

ANNUAL REPORT FOR CALENDAR YEAR 2007

USDA ARS

National Clonal Germplasm Repository

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Janine de Paz, Bio. Sci. Tech, Tissue Culture
Missy Fix, Bio. Sci. Tech., Plants
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James Oliphant, Bio. Sci. Tech., Greenhse. Mgr.
Yvonne Pedersen, Secretary
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Barbara Reed, Research Plant Physiologist
Joe Snead, Ag. Sci. Tech., Field Manager
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Temporary Staff and Students

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Devos, Byron, Volunteer
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Alicia Leytem, Bio. Sci. Aid, Field
Sonja McMackin, Bio. Sci. Aid, Tissue Culture
Laura Morrison, RSA, TC Lab
Kari Page, Wk. Study
Carolyn Paynter, Volunteer
Richard Schmitt, Bio. Sci. Tech., Field
Jon Tilles, Bio. Sci. Aid, Field
Debra Tyson, Ag. Sci. Aid, Greenhouse
Andrew Wilson, Wk. Study
Tyler Young, Bio. Sci. Aid, Greenhouse



Open House – July 20-21, 2007

Graduate Students and Visiting Scientists

Danny Dalton, GRA, Horticulture
Dr. Magfrat Muminova, Uzbekistan
Wambui Njuguna, GRA, Horticulture
G. Prabhakara Rao, India
Arzu Sezer, Turkey (collaboration w/OSU)
Esther Uchendu, GRA, Horticulture
Sugae Wada, GRA, Horticulture
Mihai Botu, Romania (collaboration w/OSU)

Collaborators

Francis J. Lawrence
Maxine Thompson

Annual Report for Calendar Year 2007

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Major Accomplishments for 2007

Service

- Improved efficiency of maintenance of greenhouse and screenhouse ex situ collections. Nearly 8300 containerized healthy plants are now inventoried and preserved.
- Developed a database and inventory of freeze-dried leaves from the four core collections in strawberry, blueberry, hazelnut and pear.
- Distributed a record number of items: more than 5,037 accessions for more than 550 requests.
- Regenerated 77 accessions of strawberries in cages with hand pollinations.
- Sent 326 seedlots of 9 genera and 200 species to the World Nordic Genebank. Had excellent local media coverage of this event including stories in the Corvallis Gazette Times and on the KEZI Eugene, Oregon, TV.
- Participated in a plant collecting expedition to the Southeastern and Midwestern US that obtained 127 new berry and nut accessions for the Corvallis Genebank.
- Hosted a July open house in the blueberry and pear collections that attracted at least 150 visitors during two days and positive media coverage in Portland, Eugene, Salem, and Corvallis newspapers.
- Hosted visiting scientists from Uzbekistan (6 months), India (2 months), Romania (1 month), and Turkey (1 month).
- Trained 5 graduate students, 10 undergraduates, 18 physically/mentally challenged individuals in maintenance and research of genetic resources.
- Technology Transfer: to Floraginex- Blueberry molecular database through a MTA.

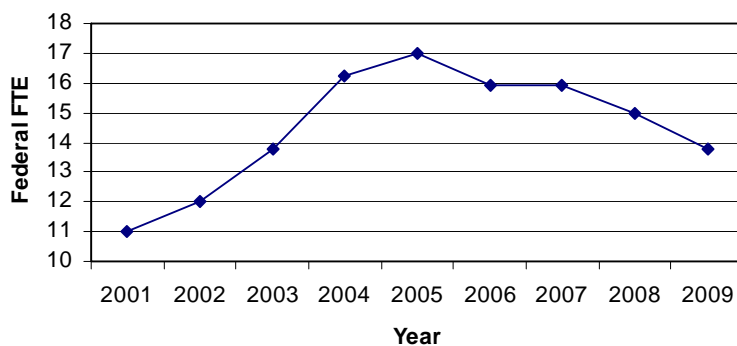
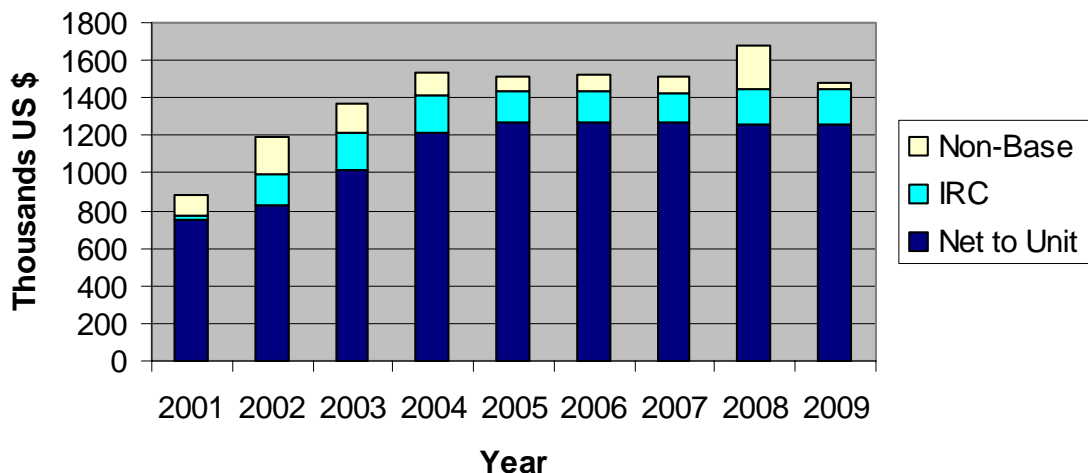
Research

- Produced books on cryopreservation protocols; *Plant Cryopreservation: A Practical Guide* (Springer); *Second International Symposium on Plant Genetic Resources* Vol. 1 and 2, published from the IHC in Seoul, Korea by ISHS as *Acta Horticulturae*; *Global Conservation Strategy for Fragaria (Strawberry)* published by ISHS as a *Scripta Horticulturae*.
- Tested a fingerprinting SSR set for hazelnut in 29 trees from the backup Parlier collection. Compared their fingerprints to those of true-to-type trees in the Corvallis collection and identified three mislabeled trees.
- Finished generating genetic profiles for 146 pear accessions using 10 EST-SSR loci. Tested a proposed fingerprinting set for genotyping the pear collection and identified multiple fingerprints in 'Hosui'. Used a fingerprinting set of 9 SSRs to evaluate genetic relationships of heritage apples and pears grown on Terceira Island in the Azores.
- Developed a DNA extraction protocol from immediately quick frozen (IQF) 'Marion' and 'Kotata' berries and the tools for genetic identification. Used SSRs to identify IQF berries and demonstrate contamination of commercially available 'Marion' with 'Kotata' berries.
- Improved *in vitro* cold storage of hop germplasm through reduced iron in the medium.
- Determined that blackberry subgenera and some species can be distinguished by seed anatomy.
- Screened 14 quince seedling populations for fire blight resistance.
- Identified backup hazelnut plants in Parlier, CA, using phenotypical observations and DNA fingerprinting.
- Produced a manuscript entitled: *Rubus Iconography: Antiquity to the Renaissance*.

Administration

Budget and Staffing at the NCGR Corvallis

NCGR Funding



<u>FY</u>	<u>Purpose</u>	<u>2007</u>
Amount		Source
15,000	Evaluation of quince for fireblight susceptibility	National Program Staff, ARS
10,000	Former Soviet Union Science Cooperative program for retraining scientists - BR	ARS-OIRP
17,000	Evaluation of Ribes for WPBR - KH	National Program Staff, ARS
11,500	Azores cooperative grant - KH	OIRP
7,600	Plant exploration to southeast US to collect black raspberries - KH	PEO, Beltsville, MD
3,000	Pear genetic analysis - NB, JP	National Park Service
12,500	Cranberry genetic analysis - NB	NW Center Small Fruit
6,000	Blackberry genetic analysis - NB	Oregon Blackberry and Raspberry Commission
82,600	Total	

Administrative Overview

Staffing Changes

Two temporary term appointments (4-year) were completed this past year that we could not replace due to budget constraints. The position of Jack Peters, our seed manager, and Janine DePaz, a tissue culture technician, were finished. Graduate students are now filling in for us in these work areas on a temporary basis.

The following staff members have been promoted during the past year: Missy Fix, Biological Science Research Technician, and Kim Hummer, Research Leader. Congratulations!

Budget and Fiscal

Base funding has remained at about \$1.45 million for the past six years. Our last significant increase was in FY 2003. With promotions, within grade increases and pay-act increases our salary costs are more than \$1.06 million and the federally supported personnel are projected to decrease to 13.8 FTE for FY 2009. Our administrative overhead charges have been roughly similar for the past 3 years. The non-base funding that our scientists have been able to obtain has been fairly constant at about \$75,000 per annum. The large extramural amount for FY 2008 represents facilities upgrades given by the Pacific West Area in conjunction with Headquarters funding. We thank them for providing money for a new more efficient boiler and an improved fire alarm system.

Within three years our discretionary dollars per scientist will be lower than the required minimum that our administrators recommend. This will require programmatic activity reduction unless additional base funding is increased.

View from the Front Office

The actuality of our “flat” base budget, since 2004, provides us with direct challenges due to inflation. Term positions that we were able to hire in 2003 have now been eliminated due to lack of funds to maintain these positions. We have lost significant (4.0 FTE) since then. We have changed our plant management approaches to be as efficient as we can be in germplasm maintenance. We now must begin difficult planning decisions to reduce our activities if budgets continue to remain flat or if cuts are instituted.

EEO/CR/Outreach

- We worked with Dr. Bobby Phills, Florida A&M University, on an 1890’s Capacity Building Grant concerning development of low chilling *Rubus*. One of his staff members visited our unit in 2007.
- We are working with Dr. Kirk Pomper, Kentucky State University on an 1890’s Capacity Building Grant concerning evaluation of specialty fruit crops for Kentucky production.
- Through Research Support Agreement with Oregon State University three female graduate students were trained. Two of these students were women of color; two Asian; one disabled.
- During the winter, 15 disabled high school students (program was funded through local school district grant) were trained in greenhouse management activities.
- During the winter an additional 3 disabled individuals from a local private organization (Work Unlimited) were trained in strawberry greenhouse activities.
- Three disabled individuals have temporary federal technical appointments on our staff.

- The location has formed an EEO/CR committee and our staff is very involved. Outreach activities for recruitment from diverse workforce opportunities are being pursued.

