ANNUAL REPORT FOR CALENDAR YEAR 2005
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National Clonal Germplasm Repository Staff

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Douglas Cook, Computer Specialist
Jeanine DeNoma, Bio. Sci. Tech., Tissue Culture
Missy Fix, Bio. Sci. Tech., Plants
Kim Hummer, Research Leader/Curator
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Yvonne Pedersen, Secretary
Joseph Postman, Plant Pathologist/Pear Curator
Barbara Reed, Research Plant Physiologist
Joe Snead, Ag. Sci. Tech., Field Manager
Beth Timmons, Ag. Sci. Tech. Field
Dennis Vandeveer, Facilities Manager

Blue honeysuckle (edible) collection at NCGR, March 2006. Selections of *Lonicera caerulea* - left to right: Czech # 17, 'Goluboye,' 'Verentino,' 'Magadan,' 'Sinyaya Ptitsa,' and 'Nina #9.'

Temporary Staff and Students

Hervik Artounian, Wk. Study
Tristan Conway, Bio. Sci. Aid, Tissue Culture
Janine de Paz, Bio. Sci. Tech, Tissue Culture
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Barbara Gilmore, Bio. Sci. Tech, Genetics
Stephanie Halstead, Sat. Academy
Jason Hotchkiss, Bio. Sci. Aid
Ryan Kelso, Field, Wk. Study
Ryan Mahler, Wk. Study
Sonja McMackin, Bio. Sci. Aid, Tissue Culture
Meghan Oakes, Ag. Sci. Aid, Plants
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Tyler Young, Bio. Sci. Aid, Greenhouse

Graduate Students and Visiting Scientists

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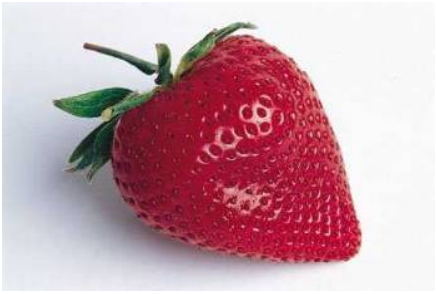
Peter Boches, GRA, Horticulture
Nina Castillo, GRA, Horticulture
Sandhya Gupta. NBPGR, India
Wambui Njuguna, GRA, Horticulture
Jodi Smith, GRA, Horticulture
Esther Uchendo, GRA, Horticulture

Collaborators

Francis J. Lawrence
Maxine Thompson

“The Home of Specialty Crops”



Annual Report for Calendar Year 2005

Table of Contents

National Clonal Germplasm Repository Staff *1*

Table of Contents *2*

Major Accomplishments for 2005 ..... *4*

Service **4**

Research **4**

Administration *5*

Budget and Staffing **5**

Non-base and Extramural Funding **6**

Administrative Overview **6**

View from the Front Office **7**

Facilities and Security **8**

Awards 2005 ..... **9**

Training 2005 ..... **9**

Promotions 2005 ..... **9**

Travel 2005 ..... **10**

Visitors 2005 ..... **11**

Germplasm Collections and Research *11*

New Acquisitions and Status of Collections **11**
New Accessions in 2005: 12

Tissue Culture and Cryopreservation **13**
Staff 13
The In Vitro Collection 13
Analysis of In Vitro-Stored Plants 13
Genetic Stability of Cryopreserved Plants 14
Antioxidant Effects on Cryopreserved Shoot Tips 14
Rubus Cryopreservation Techniques 14
Germplasm Preservation in Kazakhstan 14

Molecular Genetics **15**
Corylus 15
Fragaria 15
Pyrus 15
Vaccinium 16
Rubus 16

Plant Pathology **17**
Virus Indexing 17
Other Plant Pathology 18
Pyrus - Evaluations for disease incidence. 18
Corylus – Eastern Filbert Blight 18

Field Collections **19**
New Research Groups 19
Changes to collections and new additions 19

Plant Distribution **20**

Screenhouse/Greenhouse Collections **23**
Actinidia 23
Corylus 23
Fragaria 23
Humulus 23
Mentha 23
Pyrus 23
Ribes 24
Rubus 24
Vaccinium 24
Clonal Accessions maintained in the Greenhouses and Screenhouses 25
Quarantined Plants 25

Seed Program **26**

Computer/Information Management **27**

Publications 2005 ..... **28**
Journal Articles and Websites 28
Chapters 29
Books 29
Presentations, Abstracts, and Miscellaneous publications 29

Major Accomplishments for 2005

Service

1. The Repository received 145 new accessions during 2005. The total inventory increased by 989, which included new on-site back-up forms for primary inventory items. We loaded 4,401 images to GRIN for *Actinidia*, *Fragaria*, *Rubus*, *Ribes*, *Vaccinium*, *Pyrus* and *Juglans* plants, flowers or fruits.

2. For the third year in a row, Bruce Bartlett, Plant Distribution Manager, broke records for distribution, shipping 4,640 items for 503 requests around the world. This is the largest number of accessions distributed in one year from the Corvallis Repository since establishment in 1981. This germplasm is used by breeders to develop new cultivars, by researchers to discover new genetic traits, by nurseries to expand the selection of plant materials available to the public, and by growers to expand the production of fruit and nut crops to new geographic areas or unusual environments.

3. The Repository hosted two meetings this past year: the 56th annual Western Pest and Disease Conference on 11 and 12 January 2005, at Timberline Lodge, Government Camp, Oregon; and a workshop for clonal curators in the National Plant Germplasm System held at the Corvallis Repository on 2-3 October. More than 40 individuals attended from NPGS gene banks in Brownwood (2 people), Corvallis (17), Davis (5), Hilo (4), Geneva (6), Fort Collins (2), and Riverside (4). We had productive discussions and hands-on technology exchanges on computer and database issues, screenhouse and field collection management, *in vitro* and cryogenic methods, and molecular evaluations. A joint publication of clonal activities to was prepared for submission to HortScience as a result of this meeting.

4. Joseph Postman and his staff evaluated and documented information concerning the pear field collection. A long, rainy spring season resulted in very high fungal disease incidence and provided an opportunity to add useful data to ongoing evaluations for pear leaf scab, fruit scab and Fabraea leaf spot. A large number of accessions were identified as either highly resistant or highly susceptible to these diseases. In September and October, more than 1000 fruit photographs were taken and loaded to GRIN as image vouchers.

5. The tissue culture lab provided *in vitro* materials for core collection cryopreservation to NCGRP - Ft. Collins. These materials will provide a cryogenic backup for our collections. At present the mint core is cryostored as are parts of the *Pyrus*, *Ribes, Humulus, Fragaria*, and *Rubus* core collections. We are collaborating with NCGRP on the cryostorage of these collections.

Research

1. Barbara Reed and graduate student Hailu Aynalem developed a computer analysis technique to screen *in vitro*-stored cultures. The results correlated well with our standard visual screening method but the procedure is not practical for direct use at this time. Dr. Reed and visiting scientist Dr. Sandhya Gupta optimized vitrification and encapsulation cryopreservation protocols for several accessions of *Rubus.* These protocols, in addition to the slow-cooling protocol already in place, provide several options for cryostorage of the *Rubus* collection.

