COMBINED ANNUAL REPORT

# State of Alaska
# Plant Materials Center

## 2009 - 2010

# Alaska Plant Materials Center

5310 S. Bodenburg Spur Rd.
Palmer, AK 99645

Phone: (907) 745 - 4469
Fax: (907) 745 - 1568
Web: http://plants.alaska.gov/
Email: dnr-pmc@alaska.gov

The Alaska Plant Materials Center (PMC) is a section of the Division of Agriculture within the Department of Natural Resources. Established under AS 03.22, The Alaska Plant Materials Center's work advances applied plant research for northern latitudes through seven major programs:

1. Revegetation,
2. Alaska Ethnobotany Research Project / Teaching Garden,
3. Rural Village Seed Production Project,
4. Foundation Seed Program,
5. Commercial Development of Native Seed & Plants,
6. Potato Disease Control Program,
7. Invasive Plants and Agricultural Pest Management.

Each of these programs will be addressed in detail within this report.

Often in late July or early August, the Plant Materials Center hosts an open house. The PMC staff is available to answer questions about the projects and give tours of the facilities. While ongoing construction has limited the number of open house events in recent years, attendance is generally strong. Notice of upcoming open houses will be posted on the Plant Materials Center's website at least 1 month prior to the event.

Much of the Plant Materials Center's funding has come from non-state sources. The United States Department of Agriculture (USDA) was a major funding source in recent years. The PMC is also a recpient of funds from the American Recovery and Reinvestment Act of 2009 (ARRA), dedicated to the Rural Village Seed Production Project.

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

# STATE OF ALASKA

**DEPARTMENT OF NATURAL RESOURCES**

***DIVISION OF AGRICULTURE***

***SEAN PARNELL, GOVERNOR***

■ **CENTRAL OFFICE**
1800 GLENN HIGHWAY, SUITE 12
PALMER, ALASKA 99645-6736
*PHONE: (907) 745-7200*
*FAX: (907) 745-7112*

☐ **NORTHERN REGION OFFICE**
1648 S. CUSHMAN ST., # 201
FAIRBANKS, ALASKA 99701-6206
*PHONE: (907) 328-1950*
*FAX: (907) 328-1951*

☐ **PLANT MATERIALS CENTER**
5310 S. BODENBURG SPUR
PALMER, ALASKA 99645-9706
*PHONE: (907) 745-4469*
*FAX: (907) 746-1568*


January 31, 2011

The Alaska Plant Materials Center (PMC) provides essential seed cleaning and conditioning services to Alaska farmers. The PMC has produced dozens of cultivars and selected class releases of plants native to Alaska, and is home to the only certified seed testing laboratory in Alaska. The Plant Materials Center conducts seed potato inspections required for certification, and maintains a limited-generation tissue culture propagation program to minimize the incidence of disease in Alaska-grown seed potatoes.

The PMC is also a premier resource for revegetation research and technology transfer in Alaska. 2010 saw the publication of the Alaska Coastal Revegetation and Erosion Control Guide. Soil testing and conservation capabilities were also added during this reporting period. The Plant Materials Center has expertise in agronomic soil issues and storm water pollution prevention plan methods.

With the completion of the Ethnobotany Teaching Garden and the new interactive whiteboard conference facilities, the Plant Materials Center has become an educational destination of note. PMC Staff have led workshops and conducted tours, in cooperation with K-12 educators. The PMC is also working to ramp-up rural agricultural production, through the Rural Village Seed Production Program. Interested rural communities are receiving consultation, training, and limited grant funds to support this initiative.

The Plant Materials Center plays a unique role in Alaskan agriculture. This report contains details about specific PMC programs and accomplishments for 2009 and 2010. The Plant Materials Center is a strong asset to the State of Alaska. I am pleased to present this report.

Sincerely,

Franci Havemeister

Franci Havemeister
Director

## Alaska Plant Materials Center
## - Staff -

**PMC Manager**
Stoney J. Wright, *Agronomist*

**Potato Disease Control**
William L. Campbell, *Agronomist*

**Revegetation**
Phil K. Czapla, *Agronomist*

**Foundation Seed**
Peggy Hunt, *Agronomist*

**Soil Science**
Casey Dinkel, *Agronomist*

**Seed Lab Supervisor**
Lyubomir Mahlev, *Agronomist*

**Rural Seed Development**
Sohban Sajja, *Agronomist*
Alexander Ault, *Natural Resource Specialist*

**Seed Cleaning / Conditioning**
Brianne Blackburn, *Natural Resource Specialist*

**Invasive Species Management**
Gino Graziano, *Natural Resource Specialist*
Andrew Weaver, *Natural Resource Specialist*

**Farm Foreman**
Kathi VanZant, *General Foreman*

**Publications**
Brennan Veith Low, *Publications Specialist*

**Administration**
Ronald C. Cotterman, *Administrative Assistant*

# 2009 - 2010
# Combined Annual Report

## Table of Contents

# Commercial Development of Native Plants

While early cultivar development in Alaska was centered at the University of Alaska's Agricultural Experiment Station, it is the Alaska Plant Materials Center (PMC) that is responsible for seeing these releases into production. The PMC maintains continual contact with growers across Alaska, suggesting native plant species whenever possible. In addition, the PMC initiated a program to develop accessions and cultivars of native plants in 1979. Since that time, 5 cultivars and 32 named germplasm releases have originated at the PMC.

Native plant species are already adapted to the extreme climate of Alaska, and are most likely to do well under cultivation. There is a steady demand for seed stock for revegetation and reclamation purposes. Native plant species are required to support public infrastructure projects, such as roads and airports, as well as private industry, including exploration activities for the mining and petrochemical sectors.


*The Directory of Alaska Native Plant Sources is offered as a service to growers, and is available in print and online, at [http://plants.alaska.gov/native/](http://plants.alaska.gov/native/)*

## Directory of Alaska Native Plant Sources

The PMC maintains a comprehensive directory of all in-state producers of Native Alaskan plants. This reference includes growers of trees and shrubs, grass and wildflower seed producers, and suppliers offering revegetation resources and consultations. In 2010, the online Directory of Alaska Native Plant Sources was redesigned to facilitate easier interaction between growers and the PMC. Seed and plant producers are now able to electronically submit their information for inclusion in the directory. The directory is currently in the 6th edition; the 7th edition will be published in the spring of 2011.

Most growers and producers are centered in the main agricultural regions of the state; the Delta area in the north, and the Matanuska & Susitna valleys to the south. With the launch of the Rural Village Seed Production Project, the number of native plant producers in the state is expected to increase. More details about this program are presented later in this document.

# Commercial Development of Native Plants

The Alaska Plant Materials Center is continually involved in propagation and testing of plants through seed increase programs. The following projects and programs list new and on-going efforts in commercial development of native plants.

## Seed & Plant Increase Program

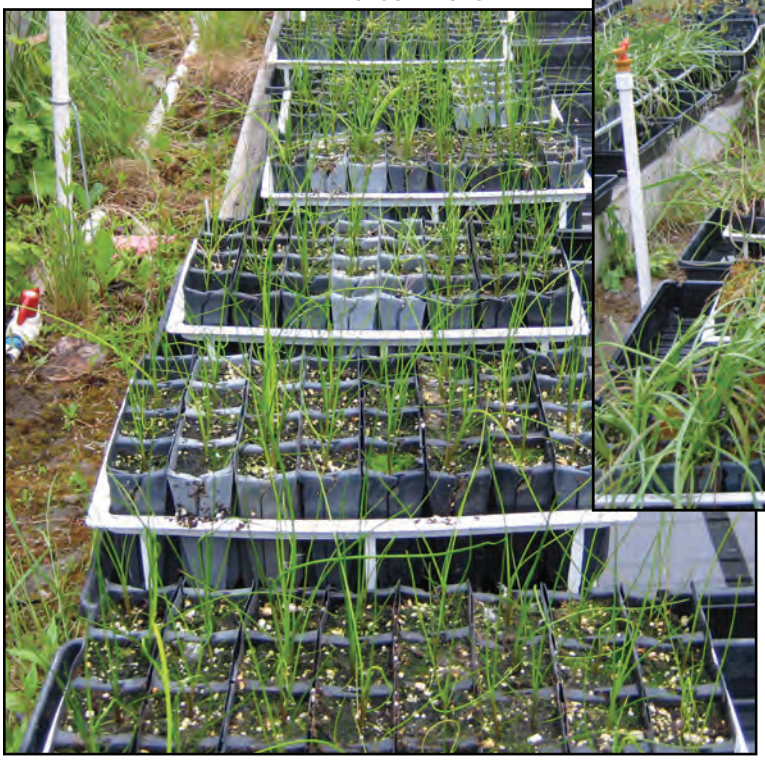
### Westchester Lagoon Aquatic Ecosystem Restoration

Working with HDR Inc., PMC staff assisted with the propagation and production of over 1200 Seaside arrowgrass (*Plantago maritima)* and Seaside plantain (*Triglochin maritima)* seedlings, for use in an aquatic ecosystem revegetation project at Anchorage's Westchester Lagoon. These species are saline tolerant wetland plants, suitable for the tidal inundation expected regularly experienced at the mouth of Chester Creek.

Prior to planting, germination tests were conducted to determine the viability of the seed. Seeds of both species were planted in the beginning of April. Fast germination and uniform growth was evident with the Seaside arrowgrass. Seaside plantain seeds planted in the greenhouse showed significantly lower germination rates than seeds germinated in a special germination chamber, so arrowgrass seeds were germinated in germination chamber and than transplanted in the greenhouse. Seedlings were ready for transplant by the end of July, 2009.

PHOTOS: LYUBO MAHLEV

*Seaside arrowgrass (*Triglochin maritima*) in the lath house*



*Seaside plantain*, (Plantago maritima) *seedlings in the lath house*

# Commercial Development of Native Plants

## Chugach National Forest Seed Increase Program

In cooperation with the U.S. Forest Service (USFS), the PMC initiated a seed collection and increase program for the Chugach National Forest. The program began in 2006, with the intent to create enough viable seed to support a planting program within the Chugach National Forest (CNF). After plant material from the CNF was obtained, the first field plantings began in 2007.