Facilities and Security

This was a big year for security upgrades. The facilities manager worked closely with the contractor on the entire installation to receive training and give advice and guidance on the facilities side. The north farm gate was replaced with a new upgraded operator and key card access. The security system was also replaced with “state of the art” equipment and was linked to the main system at the repository. The gate at the main repository was also replaced with an operator and card lock. The old gate was a double swing type and required a padlock to secure it at night. The new gate is a cantilever type and is controlled by the security system.

A new room addition was completed in the main complex building to house the new security equipment including ID card printing capabilities. All of the exterior doors were upgraded to card/mag lock eliminating the use of many keys. Now an employee can be granted compartmented access. Access can be programmed as to times of day and days of the week.

A CCTV system was also installed with a total of 6 day/night infrared cameras. This system is totally programmable and expandable. Training was provided on the complete of the system including security badging. The fire alarm system was tested again this year in compliance with the NFPA for certification. Some security lighting was added and numerous fixtures were repaired by facilities force account. Existing flag light was replaced by a new light standard and fixture.

The greenhouses and screenhouses received a great deal of attention this year. The Wadsworth control system was expanded to control the swamp coolers in greenhouses 1 and 3. Also the HAF fans were placed on the Wadsworth system in those two greenhouses. All this was done by facilities force account including replacing all control relays and adding additional electrical equipment for high voltage and low voltage controls. Greenhouses 2 and 4 cooling systems will be changed over soon. Plans are in the works and outside vendors have been contacted concerning replacing the existing heat control valves in all the greenhouses.

An economizer was installed in the headhouse to achieve a positive pressure atmosphere during pesticide applications in the greenhouses. This system pulls outside air in to the headhouse forcing the airborne pesticides to remain in the greenhouses.

A major effort was put forth in replacing numerous rotted wood lath pieces, stem wall top half round pieces and repairing holes in screening in the screenhouses. This was performed in the fall in preparation for winterization. New wood was primed and painted and painting was also performed on existing wood pieces. A lower portion of screening was caulked and numerous holes were filled in the stem walls to keep pests out. This was performed by facilities and force account. Additional routine facilities maintenance was performed.

We had hoped to replace our old boiler with a more efficient model – but that was delayed until FY 2008 due to contracting issues.

Awards

Compiled by: Yvonne Pedersen

Joseph Postman – Performance Bonus Award for superior performance of germplasm collection, maintenance, and evaluation, for scientific reporting and research, and for excellently representing the agency and the unit during the calendar year 2007; awarded February 2007.

Nahla Bassil – Performance Bonus Award for highly superior performance of molecular analysis, research planning, resource management, collateral duty safety officer, and in personal development during the calendar year 2007; awarded February 2007.

Kim Hummer - Quality Step Increase for outstanding performance during the calendar year 2007; awarded February 2007.

Bruce Bartlett– Performance Bonus Award for superior performance of plant distribution for the National Clonal Germplasm Repository rating for April 2006 through March 2007; awarded May 2007.

Jeanine DeNoma – Quality Step Increase for outstanding performance of duties in tissue culture and cryopreservation from May 2006 through April 2007; awarded May 2007.

Missy Fix – Quality Step Increase for outstanding performance for evaluation period April 2006 through March 2007; awarded May 2007.

James Oliphant – Performance Bonus Award for superior performance, unusual creativity, and innovation during evaluation period April 2006 through March 2007; awarded May 2007.

Yvonne Pedersen – Performance Bonus Award for highly superior performance during April 2006 through March 2007; awarded May 2007.

Training

Compiled by: Yvonne Pedersen

Jim Oliphant, Missy Fix, and Joe Snead – Corvallis, Oregon to attend the Non-Crop Vegetation Management Course; January 2007.

All employees completed the annual AgLearn training of Security Awareness and the Ethics Training in 2007.

Joseph Postman and Yvonne Pedersen continue to participate in the monthly ARS Site Publisher teleconference/training.

Travel

Compiled by: Yvonne Pedersen

Joseph Postman – Tbilisi, Armenia, Caucasus Germplasm Expedition; September/October 2006.

Kim Hummer – Bellingham, Washington, to attend and give report of the repository activities to the NCCC-22 (Small Fruit and Viticulture Workshop) meetings; October 2006.

Kim Hummer – Taastrup, Denmark, by invitation as an invited speaker, to attend the 50th Anniversary of the Danish Genebank; November 2006.

Nahla Bassil – Indianapolis, Indiana, to attend workshop at the ASA annual meeting; Nov. 2006.

Kim Hummer – Kennewick, Washington, to attend and give report at the annual NW Center Small Fruits Research Meeting; November 2006.

Nahla Bassil – Kennewick, Washington, to attend and give report at the annual NW Center Small Fruits Research Meeting; November 2006

Barbara Reed – San Antonio, Texas, attend the ISHS meeting and symposium; December 2006.

Kim Hummer – Pullman, Washington, invited to participate in the interview process in Research Leader search; December 2006.

Joseph Postman – Portland, Oregon, attend the Western Orchard Pest/Disease Conference; January 2007.

Nahla Bassil – San Diego, California, attend the Plant & Animal Genome Conference; Jan. 2007.

Nahla Bassil – Richmond BC, Canada, invited to attend and address the BC Cranberry Marketing Commission workshop; February 2007.

Kim Hummer – Ventura, California, attended North American Strawberry Growers Association symposium and conference; February 2007.

Nahla Bassil – Bandon, Oregon, invited to attend and give presentation at the Oregon Cranberry School; February 2007.

Joseph Postman – Hood River, Oregon, attend and participate in the Pear Crop Committee Meeting and Washington Tree Fruit Commission – Pear Research Review meeting; Feb. 2007.

Jim Oliphant – Aurora, Oregon, site visit to the North Willamette Station; February 2007.

Kim Hummer – Azores, invited and funded by the Office of International Research Programs to give presentation and advise the Technical Working Group of the Azores Cooperative Initiatives Program; February 2007.

Joseph Postman – Fresno, California, site visit to the Parlier Station; May 2007.

Kim Hummer – Beltsville, Maryland and East Coast, attend the PGOC meeting in Beltsville and then East Coast collection trip; May 2007.

Joseph Postman – Lisbon, Portugal, attend and present at the ISHS International Pear Symposium; May 2007.

Barbara Reed – Indianapolis, Indiana, attend the *In Vitro* Biology Meeting to present a talk, chair a contributed paper session and co-chair a symposium; June 2007.

Missy Fix, Alicia Leytem, Deb Tyson, Jim Oliphant, and Joe Snead – Aurora, Oregon, attend North Willamette Station Field Days; June 2007.

Barbara Reed – Kazakhstan, ISTC grant site visit and review FSU project on the “Preservation of Germplasm of Fruit and Berry Crops in Kazakhstan”; June and July 2007.

Joseph Postman – Pullman, Washington, attended and participated the W-6 Meeting; June 2007.

Kim Hummer – Scottsdale, Arizona, attend the ASHS meeting; July 2007.

Nahla Bassil – Scottsdale, Arizona, attend and give presentation at the ASHS meeting; July 2007.

Esther Uchendu, Sugae Wada, Laura Morrison, Jeanine DeNoma, Barbara Reed, Sonja McMackin, and Magfrat Muminova – McMinnville, Oregon, site visit to North American Plants; July 2007.

Nahla Bassil – Portland, Oregon, attend the Fireblight Meeting; August 2007.

Missy Fix, Alicia Leytem, and Joe Snead – local travel to attend the Far West Show; August 2007.

Joseph Postman – Portland, Oregon, attend and participate in the Fireblight Workshop; August 2007.

Barbara Reed – Indianapolis, Indiana, invited to visit and participate in seminar hosted by Dow AgriSciences; August 2007.

Joseph Postman – Portland, Oregon, attend the Woody Landscape CGC FarWest Show; August 2007.

Kim Hummer – Pullman, Washington, invited to participate on interview committee; September 2007.

Barbara Reed – Davis, California, attend and present poster at the International Seed Symposium; September 2007.

Visitors

by: Yvonne Pedersen

During Calendar Year 2007, 577 people came through the Repository's doors. Guests arrived in large or small groups, or as individuals. Of the 577 people, 150 of those attended the 2007 Open House held in July.

Some groups used the Repository for their annual meetings such as the Oregon Hazelnut Commission, the Oregon Sweet Cherry Commission, and the Oregon Processed Vegetable Committee. Educational tours ranging from groups of 8 to 20 came from Willamette University, Home Orchard Society, Master Gardener Group, Oregon State University, Philomath School District, Corvallis School District, Linn Benton Community College, as well as the Greater Albany Public Schools to tour the facility for their horticultural experience. There were also numerous visitors from around the world: 1 each from the United Kingdom, Russia, Thailand, France, Spain, Ethiopia and Romania, and 2 from Canada, Korea, Tasmania, and Germany, 3 from New Zealand and China, 4 from Mexico and 5 from Chile. Also, there were graduate students working at the National Clonal Germplasm Repository from Kenya, Nigeria, and Japan. In 2007 there have been four different visiting scientists: 1 from India working with Barbara Reed in the tissue culture lab, 1 from Romania through OSU working with Nahla Bassil in the molecular lab, 1 from Turkey also through OSU working with Nahla Bassil in the molecular lab, and 1 from Uzbekistan working with Nahla Bassil in the molecular lab.