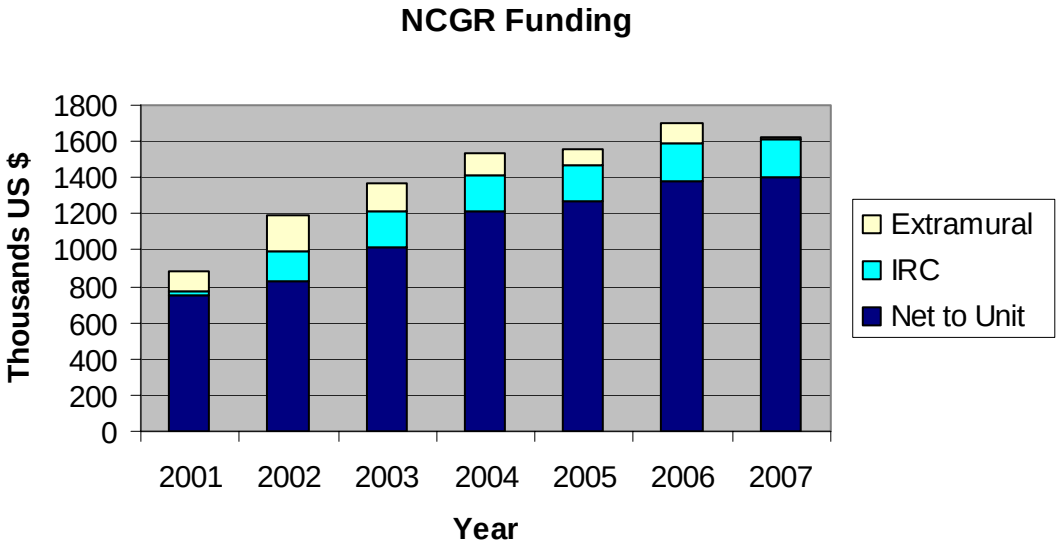
2. Nahla Bassil and her laboratory team developed 51 additional EST-SSR markers in *Fragaria*: 37 from 'Strawberry Festival', in collaboration with Kevin Folta and Kim Lewers, and 14 from 'Yellow Wonder' in collaboration with Janet Slovin. In blueberry, Nahla Bassil and Peter Boches, her graduate student, developed SSR fingerprints for 69 important blueberry cultivars using 31 SSR loci, and uploaded the results for 54 cultivars using 25 SSRs to GRIN at http://www.ars-grin.gov/cgibin/npgs/html/eval.pl?492824

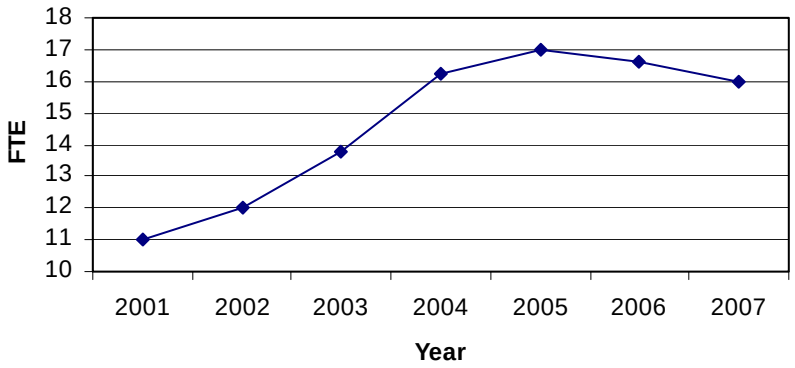
3. Kim Hummer and Nahla Bassil collaborated with Ing. Jose Mota, Isabel Arnas and other scientists in the Azores, under an Azores Cooperative Development Grant. Samples of unknown apple and pear cultivars growing in the Azores were sent for molecular marker analysis to compare to known, standard Portuguese and American cultivars. The Repository laboratory identified eight sets of synonyms in 18 apple and 9 pear genotypes grown in the Azores using 11 microsatellite markers from both genera.

4. Joseph Postman, in collaboration with Nahla Bassil, implemented phytoplasma testing protocols for repository genera. They evaluated two sets of primers for nested PCR and examined suspected phytoplasma infected clones in 4 genera (*Corylus, Fragaria, Pyrus, Vaccinium*) to verify their usefulness as positive controls. They conducted trials for appropriate sampling date, best tissue to extract, effectiveness of universal primers. Assayed all super-core strawberries (48 clones). The universal primers P1/P7 for initial PCR and R16F2n/R16R2 for the nested reaction worked well for all samples except *Vaccinium*. They obtained very good results with appropriate size bands for positive controls (hazelnut stunt, strawberry multiplier, strawberry green petal, strawberry fruit phylloidy, pear decline, cranberry falseblossom). Sampling dates after mid-September were best. Leaf petioles were the tissue of choice. Nearly half of our super-core strawberries tested positive for phytoplasmas. The testing results will now allow us to distribute some of the strawberry collection to countries in the European Union.

Administration

Budget and Staffing at the NCGR Corvallis





(Note: amounts for 2006 and 2007 are projected.)

Non-base and Extramural Funding for the USDA-ARS NCGR - FY 2005

10,000	Pear/Apple identification Azores – Nahla Bassil/Kim Hummer	DOD/OICD
2,700	Summer ASE Student – Barbara Reed	Portland State University
8,000	Kiwifruit flowering evaluation Kim Hummer in collaboration with Bernadine Strik	NW Center for Small Fruit
18,000	Pear evaluation SSR Markers Nahla Bassil collaboration with Joseph Postman	NPS Germplasm Evaluation Grant
17,000	Blueberry Evaluation – SSR - Nahla Bassil	NW Center for Small Fruit
15,000	Former Soviet Union Science Cooperative program for using former weapons scientists – Barbara Reed	ARS-OIRP
3,000	Travel grant for presentation in Argentina Kim Hummer	RED BIOS, Argentina
3,500	Travel grant for Azores Technical Review Kim Hummer	DOD/OICD
77,200	Total	

Administrative Overview

Staffing Changes

Our total staffing FTE increased slightly during CY 2005 over CY 2004. We had two permanent technical staff changes during CY 2005. We hired Beth Timmons, Agricultural Research Technician to work in the field. She replaced the position formerly held by Raymond Gekosky. Beth was recruited through a Student Cooperative Education Position (SCEP) initiated by the U. S. National Resource Conservation Service. We hired Jeanine DeNoma in the tissue culture/cryogenics Biological Science Research Technician position formerly held by Carolyn Paynter. Janine de Paz was selected for a term position in the tissue culture laboratory. Jason Hotchkiss, Meghan Oakes, and Bruce Bartlett were promoted.

