

ANNUAL REPORT FOR CALENDAR YEAR 2009

USDA ARS

Arctic and Subarctic Plant Gene Bank -Palmer
(ASPGB)

1509 South Trunk Road
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Kim E. Hummer, Research Leader

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Looking south from the ASPGB facility.



Permanent/Term Federal Staff

Kim Hummer, RL (not pictured)
Rob Carter, Bio. Sci. Tech Currants, *Ribes*, Peonies,
Specialty clonal crops
Bonnie Furman, Curator (Resigned effective 21 May 2010)
Dan Hall, Agri. Sci. Tech., Mint, Rhubarb, seed crops
Nancy Robertson, Research Plant Path.
Todd Steinlage, Bio. Sci. Tech., Lab

Temporary Staff and Students

Ashley Lillard, Bio. Sci. Aid, Plants
Christine Macknicki, Bio. Sci. Res. Tech.
Carmel Sergio, Bio. Sci. Aid, Lab (not pictured)

Accomplishments for 2009

SERVICE

- A new numbering system was put into place for Subarctic and Arctic seed germplasm. Germination testing was completed for all Subarctic and Arctic seed accessions. All viable seed were weighed (total seed weight and 100-seed weight), put in air-tight plastic bottles, labeled clearly, and placed in plastic bins in metal cabinets. In addition seed samples were scanned for photos and a seed herbarium was established. A new numbering system was also put into place for the *Rheum* collection. Accessions were physically split and moved to a new field.
- A total of 12 rhubarb accessions were repatriated from Pullman, Washington and 5 new Rhubarb accessions were added to the collection. 111 accessions of currants and gooseberries and 205 accessions of mint were also added to the collection. A total of 8 requests for rhubarb material were filled, including 31 accessions of clonal material and 21 tissue samples. A total of 6 seed requests were filled, including 78 accessions. In addition, six accessions of rhubarb were backed up in Pullman, Washington and 125 seed accessions were backed up at NCGRP Fort Collins, Co.
- All Subarctic and Arctic seed information was updated on GRIN, including accession number, taxonomic name, seed weights, and inventory and seed photos. The *Rheum* clonal collection inventory information was updated on GRIN. A total of 26 morphological and growth descriptors were added to GRIN. GRIN digital images collected from 2005-2008 to document each of the *Rheum* accessions were incorporated into the GRIN system. In addition, a total of 1400 AFLP markers previously generated for 46 *Rheum* accessions were added to GRIN.
- The on-site rhubarb (*Rheum* sp.) collection was monitored for pathogens with an emphasis on *Turnip mosaic virus*; diseased plants were identified and removed from site.
- Disease survey was conducted on Alaskan grown vegetables (potato, zucchini, dill, parsley, carrots), and small fruits (raspberries, strawberries, currants).
- Mint accessions were monitored by ELISA for Alfalfa mosaic virus, Cherry rasp leaf virus, Cucumber mosaic virus, Strawberry latent ringspot virus (SLRSV), Tobacco ringspot virus (TRSV), and nonspecific potyviruses; detection was limited to SLRSV and TRSV.

RESEARCH

- Germplasm collaborators were contacted to request material for grow out. In collaboration with scientists at Pullman, WA, the ARS lentil core collection consisting of 285 accessions, 17 of garden pea and 10 accessions of *Scorpiurus* sp. were evaluated in Palmer, Alaska field conditions.
- A blueberry evaluation trial was established in fields in the Kenai Peninsula. 9 cultivars of high- and half-high blueberries were planted in 2 locations and base-line data were recorded.
- First year characterization and growth data was collected on the transferred rhubarb germplasm.
- The ARS lentil core collection 2009 planting on the Palmer site was monitored for viruses based on symptoms, mechanical transmission to plant host range, and size of coat protein from purified virus preparations. The most prevalent virus was determined to be *Pea seed-borne mosaic virus* by serology and genomic sequences from RT-PCR segments.
- In collaboration with University of Alaska-UAF researchers, potatoes derived from Alaskan villages that were infected with viruses (*Potato virus X*, *Potato virus A*, and *Potato leafroll virus*) were studied to include symptomology and molecular characterization of their coat protein for definitive identification and taxonomic relationships.
- Barley, oats, and grasses were observed and sampled for *Barley yellow dwarf/Cereal yellow dwarf* viruses at the Plant Material Center in Palmer, Alaska and in a commercial barley field in North Pole, Alaska. Sunshine barley and grasses from Palmer were confirmed to be infected with *Barley yellow dwarf virus-PAS* and *Barely yellow dwarf-ORV* from sequences obtained by RT-PCR assays.