Collection Summaries

	Number of Taxa	Total Accessions	Seed Accessions	Field Plants	Screenhouse Plants	<i>In vitro</i> Plants
Major Genera						
<i>Actinidia (Hardy Kiwi)</i>	34	168	22	136	67	0
<i>Amelanchier (Serviceberry)</i>	15	73	52	15	1	8
<i>Corylus (Hazelnut)</i>	23	598	5	638	220	28
<i>Cydonia (Quince)</i>	3	93	21	103	27	0
<i>Fragaria (Strawberry)</i>	58	1526	421	0	2032	198
<i>Humulus (Hops)</i>	6	637	273	17	409	41
<i>Mentha (Mint)</i>	41	480	55	0	511	160
<i>Pyrus (Pears)</i>	48	1823	328	1881	661	175
<i>Ribes (Currant/Gooseberry)</i>	128	1122	537	1161	535	45
<i>Rubus (Blackberry/Raspberry)</i>	180	1684	1271	190	1753	198
<i>Vaccinium (Blueberry/Cranberry)</i>	79	1276	775	625	863	68
Total Major Genera:	615	9480	3760	4766	7079	921

Minor Genera						
<i>Aronia</i>	1	7	6	13	0	0
<i>Asimina (Pawpaw)</i>	4	50	8	67	9	5
<i>Chaenomeles (Asian Quince)</i>	3	6	0	23	4	0
<i>Crataegus (Hawthorn)</i>	7	6	6	7	0	0
<i>Duchesnea (False Strawberry)</i>	2	5	2	0	9	0
<i>Elaeagnus</i>	1	15	0	3	31	0
<i>Gaultheria (Salal)</i>	19	33	26	0	1	0
<i>Gaylussacia (Black Huckleberry)</i>	7	16	12	0	6	0
Intergeneric hybrids	18	25	3	16	13	2
<i>Juglans (Butternut)</i>	2	60	0	22	2	0
<i>Lonicera (Edible Honeysuckle)</i>	13	52	28	31	22	0
<i>Mespilus (Medlar)</i>	3	45	18	24	42	0
<i>Peraphyllum (Wild Crabapple)</i>	1	6	5	0	0	0
<i>Potentilla (Silverweed)</i>	1	2	1	0	1	0
<i>Pycnanthemum (Mountain Mint)</i>	27	94	69	0	96	30
<i>Sambucus (Elderberry)</i>	33	144	114	47	12	0
<i>Sorbus (Mountain Ash)</i>	68	223	161	59	8	0
Miscellaneous other Genera	24	63	41	36	32	0
Total Minor Genera:	234	852	500	348	288	37
Total All Genera:	849	10332	4260	5114	7367	958

Miscellaneous Other Genera						
<i>Lolium (Ryegrass)</i>	1	0	0	0	13	0
<i>Cynodon (Bermuda Grass)</i>	2	0	0	0	14	0
<i>Arctostaphylos</i>	1	2	2	0	0	0
<i>Castanea</i>	1	2	2	0	0	0
<i>Cavendisha</i>	2	2	2	0	0	0
<i>Cornus (Dogwood)</i>	2	5	4	1	0	0
<i>Cotoneaster</i>	1	1	1	4	0	0
<i>Docynia</i>	1	1	0	0	4	0
<i>Empetrum</i>	2	7	7	0	0	0
<i>Hippophae</i>	1	3	3	0	0	0
<i>Kalmia</i>	1	1	1	0	0	0
<i>Malus (Apple)</i>	2	34	11	29	0	0
<i>Morus</i>	2	0	3	0	0	0
<i>Photinia</i>	0	0	0	2	0	0
<i>Psammisia</i>	1	1	1	0	0	0
<i>Pyracantha</i>	1	1	1	0	0	0
<i>Sibboldia</i>	0	1	0	0	1	0
<i>Sorbaria</i>	1	1	1	0	0	0
<i>Sphyrospermum</i>	1	0	1	0	0	0
<i>Waldsteinia</i>	1	1	1	0	0	0
Total Miscellaneous Genera:	24	63	41	36	32	0

Plant Pathology and Tree Fruit Curator Report by Joseph Postman

Hazelnut identity confirmation in backup collection. Using a combination of phenotype observations and DNA fingerprinting, we confirmed the identity of most of the clones growing at the backup hazelnut collection in Parlier, California and eliminated contaminant root suckers. The primary collection in Corvallis is self-rooted to prevent rootstock contamination, but the backup core collection in Parlier is grafted onto seedling rootstocks. *Corylus* has a strong tendency to produce root and stem suckers. It became obvious in 2006 that a number of trees had mixed genotypes within single trees, or the two trees of some genotypes did not match each other. SSR fingerprints of problem trees at Parlier were compared to their mother trees in Corvallis. Follow-up phenology examination in March, 2008 combined with DNA fingerprint results allowed the elimination of about a dozen contaminated trees, and removal of about a dozen large rootstock suckers.

Cydonia fire blight evaluation. Began screening the quince germplasm collection for fire blight resistance. Of all the pome fruits, *Cydonia* is considered to be one of the most susceptible to fire blight, with no known domestic sources of resistance. Thanks to an NPGS germplasm evaluation grant, we were able to generate seedling populations from each of our 14 *Cydonia* seed accessions, clonally propagate about 80 tree accessions, and also collect open pollinated seed from each clonal accession. Following greenhouse inoculation of seedlings with a virulent isolate of *Erwinia amylovora*, 5 seedlings were selected with potentially strong resistance to *E. amylovora*. Quince germplasm was recently obtained from Bulgaria that had been selected for resistance to natural fire blight infections. NCGR inoculation work will continue in 2008 with Repository base funds to test the clonally propagated accessions, o.p. seedlings from the Corvallis field genebank, and Bulgarian seedling populations. We expect to have enhanced *Cydonia* germplasm available by the end of 2008 for further evaluation by cooperators.

Pear Collection Summary

- **2359 Pyrus Accessions**
 - Representing 37 taxa from 52 countries

- **328 seedlots**
 - available for distribution: 142 seedlots (based on viability & seed count)
 - viability >50%: 231 seedlots
 - seed amount < 100: 190 seedlots
 - seed amount >99: 138 seedlots
 - seedlots designated as **core accessions: 44**

- **2023 clonal accessions**
 - available for distribution: 1664
 - accessions representing genotypes: 1246
 - Asian cultivars & selections: 148
 - European cultivars & selections: 855
 - hybrid cultivars & selections: 93
 - rootstock selections: 151
 - accessions representing species: 780
 - **clones designated as core accessions: 216**

Pear Collection Backup

Seed Accessions

- *Pyrus* seedlots at NCGRP, Fort Collins, Colorado: 18
- *Pyrus* seedlots at Svalbard Global Seed Vault, Norway: 12

Clonal Accessions

- *In vitro* and cryo collections
 - 190 accessions are stored onsite as *in vitro* cultures
 - 153 accessions are stored as cryopreserved meristems
- clones backed up onsite as second tree, *in vitro* culture or cryo-stored meristem: 471
 - 320 (26%) of “genotype” clones are backed up onsite
 - 135 (63%) of core clones are backed up onsite
- clones “backed up” at alternate collection (NRSP-5 in Prosser, WA; USDA-ARS in Kearneysville, WV; Canadian Clonal Genebank in Harrow, Ontario; or Brogdale National Fruit Trials in England)
 - 384 (31%) of “genotype” clones

Quince Collection Summary

- The NCGR *Cydonia* collection includes 105 clones and 14 seedlots from 15 countries. Clonal quince accessions are maintained as self-rooted trees in a field collection.

Phenotype Evaluations in 2007

Pyrus

- continued annual pear scab ratings
- phenology of late maturing cultivars
- dormant bud cryostorage trial in collaboration with NCGRP, Fort Collins

Cydonia

- observations for *Fabraea* leafspot and Rust incidence
- ripening phenology
- greenhouse inoculations for fire blight resistance

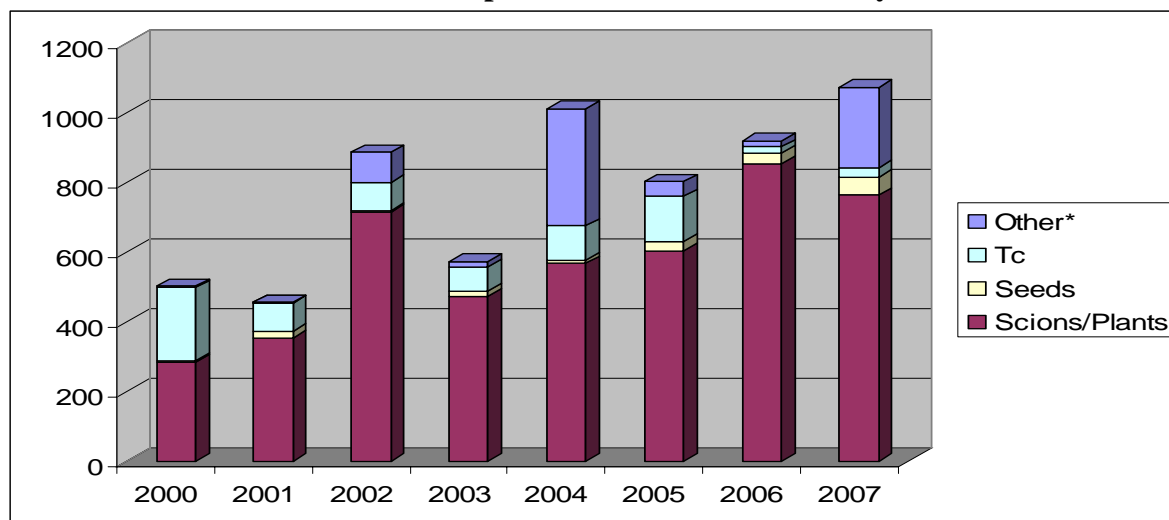
Genotype Evaluations in 2007 (see Genetics Lab Report)

- collaborated with National Fruit Trials, Brogdale, England, to establish a universal pear SSR fingerprinting set and 8 standard reference genotypes.
- flow cytometry for ploidy determination: 105 pear clones and 100 quince clones
- received USDA evaluation grant (February 2008) to generate additional genotype and phenotype data for core collection and compare SSR fingerprints to corresponding cultivars in the National Fruit Trials, Brogdale, England.

***Pyrus* Distribution in 2007**

- **1073 *Pyrus* samples were distributed to 52 requestors**
- **21% of the 5,040 NCGR samples distributed in 2007 were *Pyrus***

Pear Samples Distributed This Century



* 'Other' includes DNA, leaves, pollen, fruit, etc. **New Accessions in 2007**

New *Corylus* accessions – Three new EFB resistant cultivars recently released by Oregon State University, and six replacement cultivars, were obtained from S. Mehlenbacher. Two native *C. americana* plants were collected by K. Hummer and M. Dossett from the SE United States. Three seedlots collected in Azerbaijan were received from M. Aradhya.

New *Mespilus* accessions – The cultivar 'Royal' was obtained from a nursery. Sixteen medlar trees were planted in the field collection.

New *Pyrus* accessions – Nine *P. communis* and three *P. pyrifolia* rootstock clones were received from W. Proebsting. Nine clonal accessions were released from quarantine with origins in China, Czech Republic, Estonia, India and Macedonia. Four cold hardy cultivars were purchased from a nursery in upper New England. Fifteen seedlings of *P. caucasica*, *P. salicifolia* and *P. sachokiana* were generated from seed collected in the Republic of Georgia. Two heirloom U.S. cultivars were found in abandoned orchards in western Oregon.

Open house

Organized a July open house in the NCGR Blueberry and Pear collections that attracted at least 150 visitors during two days and positive media coverage. The local Master Gardener fruit interest group helped with publicity, outreach and logistics.

Corylus – EFB –

We continue to protect our field collection with prophylactic fungicide sprays and monitor several times a year for symptoms of Eastern Filbert Blight. The disease is present within 2 miles of our genebank, but has still not been observed in our field collection. Only *Corylus in vitro* cultures can be distributed to requestors outside the United States.