Plugs of 5 different wild collections were overwintered in a lath house, then later transplanted in boxes. Boxed plantings are easier to maintain and facilitate harvest of the seed. Harvested seed was planted in fields 3 and 4 for field production. The final harvest yielded significant quantities of the following species in 2009:

- Bering hairgrass, *Deschampsia beringensis*
- Bluejoint reedgrass, *Calamagrostis canadensis*
- Beach wildrye, *Leymus mollis*
- Meadow barley, *Hordeum brachyantherum*
- Arctic wheatgrass, *Agropyron violaceum*
- Red fescue, *Festuca rubra*
- Alpine timothy, *Phleum alpinum*
- Alpine bluegrass, *Poa alpina*

Spike Trisetum *(Trisetum spicatum)* seedlings, grown in raised planting beds

2010 was an unusually wet growing season. Harvest of planted Bering hairgrass and Bluejoint reedgrass did not meet expectations. Cultivation of crops for the CNF will continue until 2013.

PHOTOS: LYUBO MAHLEV

*Bluejoint reedgrass (*Calamagrostis canadensis*) seed is harvested using a vacuum seed-stripper in this photo. The cleaned seed will be used to support revegetation efforts in the Chugach National Forest.*

*PMC staff harvests Bering hairgrass (*Deschampsia beringensis*) for the C.N.F. seed increase program*

# Commercial Development of Native Plants

## Seeds of Success Program

In the fall of 2009, the PMC received 43 seed lots from the Bureau of Land Management (BLM). The seed was collected from many different areas within the state of Alaska, including the Chugach National Forest (CNF), Chugach State Park (CSP), the Municipality of Anchorage, the Palmer Hay Flats, Denali National Park (DNP), and other BLM land. Raw seed was processed at the PMC (conditioned & cleaned) and seed per gram counts were determined. Due to the small size of the seed lots, all processing occurred at the Seed Laboratory.


PHOTO: LYUBO MAHLEV

*1.5 million cleaned seeds - the product of the 2009 Seeds of Success program*

Seed cleaning began with the fleshy species that needed specialized cleaning. A kitchen blender was used to remove the fleshy parts of the fruit from Red Elderberry (*Sambucus racemosa*) and Arctic rose (*Rosa acicularis*). Remaining species were placed in a seed drier box where they were dried to a desired moisture content to prevent development of mold. The cleaning for these species continued with the use of more elaborate equipment, such as an electric seed scarifier, a seed blower, and various sieves. A seed scarifier was used to detach the seed from the flower parts and to prepare them for the seed blower which removes the light portion of the inert material or empty seed. Sieves were used to remove additional particles and contaminants of various sizes.

Total weight of all species after cleaning was approximately 1.5 kg of pure seed. Cleaned seed was stored in a low temperature and low humidity environment to ensure the longest possible viability.

2009 Processing yeilded over 1.5 million cleaned seeds for the the Seeds of Success program. The processed species were as follows:

Siberian yarrow, *Achillea sibirica*
Northern bentgrass, *Agrostis mertensii*
Rough bentgrass, *Agrostis scabra*
Thinleaf alder, *Alnus incana var. tenuifolia*
Tilesius' wormwood , *Artemisia tilesii*
American sloughgrass, *Beckmannia syzigachne*
Lyngbye's sedge, *Carex lyngbyei*
Carex mertensii, Mertens' sedge
Closedhead sedge, *Carex norvegica ssp. Inferalpina*
Alpine sweetvetch, *Hedyasrum alpinum*
Common cowparsnip, *Heracleum maximum*
Meadow barley, *Hordeum brachyantherum*
Marsh pea, *Lathyrus palustris*
Nootka lupine, *Lupinus nootkatensis*
Seep monkeyflower, *Mimulus guttatus*
Field locoweed, *Oxytropis campestris*
Marsh grass of Parnassus, *Parnassia palustris*
Norwegian cinquefoil, *Potentilla norvegica ssp. Monspelliensis*

# Commercial Development of Native Plants

Fireweed, *Chamerion angustifolium*
Dwarf fireweed, *Chamerion latifolium*
Purple marshlocks, *Comarum palustre*
Artic daisy, *Dendranthema arcticum*
Drummond's mountain-avens, *Dryas drummondii*
Dahurian willowherb, *Epilobium palustre*
Bitter fleabane, *Erigeron acris*
White cottongrass, *Eriophorum scheuchzeri*
Largeleaf avena, *Geum macropyllum*
Alpine bluegrass, *Poa alpina*
Alpine timothy, *Phleum alpinum*
Little yellow rattle, *Rhinanthus minor*
Prickly rose, *Rosa acicularis*
Elderberry, *Sambucus racemosa*
Canadian burnet, *Sanguisorba canadensis*
Beauvard's spirea, *Spiraea stevenii*
Northern starwort, *Stellaria calycantha*
Merckia, *Wilhelmsia physodes*

*Artemesia tilesii grown in the greenhouse*

The BLM selected the following eleven species for further increase in 2010:

- Siberian yarrow, *Achillea sibirica*
- Northern bentgrass, *Agrostis mertensii*
- Rough bentgrass, *Agrostis scabra*
- Tilesius' wormwood, *Artemisia tilesii*
- Mertens' sedge, *Carex mertensii*
- Dwarf fireweed, *Chamerion latifolium*
- Alpine sweetvetch, *Hedyasrum alpinum*
- Field locoweed, *Oxytropis campestris*
- Canadian burnet, *Sanguisorba Canadensis*
- Merckia, *Wilhelmsia physodes*
- Alpine bluegrass, *Poa alpina*

For all species, plugs were grown in the greenhouse and then transplanted in to production boxes. Plugs of the three grass species (*P. alpina, A. scabra, and A. mertensii*) were transplanted in the field. The rest of the species were planted in an outdoor box garden, which allowed for easier maintenance.

*Seedlings from the Chugach National Forest were transplanted into outdoor grow boxes during the summer of 2010*

While in the greenhouse, powdery mildew and aphids were detected on some plants. Pesticides application resolved the aphid issue. Plants were kept well ventilated and powdery mildew symptoms gradually disappeared. Later in the season, when the plants were established, they were moved outside in the lath house to harden.

## 2010 Aleutian Fern Propagation Trials

*Aleutian Shield Fern, Polystichum aleuticum*

In 2010, the Alaska Plant Materials Center (PMC) began cultivation of Aleutian Shield fern, *Polystichum aleuticum*, a species native to the Aleutians. This fern was selected by the US Fish and Wildlife Service (USFWS) for review under the Endangered Species Act. The Aleutian Sheild Fern was listed as endangered in 1988, and this study will be used to ascertain whether that designation is still accurate. A 'Native Endangered Species Recovery Permit' was obtained by the USFWS, and spores were collected from the Alaska Maritime National Wildlife Refuge in September of 2010. The PMC was asked to produce nursery stock of at least 1,000 mature sporophytes plus genetic material for storage in a germplasm repository. Aleutian Shield Fern fronds were collected in September of 2010 from Adak Island by the USFWS, and delivered to the PMC for increase.

The Aleutian Shield Fern's natural growth habitat, as its name implies, is limited to a few areas of the Aleutians. On Adak and Attu Islands, this fern grows on north facing rock outcrops, alpine talus slopes, rock grottos, and moist crevices at elevations of around 2000 feet. Associated plant communities are dwarf willow-moss, dwarf willow-sedge-moss, and sedge-anemone-arnica-moss. This fern is very slow to grow, taking about 13 months from spore to mature sporophyte.

Many propagation techniques have been tried in the past. Existing literature was studied before propagation and increase efforts began. *Polystichum aleuticum* spores are dormant at temperatures below 8 and above 20 degrees Celsius. The species does not respond well to transplanting. Most sporophytes grown in artificial growth media have died. *Polystichum aleuticum* spores will die when subjected to boiling temperatures, herbicides, or fungicides. Moss or algae infestation, fungus gnat infestation, or desiccation/constant saturation can also hinder germination.


*The Aleutian Shield Fern grows on north facing, rocky slopes in the Aleutians*

Aleutian Shield Fern growth experiments show the most successful germination resulting from spores sown in moderately acidic, sandy loam soil. The PMC has arrived at a spore propagation protocol, based on past research and current experience, and is conducting several trials to find the best method to achieve the population goal of 1,000 mature plant specimens. Different substrate mixes will be used if enough spores exist. Future trials will involve the PMC's soil scientist in the design of substrate similar to the natural growing conditions. As of late December, prothalli growth was observed on several of the experiments. Evaluation of *Polystichum aleuticum* will continue in 2011 and 2012.

# Commercial Development of Native Plants

## Mat-Su Riparian Revegetation & Seed Increase

The Alaska Plant Materials Center (PMC) began work in 2010 on the Mat-Su Riparian Revegetation Project. The U.S. Fish and Wildlife Service (USFWS) is working on replacing culverts on creeks in the Matanuska and Susitna valleys, with the goal of improving salmon habitat. Narrow culverts, which can be an obstacle for fish, will be replaced with wide culverts to facilitate easier fish passage. The PMC will support this four-year project by providing native plant material to revegetate disturbances when culverts are replaced.

In the summer of 2010, PMC staff collected seed material from several locations in the Matanuska and Susitna valleys. Once collected, seed was placed in a seed drier box to prevent the development of mold. The seed from these wild collections was conditioned and cleaned, and was undergoing germination tests at the end of 2010.