Arctic and Subarctic Plant Genetic Resource Unit, Palmer

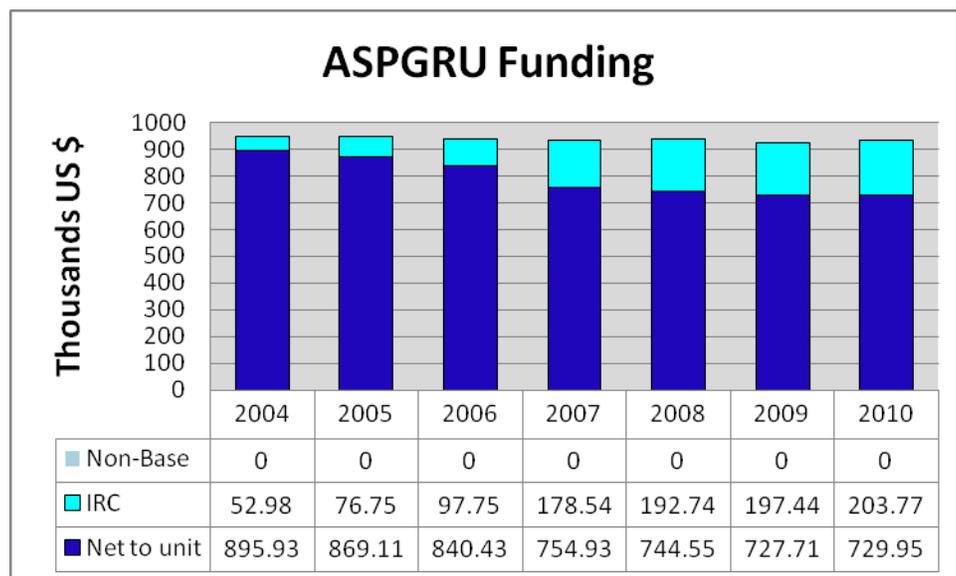
Administrative Overview – Kim Hummer, Research Leader

Management

In December 2009, the USDA ARS Arctic and Subarctic Plant Genetic Resources in Palmer, Alaska was administratively merged as a worksite with the Corvallis National Clonal Germplasm Repository under the supervision and management of Dr. Kim Hummer, Research Leader. While 2,570 miles separate the two locations, many programmatic aspects of clonal genebank management unite them. While, personnel management activities for Palmer will be initiated by staff at Corvallis, where the supervisor is assigned, financial ones will be initiated through staff at the ARS Fairbanks, Alaska Administrative Office. The ASPGRU staff will continue to work closely with University of Alaska, Fairbanks, staff members for facilities coordination and farm use.