Molecular Genetics

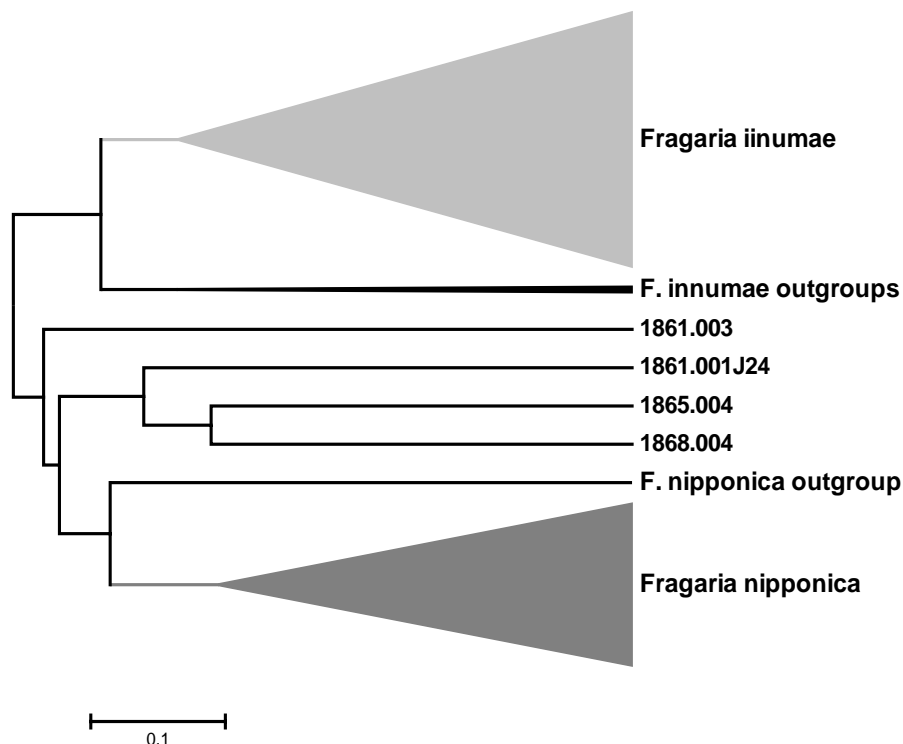
By Nahla V. Bassil

Continuing Graduate Student

Wambui Njuguna, a PhD candidate at the Horticulture Department at Oregon State University, is actively working on three projects that use molecular markers to answer different questions in *Fragaria*. The objective of the first project is to evaluate genetic diversity in *F. nipponica* and *F. iinumae* collected in Hokkaido, Japan (collaboration with Kim Hummer and Tom Davis). Using

20 SSRs on these two Asian diploids, putative hybrids between *F. iinumae* and *F. nipponica* as well as an unexpected octoploid accession from Hokkaido, Japan, were identified. SSR-based cluster analysis shows a cluster each for *F. iinumae* and *F. nipponica* as well as additional specimens collected from Honshu, Japan (Fig. 1). Possible hybrids were identified as accessions falling out of the 2 major clusters. The objective of the second project is to evaluate five chloroplast sequences and the ITS nuclear DNA sequence for usefulness in barcoding and species identification in *Fragaria*. Preliminary analysis has revealed moderate variability in four of the six sequences. Additional chloroplast regions recently reported as highly variable among species will be explored in the near future to help in identifying *Fragaria* species. The third project consists of identifying a strawberry SSR fingerprinting set. Preliminary testing of 24 SSRs in 15 *F. ×ananassa*, four *F. virginiana* and four *F. chiloensis* accessions and one *F. iturupensis* accession was recently completed. Wambui will then use a selected number of SSRs for fingerprinting a subset of the *Fragaria* core and supercore collections.

Fig. 1. Neighbor Joining cluster analysis of 139 Asian diploid accessions based on the proportion of shared allele distance using 20 SSRs. The putative hybrids 1861.003, 1861.001J24, 1865.004 and 1868.004 did not group with the two major species groups: *F. iinumae* and *F. nipponica*. Two *F. iinumae* accessions, PI 551751 and PI 616505 one *F. nipponica* accession, PI 616506 Honshu, Japan were used as outgroups.



Projects in Progress 2007

Characterization of European hazelnut cultivars using SSR markers. MS student, Tufan Gokirmak, in collaboration with Shawn Mehlenbacher and the NCGR geneticist, Nahla Bassil, used twenty-one pairs of SSR primers to investigate genetic diversity in 270 accessions of European hazelnut (*Corylus avellana* L.) representing a wide geographic range. Of the 270

accessions, 198 had unique fingerprints while 72 were duplicates, as suspected based on identical morphology and incompatibility alleles. Cluster analysis revealed geographically tight clusters and several sets of synonyms. The major groups identified were Central European, Black Sea, English and Spanish-Italian. SSR alleles indicated the parentage of 31 accessions, including support of the reported parentage of 'Daria' and 'Imperatrice Eugenie'. The fingerprints were uploaded to GRIN and are available at <http://www.ars-grin.gov/cgi-bin/npgs/crop/evaluation.pl?492825>

SSR fingerprinting panel for identity verification of clones in backup hazelnut collection.

Visiting scientists Mihai Botu used a set of 12 SSRs to fingerprint 29 Parlier trees that exhibited uncharacteristic morphological phenotypes and to compare the resulting profiles to those of the same accessions in the Corvallis collection. Initial results detected 3 mis-identified trees, possibly resulting from suckers arising from below the graft union. However, the majority of the trees were true-to-type.

Genetic fingerprinting and identification of pear.

We have used 10 of the EST-SSRs that we have previously developed to develop genetic profiles for 144 pear accessions and to identify duplicates in the NCGR pear (*Pyrus communis* L.) collection. Nine apple (*Malus domestica* Borkh.) microsatellite markers were used to determine potential genetic relationships of apples and pears grown in Terceira Island in the Azores with standard apples and pears of Portuguese or American descent.

Among the 17 heritage apple genotypes, 7 unique accessions were identified and four groups of synonyms or possibly clones were detected in addition to one homonym pair. One pair of apple clones, 'Reineta Agosto' and 'Reineta Verde' from Altares appear to be derived from an unreduced gamete of 'Golden Delicious'. Another apple genotype 'Maçã Acida' could be a sibling of the 'Maçã Pêra' clonal group. Other tested standard apples from the US genebank were unrelated to Terceira genotypes. Of the seven heritage pears, five unique genotypes and one pair of synonyms were detected.

Genetic fingerprinting of cranberry.

Sixteen out of 46 blueberry (*Vaccinium corymbosum* L) SSRs were found to amplify and generate polymorphic markers in 16 important cranberry (*Vaccinium macrocarpon* Ait.) genotypes. Nine of these blueberry SSR markers were used to fingerprint 43 cranberry accessions making up the core collection at the NCGR, and to evaluate genetic variation of important cultivars growing in Oregon and Vancouver (British Columbia). These markers differentiated between all cranberry varieties except for 'Howes' and 'Pride'. Multiple genotypes or variants were found in five cranberry cultivars ('Stevens', 'Crowley', 'McFarlin', 'Olson's Honkers' and 'Pilgrim') collected from 11 Oregon bogs and in two cultivars ('Bergman' and 'Stevens') collected from Vancouver. Four of these SSR markers were chosen as a fingerprinting set. This small set can be used in two multiplexes and differentiated between the same genotypes that were identified using all 13 SSRs except for 'Franklin' and 'Centennial' which were different at VCC-J5. We recommend using this set of four SSR primer pairs for variety identification.

SSR-based identification of Immediately Quick Frozen (IQF) 'Marion' and 'Kotata' berries. A DNA extraction protocol was developed for frozen and fresh berries. Twenty-six blackberry (*Rubus* hybrid) SSR primer pairs were evaluated for amplification and polymorphism in 'Marion' and 'Kotata'. The ten most polymorphic SSRs were used to identify 'Marion' and 'Kotata' tissues after separation by capillary electrophoresis. The genetic profiles of 'Kotata'

leaves and berry tissue were identical irrespective of the berry's fresh or frozen status. However, the genetic profile of commercially-obtained frozen 'Marion' berries was different from that of leaves and fresh berries of 'Marion'. When DNA was separately extracted from 3 individual berries (receptacle and drupelets) from the IQF 'Marion' berries bag, the genetic profile of two out of the three berries was identical to 'Kotata' while the remaining berry generated a 'Marion' fingerprint, thus indicating that the IQF 'Marion' berries bag contained a mix of 'Kotata' and 'Marion' berries.

Estimating the impact of wide species hybridization in southern highbush blueberry breeding. In collaboration with Patricio Brevis, James Hancock, and James Ballington, 21 single-locus microsatellite markers were used to calculate heterozygosity and proportion of shared alleles distances (D_{sa}) across 68 blueberries (*V. corymbosum*) that consisted of important southern highbush cultivars and their founding clones. Pedigrees of 107 highbush cultivars were also used to calculate tetrasomic inbreeding coefficients (F), pedigree-based genetic distances, and genetic contributions of wild clones to SHB cultivars. The results indicated that the effects of wide hybridization on genetic diversity of cultivated blueberry were lower than previously thought. Pedigree-based genetic distances and SSR-based genetic distances (D_{sa}) were significantly correlated, indicating that microsatellite markers are a reliable tool to assess the genetic relationships among SHB cultivars. The contribution of seven *Vaccinium* species to the current genetic base of 38 important SHB cultivars was also reported in this study.