Seed of the following species was collected:

- Bluejoint reedgrass, *Calamagrostis Canadensis*
- Lepidota Cristata Fern, *Dryopteris dilatata* (spores)
- Lady fern, *Athyrium filix-femina* (spores)
- Fireweed, *Chamerion angustifolium*
- Nootka lupine, *Lupinus nootkatensis*
- Wild Alaskan geranium, *Geranium erianthum*
- Mountain larkspur, *Delphinium glaucum*
- Western columbine, *Aquilegia formosa*
- Northern bluebell, *Mertensia paniculata*

*Collection site for the Mat-Su riparian project*

In the spring of 2010, dormant whips of two willow species (*Salix lasiandra, Salix alaxensis*) and cottonwood (*Populus balsamifera*) were harvested, then stored at appropriate temperature and humidity until processing could begin. Whips were cut to a length of 12-16 inches and rooted at 15-25C. When sufficient roots had developed, these cuttings were transplanted into the greenhouse. The rooted cuttings were taken outside for hardening at the beginning of June. 170 cuttings were planted in an outdoor fenced area in late June. This planting area will be a source of future cuttings, ensuring steady availability of these species suitable for stream bank revegetation.

PHOTOS: LYUBO MAHLEV

*Rooted willow cuttings, being hardened in ahead of planting*

Additional species were requested by the Fish and Wildlife Service, and were collected in the fall of 2010. Merten's sedge (*Carex mertensii)* and Goat's beard (*Aruncus dioicus)* are good seed produc-

# Commercial Development of Native Plants

ers, and will be easy to collect and clean. Dormant cuttings of Red elderberry (*Sambucus racemosa)* and Red Osier dogwood (*Cornus stolonifera)* will be collected in late winter.

A seed scarifier was used to detach the seed from the flower parts. Next, a seed blower was used to remove inert material or empty seed (the light portion). Sieves were used to remove any additional particles or contaminants.

Raised outdoor planting boxes were installed to support the Mat-Su riparian revegetation project. The existing box garden was extended and more planting boxes installed. New boxes will accommodate 2011 seed increases, using seed that was collected in 2010. Plant plugs will be grown in the greenhouse in the spring, and transplanted into the planting boxes in the summer of 2011.

*Harvested Calamogrostis canadensis contained numerous insects. The black oblong objects in the detailed image are thrips.*

PHOTOS: LYUBO MAHLEV

*The box propogation garden at the Plant Materials Center saw significant expansion in 2010*

# Plant Material Collection

## Subarctic - Arctic Germplasm Collection Project

With funding from the Agricultural Research Service and Natural Resources Conservation Service, the PMC initiated collections of plant material from across the Arctic. Specimens were collected between 2001 and 2005, and evaluated through 2010. All of the collected accessions were turned over to the national germplasm collection. Between 50 and 500 seeds of each viable collection were retained by the PMC for evaluation planting. The best performing accessions will be consolidated with material from other Arctic collections in 2011 or 2012 for advanced evaluation.


*Collection area near TJØMUVIK, Faroe Islands*


*Collection area in South Greenland*

### Iceland and Faroe Islands

The PMC initiated a seed collection program on Iceland and the Faroe Islands in 2001. The 123 accessions were first planted in the greenhouse, with seedlings field planted at the PMC in 2002. Between 2003 and 2007, plantings were evaluated three times per year, with seed from the best performing accessions placed into storage.

### Svalbard (Spitzbergen),Norway

A total of 212 accessions of seed from Svalbard were imported to the U.S. under a Norwegian phytosanitary permit and the general USDA import permit. This seed was field planted at the PMC in 2003, with evaluation continuing until 2008.

### West and South Greenland

In the fall of 2003, a seed collection occurred in west and south Greenland. The seed collection project was very successful, resulting in 403 collections of 31 distinct species. This was the largest collection to date by the PMC, and part of a federally funded germplasm collection project, exceeding initial goals by at least sixty percent. Collection conditions were nearly ideal, which in concert with optimal weather during the preceding summer, resulted in very high quality accessions.

### Canada - Nunavut, Nunavik, Newfoundland and Labrador

Seed collection in the High Arctic (Nunavut) and Sub-Arctic (Nunavik, Newfoundland, and Labrador) regions of Canada was conducted in 2004 and 2005, respectively. The collection consisted of 424 and 451 accessions, respectively including a total of 27 species.

Material collected from Nunavut, Greenland, Spitzbergen, Norway, Iceland, the Faroe Islands, Nunavik/Labrador, and of course Alaska, puts the Alaska Plant Materials Center in the unique position of having the largest Nordic or Arctic Germplasm collection under evaluation in North America. The highest quality materials will be put into advanced evaluation in 2011 or 2012, so long as a pesticide application permit can be obtained from the Alaska DEC. Alternative weed control methods will be considered, but a failure to obtain a permit will most likely result in the cancellation of further evaluations.

# Foundation Seed Program

Part of the Plant Materials Center's mission is to make an appropriate supply of high-quality seed available to growers, seed that is well-suited to Alaska's climate and soils that will produce economic benefits for the growers.

The foundation seed program at the PMC aims to provide the highest quality low generation seed (foundation class seed) to producers for cultivar seed production. Certification is important to identify that plants have been handled in such a way as to meet high standards of pedigree retention, varietal purity and viability, and that are free of weeds, diseases, and physical damage. This process encourages the production of high quality seed of superior varieties for agricultural interests and revegetation needs throughout the State of Alaska.

**Certified Seed Classes**

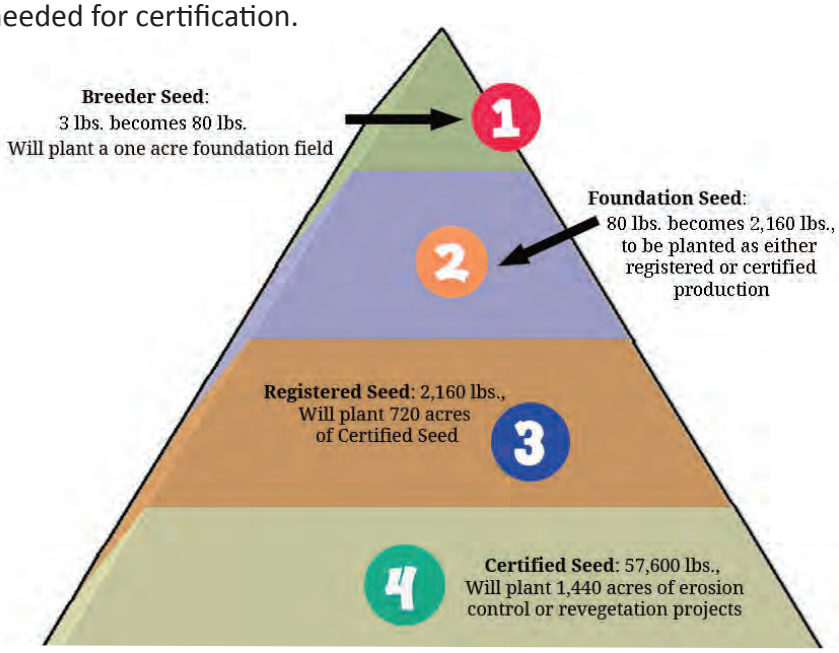
- Breeder Seed: The seed or vegetative propagating material directly controlled by the originating or sponsoring plant breeder, institution, or firm which supplies the source for the initial and recurring increase of foundation seed.


*Certified Seed tags; used to identify seed of known origin and quality*

- Foundation Seed: The seed that is the progeny of breeder seed. Production is carefully supervised, so as to maintain specific genetic and physical purity.
- Registered Seed: Registered seed is the progeny of foundation seed and must be handled carefully to maintain satisfactory genetic and physical purity.
- Certified Seed: Certified seed is the progeny of foundation or registered seed, which has the genetic and physical purity needed for certification.

## Foundation Seed Production

The PMC harvested over 40 different forb, grass, and grain crops in the 2009 & 2010 seasons. In 2009, thirty-five species of native grasses and twenty-one species of forbs were grown with thirty-six species harvested. In 2010, thirty-six species of native grasses and twenty-one species of forb were grown, with a total harvest of thirty-seven species. Grain varieties planted and harvested in 2009 were 'Sunshine' Barley, 'Nip' Oats, 'Toral' Oats, and 'Vigal' Wheat. Three grain varieties were planted in 2010, including 'Bebral' Rye - a biannual crop that overwinters. This variety will be harvested in 2011.




*The Seed Increase Pyramid illustrates the multi-phased seed increase process, whereby 3 pounds of breeder seed can be increased to a commercially usable quantity. Clean seed yields are based on an 80 lbs / acre. The planting rate is based on 3 lbs / acre for seed production and 40 lbs / acre for reclamation purposes.*

# Foundation Seed Program

A new field of 'Egan' American sloughgrass was established in 2009. In 2010, new crops of 'Nugget' Kentucky bluegrass, Ninilchik Nootka alkalaigrass, Council Arctic bluegrass, 'Wainwright' Slender wheatgrass, and Andrew Bay Large-glume bluegrass were also established.

In addition to our traditional harvesting equipment, the PMC now has a Wintersteiger Combine which was used throughout the 2009 and 2010 production seasons. This new machine brings some seed cleaning functions to the field. It proved to be effective with a wide range of crops including grasses, grains, and forb species. The versatility and faster clean-out time, compared to our larger traditional combine makes the Wintersteiger a valuable tool at the PMC. In addition to using combines, crops were harvested using a flail-vacuum or seed striper, as well as a seed / leaf vacuum. We also hand harvested some smaller lots.


*Foundation seed must meet strict standards for genetic purity and be free of contaminants*

## Annual Seed Sale

In 2009, only one seed sale was held. Forty-four species were available for sale to producers. Twenty-two lots of 16 species were purchased. In 2010, two seed sales were held, in the spring and in the fall. In the spring, eighty-five lots were offered for sale. In the fall seventy-one lots were offered. The total number of species offered for 2010 was 49. After the seed sale was over, a total of fourteen lots of eleven species were sold in 2010.