Budget and Fiscal

Once again the Presidential budget proposed a cut of about 20% for our unit base funds that would eliminate our molecular marker identification program (Congressional add-on in FY 2002.) We are hoping, as has happened in each of the past 4 years, that these funds will be

reinstated by congress when the budget is passed for next year. With potential pay act increases and plans for a flat-line or decreasing budget over the next year, we anticipate the need to reduce student or part-time positions to keep within the suggested percent salary to operating budget ratio. Our scientists continue to seek extramural funding for technical assistants, graduate students and additional research projects.

View from the Front Office

Rainy! We have had an excellent crop of rain this past winter. We had one flood day (19 January 2005) when the Willamette River closed Route 34 near the bridge to Corvallis, and overlapped Peoria Road by the North Farm. Spring started early but has been delayed by cooler weather. Requestors, particularly in Eastern North America, seem to be constantly surprised that our dormant season ends 15 February because buds have broken. This year was no exception.

Our staff is working diligently to organize and prepare the primary genetic resource collections for improved efficient permanent routine maintenance. Our screenhouse berry plants are on rotational re-propagation schedules to maintain vigor, plant health, and confirm identity. Plants were regrouped according to disease pressure and treatment needs. The orchards of minor fruit trees were rearranged for improved plant spacing and organization. Our staff realizes the need for long term views for successful plant maintenance. Our tissue culture collections continue to test for internal contaminants and provide clean *in vitro* plantlets to requestors.

We continue to add additional pathogen testing procedures on our foundation genetic resources as new pathogens and their testing protocols are developed. Despite the additional requirements and phytosanitary certification challenges, the trend for the past year has been increased numbers of plant distributions to an ever increasing number of requestors.

EEO/CR/Outreach

Tyler Young, Bio. Sci. Aid, and Yvonne Pedersen, Secretary, prepare the time sheet.

The unit's federal permanent and term staff totals 17.0 FTE. During FY 2005 we had 9 women (53%), 1 individual of Hispanic extraction, 1 individual of Lebanese extraction, and 3 individuals with disabilities. We have three female incumbents in our four SY positions. Our temporary/student staff was composed of 42% female 10% Hispanic and 25% Asian employees. Our seven graduate students in training include 1 of Ethiopian extraction, 1 of Kenyan extraction, 1 of Nigeria extraction, 5 females, and 1 white male. This past year we trained a number of challenged people including an individual with multiple sclerosis, individuals with learning disabilities, and more than 15 physically or mentally challenged high school students. The unit continues to actively recruit from multi-cultural associations such as the Minority Education and the Native American Education Departments in Western Universities. We are actively working with private, Oregon State Vocational Rehabilitation and high school programs in recruitment, hiring and training of disabled individuals. We train graduate, undergraduate, and high school interns through collaborative programs at Oregon State University and local high school apprenticeship programs. Our scientists regularly participate as advisors at state, local, and graduate student science fair competitions.

Facilities and Security

Kim Hummer and Dennis Vandeveer

The big push in facilities improvements this past year has been the initiation of the "Green" movement. Many of our facilities repairs and improvements could be classified as improving our environment, using less energy and running our facilities more efficiently. We installed upgrades for environmental greenhouse control switching from wireless to hardwired system. We repaired and upgraded numerous light fixtures to electronic tubes and ballasts for energy conservation. One important "green" item that we began researching is: solar energy to supply hot water for our main heating unit or hot water supply for the main building and head house area. If solar panels could be installed this would augment or replace the existing gas fired system and save energy costs besides reducing environmental costs. We found that the expense of installing a solar hot water unit was within our means, so we will pursue that in FY 2006. With the excellent program that is offered in Oregon, we continued extensive recycling for co-mingle, cardboard, metal, hazardous waste, batteries, fluorescent tubes, antifreeze and used engine, transmission and hydraulic oil. We also recycle all of our oil filters.

Securities issues are still looming large in the federal facilities workplaces. We performed the annual fire alarm and burglar alarm testing and certification for systems at the main complex and the north farm. We trained new employees in the operation of our security system. We cleared excess codes from security system memories and checked-in returned keys and card-keys from former employees. We performed the annual fire extinguisher inspection and service and had practice fire alarms. We performed the annual load testing on the main 180 KW back-up generator and kept it in proper working condition. In addition we serviced both the main 180 KW and the portable 8 KW generators. We connected the AED (defibrillator) at North farm to our private security company's automatic paramedic alert system.

We remodeled the interior of the headhouse, repainted, rewired, and installed improved lighting and phone. We also improved the air changing, conditioning capacity in our seed laboratory and group office. We installed new benches in the genetics laboratory and new counter in the headhouse.

We had several main facilities repairs over the course of the year. The main HVAC system blower assembly failed and had to be replaced. Each of the 16 swamp coolers on our greenhouses were repaired by replacing pads, numerous pumps and blower motors. We replaced the sewer lift station pump and had the system cleaned. We installed a spin filter on the main water system to trap sand from our main building complex well.

Regular preventative maintenance was performed on vehicles, tractors and small equipment. Small engines were repaired and serviced. Numerous flat tires, batteries, starters and other mechanical difficulties were addressed in vehicles, tractors and field equipment. Located replacement valves for the programmable cryo freezer.

We had flooding in mid-January 2006. While much of our field collections were flooded, the water did not approach the buildings and they are in good shape.

Awards 2005

Compiled by: Yvonne Pedersen

Barbara Reed – Received an ARS PWA EEO award for outstanding effort in mentorship and training of students to encourage pursuit in scientific careers. January 2005.

Barbara Gilmore – Spot Award for showing initiative and great dedication by repeatedly working overtime to ensure that her supervisor meets a Dec. 15 manuscript submission deadline; awarded December, 2005.

Joseph Postman - Performance Bonus Award for highly superior performance testing of NCGR collections, in *Pyrus* evaluation, research reporting, and technology transfer during 2005; awarded January 2006.

Nahla Bassil - Performance Bonus Award for superior performance in molecular analysis of NCGR collections, in research planning and research reporting during 2005; awarded January 2006.

Barbara Reed – Selected as an Associate Editor for Plant Cell Tissue and Organ Culture for 2006-2008. She is currently an Associate Editor for *In Vitro* Cellular and Developmental Biology – Plant.

Training 2005

Compiled by: Yvonne Pedersen

Jim Oliphant, Missy Fix, Bruce Bartlett and Joe Snead – Eugene, Oregon to attend the PNW Integrated Pest Management Short Course; February 2005.

Beth Timmons – Pesticide Applicator Training at Chemeketa Community College; December 2005.

All employees completed the AgLearn training of Security Awareness and the Ethics Training; by September 2005.

New permanent employees took full First Aid/CPR course and 40% took the CPR/AED refresher course; June 2005.

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

Promotions 2005

- Jason Hotchkiss from GS-1 to GS-2, effective June 1005.
- Meghan Oakes from GS-2 to GS-4, effective October 2005.
- Bruce Bartlett from GS-8 to GS-9, effective October 2005.