Tissue Culture and Cryopreservation in 2007

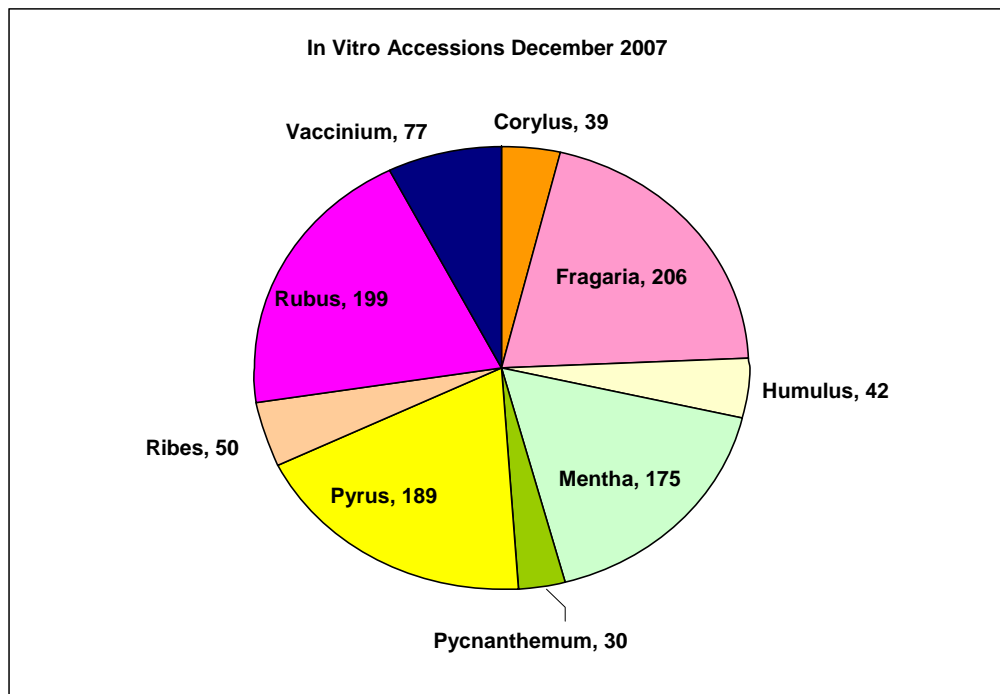
By Barbara M. Reed

Major Accomplishments:

1. Seed sent to the Nordic Gene Bank
2. Regeneration of strawberry seed
3. Determined that the seed of blackberry cultivars can be distinguished by seed anatomy
4. Production of a book of cryopreservation protocols
5. Improvement of *in vitro* cold storage of *Humulus* germplasm

The *In Vitro* collection

The *in vitro* collection is backed up at NCGRP, Ft. Collins, CO. These backup plants are also available for cryopreservation by the team at NCGRP. Janine de Paz left the program in March. Jeanine DeNoma, research technician, took over responsibility for the *in vitro* collections. Jeanine DeNoma, Laura Morrison, and student helper Sonja McMackin collected materials as plants were available. The spring and summer explanting season resulted in 315 accessions successfully initiated into culture and cold stored. Mr. G.P. Rao, scientist at the Rubber Institute of India, visited the lab for 2 months to study *in vitro* culture and germplasm preservation. He also completed a preliminary study on cold storage of rubber scion wood.



Effect of Pseudomonas on explant collection. In order to add to the *in vitro* collection of pears we collect dormant scion wood and force it in the greenhouse. In the past few years pseudomonas infections have damaged the new shoots and made many unusable. This year we added an application of a copper-based fungicide following heat treatment of the dormant wood. This reduced or delayed the pseudomonas infection and aided our collection of uninfected shoots.



Forced pear shoots showing a resistant accession and a pseudomonas infected accession.

Iron effects on *in vitro*-stored plants. After our studies detected a decline in storage length of *Humulus* cultures stored on medium with sequestrene iron, we felt it important to determine the best concentration of iron for growth and storage of our *Humulus* collection. We cultured plants on either 1X MS medium or 1X MS medium with sequestrene for 3 weeks. Shoots from each treatment were stored in tissue culture bags on MS iron at 0, 0.5, 1, 2, 3, 4, and 5 X the normal concentration or on MS iron at 1X with 100 mg/L sequestrene 138 iron. After 8 months of storage, analysis of the plant condition ratings showed a significant interaction of accession, pretreatment, and storage medium. Overall the storage treatments displayed a decline from the least to the most iron. The results indicate that each of the accessions tested should be grown on MS 1X iron for one growth cycle before storage and stored on MS 0.5 or 1X iron medium for the longest duration in cold storage.

Cryopreservation of shoot tips.

Ph.D. candidate Esther Uchendu (studying at Oregon State University on a Ford Foundation Fellowship) completed a study comparing three cryopreservation techniques for the long-term storage of mint. She is also studying the cryopreservation of *Vaccinium* shoot tips. Her study on the effect of antioxidants on cryopreserved *Rubus* shoot tips will determine the effectiveness of including antioxidants at various stages of the cryopreservation protocol.

Visiting scientist Dr. Magfrat Muminova learned cryopreservation techniques and assisted with a study of the effect of polyvinylpyrrolidone pretreatments on cryopreservation of *Rubus* shoot tips.

Barbara Reed completed editing of a book of cryopreservation protocols. *Plant Cryopreservation: A Practical Guide* is a unique resource for plant scientists in many fields. This compilation provides over 100 ready-to-use protocols for plant types from algae and bryophytes to a range of flowering plants. It includes techniques for diverse plant parts such as dormant buds, pollen, and apical meristems, and for cell types such as suspension and callus cultures. Five introductory chapters describe theoretical principles, practical aspects of long-term cryopreserved storage, and details of the main cryopreservation techniques. The remaining 14 chapters are separated by plant type. Each chapter briefly reviews the literature and includes ready-to-use protocols designed for easy transfer into the lab and adaptation to new species.

Germplasm preservation of fruit, berry cultures and grape in Kazakhstan.

Barbara Reed completed a 6 year ISTC grant project working with scientists in Almaty, Kazakhstan developing *in vitro* and cryostorage of fruit crop genetic resources. The project now has a large *in vitro* collection of apples, pears, and cherries and is developing systems for other crops. They have also begun a cryopreserved collection. A Kazakhstan national gene bank is under construction.

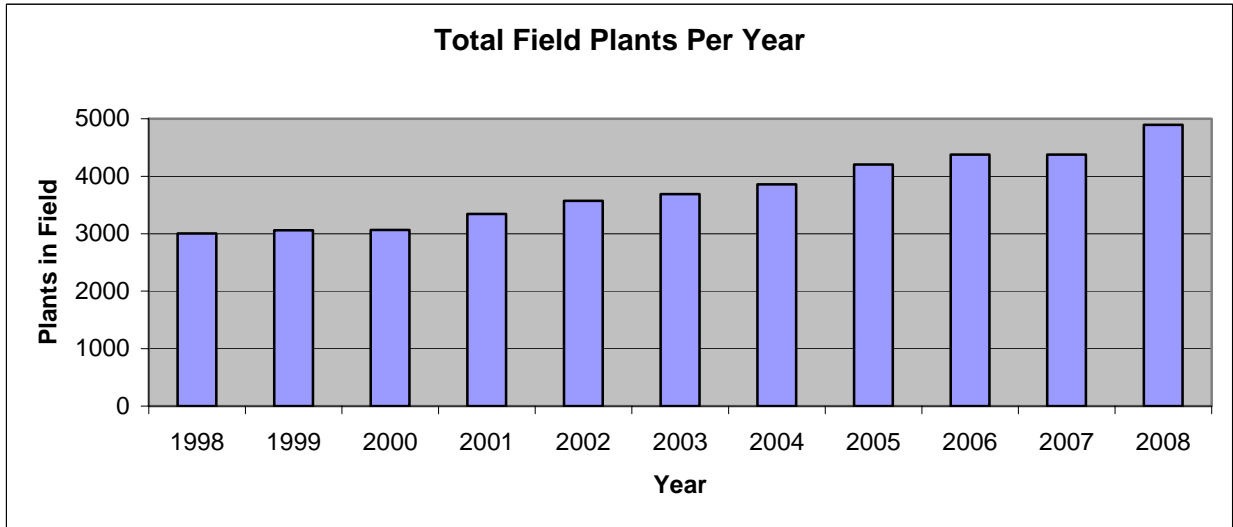


Left: Dr. Svetlana Kushnarenko and technician Timur Turiv work with the cryogenic freezer. Right: Cryogenic laboratory at the Plant Physiology Institute with Dr. Kushnarenko and Dr. Irina Kovalchuk.

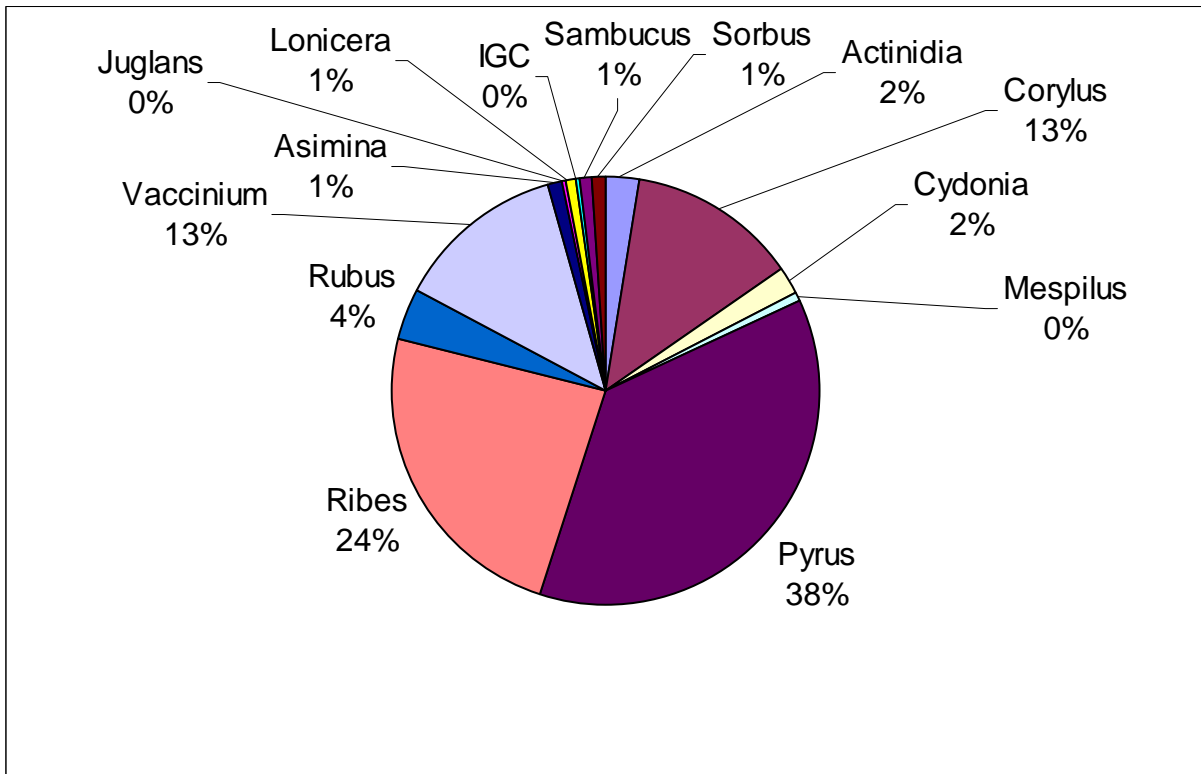
Field Collections and North Farm Management

By Joe Snead and Alicia Leytem

The field plant collections and operation is challenging due to the constant increase of plant inventory and the decreasing amount of field staff. Each of the major and minor field collections, except pears, increased in 2006 and 2007. In 1997 we had 3000 plants in the field; at the end of 2007, 5,000.