*The Wintersteiger combine in use at the PMC performs some basic conditioning of harvested crops, reducing the time required for post-harvest cleaning*

# Revegetation Projects

Reclamation research in Alaska began in the 1970s, with the construction of the Trans-Alaska-Pipeline-System (TAPS). Since then, ideas about the science of revegetation have changed. Applied research, spurred by interest in mining, continued oil and gas development and regulations have addressed the definition of 'reclamation', in some cases precluding the the use of 'traditional' plant materials and planting technology. The PMC has assisted score of agencies and private companies in reclamation, erosion control, and revegetation through 2010.

The Alaska Plant Materials Center (PMC) leads Alaska in reclamation, erosion control, research, technology and knowledge transfer, and revegetation. Research priorities include the use of dormant seedlings to extend planting seasons, cost-effective methods of willow planting, and wetland ecosystem restoration. This program has gathered at least 275 plot-years of information from sites around the state, and developed 11 new cultivars and 33 natural "Selected Class" germplasms for release. The PMC maintains these collections, as well as the 9 cultivars developed by the University of Alaska Fairbanks (UAF) and the Agriculture Research Service (ARS), for use in revegetation and reclamation.

Revegetation is the process of covering bare ground (usually raw mineral soils) with perennial plants, and it is one of the primary activities of the Alaska Plant Materials Center (PMC). By using native plant material, disturbed sites can be brought back to a condition as close as possible to what was there before the disturbance. This also ensures that there are fewer invasive species that would compete with native vegetation. During 2009 and 2010, the PMC monitored several past revegetation and restoration projects, and initiated a number of projects as well.

## Kenai Boat Launch

In the summer of 2010, PMC staff travelled to the city of Kenai to assess a revegetation process that began in the summer of 2009, with a seeding and fertilization treatment. An expanse stretching from the viewing deck to the waters edge was exhibiting very poor growth, due to heavy foot traffic and tidal inundation. As seeding has occurred during the previous summer, PMC staff applied fertilizer only, relying upon natural reinvasion and existing seed for plant establishment. 400 lbs of fertilizer was applied to the site, using hand-operated spreaders to achieve uniform coverage. PMC staff met with volunteers from the Kenai Watershed Partnership, participants in local site monitoring. 100 lbs of additional fertilizer was left with these volunteers. Monitoring will continue until 2012, or until plant cover has been reestablished.

PHOTOS: STONEY WRIGHT

*Fertilizer was applied up to the edge of existing vegetation, which will serve as a seed bank for natural re-invasion of the area.*
***INSET:** PMC staff spreads fertilizer with a hand-operated spreader*

# Revegetation Projects


*Eagle landfill site capped with topsoil, and ready for fertilizer and seeding. Depressions in the soil create a micro-climate well suited for seed growth.*

## Eagle Landfill

In 2010, PMC staff revegetated a 1.3 acre site that was once used as a landfill for the City of Eagle. The site was capped with approximately four feet of fill material, and topsoil was spread to improve growing conditions. The 'track-walking' method was used to create a favorable environment for seed germination and growth. Revegetation treatments included seed and fertilizer application, using an ATV-mounted seed spreader. Seed material was provided by the PMC, and was composed primarily of 'Nortran' hairgrass and 'Arctared' fescue. Small amounts of *Achillea millefolium*, *Artemesia tilesii*, and *Potentilla bimundorum* seed were added to the mixture also, for aesthetic reasons and to increase variety.

## Kanuti Pit

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

A site visit was performed in 2010 to evaluate the revegetation effort completed in 2003. Two 300 feet long transects were lain, and quantitative measurements of species diversity and plant cover were taken. Observations were taken at one foot intervals, resulting in a total of 300 data points per transect. Pictures were taken at designated photo points, as a qualitative measures of the revegetation performance. Planted species have become established, and natural re-invasion of native non-seeded species is occurring. All species appeared to be performing well.

*Bluejoint reedgrass (*Calamagrostis canadensis*) at the Kanuti gravel pit*

PHOTOS: PHIL CZAPLA

*Seeded grass performance: Summer, 2010*

# Revegetation Projects

PHOTOS: BRENNAN VEITH LOW

*Seed and fertilizer were spread over three different sites at Boy Scout Rock*

*Boy Scouts used handheld seed spreaders to distribute the planting mixture*

## Boy Scout Rock

The Plant Materials Center was contacted by a Scout troop in the summer of 2010, for assistance with a revegetation project at Boy Scout Rock. This popular climbing destination along the Seward highway had been damaged by frequent camping and unauthorized fire pits. The scout troop identified three sites for revegetation, totaling approximately 1400 square feet. The scouts met with PMC staff at the McHugh creek state recreational area.

PMC staff prepared a seed mixture of native plant species, consisting of 40% Deschampsia beringensis (*Bering hairgrass*), 35% Red fescue (*Festuca rubra*), and 5% of each of the following species:

- Bluejoint reedgrass, *Calamagrostis canadensis*
- Western Columbine, *Aquilegia formosa*,
- Tilesius wormwood, *Artemesia tilesii*
- Field locoweed, *Oxytropis campestris*
- Alpine sweetvetch, *Hedysarum alpinum*

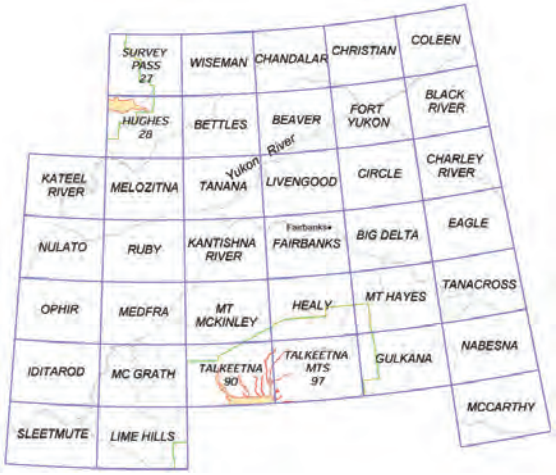
Rice hulls were added to the seed mixture to ensure uniform distribution, given the small amount of seed. Under supervision from PMC staff, the scouts scarified the ground where the fire pits had been, dispersed seed, and spread 8-32-16 fertilizer over the revegetated areas. Seed and fertilizer were dispersed using hand operated seed spreaders. Monitoring of the site is ongoing.

## Alaska Coastal Revegetation & Erosion Control Guide


The Alaska Coastal Revegetation and Erosion Control Guide is an information resource created to assist professionals involved in construction or cleanup activities in coastal areas of Alaska. The authors are Stoney Wright and Phil Czapla of the Alaska Plant Materials Center.

This publication contains species suggestions, descriptions of vegetation communities, and detailed case studies for each region of Alaska, and features a step-by-step guide to planning a revegetation project. The guide includes plant profiles and case studies that are color coded to each region of Alaska, creating a reference that is easy to navigate.

A major focus of the Alaska Coastal Revegetation and Erosion Control Guide is to encourage the use of native species already adapted to the harsh climate. The guide includes information on techniques for planting, wild harvest, and the protection of fragile coastal resources. The Alaska Coastal Revegetation & Erosion Control Guide was funded in part by a grant from the USDA Natural Resource Conservation Service. The guide is available for download at plants.alaska.gov/pdf/Coastal-Reveg-Manual.pdf.




*The Interior Revegetation guide will focus on plants and projects from the 37 quadrangles of interior Alaska*

### Interior Revegetation Guide

In 2011, an additional guide will be published, covering plants and projects relevant to interior Alaska. Major geographic regions considered include:

- Alaska and Brooks Ranges
- Minto and Yukon Flats
- Tanana and Copper River Valleys

One major impact to the natural environment not covered in the Coastal Revegetation Guide is Wildfire. Fire Reclamation techniques will be specifically addressed in the forthcoming guide.

# Revegetation & Erosion Control

## Erosion Control with Vegetation

Erosion (the displacement of solids by the agents of wind, water, ice, or movement in response to gravity) is a problem that growers, contractors, engineers, and other industry professionals have faced for decades. Erosion not only causes soil and nutrient loss, but it can also cause sediment loading of stream channels, which can have major impacts on fisheries and plant ecosystems. Increasing construction, urban development and climate change are just a few of the many causes of erosion.

The PMC can offer technical advice and project assistance on erosion control issues that professionals deal with daily. Being aware of potential areas of erosion, as well as applicable federal/state regulations can greatly reduce future problems and allow for a successful project. The PMC only directly deals with erosion control issues *not* affecting life or safety. For these concerns, contact a professional engineer. Stormwater Pollution Prevention Plans (SWPPPs) are plans that have been found to be effective in addressing erosion and sedimentation problems on construction projects larger than 1 acre in size. SWPPs are based on best management practices, and are required for certain construction activities. The PMC can assist in preparing the vegetation component of a SWPPP.

For more Information on soil sampling, testing, erosion control, or revegetation, please contact the PMC at (907)-745-4469. Three members of the Plant Materials Center staff have received certification as Alaska Certified Erosion and Sediment Control Leads (AK-CESCL).

*Live willow stakings, erosion control fabric, and armor rock provide slope reinforcement*

*PMC staff assisted in the vegetation design of this embankment along the Matanuska River, near Sutton*

# Rural Village Seed Production Project

The Rural Village Seed Production Project (RVSPP) is a new project at the Alaska Plant Materials Center, designed to bring small-scale native seed production to rural communities with the intent of stimulating village economies, creating training and job opportunities, and producing a quality seed product to be sold for revegetation. The PMC is providing technical assistance, resources, and training; helping rural Alaskans to develop successful seed production programs in their communities.

*Tow behind harvester at work in rural Alaska*

Villages are expected to establish native seed production ventures, based on local input and with the support of their community. Villages with strong community support and natural plant resource potential will be receive assistance under the RVSPP. Interested individuals are encouraged to become part of larger village projects. The four or five villages showing the most interest will have local plant resources identified for potential planting and harvesting. The PMC will work with selected villages to evaluate existing equipment and infrastructure as well as the availability of a workforce to support a community project. Technical help will be provided throughout the process, and an informational web site has been established to aid in this process.