Travel 2005

Compiled by: Yvonne Pedersen

Nahla Bassil – Boise, Idaho, for the Northwest Center for Small Fruits Research Conference; December 2004.
Kim Hummer – Boise, Idaho, for the Northwest Center for Small Fruits Research Conference; December 2004.
Kim Hummer – Ponta Delgada, Azores, Portugal, to give presentation and advise the Technical Working Group of the ACIP (Azores Cooperative Initiatives Program); December 2004.
Kim Hummer and Joseph Postman – Timberline, Oregon, to attend the 56th Annual Small Fruit Pest Conference; January 2005.
Nahla Bassil – San Diego, California, to attend the Plant & Animal Genome XIII Conference; January 2005.
Kim Hummer and Jodi Smith – Gleneden Beach, Oregon, to attend the 2005 HRC (Hop Research Council) Winter Meeting; January 2005.
Joseph Postman – Las Vegas, Nevada, to attend and give presentation at the Mint Industry Research Council Meeting; January 2005.
Kim Hummer – Bodega Bay, California, to attend the 37th Annual Walnut Research Conference; January 2005.
Jim Oliphant, Missy Fix, Bruce Bartlett, and Joe Snead – Eugene, Oregon, to attend the Pacific Northwest Integrated Pest Management Short Course; February 2005.
Joseph Postman – Beltsville, Maryland, to attend the PGOC GIS Committee; March and April 2005.
Kim Hummer – Albany, California, to attend Workforce Diversity Committee meeting; May 2005.
Barbara Reed – Phoenix, Arizona, invited to attend and participate as a judge at the Intel ISEF, science fair; May 2005.
Nahla Bassil – Raleigh, North Carolina, North Carolina State University, to attend the Summer Institute in Statistical Genetics; May 2005.
Kim Hummer – Albany, California, to attend the ARMP budget meeting; June 2005.
Barbara Reed – Baltimore, Maryland, to attend the SIVB (Society for *In Vitro* Biology) meeting and present poster; June 2005.
Jack Peters, Peter Boches, and Joseph Postman– Pullman, Washington, to attend the PGOC (Plant Germplasm Operations Committee) meeting; June 2005.
Joseph Postman – Bozeman, Montana, to attend the W-6 Technical Advisory Committee meeting; June 2005.
Kim Hummer – Buenos Aires, Argentina, invited to give presentation and participate in the FAO (Food and Agriculture Organization of the United Nations); June 2005.
Kim Hummer – Beltsville, Maryland, to attend the annual meeting of the Woody Landscape Plant Crop Germplasm Committee; July 2005.
Barbara Reed, Kim Hummer, and Jodi Smith – Las Vegas, Nevada, to give presentations at the ASHS meeting; July 2005.
Kim Hummer – Yakima, Washington, to attend the HRC (Hop Research Council) meeting; August 2005.
Joseph Postman – Santa Cruz, California, to attend the California Rare Fruit Growers and the North American Fruit Explorers Meeting; September 2005.
Barbara Reed – York, England, to give presentation at the Society for Low Temperature Biology Meeting and then to Almaty and Astana, Kazakhstan, to review the Preservation of Germplasm of Fruit and Berry Crops in Kazakhstan project; and a one day visit at the Millennium Seed

Bank, Kew Gardens, Wakehurst Place and discussed seed research with Dr. Hugh Pritchard, head of seed research. September 2005.
Barbara Reed – Barbara Reed presented a talk and a poster at the International *Rubus-Ribes* Symposium, Pucon, Chile.

Visitors 2005

by: Yvonne Pedersen

During Calendar Year 2005, 573 people came through the Repository's doors. Guests arrived in large or small groups, or as individuals. The Repository hosted the first Clonal Managers Workshop welcoming 38 participants from seven various clonal gene banks.

Some groups used the Repository for their annual meetings such as the Oregon Hop Council, the Oregon Sweet Cherry Commission, and the Oregon Processed Vegetable Committee. Educational tours ranging from groups of 8 to 18 came from Oregon State University, Alsea High School, Philomath School District, Corvallis School District, 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: 3 from the United Kingdom, 2 from Japan, 2 from New Zealand, 1 from Turkey, 1 from Russia, 3 from Korea, 5 from Canada, 1 from Australia, and 1 from India. Also, there were graduate students working at the National Clonal Germplasm Repository from India, Ethiopia, Nigeria, Korea, and the Philippines.

Germplasm Collections and Research

New Acquisitions and Status of Collections

By Joseph Postman

New Accessions during calendar year 2005. Collection summaries by maintenance location.

	2005 Acquisitions [a]		Total NCGR Accessions [b]				
Genus	**Seedlots**	**Plants**	**Seed**	**Screenhouse**	**Field**	**in vitro**	**DNA** [e]
Actinidia	15 [c]	29	22	98	86	0	0
Asimina	0	11	6	15	53	5	0
Corylus	4	31	0 [d]	122	574	29	246
Cydonia	0	7	13	90	95	0	80
Fragaria	2	14	365	1343	0	186	215
Humulus	3	37	270	261	0	53	57
Juglans	0	26	0 [d]	2	23	0	0
Mentha	0	10	53	448	0	191	0
Pycnanthemum	0	5	64	37	0	26	0
Pyrus	0	80	318	414	1760	190	290
Ribes	1	95	475	496	687	47	0
Rubus	2	24	1122	788	73	151	139
Sambucus	1	14	115	7	43	0	0
Sorbus	0	0	161	7	66	0	0
Vaccinium	3	81	748	520	340	70	116
Total	**31**	**464**	**3056**	**4648**	**3800**	**948**	**1143**

a - Plant acquisitions includes clones as well as seedlings.
b - "Accession" as used here refers to number of unique inventory numbers, not accession numbers. In the field or screenhouse an inventory number may be represented by 2 plants.
c - All *Actinidia* seed received in 2005 was non viable and was not added to collection
d - *Corylus* and *Juglans* seed is recalcitrant. All seed are germinated and not stored.
e - All DNA is from 2005 extractions.

New Accessions 2005:

Actinidia - Cuttings of 29 clonal accessions were received representing very unusual species of *Actinidia* including *A. chrysantha, A. eriantha, A. fulvicoma, A. glaucophylla, A. hemsleyana, A. indochinensis, A. lanceolata, A. latifolia, A. melanandra,* and *A. setosa*. Most of these cuttings are now established in the greenhouse.

Fragaria - New plant accessions include seedlings of *F. nilgerrensis* from Yunnan, China, and seedlings from 3 wild hexaploid strawberry populations that were collected by Andrey Sabitov in Sakhalin, Russia. New seedlots include 2 samples of alpine strawberry *F. vesca f. semperflorens* that are inbred lines for a yellow mutation.

Corylus – Inventory added in 2005 includes 28 *C. avellana* and *C. colurna* seedlings from seedlots wild-collected in Armenia and Republic of Georgia, several *C. americana* seedlings from Illinois, and a clone of *C. avellana* from Philadelphia's Morris Arboretum that is reputedly resistant to Eastern Filbert Blight.

