

**ANNUAL REPORT FOR CALENDAR YEAR 2010**  
**USDA, Agricultural Research Service**  
**Arctic and Subarctic Plant Gene Bank (ASPGB)**  
**Palmer, Alaska**



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Rob Carter, Bio. Sci. Tech.  
Ashley Lillard, Bio. Sci. Tech.  
Dan Hall, Agri. Sci. Tech.



**(L-R) Dr. Nancy Robertson, Plt. Pathologist**  
Christine Macknicki, Bio. Sci. Tech.  
Todd Steinlage, Bio. Sci. Tech., Lab  
Non Pictured:  
Carmel Sergio, Bio. Sci. Aid, Lab

## Palmer Gene Bank Accomplishments for 2010

### SERVICE

- 785 accessions from 25 genera were distributed to requestors in 10 countries.
- New acquisitions included > 100 new peony clones and >30 peony seedlots. Blueberry raspberry and blue honeysuckle cultivars were received for research plantings under northern conditions.
- *Mentha*, *Pycnanthemum*, and *Ribes* cuttings obtained in 2009 were established in containers and grown out in greenhouses. *Rheum* clonal material obtained in 2009 and 2010 was established in field plots.
- Inventories were prepared and updated on GRIN. Descriptors for peonies and peony voucher images were loaded to GRIN.
- Curatorial operations and collections were reviewed and revised to adopt standard NPGS methodologies and operational procedures.
- A people's garden, managed by repository staff produced about 434 pounds of cabbage and 156.5 pounds of zucchini that were donated to the Food Pantry of Wasilla, Alaska.

### RESEARCH

- A novel vitivirus was identified from domestic red and black currants in Alaska. This is the first occurrence of a vitivirus detected in *Ribes*, and the first virus to be reported from currants in Alaska.
- 20 Hop clones were tested for viroids. 18 were infected with *Hop latent viroid* and all accessions tested "negative" for *Hop stunt viroid* and *Apple fruit crinkle viroid*.
- Mint, currant and gooseberry, rhubarb, honeysuckle, and hops accessions in the ASPGB collection were screened for viruses and phytoplasmas.
- Domesticated plants from home gardens in South Central Alaska (Palmer, Wasilla, Anchorage), North Central Alaska (Fairbanks and North Pole), and Kenai Peninsula (Soldotna, Sterling) were tested for viruses. The plant material collected included leaf samples from blueberries, currants and gooseberries, raspberries apples, and perennial ornamental flowers.
- *Angelica virus Y* (AnVY) specific polyclonal antibodies were generated from laboratory purified AnVY, and used in ELISA (enzyme-linked immunosorbent assay) to rapidly screen large numbers of plants for the presence of AnVY. AnVY may be an emerging virus that experimentally infects and often kills domesticated and native plants belonging to the celery family.
- *Tobacco rattle virus* (TRV) was isolated and molecularly characterized from bleeding-heart (*Dicentra spectabilis*). This is the second finding of TRV in Alaska. TRV may be introduced to a new location from infected clonally propagated plant material. TRV has a large host range, and once introduced to a region, has the potential to infect other economically important cultivated crops.
- Blueberry cultivar evaluation trials were continued on the Kenai Peninsula. A first year report was prepared.

<http://www.ars.usda.gov/SP2UserFiles/Place/53581500/Palmer/reduced%203-11%20Blueberry%20Trials%20on%20the%20Kenai%20Peninsula%20-%20First%20year%20report.pdf>