The RVSPP is a multi-phased program. In the first phase, training and equipment requirements for each village were determined. PMC staff will work with communities and help establish and coordinate seed production. The next phase involves the purchase of equipment, preparation of planting sites, and development of seed purchase agreements. Training will continue in villages and at the PMC facility. Trainees in Palmer will receive hands-on instruction on harvesting procedures; seed cleaning techniques; equipment operation and maintenance; pest management and noxious weed identification, as well as seed storage. The final phase of the project will be the initiation of seed production in villages. Planting, production, harvesting and seed cleaning will be supervised and monitored for two years.


*The RVSPP website, at http://rvspp.plantalaska.net, is a growing resource for rural producers of agricultural products*

The Rural Village Seed Production Project was funded by the American Recovery and Reinvestment Act of 2009. Implementing this project will help communities build an industry that promotes sound natural resource use, and provide the agricultural materials needed to rehabilitate disturbed lands such as gravel pits, mines and airports. The grant's goal is to establish sustainable, high quality jobs for rural Alaskans. This aligns with the mission of the Alaska Division of Agriculture: to encourage agricultural development in Alaska. Funding is expected to continue through 2013.

Rural villages across Alaska were visited in 2010, including Metlakatla, Hooper Bay, Emmonak, Manley Hot Springs, Pedro

# Rural Village Seed Production Project


PHOTO: SOBHAN SAJJA

*Hand harvesting wild grass seed*

Bay, and others. Project staff met with representatives from these interested villages, and presented an overview of the program to each community visited. Required labor contribution and site conditions were also discussed. PMC staff also conducted soil analyses of some potential sites in 2010, with further soil tests planned for 2011. Several sites are presently under consideration, and in 2011, five of these potential agriculture initiatives will be chosen to receive grant-funded support for their seed production efforts. Community profiles are being prepared for each of the villages, as well as print and video training materials. Hands-on training at the PMC will continue in 2011, focussing on equipment usage, crop management, and seed processing.


Hooper Bay
COMMUNITY PROFILE
Local Contacts:
Metlakatla
COMMUNITY PROFILE
Local Contacts:
Dawn Pringle
Metlakatla Project Administrator
Metlakatla Indian Community (MIC)
Forest and Land Resources
(907) 886-5111
Location:
Metlakatla is located on the Annette Island Reserve, about 15 miles south of Ketchikan. The village is the RVSPP's southernmost project location.
Cultural Identity:
Learn more about the people of Metlakatla at:
http://metlakatla.com.
MIC Agricultural History:
The Metlakatla Indian Community's Forest Land and Resources team first started growing Alaskan Native Plants on the Island in 2000. Shortly after, wild collections were undertaken as a way to become more familiar with the surrounding plant communities and to become more aware of how to harvest the plants started from seed.
MIC was awarded a contract by the United States Forest Service to propagate plants for the Tongass National Forest. Species such as: Calamagrostis canadensis (Bluejoint Reedgrass), Lupinus nootkatensis (Nootka Lupine) and Epilobium latifolium (Dwarf Fireweed) were tried in the early stages of this project. MIC had a 1/10 of an acre plot under cultivation for each species. Calamagrostis and Epilobium plantings had minimal success and were discontinued.
Due to satisfactory yields and production of seed, MIC expanded the Lupinus plots in the following years. MIC grew and harvested Lupine seed up until 2009. Unfortunately, the Lupinus Nootkatensis seemed to stop producing quality seed after about 5 years. The Forest Land and Resources team found that a new planting is required after that time, in order to get the production of seed needed for a viable harvest. MIC was in the process of replanting when the Forest Land and Resources team heard of the Rural Village Seed Production Project in 2010. The Metlakatla Indian Community has chosen to discontinue the Lupine harvesting project and pursue the cultivation of Native Plants on lands indentified in cooperation with RVSPP Staff.
RVSPP Agricultural Initiative:
Three potential sites are being studied. They are:
1. Former trailor court
2. Town lagoon site
3. experimental / demonstration garden plots
Estimated acreage of this project is 5 to 7 acres. Field work will begin in Spring / Summer 2011.
Crops being considered for the Metlakatla Indian Community include:
1. Leymus mollis, Beach Wildrye
2. Trisetum spicatum, Spike Trisetum
1. Leymus mollis
2. Trisetum spicatum
Further Information:
For more details about the Rural Village Seed Production Program in Metlakatla, and in communities across Alaska, please visit the R.V.S.P.P. website, at:
http://rvspp.plantsofalaska.net

*Agricultural profiles are being prepared for rural sites, highlighting species well adapted to local conditions, historical production efforts, and contact information for community RVSPP coordinators*


PHOTO: BRIANNE BLACKBURN

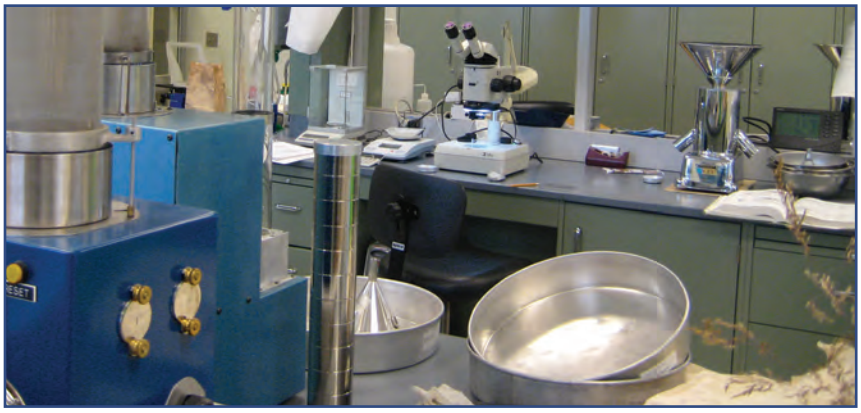
*PMC staff conducted soil tests at potential production sites across Alaska*

# Certified Seed Laboratory

## Overview

The Alaska State Seed Laboratory at the Alaska Plant Materials Center (PMC) is an official seed testing laboratory, certified by the Association of Official Seed Analysts (AOSA), a national seed testing organization. The Alaska State Seed Lab was certified in 1998, and it remains the only official seed testing lab in the state of Alaska.

The laboratory provides many essential services, including purity and germination tests, noxious weed seed examinations, tetrazolium testing, and grain moisture testing. The seed lab conducts qualitative seed analysis for growers, state and federal agencies, companies, and academic institutions.



*The Alaska State Seed Laboratory conducts comprehensive tests on seed*

## Seed Testing & Analysis

Agency clients, such as the Agriculture Research Service (ARS), U.S. Forest Service (USFS), the Alaska Department of Transportation and Public Facilities (DOT&PF), and the Division of Forestry (DOF), rely on the State Seed Lab for plant material testing. Seed grown at the PMC, intended for use by the above agencies, is also evaluated.

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

*Cleaned and sorted seed from the Red Devil Mine*

The seed lab conducts research into laboratory germination and dormancy breaking techniques, focusing on understudied native species that are being considered for cultivation. The seed lab also assists other state agencies and individuals in research on various projects including seed upgrade and viability enhancement, propagation techniques, and invasive weed seed vigor.

The Alaska State Seed Laboratory continues to train and educate personnel in seed examination, to provide for continuity of service. In 2010, the lab received a technology upgrade, consisting of an interactive whiteboard that is coupled with a high-powered digital microscope. Conference software running at the PMC allows these high-resolution images to be viewed and manipulated from the main conference room, assisting training and education efforts without putting sensitive lab equipment at risk.

# Seed Cleaning and Conditioning

Seed conditioning / cleaning is a critical step in producing a high-quality seed product that is free of contaminants. Seed cleaning facilities at the Plant Materials Center handle seed from PMC fields, as well as seed received from the Alaska Seed Growers Association, private companies, and agencies.

The PMC has two separate seed cleaning facilities. The small seed lot cleaning facility (SSLCF) is designed for cleaning small quantities of seed (up to 150 lbs), and has more precision equipment. Larger lots are sent to the large seed cleaning facility, which can accommodate commercial quantities of seed. Cleaning is priced at an hourly rate.

The seed cleaning 'season' is concentrated in the winter months when field activities have slowed down. As seasons extend across calendar years, figures reported below are correlated with the harvest year.

- 2009 Cleaning Season (October 2009-August 2010):
  - 50,672 lbs of cleaned seed
- 2010 Cleaning Season (October 2010-present):
  - 11,400 lbs of seed processed.

The PMC has over 50 harvested lots yet to be processed this season in the small seed lot cleaning facility (including over 100 bushels of spruce cones) and approximately 200 bulk bags of seed to process in the larger facility.

*Pure Beach Wildrye (*Leymus mollis*) seed*

Photos: Sobhan Sajja

## Seed Cleaning Equipment

The PMC uses specialized equipment to handle different amounts and types of seed. The seed cleaning process utilizes machines that brush, agitate, or blow weeds and non-seed material away from the crop. Seed cleaning is a multi-phased process, working from a raw harvest material with a lot of contaminants and chaff down to a refined product of nearly pure seed.

Cleaning debris from seed involves separating crop seed, weed seed, stems or leaves (chaff), and other contaminants by their physical properties (size, shape, specific gravity, weight, etc). Screens divide a crop based on size or shape, while an air machine will separate based on weight. The process is different for every crop. Seed can vary in size from year to year, depending on environmental conditions.


*The screen separator uses vibrating screens to separate chaff from target seeds*

# Seed Cleaning and Conditioning

*A brush cleaner uses rotating brushes to separate seed from inert plant materials*

Photos: Sobhan Sajja

*Plant materials of similar size but different densities are separated using a gravity separator*

An assortment of cleaning equipment allows the PMC to handle a wide variety of crops. A short list of the most-used machinery includes the following:

**Screen Separator** - This machine separates target seed from unwanted material (chaff, inert material, other sizes of seed) through a series of vibrating screens. The top screen scalps off material that is larger than the seed. The bottom screens, combined with airflow, separate lightweight trash and dust, which are ejected through different chutes.