Cydonia & Chaenomeles – The 7 plants added in 2005 include 5 seedlings of wild *C. oblonga* from Republic of Georgia, a quince cultivar from Iran and another from Ukraine. Four *Chaenomeles* cultivars were obtained to supplement our quince collection with fruiting types of this related genus.

Mespilus – Two medlar seedlots received in 2005 were collected in the wild by a collaborator in Republic of Georgia.

Pyrus – Thirteen clones were provisionally released to the Repository from the national quarantine program in Beltsville including selections from China, India, Pakistan and Russia. Seedling populations were generated from seedlots not represented by trees, or from seedlots with very low seed numbers. These include rare samples of *P. regelii* from Kazahkstan, *P. salicifolia* from Republic of Georgia, and *P. syriaca* from Armenia.

Ribes - New plant accessions include seedling populations of *R. dikuscha, R. fontaneum* from the Russian far east, 3 Russian black currant cultivars, a selection of *R. thacherianum* (gooseberry) from California's Santa Cruz Island, seedlings of *R. wolfii* from Colorado, and seedlings of *R. hudsonianum* from Oregon.

Rubus – Seed of *R. mesogaeus* was received from Japan. Seedlings were generated of *R. cockburnianus* and *R. innominatus* from NCGR seed accessions. Six superior selections of native *R. ursinus* from the Pacific Northwest were received from Chad Finn.

Sambucus - Fourteen elderberry cultivars and selections were propagated from Chad Finn's replicated evaluation planting in Corvallis in anticipation of the future removal of his plot.

Vaccinium - A large number of *Vaccinium* plants were added in 2005 including 24 cranberries from southern Oregon, and 13 lingonberry cultivars mostly of Swedish origin. Other notable additions were *V. oxycoccos* and *V. membranaceum* from Idaho, *V. myrtillus* from Oregon, *V. darrowii* selection 'Native Blue', and a plant of the species *V. exul* from South Africa.

Tissue Culture and Cryopreservation

By Barbara Reed

Staff

Ms. Jeanine DeNoma was hired as a Biological Science Technician for the tissue culture and cryopreservation program in March 2005. Jeanine comes to us with a MS in Crop Science from OSU and varied experience in plant sciences including genetics, plant breeding, tissue culture, and cryopreservation. Jeanine has primary responsibility for *in vitro* and cryopreservation research projects. She joins Biological Science Technician Janine de Paz who is charged with caring for the *in vitro* collections.

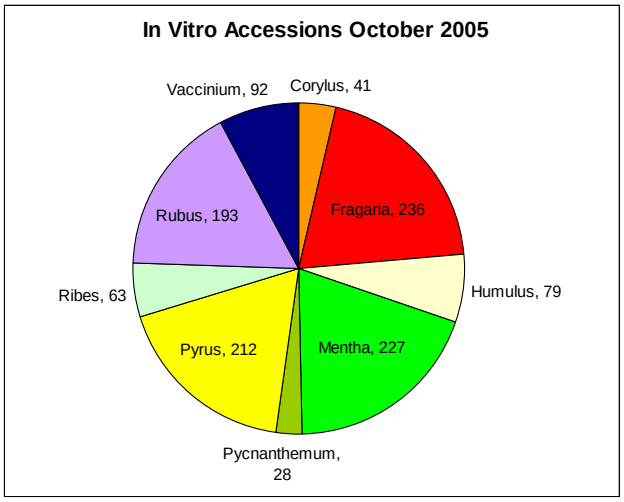
Jeanine DeNoma

Projects in progress 2005

The In Vitro Collection

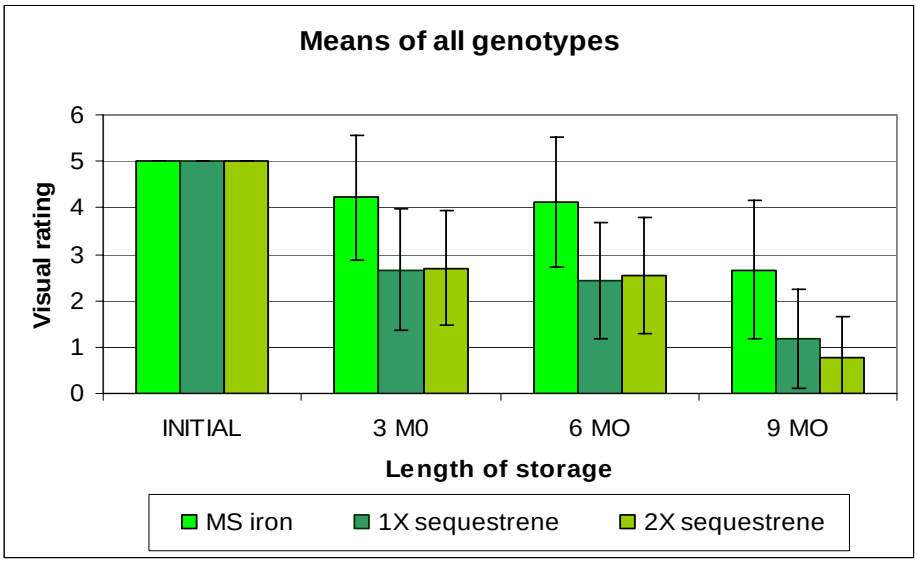
The spring and summer explanting season resulted in 447 accessions successfully initiated into culture. Janine de Paz and student helpers Sonja McMackin, Kayly Lembke, and Stephanie Halstead collected and recollected as plants were available. These plants include designated core accessions and plants that were requested but not available *in vitro*. The initiation process includes two contaminant detection steps that help to limit the number of cultures with bacterial or fungal infections.

Analysis of In Vitro-Stored Plants



"Nondestructive Evaluation of *In Vitro*–Stored Plants: A Comparison of Visual and Image Analysis Systems" was the MS thesis of Mr. Hailu Aynalem completed in March, 2005. The study was initiated to develop imaging techniques to evaluate the health condition of *in vitro Pyrus* plantlets while they were in cold storage and to compare the results with our standard visual evaluation. This included visual analysis on a 5 point scale; digital photography and computer analysis of plant color; and comparison of the techniques. Several image analysis factors correlated well with the visual rating system in both studies, but the digital system will require more research before it is practical to use. This analysis showed that the present visual evaluation was easier than and as accurate as the image analysis system at this point.

A similar study was initiated to characterize the response of diverse *Humulus* genotypes to the iron formulation used in the culture medium during storage. The decline in plantlet health was much greater for several genotypes stored on medium with sequestrene iron than those on MS iron.



Eight hops (*Humulus lupulus*) cultivars stored at 4ºC for 9 months on NCGR-HUM medium with EDTA chelated iron (MS iron) alone or MS iron with 100 mg (1X) or 200 mg (2X) of EDDHA chelated iron (sequestrene 138) added per L compared with the 0 month control. Rating of 5 is for dark green, rating of 2 is for yellow/tan shoots.