## Budget

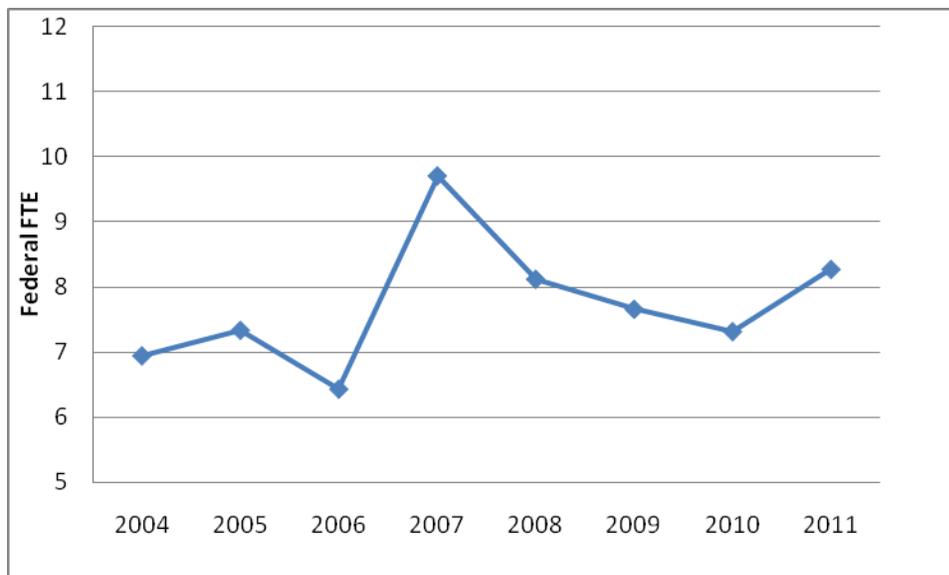
The budget for the Palmer ASPGB has been about \$933 K since 2004. The administrative overhead was about \$210 K in FY 2011.

The unit has a research support agreement and two leases with the University of Alaska, Fairbanks, at their Matanuska Experiment Station in Palmer, Alaska. These agreements are for facilities and utilities use.

A standard cooperative agreement is in place for ASPGB scientists to work with two fruit growers on the Kenai Peninsula to evaluate blueberries for Alaska Production.

The scientists at Palmer ASPGB, the NCGR-Corvallis, and the UAF applied for a 5-year \$6.7 million Specialty Crop Research Initiative Grant from NIFA in January 2011. They worked with the Alaska Peony Growers and the American Peony Society and others to obtain private matching sponsorship to equal the federal contribution for this project.

## Staffing



Federal staffing at the US Department of Agriculture, Agricultural Research Service, Arctic and Subarctic Plant Gene Bank in Palmer, Alaska, during the past 8 years.

## **Administrative Overview**

### **Scientific Staff**

The staffing plan has one Research Plant Pathologist, one Research Geneticist- Plants, and one Curator for a total of 3 permanent FY positions located in Palmer. Kim Hummer is the Research Leader and manages the site (0.2 FTE), although her base location is in Corvallis, Oregon.

Nancy Robertson, Research Plant Pathologist, has been with the genebank program since 1998. She has recently discovered previously unknown viruses in black and red currants, and other pathogens in peonies, red raspberries, and members of the carrot family in Alaska collected plant material.

Dan Barney, Horticulturist/Curator was hired at the end of September 2010. Dan curates the plant collections for the main genera (rhubarb, currants, gooseberries, mint, and peonies) and the other assigned agronomic genera for the gene bank. He is interested in evaluating cold hardy fruit crops for potential growth in Alaska.

The full time Research Geneticist position is vacant, though Barb Gilmore was hired in November as a Post Doctoral Scientist to fill that position in a temporary capacity. Barb is using molecular markers to assess the identity of clones of peonies and rhubarb in the Palmer gene bank collection.

### **Technical Staff**

Dan Hall was hired as a USDA Agricultural Science Technician. He provides technical help in the greenhouse and field for Dr. Dan Barney in the gene bank. Dan Hall previously worked for the Matanuska Experiment Station as an employee of the University of Alaska Fairbanks. Dan has been taking HVAC courses and oversees the facilities management of the USDA facilities. He works closely in conjunction with the UAF staff.

Rob Carter works in a term position as a Biological Science Research Technician. He has been closely involved in the Kenai blueberry project, collecting weather data, and managing the plant materials. He also has worked with the plants in the greenhouse and field, and management of the seed collections.