**Brush Cleaner** - A brush cleaner consists of a screen cylinder and rotating brushes that agitate the seed away from any plant material or seed casing to which it may still be attached. This machine is particularly useful for seed attached to cottony (fluffy) material such as fireweed, or seed that is still attached to the stem after harvesting. Stems or fluff are brushed away from the seed, which is ejected through the screen cylinder. Different sized screens can be chosen based on seed size.

**Air Seperator** - An air separator uses a chamber (or a series of chambers) of a monitored air flow to blow off lighter material from the target seed. This inert 'trash' can be dust, stems, or undersized/broken and weed seed. The PMC has a single chambered air separator used for small lots and a larger, four-chambered air separator which is used for large lots. The larger separator allows the operator to set a gradient of air, with increasing air flow used to separate different impurities from the seed. The trash from each chamber is ejected into a chute, leaving only the final product.

**Gravity Separator** - A gravity separator is used to separate products that are of the same size but with a difference in specific gravity. This method is particularly useful when the seed has been processed but contains a weed seed of similar size that has not been separated out with screening or air separation. This machine is used for a very specific cleaning process, and must be tuned for each target seed. When it is used, the gravity separator is a finishing step in the cleaning process.

**Indent Cylinder** - The indent cylinder is also a finishing machine which allows specific grading of product based on size. It is composed of feeder, a rotating cylinder with indentions, and two chutes. Seed of a certain size will get caught in the indents as the cylinder rotates and will be carried away from the seed that remains and both are ejected through separate chutes.

# Soil Testing and Analysis

There are many variables to consider when planning a field, garden, or revegetation project. Temperature, moisture, aspect, region, and species selection all effect the outcome a project. An important, and often overlooked, variable to consider when choosing a growing site is the soil type. Soils, along with many other environmental factors, play a large role in the success of a project. Soil temperature, nutrient capacity, water holding capacity, and physical makeup are all factors which may have a negative and/or positive effect on plant growth.

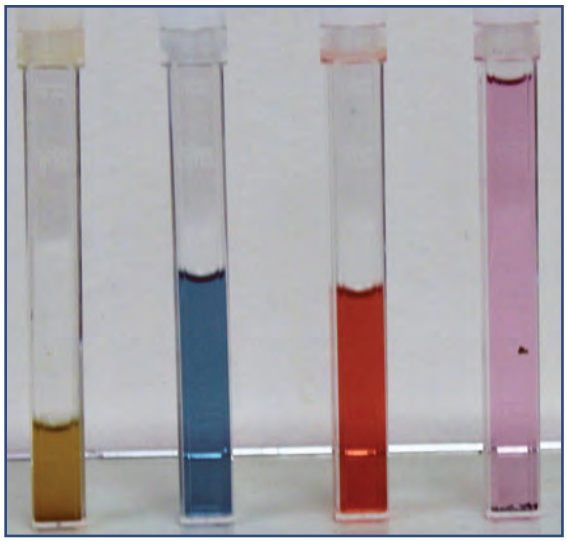
The soils laboratory at the Plant Materials Center (PMC) has limited capability to collect and test soils from across of Alaska, increasing public access to vital chemical and physical soil data. Knowing the type and potential limitations of a soil can provide field crops and revegetation projects a higher success rate. In the field or at the project site,

## Sampling

The Alaska PMC utilizes several different methods to collect soil samples. Samples are gathered using clear PVC bore hole probes, in either 6 or 24 inch depth increments. This type of collection extracts a small vertical profile with little to no compaction. The bore hole method allows collection at many sites in a short amount of time. Alternatively, samples can be collected using a hand powered auger. The auger method allows large quantities of soil to be collected, to a depth of up to 16 feet. An auger can be used in sand, silt, clay, mud, or rock less than 2mm in diameter. Both the bore hole and auger methods can be used in conjunction with open pit digging. Each sampling method can be adapted to account for variability of sites.


*A soil monolith that was extracted using a hand-auger and spade-shovel; tools commonly used to dig a soil horizon. A monolith shows the texture and character of distinct horizons within the soil profile.*

# Soil Testing and Analysis



*Colorimetric soil tests measure pH, as well as concentrations of phosphorous (P) , iron (FE+) and nitrogen (N+) in a sample. Darker colors indicate higher concentrations.*

## Chemical Testing and Analysis

The PMC can conduct chemical constituent testing of collected soil samples. Utilizing colorimetric, titrimetric, and electronic methods, the PMC tests for macronutrients such as Nitrogen, Phosphorus, Potassium, Calcium, and Magnesium. Micronutrients, such as Iron, Copper, Zinc, Chlorine, and Manganese can also be tested. Testing protocols for trace nutrients such as aluminum and sodium are currently being developed. In addition, electro-conductivity (EC) and pH can be calculated and/or measured from collected samples or in the field if requested. Each nutrient is reported in total amounts within the soil solution, and calculations can be done to estimate the total amount of available nutrient to a plant. Once chemical data is obtained, nutrient deficiencies and/or toxicities can be identified, and fertilizer ratios recommended for the project area.

Photo: Casey Dinkel

*The soils testing lab at the Alaska Plant Materials Center.*

# Soil Testing and Analysis

## Texture and Bulk Density Analysis

Soil analysis includes the description of physical characteristics of a soil, such as texture and bulk density. These physical characteristics can affect plant growth, and also indicate the erosion potential of a site. Basic hand tools, such as a garden trowel, soil sieve, and a weigh scale are utilized to collect soil samples for lab analysis.

Texture analysis is performed by weighing, drying, and sifting each sample through a column of soil sieves. These sieves allow the sample to be divided according to particle size. Soil samples are graded into very coarse sand, coarse sand, medium sand, fine sand, very fine sand, silt, and clay. A rotating and tapping machine, appropriately named the Roto-Tap, is used to process each sample for a known length of time. This machine uses a consistently applied circular, up and down motion, allowing precise results to be obtained.

Once divided, the soil remaining within each sieve is weighed again, and a percentage composition is calculated and recorded. Soil classification is based on percentages of sand, silt, and clay. Lab technicians categorize each soil sample according to the USDA textural triangle (bottom right). Lastly, bulk density testing is performed to determine soil compaction, water content, and porosity.

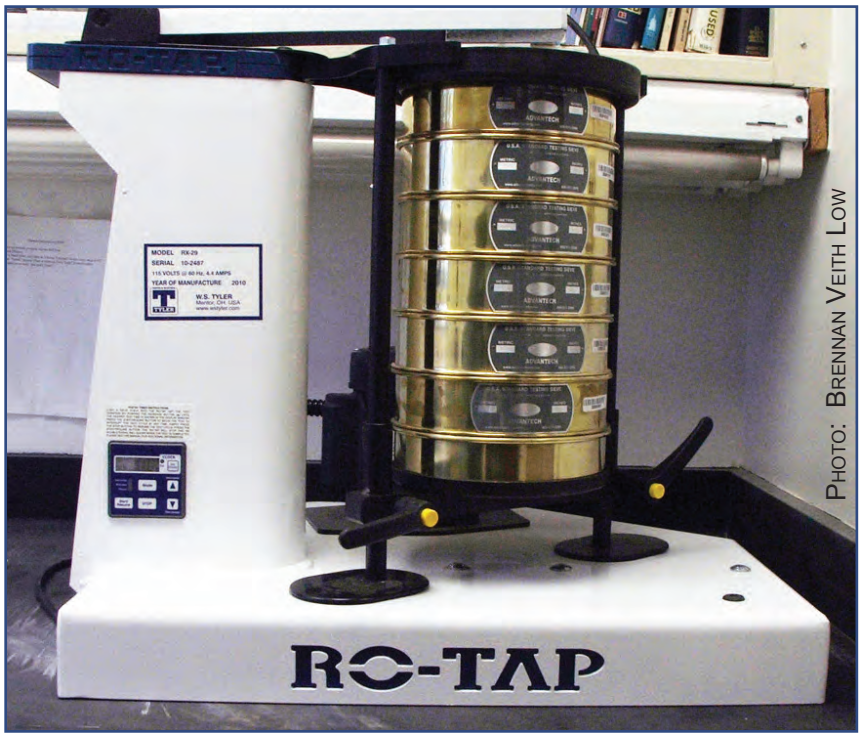
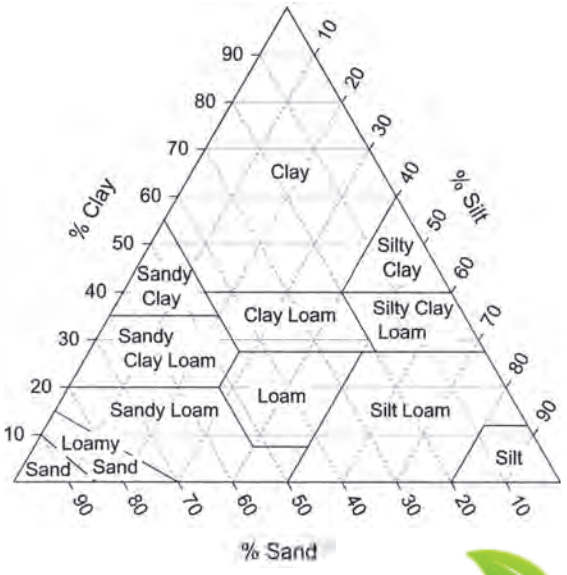



Photo: Brennan Veith Low

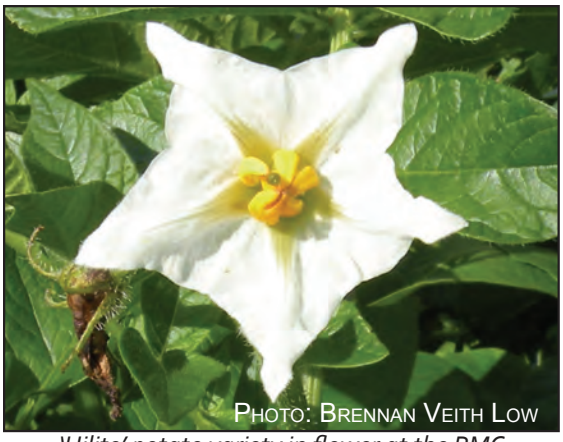
Photos: Casey Dinkel

*A quarter, shown for reference, illustrates the progressively smaller particle sizes that fall through openings in soil sieves used to grade samples*




*USDA Soil Textural Triangle*

# Potato Disease Control



*'Hilite' potato variety in flower at the PMC*

Potatoes are among the most valuable crops grown on Alaskan farms. Diseases can cause significant losses, reducing both yield and quality. Seed tubers free from disease, produced under strict protocols at the PMC, are sold annually to growers, to be increased over the next several years. This system enables the grower to maintain yields by annually replacing older diseased seed with clean, high quality, certified seed.