Genetic Stability of Cryopreserved Plants

MS student Nina Castillo (Fulbright Fellowship) is studying the genetic fidelity of cryostored *Rubus* meristems and will do some additional genetic studies on *Rubus* in cooperation with Dr. Bassil. This study will look at the genetic stability of *Rubus* shoot tips following long-term storage (14 years) in liquid nitrogen. She is comparing traditionally propagated plants with micropropagated shoots and meristems stored in liquid nitrogen and to provide information on any genetic instability induced by these processes. If genetic variability appears at a particular step for several accessions it will provide insight into procedures that destabilize DNA during the culture or storage processes. Ms. Castillo will complete her degree this summer.

Antioxidant Effects on Cryopreserved Shoot Tips

Ph.D. student Esther Uchendu (Ford Foundation Fellowship) is studying the effect of antioxidants on cryopreserved shoot tips. This study will determine the effectiveness of including antioxidants at various stages of the cryopreservation protocol. Esther will also develop improved cryopreservation protocols for *Mentha* and *Vaccinium* accessions. Esther and Jeanine DeNoma are also involved in a study of the effects of iron on cryopreservation of *Rubus* shoot tips.

Rubus Cryopreservation Techniques

Visiting scientist Dr. Sandhya Gupta, National Bureau of Plant Genetic Resources, New Delhi, India completed a one year study comparing PVS2 vitrification and encapsulation-dehydration techniques for cryopreservation of a range of *Rubus* germplasm. Dr. Gupta optimized the techniques for several *Rubus* accessions and completed some preliminary studies of the techniques with *Fragaria* accessions.

Germplasm Preservation in Kazakhstan

Barbara Reed is continuing to work 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 and cherries and is developing systems for other crops. Cryopreservation of *Ribes* and Malus germplasm was very successful and work with Prunus is now underway. Exchange of genetic resources is part of the project and apricot seeds of selected wild plants were provided to the Davis Repository.

Molecular Genetics

By Nahla Bassil

Laboratory technician Barb Gilmore is extracting and quantitating DNA in 96-well plates mostly during the spring season. The Beckman CEQ 8000 genetic analyzer is used for sequencing and fragment analysis. Adrienne Oda, a student intern, used six apple and five pear apple and primers to determine genetic relationships among 18 apple and 9 heritage European pear cultivars grown in the Azores, Portugal. Wambui Njuguna, a new PhD student, is screening microsatellite markers for usefulness across the *Fragaria* genus. Nina Flores, MS student, is developing microsatellite markers in *Rubus* and using them to fingerprint 48 accessions of raspberry and 48 blackberry genotypes. We continue to develop and evaluate molecular markers, mostly microsatellites in order to generate reliable molecular markers for various uses in different genera which include:

Corylus

We collaborated with M.S. student Tufan Gokirmak and Dr. Shawn Mehlenbacher on creating molecular fingerprints for 274 cultivars of hazelnut using 20 microsatellite markers. Molecular descriptors for these Simple Sequence Repeats (SSRs) were created and we are working on uploading the fingerprints to GRIN. We are using 16 trinucleotide SSR markers to fingerprint 168 *Corylus* accessions including five shrub species (*C. avellana, C. americana, C. cornuta, C. heterophylla,* and *C. sieboldiana*), and five tree species *C. colurna, C. jacquemontii, C. chinensis, C. ferox* and *C. papyraceae*). Thirty SSR markers were added to the hazelnut linkage map. We continue to collaborate with Dr. Shawn Mehlenbacher and Dr. Roberto Botta on developing additional microsatellite loci to saturate the hazelnut linkage map.

Fragaria

In strawberry, we have developed 37 EST-SSR markers from 'Strawberry Festival' (in collaboration with Kevin Folta and Kim Lewers) and 14 EST-SSR markers from 'Yellow Wonder' (in collaboration with Janet Slovin). These fifty-one SSRs were screened for cross-transference to 13 species of *Fragaria* including diploid, tetraploid, hexaploid and octoploid representatives. New PhD student Wambui Njuguna is identifying a microsatellite marker panel to study the diversity and structure of a population of *F. iinumae* and *F. nipponica* collected in Hokkaido (in collaboration with Kim Hummer and Tom Davis).

Some of these microsatellite markers were placed on a reference diploid linkage map of strawberry (in collaboration with Dr. Dan Sargent).

Pyrus

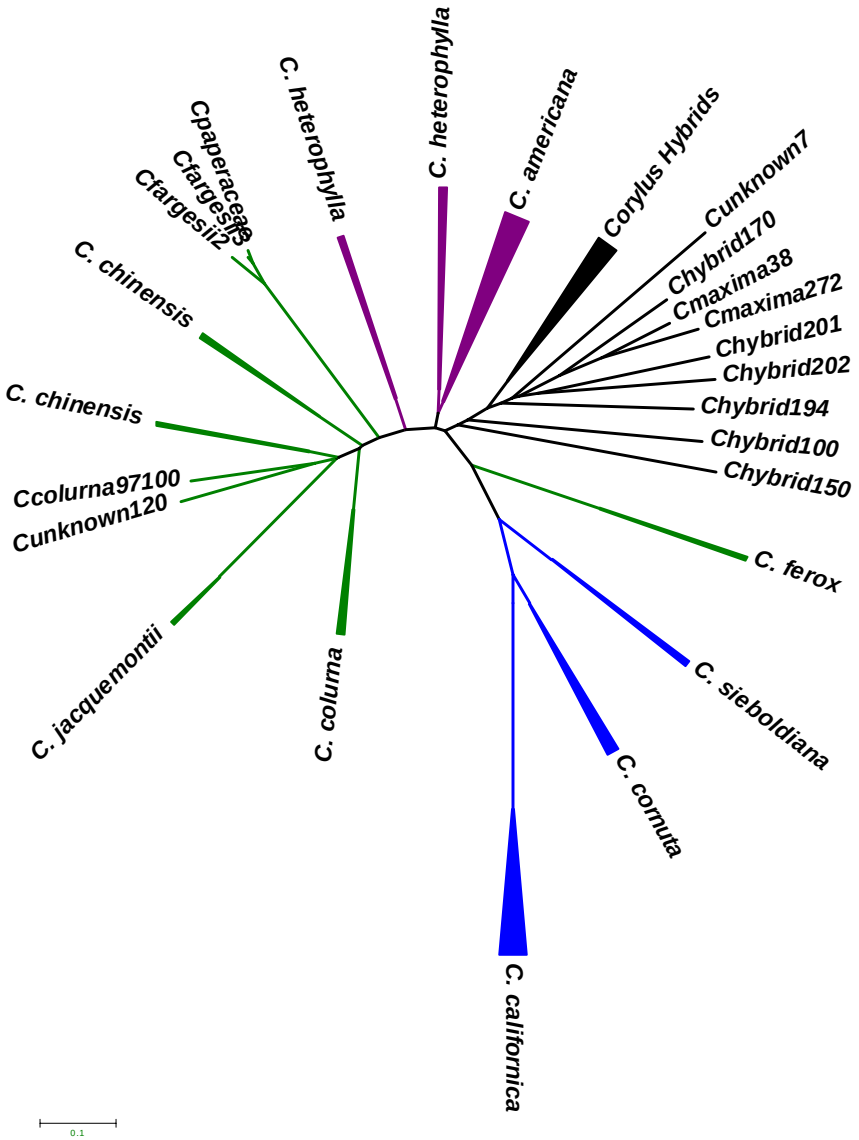
We are developing genetic profiles for 144 pear accessions using 9 EST-SSR loci. Six apple and five pear microsatellite markers were used to determine genetic relationships among 18 apple and 9 heritage European pear cultivars grown in the Azores and 8 additional standard accessions of each. Thirteen microsatellite markers were used to determine the relationships among 145 wild and cultivated individuals of *P. communis* (in collaboration with Joseph Postman, Gayle Volk and Chris Richards).