Along with the addition of new plants in the field comes the need to increase planting space. Presently we are actively farming 26 acres. This includes some of the expansion land which is currently maintained like crop land.



In addition to plot land, the field crew manages 64 additional acres. This fallow land needs seasonal maintenance otherwise native trees and brush, such as poison oak and blackberries, are quick to take over. The North Farm has > 5,000' of perimeter fencing that requires upkeep along

with about 5,000' of gravel roads. We also have three acres in cover crops being prepared for spring planting in 2008. Most of this land is for collaboration for other scientific programs.

Scientists Collaborating with NCGR on the Farm at 33707 Peoria Road.

Scientist	Project	Acres of land used
Bob Martin, USDA	IR4, HCRL research	1 (screenhouses, greenhouses)
Maxine Thompson, OSU	Honeysuckle research	3.25
Jana Lee, USDA	Root weevil research	0.5
Denny Bruck, USDA	Root weevil research	1.25
John Henning, USDA	Hop breeding collection	1.5
John Henning, USDA	Hop dwarf trellis	1.0
Chad Finn, USDA	Black raspberry research	2.0
Chad Finn, USDA	Blueberries – pollen source	0.25

In 1998 field staff included 2.0 FTE permanent employees aided by one temporary/student position that worked full time in the summer and one work study position. Presently we have 1.0 FTE, 2.2 temporary/student positions. Plans for FY 2009 are to reduce to 1.0 FTE permanent and 0.5 FTE temporary positions.

Our equipment is getting older and in need of more frequent repairs, and we have not had equipment replacement money. We have requested a new air blast sprayer. Our current one is > 25 years old and needs serious repair. During the hazelnut spray season it broke down four times which caused us to miss the window of opportunity to spray on several occasions. Most of our equipment requires the use of diesel or gasoline. Unfortunately, fuel costs continued a steep upward trend in 2007.

Plant Distribution

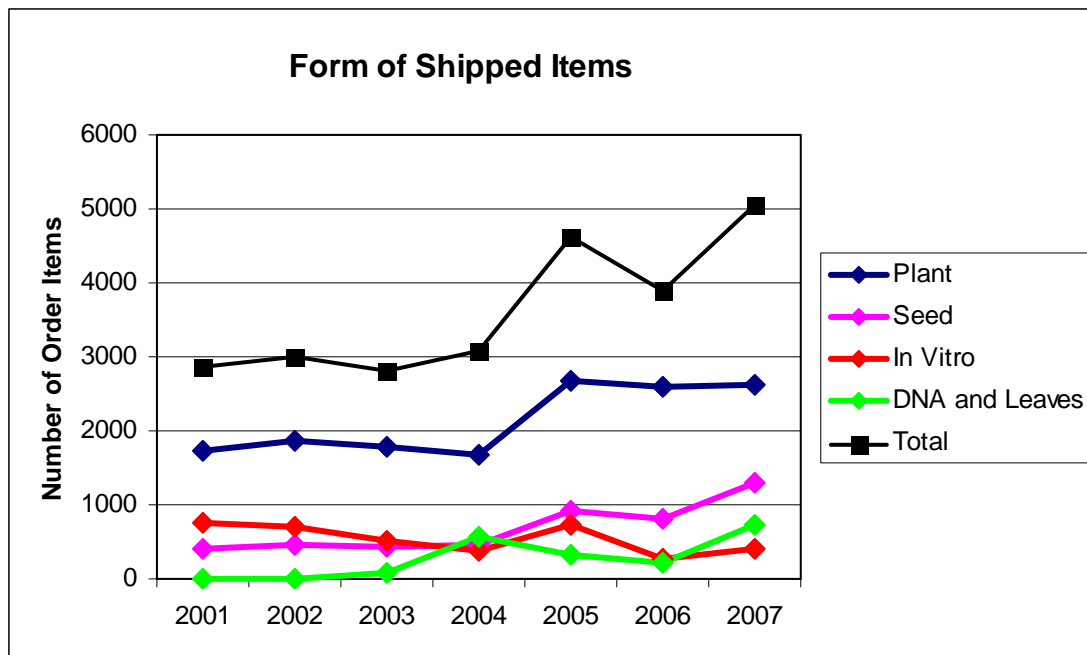
By Bruce R. Bartlett

2007 Highlights

- 5,056 items were shipped as seeds, cuttings, runners, scionwood, rooted plants, tissue culture and DNA.
- 355 tissue cultured accessions were sent to the National Center for Genetic Resources and Preservation (NCGRP) in Ft. Collins, Colorado as backup. This is 94% of all tissue culture accessions shipped to domestic requestors.
- 151 seed accessions were sent to NCGRP as backup. This is 19% of all seed accessions shipped to domestic requestors.
- 324 seed accessions were sent as backup to the World Deep Storage Vault in Norway (Svalbard and Jan Mayen)
- 86% of accessions requested in 2007 have been shipped.
- 26% of all items shipped were sent to foreign requestors.
- Requests for DNA samples of our accessions, in the form of DNA and lyophilized leaves, were 723 or 14% of the total number of accessions shipped.
- Scionwood (23%), Seed (22%) and *In Vitro* (6%) were the top three forms sent to domestic requestors.

- Seed (37%), Leaves (33%) and Hard Cuttings (10%) were the top three forms sent to foreign requestors.

The NCGR-Corvallis continues to distribute plant germplasm within the United States and at the international level. The information supplied in this report reflect all items shipped in CY 2007 which represent some accessions requested from 2000 up to and including 2007. Information is also presented that represents all accessions requested only during CY 2007. At the time of this printing, we have distributed 5,273 items as seeds, cuttings, runners, scionwood, rooted plants, tissue culture and DNA from 2007 requests. This represents 86% of the total number of items requested for 2007. Additional material will be shipped in CY 2008 from 2007 requests. An average of the total number of items shipped over the last seven years show that we ship 91% of the total number of items requested from any given year.



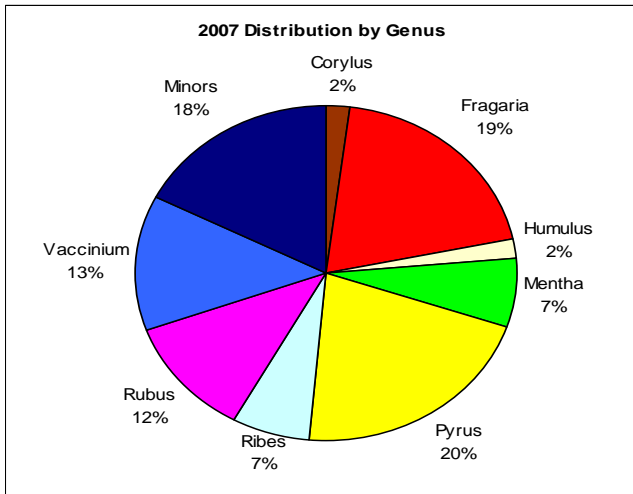
CY 2007 saw an increase in the total number of items shipped to an all time high of 5,056.

Plants and seed still remain the most predominant forms sent.

Material requested in a given year may require more than one year before the item is eventually shipped. This is due to the fact that we have very diverse holdings and are a clonal facility. At times plant material needs to be propagated from our mother plants in order to have items in a form that is sufficient for shipping. This is especially true for international requests. However, an average of 91% of items requested will be shipped within two years of the original request. Three items from 2000 were shipped, one from 2003, one from 2004, nineteen from 2005, 1,344 from 2006 and 3,688 from 2007.

Domestically, plant items from *Pyrus*, *Fragaria* and *Vaccinium* in decreasing order were sent the most. Internationally, the order was *Fragaria*, *Pyrus* and *Rubus*. When considering all items shipped, regardless of destination, the order of the top three genera was *Pyrus*, *Fragaria* and *Vaccinium*. When all plant items from minor genera are considered collectively the group

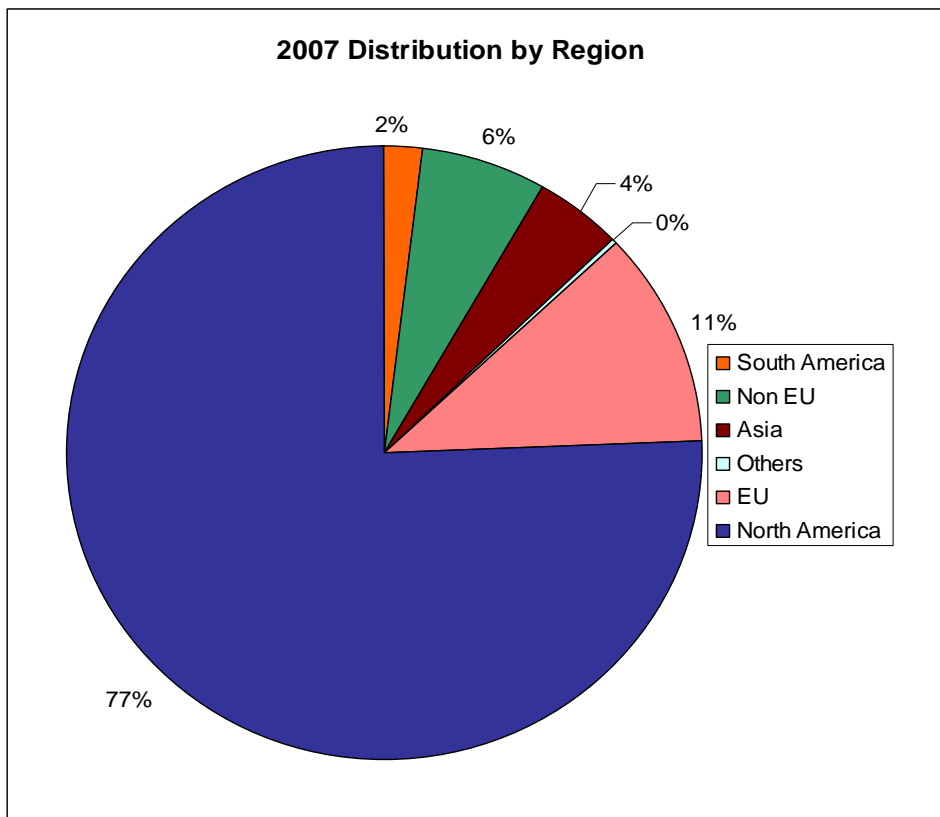
represents 18% of all items shipped. Continued interest in Hardy Kiwi Fruit (*Actinidia arguta*) accounted for 40% of all minor genera sent.