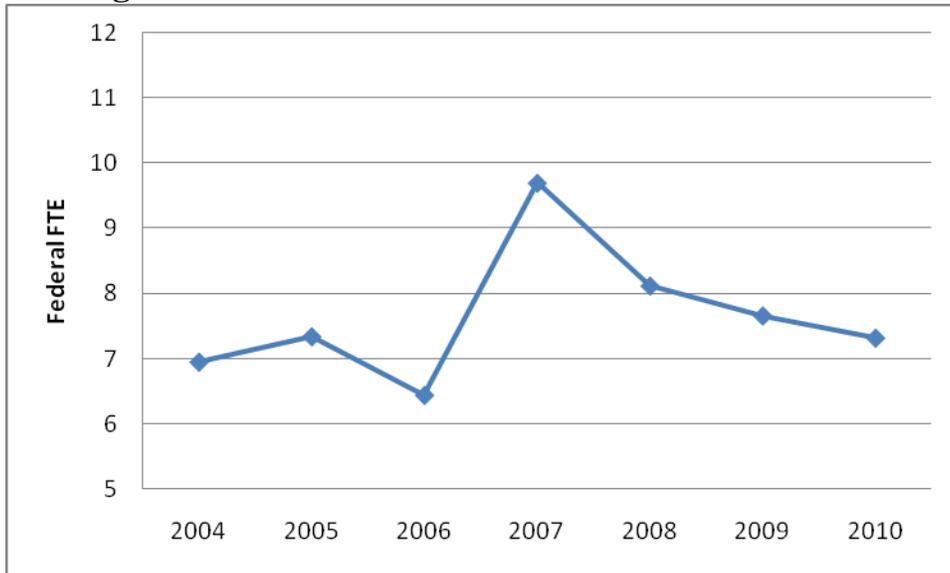
The Palmer location will be the primary US National Plant Germplasm System genebank for mints (*Mentha*), peonies (*Paeonia*), currants and gooseberries (*Ribes*), and rhubarb (*Rheum*), in addition to 20 genera of agronomic reclamation interest to arctic and subarctic regions. Palmer will provide backup remote storage for hop and other specialty crops presently assigned to the National Clonal Germplasm Repository in Corvallis (NCGR). The NCGR will also backup peonies for the Palmer genebank. The Palmer worksite has objectives to collect, maintain, distribute, evaluate and document phenotypic and genotypic information concerning their assigned crops.

Budget and Fiscal



The Palmer location has had roughly \$930 k during the past 3 years total funding with about \$200 k for indirect research cost (IRC) to support the Alaska Administrative office during that time. Utilities costs are high for the Palmer station being about \$80k annually. Non-base funds have not been awarded to Palmer scientists thus far. This next year we will begin applying for grants from various sources.

Staffing



The federal base funded staffing at Palmer ASPGR has been declining during the past four years.

Scientific Staff

The staffing plan has one Research Plant Pathologist, one Research Geneticist- Plants, and one Curator for a total of 3 FY positions. The Geneticist position is vacant, and a request for recruitment is in process. Some additional technical support personnel will be sought after the scientific staff members are in place.

In February 2010, Dr. Nancy Robertson, station Research Plant Pathologist, was promoted. We congratulate Nancy on her excellent scientific work in study of viruses affecting Alaskan agriculture. We look forward to great things as she screens the new collections of clonal plant material for viruses and other pathogens.

In May 2010, Dr. Bonnie Furman, resigned as Curator for the Palmer Gene Bank to begin a position at the International Wheat and Maize Improvement Center (CIMMYT), based in Texcoco, near Mexico City. Best of luck to Bonnie in her new position.

Technical Staff

Dan Hall, our Agricultural Science Research Technician returned to us in early January after his tour of duty was completed in Iraq. Congratulations to a successful mission and welcome back, Dan. We are happy to have you back in Palmer working on our team. We'll look forward to your continued care of the rhubarb collection and your new assignment with mint and the seed propagated crops at Palmer.

Rob Carter's term position as a Biological Science Research Technician was extended for two years. We appreciate him filling in during Dan's absence. Now Rob will take on responsibilities of maintaining germplasm for the peony, currant, gooseberry, and other specialty clonally propagated crop collections.

Todd Steinlage, Biological Science Research Technician- Plant Pathology, was recruited this past year and is working hard for Dr. Robertson testing and screening the new collections for viruses, viroids, phytoplasmas, and other pathogens.

Temporary Biological Science Technicians

We are also happy to have Ashley Lillard, Bio. Sci. Aid, Plants, in the support of the Palmer genebank. Christine Macknicki, Bio. Sci. Res. Tech. (130-day) and Carmel Sergio, Bio. Sci. Aid, (student worker) working in the Plant Pathology laboratory to assist identification of viruses.