Vaccinium

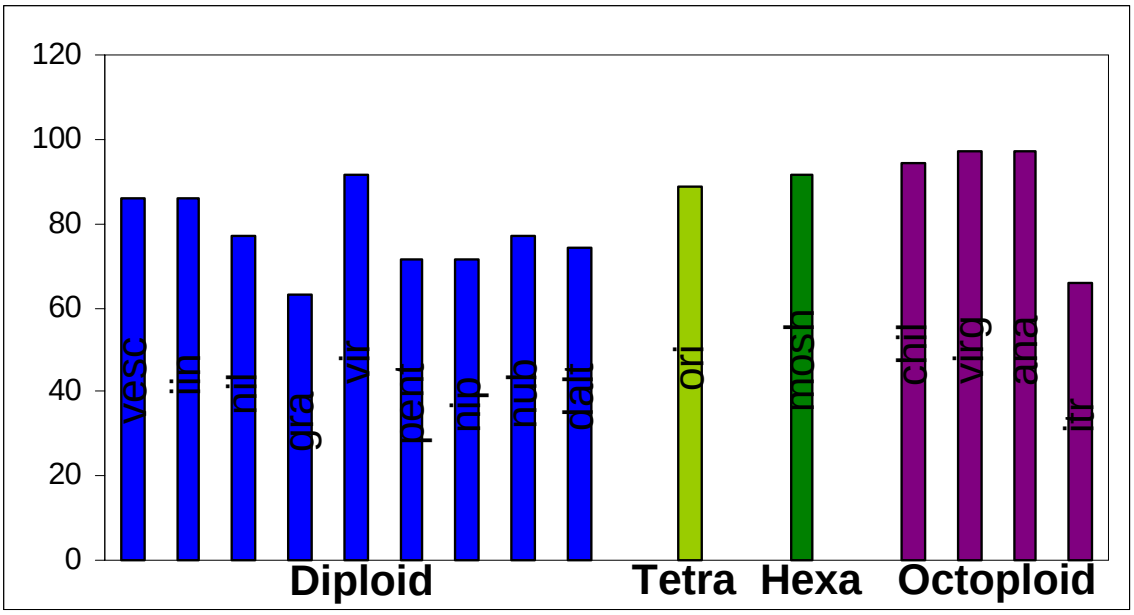
Out of forty-nine SSR markers initially isolated from 'Bluecrop' blueberry, 23 amplified a product and detected variation in the American cranberry (*V. macrocarpon* Ait.) while 29 cross-amplified and were polymorphic in the European cranberry (*V. oxycoccus* L.). These markers will be used to fingerprint important cranberry accessions and to evaluate genetic variation in Oregon cranberry fields.

Rubus

Nina Flores (M.S. student) has constructed a microsatellite-enriched library from 'Meeker' raspberry and 'Marion' blackberry. She has developed twelve microsatellite markers from these libraries and is using them to fingerprint 96 raspberry and blackberry accessions (48 each). Thirteen AFLP primer pairs were used to study genetic stability in cryopreserved *Rubus* accessions that have been regenerated after 10 years of storage in liquid Nitrogen.



Neighbor Joining cluster analysis of 81 representative accessions from nine *Corylus* species and hybrids using 14 trinucleotide SSR markers.



Cross-species amplification (%) of 35 EST-SSRs isolated from the domestic strawberry cultivar 'Strawberry Festival' in 15 *Fragaria* species including nine diploid (vesc, *F. vesca*; iin, *F. iinumae*; nil, *F. nilgerrensis*; gra, *F. gracilis*; vir, *F. viridis*; pent, *F. pentaphylla*; nip, *F. nipponica*; nub, *F. nubicola*; dalt, *F. daltoniana*), one tetraploid (ori, *F. orientalis*), one hexaploid (mosh, *F. moshata*), and four octoploid (chil, *F. chiloensis*; virg, *F. virginiana*; ana, *F.* x *ananassa*; itr, *F. iturupensis*) species.

Plant Pathology

by Joseph Postman

Summary of 2005 Virus Assays and Therapy Efforts

Genus	Bioassays	ELISA	Phytoplasma PCR Assays	Therapy (clones)
Corylus	3	33	18	-
Fragaria	64	79	98	-
Humulus	-	567	-	12
Mentha	-	15	-	-
Pyrus	-	3	23	-
Ribes	-	-	-	10
Rubus	24	401	-	-
Sambucus	-	86	-	-
Vaccinium	-	1154	13	

Virus Indexing 2005

- ELISA monitoring of *Vaccinium* field for Scorch & Shock twice during growing season, removal of the small number of infected plants.

- ELISA testing of all *Rubus* and *Sambucus* for Cherry Leafroll Virus. Many infected elderberry clones. No infected *Rubus*.
- ELISA testing of all new *Humulus* accessions for 5 viruses
- Heat Therapy of 20 *Humulus* and 20 *Ribes* accessions resulting in meristem cultures for 12 and 10 accessions respectively.
- Implemented Phytoplasma testing, evaluated for best collection date, best tissue to extract, effectiveness of universal primers. Tested super-core strawberries, all suspected positives in 4 genera to identify controls. Good results for positive controls. Samples after mid-September were best. Leaf petioles were better than other tissue. We now feel confident about using our isolates of Pear Decline, Strawberry Multiplier, Cranberry Falseblossom and Hazelnut Stunt as positive controls.

Other Plant Pathology Activities

Pyrus - Orchard collection evaluated for disease incidence.

Leaf Scab, Fruit Scab, and Fabraea Leaf Spot and Pseudomonas incidence.

The long, wet spring of 2005 brought ideal conditions for the development of many fungal diseases, and our pear collection had a very high incidence of scab and leaf spot, and a higher than usual incidence of rust. More than 1670 trees were evaluated in the spring for Pseudomonas blossom blast (*Pseudomonas syringae*), leaf scab (*Venturia pirina*), rust (*Gymnosporangium sp*.) and leaf spot (*Fabraea maculata*). In the fall, all trees with fruit were evaluated for fruit scab (*Venturia pirina*). Nearly 800 trees were evaluated for fruit scab on a scale of 1-9 (1 = no disease, 9 = severe scab) and 340 clones were rated as 1 or 2. Many accessions with low fruit scab were Asian cultivars or hybrids, which we know to be resistant, but many European cultivars were also identified as potential sources of pear scab resistance.