Ashley Lillard, temporary Bio. Sci. Tech, has been working on the seed management and tissue culture laboratory development for the gene bank. She just resigned as of April 2011 and will be taking a new position with the Anchorage Parks Department. We thank her for her precise and detailed work and wish her well in her new position.

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

Christine Macknicki, Biological Science Research Technician (130-day), has worked in plant virus research for over three years. She has assisted in experiments that involve greenhouse and laboratory skills such as virus inoculations to plants and cloning virus genomes for identification.

Carmel Sergio, Biological Science Aide (student worker), has worked for two years in the plant pathology program. She has assisted in transplanting experimental plant seedlings and virus inoculations in the greenhouse. Her laboratory assignment largely accounted for viral leaf extractions/minipurifications for

Table 1. Clonal and seed accessions maintained at the USDA-ARS Arctic and Subarctic Plant Gene Bank during 2010.

Genus	Accessions		Genus	Accessions	
	Clonal	Seed		Clonal	Seed
Anemone *	0	3	Mentha	431	0
Anthoxanthum *	0	3	Mertensia	0	3
Arnica *	0	2	Microseris	0	1
Bolboschoenus	0	4	Nephrophyllidium	0	1
Calamagrostis	0	96	Oplopanax	0	12
Carex	0	125	Paeonia	108	31
Chamerion	0	1	Parnassia	0	3
Deschampsia *	0	1	Parrya *	0	2
Elaeagnus	0	24	Phyllodoce	0	2
Eleocharis	0	2	Picris *	1	1
Empetrum	0	1	Pycnanthemum	0	17
Erigeron	0	1	Pyrola	0	1
Eriophorum	0	6	Rheum	68	14
Galium	0	1	Rhododendron	0	1
Honckenya	0	8	Ribes	0	246
Juncus	0	42	Schoenoplectus	0	10
Kobresia	0	3	Scirpus	0	5
Ligusticum	0	4	Streptopus	0	1
Luzula	0	4	Typha	0	1
Meconopsis *	0	2	Veratrum	0	2

\* All accessions for these genera were transferred to other NPGS facilities during 2010.

The ASPGB received a shipment of 57 clonal herbaceous peonies (*Paeonia lactiflora*) and 51 clonal tree peonies (*P. suffruticosa*), plus 2 *P. lactiflora* and 29 *P. suffruticosa* seed lots from the USDA-ARS National Clonal Germplasm Repository in Corvallis (NCGR), Oregon during October, 2010. The clonal materials were planted into the ASPGB field. Seeds were stored at 2-4 °C. Peonies now represent one of the 4 major genera for the ASPGB.

The ASPGB staff held an open house for the Pioneer Fruit Growers in summer 2010, participated in the Ag Days open house coordinated by the UAF, and the Alaska State Fair in August 2010. The scientists have given talks at the Alaska Peony Grower meetings, and the Greenhouse and Nursery Conference as well as the Alaska Produce Growers Conference in 2010.

Table 2. Germplasm distributions from the USDA-ARS Arctic and Subarctic Plant Gene Bank in 2010.