The importation of seed from outside the state has the potential to introduce pests or diseases not known to occur in Alaska, and is therefore discouraged. Growers wishing to try new varieties are encouraged to obtain clean seed potato stock from the PMC.

## Pathogen Testing

*A test-tube plantlet is grown in a sterile environment at the PMC potato lab*

Seed provided by the PMC is used as the initial stock for a multiple year certified seed production scheme, and must be of the highest quality. All production is rigorously tested and retested for disease prior to sale. Seed potatoes for export must meet the importing countries' phytosanitary requirements, which typically require lab testing to ensure compliance with regulations.

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

## Disease-Tested Seed Potato Production

Disease-tested potato plants are mass propagated in a sterile environment. Growers place orders for these seed tubers the winter prior to production, which provides the necessary lead time to propagate the thousands of plants required the following spring. Requested varieties are obtained either from existing stocks in the clone bank, or from seed programs in the US or Canada.

Applications for certification are submitted by seed growers to the PMC in June. Two field inspections are performed on each seed lot during the growing season. The percent of diseased plants is calculated and discussed with the grower. Certification standards allow for the presence of small amounts of disease, up to a certain level. Removal of diseased or off-type plants can bring a lot into compliance. Field inspections represent an effective way to identify and remove seed lots which have become too diseased, or are otherwise of reduced value for use as seed.

## Seed Potato Certification

State of Alaska Seed Regulation **11 AAC 34.075 (J)** requires that all potatoes sold, offered for sale, or represented as seed potatoes be certified. Grower produced certi-

# Potato Disease Control

fied seed potatoes are sold to other seed growers, table stock growers, garden supply retailers and gardeners throughout Alaska. Certified seed potatoes are grown in the Matanuska Valley, Fairbanks, Nenana, and Delta Junction.

The Seed Potato Certification Program is designed to provide growers with potato seed stock that is varietally pure and relatively free from disease causing organisms. These results are achieved by the voluntary compliance of seed growers with certification regulations. The use of seed in which diseases are absent or at manageable levels has been proven to greatly reduce the risk of losses. The local availability of disease-tested seed reduces the potential of introducing diseases which could become endemic. The PMC currently has 150 named varieties in the field and tissue culture bank. There were almost 60 varieties entered for certification in 2009.

*Certified seed potatoes in the field*

## 2009 Activities

The potato disease control program produced 600 lbs of Generation-Zero (G0) seed in the greenhouse and maintained 150 varieties, both in the field and in tissue culture. There were 58 varieties in production as certified seed on 198 acres in Alaska during the year. No serious disease or weather events occurred in 2009.

## 2010 Activities

The program produced 650 lbs of G0 seed in the greenhouse and maintained 150 varieties in the field and in tissue culture. There were 62 varieties in production as certified seed on 153 acres in Alaska. After a rainy summer, Late Blight was found in three fields in the Matanuska Valley on September 9th. Most area fields had been vine-killed or were being harvested and follow up observations failed to discover new instance of the virus. Samples were sent to Michigan and found to be the U.S. 8 strain. Farmers are advised to carefully grade seed and to dispose of culls in a manner to prevent any disease spread.

Powdery scab caused by the fungus *Spongospora subterranea* was found on tubers from a garden in the Fairbanks area and a garden in the Copper Center area. This disease is seed or soil borne. It causes surface blemishes that look similar to common scab and survives in the soil for many years. Abandoning the infected area and planting clean seed will allow escape.


*A potato exhibits signs of powdery scab, caused by* Spongospora subterranea*, a potato fungus*

# Ethnobotany Teaching Garden

In 2007, work began on the creation of an Ethnobotany Teaching Garden at the Alaska Plant Materials Center. This garden was the culmination of a multi-year research effort involving the Non-Timber Forest Products commercial harvest manual. The Ethnobotany Teaching Garden highlights different cultural and ecological regions of Alaska, and the native plants from across Alaska that were and are being used for food, medicine or utilitarian purposes. It shows the ecological niches and regions these plants occupy, and provides information about their agronomic uses and ethical harvesting practices. Through interpretive signage, group and individual tours, and workshops, the Ethnobotany Teaching Garden has become a showcase for Native Alaskan plants.


*Descriptive signage adorns the Alaska Ethnobotany Teaching Garden*

*Two footbridges were installed in 2010, making the Ethnobotany Teaching Garden fully compliant with ADA standards for accessible design*

With the completion of two footbridges in 2010, the garden is now completely accessible, and attracting ever greater numbers. The target audience for the Ethnobotany Teaching Garden includes lifelong Alaskans, visitors, ethnobotanists, and native peoples, as well as harvesters/buyers/users/researchers of non-timber forest products. Collaborations with Native organizations, museums, and heritage sites are ongoing. On-site demonstration gardens display and teach about the plants used by Native Alaskans.

By the end of fall, 2009, about 150 different species of plants had been planted in the garden. Agronomists selected about 45 different plants for planting in the spring of 2010. These plants are also made available for other cultural gardens.

Since the Ethnobotany Teaching Garden was opened to the public in 2009, several schools have made the Plant Materials Center an educational destination. As time allows, PMC staff provide tours, lead workshops, and are available to answer questions about

# Ethnobotany Teaching Garden

Botany as a career choice. While the Ethnobotany garden is a new addition to the Alaska Plant Materials Center, it has significantly increased public exposure to the PMC and the Division of Agriculture.

*Elementary school students get involved in some 'hands-on' training at the Ethnobotany Teaching Garden*

*PMC staff facilitates a planting workshop at the Plant Materials Center*

# Invasive Weeds & Agricultural Pests

Invasive weeds and agricultural pests are an area of expanding concern in Alaska, requiring diligent efforts to manage infestations, prevent new infestations and educate the public and industry on how to cooperate. The invasive weeds and agricultural pest management program initiated several exciting projects during 2009 and 2010.

The statewide invasive species coordinator regularly attends local and statewide meetings about invasive species management to help coordinate actions and provide advice. Efforts to streamline information sharing, provide education and assistance to educators (e.g. invasive plants curriculum review, presentations), and develop new technologies continue, in partnership with other agencies.

## Core Activities

Efforts to develop a comprehensive statewide strategic plan for invasive species management have resulted in a draft plan, currently under review by DNR. The invasives coordinator provided input on database management for the AKEPIC online monitoring system, and collaborated on invasive species modeling with the USGS.

The draft strategic plan for invasive species management was competed in 2010, and presently is receiving final revisions before being released for public comment. This plan was developed in cooperation with state and federal agencies, industry and conservation organizations. Regulations were reviewed for present content and significant research was done to identify regulations that work in other states.

*Purple loosestrife invades wetlands, compromising salmon and waterfowl habitat. Shown here is the loosestrife infestation discovered in Westchester lagoon, Anchorage.*

The coordinator has worked with many other organizations, particularly local groups, to identify and initiate new projects. Notable projects include statewide knapweed eradication, Canada thistle management in Anchorage and many others. Working with the industries to address invasive species issues remains a priority. The Division of Agriculture has helped to maintain the weed free forage certification program, is working to establish a weed free gravel certification program, and is continuing efforts to coordinate with the horticulture industry.

## Eradication Initiatives

### Purple Loosestrife

Purple loosestrife is a notorious invader that clogs wetlands, compromising habitat for salmon and waterfowl. Loos-

estrife infestations were discovered in Westchester Lagoon in Anchorage, in 2005, and eradication efforts resulted in few remaining plants in 2009 and 2010, indicating efforts are working. Still, a limited number of people in the Anchorage area use loosestrife as an ornamental. The Division of Agriculture has offered free alternatives to individuals willing to replace their planted loosestrife. This effort will continue in 2011.

## Spotted Knapweed Eradication

The PMC led a Spotted knapweed (*Centaurea stoebe*) eradication effort in 2009 and 2010, with funding from the US Fish and Wildlife Service (USFWS) through the American Recovery and Reinvestment Act. Spotted knapweed was recorded at 23 different locations in Alaska, all located in the Southeast and Southcentral regions. Spotted knapweed has the potential to be extremely invasive in Alaska. In other parts of North America, where it is more widespread, severe declines in agricultural productivity have been seen, as well as a reduction in forage species available for wildlife.

*Spotted knapweed invades wild and agricultural lands. Knapweed competes with native species, limiting available forage for animal grazing.*

With the limited number of infestations recorded, the small size of these infestations, and the threat knapweed poses to agricultural and natural resources, eradication of the plant is a priority. A coordinated effort to address the scattered knapweed infestations across Alaska was initiated with this project. PMC staff visited each of the locations where infestations were recorded, twice in the summer of 2009, and at least once in 2010. If knapweed plants were found, they were pulled, bagged and properly disposed of. Records were kept, and the details were submitted to an online database of infestations in Alaska (AKEPIC - http://akweeds.uaa.alaska.edu).

Eradication efforts resulted in a complete removal of all but 5 of the original 23 recorded infestations by the end of 2010. PMC staff evaluated the eradication initiative and found that, with these small infestations, consistently applied weed-pulling efforts are an effective method to reduce the size of, and eventually eliminate, infestations. Efforts to continue eradication, in coordination with USFWS, continued in 2010.

