90	FY 91
Authorization	361,900	743,100	725,900	912,300	863,400	888,500	733,700	596,700	556,100	566,600	566,600
Personnel	13	21	21	25	19	19	17	16	16	16	16
Full Time	7	10	10	12	10	10	9	7	7	7	7
Part Time	6	11	11	13	9	9	8	9	9	9	9

When comparing personnel figures listed for FY 90 and FY 91 to those in FY 81, bear in mind that the Potato Disease Control Project and the Horticultural Development Project were added in FY 85 and FY 82 respectively. Total FY 80 allotted man hours equalled 112 man months. FY 90 and FY 91 man months only totalled 121 as many of the seasonal positions are now two to three month assignments.

1990 Calendar Year Monthly Expenditures to the Nearest Dollar

	Jan.	Feb.	March	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
PMC Totals	46,358	37,236	31,930	41,777	46,831	54,079	61,933	34,251	68,490	46,768	51,113	29,585
Personal Services	35,294	32,516	29,328	33,475	41,745	45,231	60,557	27,215	56,996	40,623	34,591	23,470
Travel	-0-	417	-0-	581	293	-0-	-0-	1,361	2,411	1,088	1,293	-0-
Contractual	10,013	3,254	4,195	7,937	4,746	8,849	1,345	4,016	4,603	3,045	10,089	5,941
Supplies	1,084	652	155	309	48	2,278	32	1,660	4,479	2,011	3,193	1,194
North Latitude Revegetation and Seed Production Project												
Totals	30,075	22,618	18,127	23,761	23,311	28,026	29,004	16,001	34,377	22,886	26,285	14,144
Personal Services	20,955	18,888	16,718	17,140	19,594	20,888	28,266	12,773	27,090	18,999	15,958	9,990
Travel	-0-	417	-0-	581	173	-0-	-0-	291	987	596	798	-0-
Contractual	8,053	2,298	2,994	6,121	3,496	7,139	738	2,479	3,010	2,271	6,113	4,153
Supplies	1,068	620	155	174	48	2,276	-0-	459	3,290	1,019	1,469	1,021
North Latitude Vegetable and Landscape Crop Improvement Project												
Totals	16,283	14,618	13,803	18,016	23,520	26,053	32,929	18,250	34,113	23,882	24,828	15,441
Personal Services	14,339	13,628	12,610	16,335	22,151	24,343	32,291	14,442	29,906	21,624	18,633	13,480
Travel	-0-	-0-	-0-	-0-	120	-0-	-0-	1,070	1,424	492	495	-0-
Contractual	1,960	956	1,201	1,816	1,250	1,710	607	1,537	1,593	774	3,976	1,788
Supplies	16	32	-0-	135	-0-	2	32	1,201	1,189	992	1,724	173

Program Receipts

Receipts Calendar Year 90	
Technical Assistance	
U. S. N/SCS	2,738.00
U. S. Navy	10,996.00
Greens Creek Mine	400.00
Echo Bay Mine	443.00
Unocal	1,000.00
National Park Service	6,850.00
Arco	17,300.00
Achorage Water & Wastewater Utility	4,400.00
Sales	
Grass, Grain, Potato Seed*	14,290.00
Total Receipts	58,417.00

* Total value of seed and plant materials sold prior to 25% administrative fee reduction.

APPENDIX B

NEW & PENDING CROP RELEASES

NEW 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.

'Gruening' Alpine Bluegrass, Poa alpina - This selection of alpine bluegrass was released for production in 1987. A native species, alpine bluegrass has shown extreme hardiness throughout Alaska and it is well adapted to harsh sites such as mine spoil.

'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.

'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.

Pending Releases

Beach Wildrye, Elymus arenarius - The Plant Materials Center is presently in the final evaluation stages on two collections of Beach wildrye. Both may be released for commercial production. The first is a collection from Norway that has exhibited hardiness throughout most southwestern and southcentral coastal Alaska. This collection is capable of producing viable seed in commercial quantities. The second collection of Beach wildrye originated on Kodiak Island and does not produce seed, a trait common to native stands of the species. Commercial production of this collection would be limited to vegetative production.

Release is expected in 1991.

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.

APPENDIX C

LIST OF PUBLICATIONS & PRESENTATIONS

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APPENDIX D

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