Palmer holdings as of April 21, 2010

Clonal germplasm		
Genus	# species	# accessions
<i>Elaeagnus</i>	1	8
<i>Humulus</i>	1	20
<i>Lonicera</i>	1	17
<i>Mentha</i>	25	454
<i>Paeonia</i>	3	14
<i>Pycnanthemum</i>	10	17
<i>Rheum</i>	3	64
<i>Ribes</i>	9	214
Total	53	808

GRAND TOTALS

Genera	# species	# accessions
25	142	1129

Seed germplasm		
Genus	# species	# accessions
<i>Bolboschoenus</i>	1	4
<i>Calamagrostis</i>	11	96
<i>Carex</i>	44	106
<i>Eleocharis</i>	1	2
<i>Eriophorum</i>	4	5
<i>Honckenya</i>	1	10
<i>Juncus</i>	10	46
<i>Kobresia</i>	2	3
<i>Luzula</i>	1	12
<i>Mertensia</i>	1	2
<i>Microseris</i>	1	1
<i>Oplopanax</i>	1	12
<i>Parnassia</i>	1	1
<i>Rheum</i>	4	9
<i>Schoenoplectus</i>	3	9
<i>Scirpus</i>	2	2
<i>Typha</i>	1	1
Total	89	321

Germplasm requested and distributed: 2009

Type	Number of individual requests	Number of Species	Number of accessions	External/Internal
Rheum clone	5	2	29	External
Rheum tissue	1	2	5	External
Seed	6	48	78	External
Total	12	52	112	

Germplasm backed up: 2009

Type	Number of Species	Number of accessions	Location
Rheum clone	2	6	W6
Total	2	6	

GRIN Report 2008-April 2010 – Modified accessions for the Palmer genebank

Grin table	2008	2009	2010	TOTAL
accession	3	18	34	55
accession action	0	18	262	280
accessions names	228	388	82	698
descriptors	27	7	0	34
evalutions	6	4	0	10
genetic assay	0	10	0	10
genetic markers	0	10	0	10
genetic observations	0	411	0	411
habitat	0	0	0	0
inventory	97	539	740	1376
inventory action	92	1739	2287	4118
observations	0	1692	0	1692
order items	0	140	549	689
orders	0	18	27	45
pathogen	0	0	656	656
source history	18	18	9	45
source members	78	10	13	101
viability	0	472	21	493
TOTAL	549	5494	4680	10723

Plant Pathology

By Nancy L. Robertson

Projects in Progress 2009

1. Diseased Black Currant (*Ribes nigrum*): In 2008, virus(es) was(were) isolated from a diseased black currant plant to indicator test plants. The identity and characterization of the virus is being investigated by ds-RNA techniques, RT-PCR, and protein analysis. **The image at the right shows an indicator plant infected with the unknown *Ribes* virus.**



2. Angelica virus Y: To date, no natural occurrence of Angelica virus Y (AnVY) has been found in local crops (i. e., dill, carrots, cilantro). However, AnVY was easily mechanically transmitted to most domestic and wild species in *Apiaceae* (i. e. carrot, dill, cilantro, parsley, fennel, cumin). The plans for FY 2010 include AnVY purification and antiserum production, complete susceptibility plant host range assays, and finish sequencing AnVY genome.

3. Diseased native Mt. Ash (*Sorbus scopulina*): Surveys in native mountain ash reconfirmed repeated detection of a putative virus-like agent in diseased native Mt. Ash in south central Alaska. Intensive RT-PCR assays determined that the Alaskan ringspot mountain ash disease was not European mountain ash ringspot associated virus. Transmission experiments and molecular characterization of the causal agent are on-going.

4. Diseased native Raspberry (*Rubus idaeus* L.): A presumed virus that was initially detected in July 2008 from diseased native raspberry in North Pole, AK was detected again in 2009 with an expanded geographical range in only native and not commercial raspberries. Identification and characterization are on-going.

Facilities



Front of ASPGB building looking East at the main entrance.



Palmer ASPGB building map as of March 2010.

Greenhouse Summary



Looking Northeast at the four Palmer ASPGB greenhouses in February.