Genus	Requests	Clones	Seeds	Genus	Requests	Clones	Seeds
<i>Anemone</i> *	3	0	3	<i>Mentha</i>	514	514	0
<i>Anthoxanthum</i> *	3	0	3	<i>Mertensia</i>	0	0	0
<i>Arnica</i> *	2	0	2	<i>Microseris</i>	0	0	0
<i>Bolboschoenus</i>	4	0	4	<i>Nephrophyllidium</i>	0	0	0
<i>Calamagrostis</i>	41	0	41	<i>Oplopanax</i>	9	0	9
<i>Carex</i>	43	0	43	<i>Paeonia</i> **	0	0	0
<i>Chamerion</i>	0	0	0	<i>Parnassia</i>	0	0	0
<i>Deschampsia</i> *	1	0	1	<i>Parrya</i> *	2	0	2
<i>Elaeagnus</i>	0	0	0	<i>Phyllodoce</i>	0	0	0
<i>Eleocharis</i>	3	0	3	<i>Picris</i> *	1	0	1
<i>Empetrum</i>	0	0	0	<i>Pycnanthemum</i>	0	0	0
<i>Erigeron</i>	1	0	1	<i>Pyrola</i>	0	0	0
<i>Eriophorum</i>	0	0	0	<i>Rheum</i>	89	82	7
<i>Galium</i>	5	0	5	<i>Rhododendron</i>	0	0	0
<i>Honckenya</i>	0	0	0	<i>Ribes</i>	11	11	0
<i>Juncus</i>	19	0	19	<i>Schoenoplectus</i>	12	0	12
<i>Kobresia</i>	1	0	1	<i>Scirpus</i>	6	0	6
<i>Ligusticum</i>	6	0	6	<i>Streptopus</i>	0	0	0
<i>Luzula</i>	4	0	4	<i>Typha</i>	1	0	1
<i>Meconopsis</i> *	2	0	2	<i>Veratrum</i>	2	0	2
				Grand Total	785	607	178

\* All accessions for these genera were transferred to other NPGS facilities during 2010.  
\*\* *Paeonia* was in propagation and not available for distribution during 2010.

Of the accessions distributed, 607 were clonal materials and 178 were seeds. The greatest number of accession requests were for *Mentha* (514) followed by *Rheum* (89), *Carex* (43) and *Calamagrostis* (41). Details are shown in Table 2. Germplasm accessions were shipped to Canada, France, Italy, Morocco, the Netherlands, Poland, Scotland, Switzerland, the United States, and the U.S. Virgin Islands.

## BLUEBERRY RESEARCH

The blueberry evaluation trials established on the Kenai Peninsula during 2009 were continued. Evaluations in October 2010 showed that 100% of the 6 half-high blueberry and 3 highbush blueberry cultivars had survived. Harvestable crops were produced during 2010 on half-high cultivars 'Northblue' and 'Northsky.' Fall, and possibly winter, frost/freezing injury was widespread and ranged from mild to moderately severe, depending on cultivar. Crops ripened late, compared with the same cultivars grown in the lower 48 States. We observed evidence of botrytis blossom and fruit blight. Overall, fruit yields and quality were impressive given the location and age of the plants. Photographs appear on the next page.



Rob Carter of the ARS Arctic & Subarctic Plant Gene Bank uploading air and soil temperature data at the Alaska Berries farm on October 20, 2010. Photo by Dan Barney.



Fall frost and/or winter injury to 'Chippewa' half-high blueberry. Photo taken June 10, 2010. Photo by Rob Carter.



'Northcountry' fruit. Photo taken July 14, 2010. Photo by Rob Carter.



'Northblue' plant. Photo taken July 14, 2010. Photo by Rob Carter.



Alaska Berries Farm in midwinter.



'Northblue' blueberries. Photo taken by Brian Olson, Alaska Berries. (Berry diameter from 1.9 to 2.0 cm). Photo Brian Olson, Alaska Berries.

Full report on the blueberry research at:

<http://www.ars.usda.gov/SP2UserFiles/Place/53581500/Palmer/reduced%203-11%20Blueberry%20Trials%20on%20the%20Kenai%20Peninsula%20-%20First%20year%20report.pdf>

### Pathogen testing

Table 3. *Mentha* and *Ribes* virus screening results for 2010.