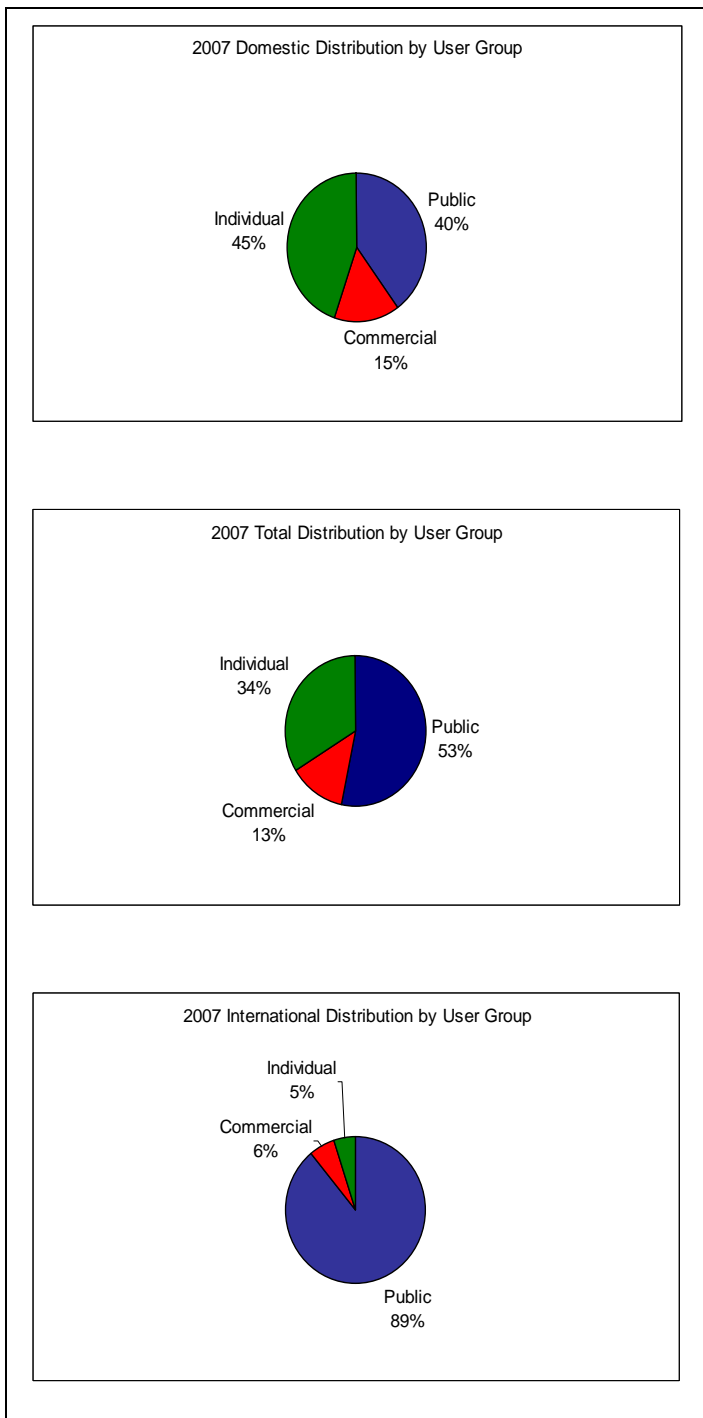


Over the last few years accessions of *Fragaria* and *Rubus* have dropped significantly in numbers sent to European Union (EU) countries. Due to the possibility of harboring viruses *Rubus* seed is prohibited. In addition the EU has increased the list of plant viruses that *Rubus* and *Fragaria* accessions arriving from the United States must be tested free from. Since we primarily test for viruses important for American agriculture, this has resulted in a significant reduction in the number of accessions of *Rubus* and *Fragaria* being sent to the EU. *Fragaria* seed is allowed entry to the EU.

Pyrus shipments to the EU have for some time been limited to seed and tissue culture since scionwood is prohibited due to fire blight (*Erwinia amylovora*). Japan, South Korea, and China have not been as restrictive and therefore reflect the high numbers of *Rubus*, *Fragaria* and *Pyrus* still being sent internationally.

During CY 2007 we shipped plant accessions to 22 countries including the United States.





By region most of the material was sent to North American destinations (77%). Of that total 2% was sent to Canada and Puerto Rico. The EU is represented by Austria, Belgium, Finland, France, Germany, Italy, Netherlands, Slovakia, Slovenia, Spain, and the United Kingdom. Asia is represented by China, Japan and South Korea. The non-EU nation is Norway. The countries of Argentina and Chile represent South America. The 'Others' category of less than 1% collectively represents material sent to Russia and Australia. Three hundred and twenty four seed accessions were sent to the World Deep Storage Vault in Norway (Svalbard and Jan Mayen). This seed represents 67% of all seed sent internationally.

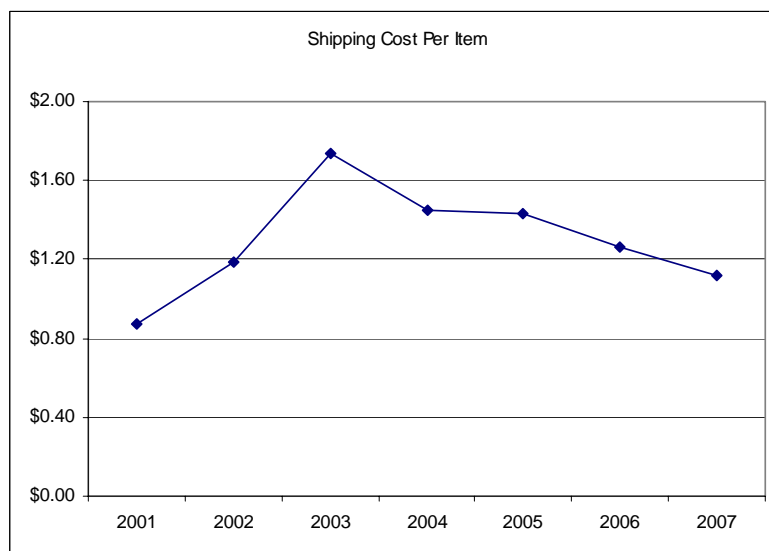
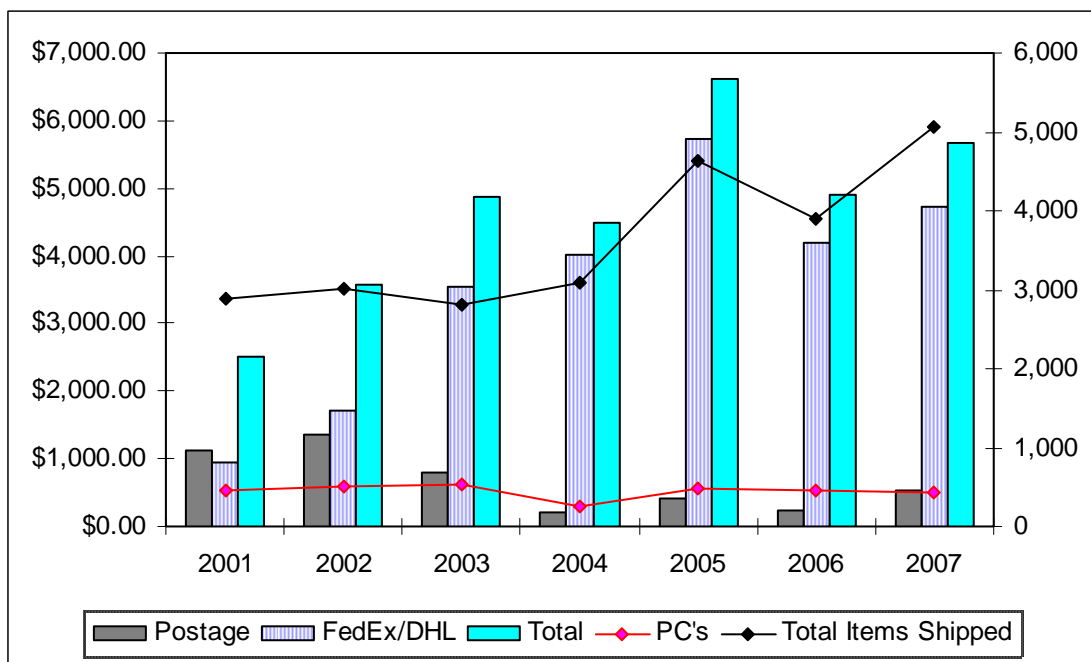
Those organizations or individuals receiving plant material have been identified by the codes established by the Germplasm Resources Information Network (GRIN). These GRIN codes can be condensed into three user groups (Public, Commercial and Individual). Domestically the Public group represents state agencies, universities (public or private), the Agricultural Research Service of USDA, other Federal agencies, and non-profit or other public organizations (botanic gardens, arboretums, societies, centers, institutes).

Internationally the Public group represents similar organizations of foreign origin. The Individual group presents persons with no affiliation and the Commercial group represents commercial companies domestic and international.

Public user groups have received 40% of domestic shipments, 89% of items sent internationally and 53% of total distributions regardless of destination. Commercial user groups received 15% of domestic shipments and 6% internationally and overall 13%. Individuals received 45% of items sent domestically, 5% of material sent internationally and overall 34%.

The most significant change in user groups from 2006 to 2007 was the increase in shipments to individuals domestically from 36% in 2006 to 45% in 2007. This may be attributed in part to the ‘shop-cart’ option on our national GRIN web site.

The total postage paid for domestic and international shipping was \$525.36. The total cost for Federal Express/DHL was \$4,713.38 and the total paid to the Oregon Department of Agriculture for 43 Phytosanitary Certificates was \$435.00. The total cost of shipping plant material in CY 2007 was \$5,673.74. This total is more than the amount spent in 2006 but less than what was spent in 2005. Rising fuel costs continue to increase the shipping rates charged by the postal service and private carriers. We kept the overall costs down somewhat by using cheaper postal service options for sending seed and dormant material. The cost per item sent in CY2007 was less than the previous three years.



We continue to use Federal Express (Priority Overnight) for most domestically shipped items and all plants sent to Canada (International Priority). Since September of 2003, we have been using DHL for all international plant shipments (excluding Canada). DHL has been the only carrier that consistently allows plant shipments to foreign destinations and is used by many facilities within the National Plant Germplasm System. The concern of having plant items arrive at their destination in a timely manner amid increased security precautions precipitated the change to using private carriers for most domestic and all international shipments.