Occasionally, this greenhouse space is also utilized by the Alaska Department of Fish and Game for their projects. At this time, ASPGR greenhouse collections include *Mentha*, *Ribes*, *Humulus*, *Lonicera*, and *Paeonia*, *Eleagnus*, and *Pycnanthemum*.

Photo to right: In Greenhouse #3 at half of the mint collection just after many of the plants were cut back for a plant distribution order.



We also have various vegetables and flowers seeds being started for use in our People's garden, which will be planted in the coming weeks. These plants will be grown out and harvested for our local food share programs. In addition, UAF is currently making use of some space in the cooperative growing area for a potato grow-out project.



(Left) *Humulus lupulus* 'Candian Redwine,' 917.001. Palmer is backing-up the core *Humulus* collection from Corvallis. (Right) *Paeonia lactiflora* 'First Arrival,' the first peony received at the Palmer Gene Bank. We gratefully appreciate the donation of this cultivar by Aldeman Peony Gardens, LLC, Brooks, Oregon.

Safety Health and Environmental Management report

By Todd Steinlage

- An EMS audit was performed August 25-27, 2009, and the Unit was given a Declaration of Conformance, making it the second unit in the PWA to achieve this status.
- Members completed 1st Aid and CPR training on Nov. 2, 2009.
- **Kill-A-Watt** meters have been used throughout the year to track electricity usage of laboratory and office equipment. A “Kill-A-Watt” meter helps determine the amount of electricity used during the time that the meter is on the system. This will be used for baseline amounts.
- Laboratory hazardous waste has been documented and disposed of, in accordance with UAF-Palmer guidelines. Our arrangement is with University of Alaska Fairbanks.
- Recycling is ongoing; a large central area for collection has been established at the Barn for plastics (#1 & #2), office paper, other paper, and cardboard.

Travel/Training/Committee Meetings

- Bonnie Furman presented a seminar at the 2009 Alaska Potato, Vegetable and Fruit Growers Conference on February 10th in Palmer, Alaska.
- Bonnie Furman presented a seminar to staff at the National Clonal Germplasm Repository at Corvallis, Oregon on March 10, 2009.
- Bonnie Furman participated in a teleconference meeting for the W6 germplasm members and gave a report on Alaska germplasm activities on June 19, 2009.
- Bonnie Furman attended the 2009 PGOC meeting in Sturgeon Bay, WI from July 14-15, 2009 and presented on Subarctic and Arctic germplasm.
- Nancy Robertson attended an invitational 2nd Plant Virology Ecology Network workshop and presented “Stalking the Wild Virus” in April 2009 on the campus of the International Center for Genetic Engineering and Biotechnology, Ca Tron di Roncade, Italy.
- Nancy Robertson was invited to present “Viruses in Native Plants and Crops of Alaska” for the June 2009 Integrated Pest Management training, University of Alaska-Fairbanks, Cooperative Extension Service in Anchorage, Alaska.
- Nancy Robertson attended the annual American Phytopathological Society in Portland, Oregon, and presented “Detection and Characterization of a Plant Virus in Wild Raspberry, *Rubus idaeus* L., in Alaska” in August, 2009.

Ribes in Greenhouse

Waiting for summer for field planting.





View from our field.



Fall Planting Legume trial.



Rhubarb collection

Publications Submitted in 2009

- Furman, Bonnie, Coyne, Clarice. 2009. Lentils in Alaska: Potential and Prospects. *Pisum Genetics*. 41:61-62.
- Robertson, Nancy, Macknicki, Christine. 2009. Detection and Characterization of a Plant Virus in Wild Raspberry, *Rubus idaeus* L., in Alaska [Abstract]. *Phytopathology*. 99(6):109.
- Robertson, Nancy, Brown, Kathryn. 2009. First Report of Bean Yellow Mosaic Virus in Alaska from Clover (*Trifolium* spp.).
- Robertson, Nancy. 2009. First Alaskan Report of *Hippeastrum* Mosaic Virus in Amaryllis. In review.
- Robertson, Nancy. 2009. Leaf Ringspots on *Sorbus scopulina* L. Green (Western Mountain Ash) Associated with Virus-Like Particles and a Putative Viral Nucleocapsid Protein.