Accession	Species	Virus
CMEN 515	<i>Mentha arvensis</i>	SLRSV
CMEN 454-1	<i>Mentha</i> × <i>gracilis</i>	SLRSV
CMEN 117.001	<i>Mentha</i> × <i>piperita</i> <i>nothosubsp. citrata</i>	TRSV
CMEN 159.001	<i>Mentha canadensis</i>	TRSV
CMEN 193.002	<i>Mentha</i> × <i>verticillata</i>	TRSV
CMEN 607	<i>Mentha hybrid</i>	TRSV
CMEN 704	<i>Mentha</i> × <i>piperita</i>	TRSV
CMEN 9002	<i>Mentha</i> sp.	TRSV
CMEN 274	<i>Mentha hybrid</i>	TRSV
CMEN 321	<i>Mentha hybrid</i>	TRSV
CMEN 325	<i>Mentha hybrid</i>	TRSV
CMEN 331	<i>Mentha hybrid</i>	TRSV
CMEN 332	<i>Mentha hybrid</i>	TRSV
CMEN 9001	<i>Mentha</i> sp.	TRSV
CMEN 9006	<i>Mentha</i> sp.	TRSV
CMEN 9007	<i>Mentha</i> sp.	TRSV
CRIB 9002	<i>Ribes</i> sp.	ArMV
CRIB 9001	<i>Ribes</i> sp.	ToRSV
SLRSV = <i>Strawberry latent ringspot virus</i>		
TRSV = <i>Tobacco ringspot virus</i>		
ArMV = <i>Arabis mosaic virus</i>		
ToRSV = <i>Tomato ringspot virus</i>		



Nancy Robertson in the laboratory.



Todd Steinlage screens the ASPGB collections for viruses.

### Searching for Pathogens Across Alaska

Domesticated currants in an Alaskan home garden that were assayed for viruses. Research is progressing on the identification of the unusual viruses that Nancy Robertson has found in this planting.



Table 4. Hops (*Humulus lupulus* L.) Viroid Testing Results: Polymerase chain reaction (PCR) assays on 20 accessions (that included 30 plants) for *Hop latent viroid* (HLVd, 18 positive, *Hop stunt viroid* (HSVd, all negative) and *Apple fruit crinkle viroid* (AFCVd, all negative).

Local accession number /potted plant	HLVd	HSVd	AFCVd
135.002	+	-	-
146.002	+	-	-
146.002	+	-	-
169.002	+	-	-
169.002	+	-	-
170.002	+	-	-
170.002	+	-	-
170.002	+	-	-
175.002	+	-	-
180.003	+	-	-
190.002	+	-	-
190.002	+	-	-
190.002	+	-	-
197.002	+	-	-
243.002	+	-	-
530.002	+	-	-
602.002	+	-	-
602.002	+	-	-
602.002	+	-	-
611.002	+	-	-
611.002	+	-	-
626.002	+	-	-
803.002	+	-	-
814	+	-	-
815	+	-	-
917.003	+	-	-
932.002	-	-	-
932.002	-	-	-
1025.007	+	-	-
1353.001	-	-	-



#### ASPGB Seed Collections

The Palmer gene bank recently received more than 300 seeds of *Ribes* and *Mentha* from the Corvallis Repository. The Palmer staff has been cleaning, counting and repackaging these seeds keeping in mind plant distribution as well as long term preservation. Ashley Lilard is preparing the final packaging of the seeds (photo above).



### Greenhouse Summary

At the Palmer location there are four fully enclosed greenhouses, 24'W x 48'L on concrete slab foundations. Three of these are functional year-round with each having two natural gas Modine forced air heaters, retractable shade cloths, twenty-eight 1000-watt high pressure sodium and metal halide grow lights, and a 50-gallon hot water heater. All four of the houses have fully automated Wadsworth control systems for heat, light and humidity. The fourth greenhouse does not have heat, water, shade cloth or lights and is only operational during two months (May and September), limiting its use. Converting this greenhouse to an enclosure that will be functional year-round will expand our abilities to harbor a larger collection of live plant material. Currently one of the year-round houses is used as a cooperative growing area for ASPGR and UAF.

### Equipment

The Palmer ASPGB recently purchased a tractor for field management. Dan Hall maintains the equipment during the winter season (image to right).



## Curator Laboratory



The Curator laboratory was reorganized and equipped to conduct in vitro plant propagation, general plant physiological research, seed studies, and microscopy. Now it is fully functional for tissue culture and microscopic morphological research and reporting.