## Anchorage Canada Thistle Management

Canada thistle is a notorious invader of wild and agricultural lands that has gotten out of hand in most of North America. However, in Alaska it is mostly confined to Anchorage and some communities in Southeast Alaska. Efforts began in 2010 to contain the Canada thistle infestations in Anchorage. Funding received allowed for coordination with DOT and mechanical management of infestations. Funds that would have allowed for more aggressive chemical treatments were returned to the National Fish and Wildlife Foundation, because of absent non-federal matching funds. Efforts continue to coordinate with agencies and garner funding to implement more aggressive treatment efforts.

## Weed Free Gravel Certification

The North American Weed Management Association has developed standards and protocols for the certification of gravel sources as weed-free. In 2010, PMC staff inventoried state and BLM owned pits on the Dalton, Elliot and Steese highways. The goal was to begin keeping records of weeds found in gravel pits, and to evaluate the development of a voluntary weed free gravel certification program. Pits surveyed were largely clean, with some notable weeds such as white sweetclover, and narrow leaf hawksbeard in about half the pits. In summer 2011, additional pits in Southcentral Alaska will be inventoried.

PMC staff are coordinating with Alaskan gravel producers to establish a voluntary weed-free gravel certification program. Presentations were made in 2010 to the Alaska Rock Products Association and the Alaska Miners Association. Once implemented, a voluntary weed-free gravel certification program should result in a value added product for gravel producers. Anticipated uses include public lands, such as wildlife or game refuges, and restoration projects in sensitive areas.

## Horticulture Industry Coordination


*http://PlantAlaska.net is an industry focused website, dealing with invasive plant issues and strategies*

The horticulture industry may accidentally introduce invasive weeds or agricultural pests when doing business, and their customers may transplant invasive weeds to yards and gardens when they are not aware of the consequences the pretty flower on the roadside might cause. The Division of Agriculture is working with the horticultural industry to identify solutions that will protect resources and improve the products provided to customers. PMC staff hosted several meetings with members of the horticulture industry, in Juneau, Anchorage and Fairbanks. These meetings will continue, and many of the issues discussed are being incorporated into PlantAlaska.net, an online communication forum dedicated to horticulture related invasive species issues.

# Other Interesting Things

## A Field Guide to Alaska Grasses

PMC staff partnered with Dr. Quentin Skinner during 2009 and 2010, assisting in research pertaining to 'A Field Guide to Alaska Grasses'. Dr. Skinner is the author of several publications; A Field Guide to Nevada Grasses and A Field Guide to Wyoming Grasses being the latest. PMC staff provided assistance with species and habitat identification, and detail about the suitability of Native Alaska Grasses for revegetation applications, and accompanied the author in collection trips across the state in 2009 -2010. Sites visited in 2009 included Adak, Prudhoe Bay, Fairbanks and other interior sites. In 2010, sites visited included Juneau, Sitka, Kotzebue, and Nome.

As a sponsoring institution, the PMC was instrumental in securing funding assistance for this publication from several agencies, including the Bureau of Land Management, US Fish and Wildlife Service, and the US Forest Service. The USDA Natural Resource Conservation Service also contributed funds to develop and publish the Field Guide to Alaska Grasses. Publication of the Guide is expected in the first half of 2011.

PHOTOS: STONEY WRIGHT

*Dr. Quentin Skinner visits western Alaska, in search of native grasses*

*Dr. Skinner photographs a grass specimen for the forthcoming Field Guide to Alaska*

# Staff Presentations & Publications

## Formal Presentations

**Campbell, William L.** 2009. Potato Production and Certification. Alaska Potato and Vegetable Conference. February 10 - 11 2009. Palmer AK.

**Campbell, William L.** 2009. Potatoes in the Far Frozen North. Alaska Botanical Garden 2009 Spring Conference . April 4, 2009 Anchorage AK.

**Campbell, William L.** 2010. Certification Up-date. Alaska Potato and Vegetable Conference February 16 – 17, 2010. Palmer AK.

**Campbell, William L.** 2010. Potatoes in the Far Frozen North (2) Alaska Botanical Garden 2010 Spring Conference. Anchorage AK.

**Campbell, William L**. 2010 Potato Growing. October 5th 2010. Central Peninsula Garden Club Soldotna AK.

**Hunt, Peggy.** 2009. The Current Status of the Commercial Production and Availability of Alaskan Native Plants. January 22, 2009 monthly meeting of the American Society of Landscape Architects, Alaska Chapter. Anchorage, AK.

**Hunt, Peggy.** 2009. The New Ethnobotany Garden at the Alaska Plant Materials Center. March 6, 2009. Alaska Greenhouse and Nursery Conference. Wasilla, AK.

**Hunt, Peggy.** 2009. Landscaping with Alaska Native Plants. September, 23, 2009. 2009 Grown in Alaska Workshop. Palmer, AK.

**Hunt, Peggy.** 2009. Collecting and Growing Native Alaskan Ethnobotanical Plants. November 30, 2009. Guest speaker for University of Alaska, Fairbanks Ethnobotany Webinar, Fairbanks, AK.

**Hunt, Peggy.** 2010. Growing Alaskan Native Plants From Seed, Ethnobotany Teaching Garden, Availability of Alaskan Native Plant Seed. September 21 - 22, 2010. 2010 Grown in Alaska Workshop. Palmer, AK.

**Wright, Stoney J.**, 2009. Revegetation & Erosion Control with Native Species March 23, 2009. Guest speaker for Alaska Department of Transportation & Public Facilities class, Fairbanks, AK.

**Wright, Stoney J.**, 2009. Revegetation & Erosion Control with Native Species March 24, 2009. Guest speaker for Alaska Department of Transportation & Public Facilities class, Anchorage, AK.

**Wright, Stoney J.**, 2009. Revegetation & Erosion Control with Native Species March 26, 2009. Guest speaker for Alaska Department of Transportation & Public Facilities class, Juneau, AK.

**Wright, Stoney J.**, 2009. Long-Term Monitoring of Dune Re-Establishment and Sand Quarry Restoration Utilizing Beach Wildrye, Leymus mollis On the Former Adak Naval Air Station On Adak Island, Alaska. 2009 Annual Meeting of the American Society of Agronomy, Pittsburgh, PA.

## PMC Hosted Workshops

**August 4, 2009.** Institute for Agriculture in the Classroom Teachers Workshop. Trainer: PMC staff. Coordinated by Victoria Naegele, Alaska Farm Bureau. 30 participants.

**August 8, 10, 11, 2009.** Grass Identification Workshop. Trainer: Dr. Quentin F. Skinner, Education Resources LLC & University of Wyoming, Emeritus. Coordinated by Society of Wetland Scientists. 24 participants.

# Staff Presentations & Publications

**March 9, 10, 2010.** National Pesticide Applicator Certification Training, State of Alaska, Department of Environmental Conservation. Trainer: Steve Brown, Mat-Su Copper River District Agriculture Agent. 20 participants.

**August 3, 2010.** Institute for Agriculture in the Classroom Teachers Workshop. Trainer: PMC staff. Coordinated by Victoria Naegele, Alaska Farm Bureau. 28 participants.

**September 21, 2010.** 2010 Grown in Alaska Workshop. PMC staff. Coordinated by Alaska Division of Forestry. 90 participants.

*PMC staff utilize the Ethnobotany Teaching Garden for educational workshops*

## Staff Publications

**Campbell, William L.** 2009. State of Alaska Potato Seed Certification Handbook 2009 (update)

**Campbell, William L.** 2010. State of Alaska Potato Seed Certification Handbook. 2010 (update)

**Graziano, G. & Weaver, A.** 2009. Eradication of Spotted Knapweed (Centaurea stoebe) Infestations in Alaska *In proceedings* of the 10th Annual Alaska Invasive Species Conferences. October 26-28, Ketchikan, AK.

**Hunt, Peggy.,** 2009. Ethnobotany Research Project. In: Alaska Plant Materials Center 2008 Annual Report. p. 15-16.
http://plants.alaska.gov/pdf/AnnualReport2008.pdf

**Hunt, Peggy.** 2009. (Editor and Designer) Commissioners Report on the Alaska Division of Agriculture (2009 Brocuhere). State of Alaska, Division of Agriculture, Plant Materials Center. 18pp.
http://plants.alaska.gov/pdf/DivAg2009Brochure.pdf

**Hunt, Peggy.** 2009. Alaska Biofuel Plants: Past, Present & Future. State of Alaska, Division of Agriculture, Plant Materials Center, University of Alaska Fairbanks, & Matanuska-Susistna Borough - Palmer, AK 4pp.
http://plants.alaska.gov/pdf/AlaskaBiofuelPlants.pdf

**Ross, Donald R.** 2009. Alaska Plant Profiles: Fiddlehead Ferns. Alaska Department of Natural Resources, Division of Agriculture, Plant Materials Center, Palmer, AK. 4 pp.

**Ross, Donald R.**, 2009. Alaska Plant Profiles: Conks / Shelf Fungi. Alaska Department of Natural Resources, Division of Agriculture, Plant Materials Center, Palmer, AK. 4 pp.

**Weaver, A. & Graziano, G.** 2009. Developing the Invasives Free Cooperator Program *In proceedings* of the 10th Annual Alaska Invasive Species Conferences. October 26-28, Ketchikan, AK.

**Wright, Stoney J**. 2009. Long-Term Monitoring of Dune Re-Establishment and Sand Quarry Restoration Utilizing Beach Wildrye, Leymus mollis On the Former Adak Naval Air Station On Adak Island, Alaska. *In Proceedings* for the 2009 Annual Meeting of the American Society of Agronomy, Pittsburgh, Pennsylvania. (Abstract).

**Wright, Stoney J. & Czapla, Phil K.** 2010. Alaska Coastal Revegetation & Erosion Control Guide. State of Alaska, Division of Agriculture, Plant Materials Center. 234 pp.
http://plants.alaska.gov/pdf/Coastal-Reveg-Manual.pdf