Screenhouse/Greenhouse Collections

By Jim Oliphant and Missy Fix

Major Accomplishments

- Installation and programming of new greenhouse environmental control system.
- Reestablishment of the *Vaccinium* collection in screenhouse.
- Development of greenhouse climate zones for low latitude, high latitude, and high elevation accessions.
- Continued sanitation throughout facilities with an emphasis on weed control, in plant containers, floors inside the houses, and a wide buffer zone outside the houses.

ACTINIDIA

Actinidia is maintained in the screenhouse, as a backup collection; at a minimum the accessions are housed for 3 years until the field plants are established. Currently, we have 40 backup accessions, there were no new accessions added in 2007. Nine accessions have been identified as non-hardy, within this group five are identified as ‘Tropical’ and are being housed in greenhouse 1 which provides the climate needed for these plants. The remaining four accessions have been placed in greenhouse 3 which houses non-hardy genera.

CORYLUS

Temporary backup trees of all new young field trees and virus infected clones of *Corylus* are maintained under screen. Before a new accession can be planted in the field it must be grafted and layered until the scion is on its own roots. Scionwood of core clones is also grafted and maintained in a greenhouse as needed for tissue culture source material. Currently, 120 accessions are being maintained.

FRAGARIA

All clonal accessions of *Fragaria* are maintained under screen. An additional backup set of Supercore is maintained in the greenhouse. We are continuing our 3-year re-propagation cycle using runners.

HUMULUS

All clonal accessions of *Humulus* are maintained in the screenhouse.

MENTHA

All clonal accessions of *Mentha* are maintained under screen. We are continuing our 3-year re-propagation cycle via cuttings.

PYRUS

In an effort to free up screenhouse space, non-hardy *Pyrus* clones were repropagated for field backup as tubes and the screenhouse plants discarded.

RIBES

All core or non-hardy clonal accessions of *Ribes* are maintained under screen. To date, 439 accessions are maintained as part of the permanent collection in screenhouse, of these 218 of the 223 core accessions are established in the screenhouse and another 186 have been identified as non-cold hardy; these non-cold hardy are housed permanently in greenhouse. We received 96 new accessions or replacements which are being established for the collection. 273 finished *Ribes* were either introduced to the permanent screenhouse as new accessions or as replacement plants. Re-propagated accessions will be ready for screenhouse replacement in 2009.

RUBUS

Clonal accessions of *Rubus* are maintained under screen. Accessions from tropical, subtropical, and high latitude habitats are maintained in the greenhouse of which we have 225 accessions. In 2007, we received 38 new or replacement accessions bringing the total number of accessions to 842 of which 269 are core accessions. 139 re-propagated accessions were placed in screenhouse. We also re-propagated *Rubus* of Concern, 13 of these to be removed from the list and placed back into the permanent collection; 8 remain under this listing. In the *Rubus* screenhouse there are an additional 41 accessions represented by one plant; 14 of these were re-propagated this spring while others will be collected later in the season.

VACCINIUM

Our goal is to maintain core, named cultivars, and non-hardy clonal blueberry under screen. Additionally, prostrate accessions, including lingonberry and cranberry are maintained under screen. Due to blueberry shock virus and *Phytophthora ramorum* concerns, we have established the primary collection in the screenhouse. We are growing vigorous stock plants to provide hard wood cuttings for distribution.

Clonal Accessions maintained in the Greenhouses and Screenhouses as of May 2007

	Total # Accessions	Core		Available	
		# Ac.	%	# Ac.	%
Actinidia	35	9	26	32	91
Corylus	120	63	53	91	76
Fragaria	1365	526	39	1299	95
Humulus	260	87	34	246	95
Mentha	458	52	11	450	98
Pycnanthemum	36	19	53	36	100
Pyrus	518	25	5	191	37
Ribes	372	216	58	239	64
Rubus	814	268	33	733	90
Vaccinium	532	225	42	442	83
Other²	156	58	37	76	49
Total	4666	1548	33	3835	82

1) includes: ASI, CYD, GAY, MES, SAM, SOR, and OTHINV

Quarantined Plants

At this time we have 144 accessions in quarantine, including 7 *Fragaria* under a federal departmental permit, 7 *Humulus* under an Oregon Director Exemption, and 100 *Pyrus* provisionally released from Beltsville Quarantine.

Seed Program

During 2007, Jack Peters built raised beds, assembled cages, and regenerated seed of 77 *Fragaria* accessions (resulting in 50 to 5000 seed per accession). We sent 326 seed accessions for the Svalbard Nordic Gene Bank, International Seed Vault and received coverage from the Corvallis Gazette Times, the OSU Daily Barometer, and a KVAL TV, Eugene. There were requests for 950 seed accessions and 110 new accessions were added to the collection. We continued testing viability (81 accessions) and germinating new accessions (27 accessions). The seed lab position ended in February 2007. Processing of incoming seed and preparation of seed for distribution will be continued by other staff members.

Ph.D. candidate Sugae Wada (OSU Horticulture Dept.) completed a study of seed scarification and germination treatments for six species in the genus *Rubus*. Sugae is testing additional dormancy breaking treatments and is determining the effect of seed anatomy on germination. Ms. Wada also determined that *Rubus* cultivars can be distinguished based on seed coat anatomy. Barbara Reed gave two presentations to the Oregon Blackberry and Raspberry Commission about this research and the Oregon Department of Agriculture also expressed interest.



Left: Sugae Wada developing seed germination protocols. Right: *Rubus occidentalis* seeds germinating after sulfuric acid scarification, 1 month warm stratification, 3 month cold stratification and 1 month in the germinator.

Computer/Information Management

By Douglas Cook

GRIN Records

<u>GRIN Records Activity during CY 2007</u>		
<u>GRIN Area</u>	<u>Created</u>	<u>Modified</u>
Accession	3340	758
Inventory	1442	22220
Observation/Voucher	58	0
Pathogen	0	0
Distribution	3583	1118
Cooperator	263	38
Total	8686	24134

This year there were 387 new accessions and other sub-tending data category records added to GRIN (1024 Accession Names, 37 Habitat, 402 Narratives, 2 Pedigree, 5 Quarantine, 823 Source, 631 Source Member and no Vouchers). There were 649 new Inventory items, 793 Inventory Actions and 58 Observations added to GRIN. For Distribution there were 224 Orders, 3060 Order Items, 299 Order Actions and 263 Cooperator records added. Among 107 existing accession records, and other sub-categories, modifications were made during the year (31 Accession Name, 0 Annotated Labels, 54 Habitat, 470 Narratives, 4 Pedigree, 5 Quarantine and 53 Source). There were 11352 Inventory, 10868 Inventory Action, 75 Orders, 1043 Order Items, 38 Cooperator and 0 Pathogen records modified.

Hardware and Infrastructure

All workstations operate with at least a 1.0 MHz CPU, 256 MB of memory and Windows® XP-Pro software. All workstations are equipped with uninterruptible power, anti-virus and the network is firewall protected. A new fileserver backup Networked Hard Drive (NAS) was added to the LAN. Four new workstations were purchased. Numerous minor (and critical) computer software configurations and hardware repairs took place.

Publications

Journal Articles

1. **Hummer, K.** 2007. Development of a Global Crop Conservation Strategy for Strawberries. *Acta Hort.* 760: 49-54.
2. Sabitov, A., P. Cherbukin, and **K. Hummer.** 2007. Plant Exploration for Fruit Genetic Resources in Sakhalin Territory. *Acta Hort* 760: 381-388.
3. **Hummer, K.** and F. Zee. 2007. Evergreen Production of Southern Highbush Blueberries in Hawai'i. *J. Amer. Pom. Soc.* 61(4): 188-195.
4. **Hummer, K.** and Janick, J. 2007. *Rubus* Iconography: Antiquity to the Renaissance. *Acta Hort.* 759:89-106.
5. *Uchendu, E.* and **B.M. Reed.** A Comparative Study of Three Cryopreservation Protocols for Effective Storage of *In Vitro*-Grown Mint (*Mentha spp.*). *CryoLetters.* May/June 2008.
6. Tzanetakis I.E., **J.D. Postman,** R.R. Martin. 2007. First report of Blackberry Chlorotic Ringspot Virus in *Rubus* in the United States. *Plant Disease* 91(4): 463.
7. Tzanetakis, I.E., **J.D. Postman** & R.R. Martin. 2007. Identification, detection and transmission of a new vitivirus from *Mentha*. *Archives of Virology.* 152:2027-2033.

Books and chapters

1. **Hummer, K. E.** 2007. Proceedings of the Second International Symposium on Plant Genetic Resources. Acta Horticulturae No. 760. Vol. 1. ISHS Leuven, Belgium. 368 pp.
2. **Hummer, K. E.** 2007. Proceedings of the Second International Symposium on Plant Genetic Resources. Acta Horticulturae No. 760. Vol. 2. ISHS Leuven, Belgium. 308 pp.
3. **Hummer, K. E.** ed. 2007. Global Conservation Strategy for *Fragaria* (Strawberry). Biodiversity International. Submitted 2 November 2008, 80pp.
4. **Hummer, K. E.**, C. E. Finn, and M. Dossett. Plant Collecting Expedition for Berry Crop Species through Southeastern and Midwestern United States. June and July 2007. USDA-ARS NCGR Station Publication. 127 pp.
5. **Reed, B.M.** (ed.) *Plant Cryopreservation: A Practical Guide*. Springer, New York. 2008.
6. **Postman, J.D.** and E.W. Stover. 2007. Trip Report: Expedition to Georgia and Armenia to Collect Temperate Fruit & Nut Genetic Resources. USDA-ARS-NCGR Station Publication
7. **Reed, B.M.** Cryopreservation - Practical Considerations, pp. 3-14. In: B. Reed (ed.) *Plant Cryopreservation: A Practical Guide*. Springer, New York. 2008.
8. **Reed, B.M.** and E. Uchendu. Controlled Rate Cooling, pp. 77-92. In: B. Reed (ed.) *Plant Cryopreservation: A Practical Guide*. Springer, New York. 2008.
9. **Reed, B.M.** Cryopreservation of Temperate Berry Crops, pp. 333-364. In: B. Reed (ed.) *Plant Cryopreservation: A Practical Guide*. Springer, New York. 2008.
10. Zhao, Y., Wu, Y., Chang, Y. and **Reed, B.M.** Cryopreservation of Fruit and Ornamental Trees, pp. 387-320. In: B. Reed (ed.) *Plant Cryopreservation: A Practical Guide*. Springer, New York. 2008.