Dan Barney and his staff have begun tissue culturing peonies for potential upcoming research projects. (Photo at left.)

## Safety Health and Environmental Management Report

Todd Steinlage (appointed Safety Officer for 2010- 2011)

- Laboratory hazardous waste has been documented and disposed of, in accordance with University of Alaska-Fairbanks (UAF)/Palmer guidelines.
- Recycling is ongoing; a large central area for collection has been established for plastics (#1 & #2), office paper, other paper, and cardboard.
- Fire extinguisher training was completed on site (5/12/10).

## Travel/Training/Committee Meetings

- Danny Barney presented one poster on the ASPGB and one poster on the ASPGB rhubarb collection at New Scientist Training at Pacific West Area headquarters in October 2010.
- Danny Barney made an oral presentation on the ASPGB Ribes collection and acquisition program at the SCCC-22 (Small Fruit Research) meetings in Oxnard, California in October 2010.
- Danny Barney participated as an ex officio member at meetings of the Small Fruit Crop Germplasm Committee and the Herbaceous Ornamental Crop Germplasm Committee during October 2010.
- Nancy Robertson gave the following presentations in 2010:
  - Genetic Analysis of Potato Viruses. 2010 Alaska Produce Growers Conference, February 16, Palmer, AK.
  - Berry Viruses. Alaska Pioneer Fruit Growers (Tour of ASPGB facilities), July 8, Palmer, AK.

- Peonies and Viruses –Indexing. Peony conference and Grant-writing Meeting, July 21-23, Fairbanks, AK
- Serological Detection and Molecular Analysis of *Tobacco ringspot virus* and *Strawberry latent ringspot virus* in Mint. American Phytopathological Society Annual Meeting, August 7-11, Charlotte, N. C. (poster).
- Nancy Robertson participated in the following 2010 conferences:
  - Alaska Peony Growers Conference, February 19-20, Anchorage, AK.
  - 11<sup>th</sup> International Plant Virus Epidemiology Symposium and 3<sup>rd</sup> Plant Virus Ecology Network Workshop, June 20-24, Cornell University, Ithaca, NY.
  - Alaska Growers, September 22, Palmer, AK.

### Publications Submitted/Published in 2010

Furman, Bonnie J. Robertson, Nancy L. and Hummer Kim E. 2010. New Clonal Emphasis for the Arctic and Sub-Arctic Plant Genetic Resources Unit in Palmer, AK. HortScience. August Abst. 55.

Furman, Bonnie J. Robertson, Nancy L. and Hummer Kim E. 2010. The USDA ARS Rhubarb Collection. HortScience August. Abst. 56.

Robertson, N. L., and Furman, B. J. Assessment of the Arctic and Subarctic Plant Gene Bank's *Mentha* sp. Germplasm Collection for Selected Viruses. (In Review)

Robertson, N. L., Smeenck, J., and Anderson, J. 2010. Molecular Characterization of *Potato leafroll virus*, *Potato virus A*, and *Potato virus X* Isolates from Potatoes in Alaskan Cities and Villages. Plant Health Progress. doi. 10.1094/PHP-2011-0209-01-BR, online <http://www.plantmanagementnetwork.org/php/>

Robertson, N. L. and Brown, K. L. 2010. First Report of *Bean yellow mosaic virus* in Alaska from clover (*Trifolium* spp.) Plant Disease 94(3): 372.

Robertson, N. L., and Furman, B. J. 2010. Serological detection and molecular analysis of Tobacco ringspot virus and Strawberry latent ringspot virus in mint. Phytopathology 100(6): S109. (abstract).

### People's Garden Project at Palmer

The people's garden, managed by repository staff, produced about 434 pounds of cabbage and 156.5 pounds of zucchini that were donated to the Food Pantry of Wasilla, Alaska.



ASPGB  
People's  
Garden 2010.  
Photo by  
Ashley Lillard.



Robert Carter (L) and Ashley (R) Lillard at the ASPGB People's Garden 2010.