Fruit Scab Rating	Number of Accessions
9	35
8	48
7	74
6	48
5	55
4	63
3	131
2	176
1	164
total	794

Coadesele (from Romania) fruit scab rating = 2

Lukavanski (from Czech Republic) fruit scab = 5

Corylus – EFB is Near

Eastern Filbert Blight is a canker disease of hazelnut trees caused by the fungus *Anisogramma anomala*. The disease has been spreading in Oregon for several decades, and in 2004 was found in Corvallis within 2 miles of the Repository. We continue to protect our field collection with prophylactic fungicide sprays and monitor several times a year for symptoms. We are still able to report that the disease has not been observed in our collection.

Field Collections

by Joe Snead and Kim Hummer

New Research Groups

Working in mutual collaboration with Oregon State University Department of Horticulture, the Repository field crew took on the cultural care for three research plots for other ARS scientists on a temporary basis. The repository field crew assisted the research units in varying degrees and particularly in mowing and irrigation. Pre-emergent herbicide was applied in the fall to several plots with the herbicide supplied by the research project. Sawdust mulch was applied to a two acre plot. Two of the research units are winding down their projects on the farm. The third research plot increased in size this year from two to three acres. An acre of new plot ground was developed from old forest area and worked to accommodate the expansion.

Weather year

The weather played havoc on the field collections last spring. After a very mild and dry winter the spring was quite wet and cold. In the hazelnut collection the plants started budding out several weeks early. Thus far we have not observed Eastern Filbert Blight (EFB) on our hazelnut collection, although this disease was observed at the University planting less than two miles away. We continue to apply cover sprays beginning at bud break. Four applications were put on at about two week intervals. Some applications were stretched out longer because the weather was not conducive to disease spread. In early April, the weather conditions turned quite wet and were perfect for EFB transmission. The field was scouted several times over the summer and fall with no strikes seen. If we had an infection this spring, we would see it after sixteen to eighteen months. We will monitor closely for this disease.

In 2005, the pear field had one of the worse years for scab and pseudomonas infections. On the positive side this allowed for taking disease data. The *Ribes* field was also hit hard by disease and insects last spring. The powdery mildew was the worse it has ever been.

Changes to collections and new additions

Each of the field collections has grown a little this last year. These numbers and the total number of accessions are represented in the collection table on page 11. The total number of plants in the field is much larger because several collections have two plants per accession.

Significant changes are taking place in the minor genera fields. The *Sambucus* field was moved and expanded. The rest of the minor genera collections were either moved by a large tree spade or re-propagated. This reorganization of the field is now complete after two years worth of effort. All the plants are in rows sixteen feet on center with the plants twelve feet on center in the row.

A new *Ribes* research block was added at the north end of the farm. The plot required spraying, soil work and new turf establishment. Two additional acres of crop land were developed from the forest slash area at the northern part of the farm. A bulldozer was rented to dig huge Douglas fir and Oregon white oak old-growth stumps. The debris was pushed into a pile and burned. The large holes were backfilled. The ground was sub soiled with a large tractor to remove roots. The ground was plowed and disked several times. Each pass brought up additional debris. The areas had some weed issues that were addressed several times. Finally in the fall the ground was seeded to grass. One acre was immediately used for extension of an edible *Lonicera* planting. The other acre will be for a butternut planting.

Four plus acres were returned to us from the small fruits breeding program. The planting had established blackberries and a huge Canada thistle problem. The blackberries were up to ten feet high and the thistle six foot in areas. We removed the trellis and the planting sprayed twice.

After die back the tangle was ground up slowly with several passes with a flail mower. Then the area disked twice and sub soiled on a crosshatch. There was a vigorous vegetative regrowth and it was sprayed again in the fall. This spring there seems to be 85% control of the blackberries and 70% control of the Canada thistle.

The last leg of perimeter fencing was moved onto the property line on the north farm. A bulldozer was rented for small tree, brush removal, and coarse soil grading. A final grade was done and the area was planted to grass. An additional 104 spaces were added to the *Corylus* Collection on Lewis Brown Farm. The area added had been very weedy and has had various weed control measures employed for three years. The area was planted to turf in the fall and new accessions were planted soon after. At the far end of the *Corylus* field OSU Horticulture moved the perimeter fence twenty feet closer to our row ends. The mature trees were moved with the tree spade into the new expansion field. The new area is filling fast.

Plant Distribution

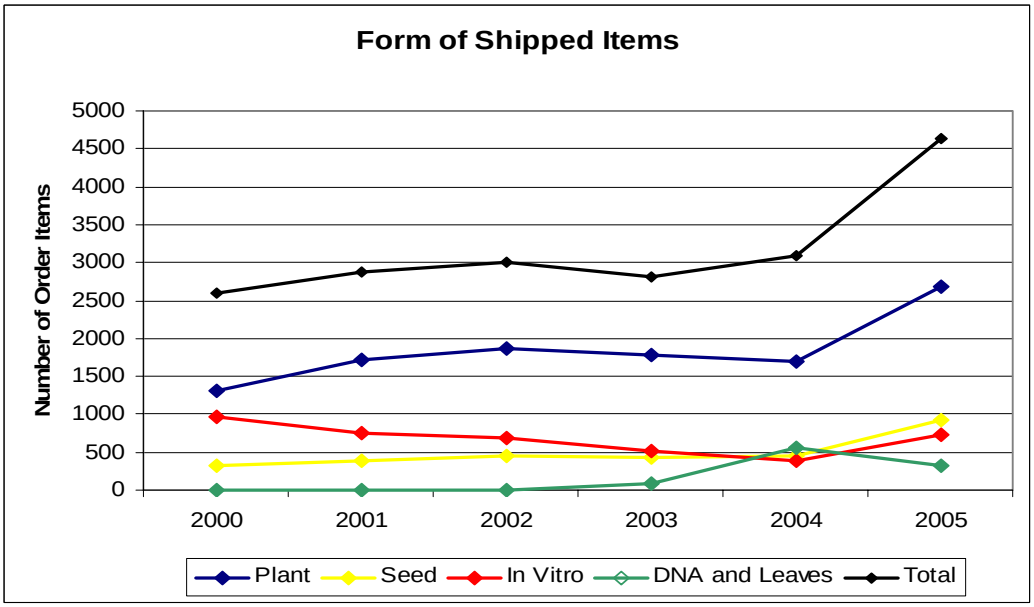
By Bruce R. Bartlett

2005 Highlights

- 4,640 items were shipped as seeds, cuttings, runners, scionwood, rooted plants, tissue culture and DNA.
- 430 tissue cultured accessions were sent to the National Center for Genetic Resources and Preservation (NCGRP) in Ft. Collins, Colorado as backup. This is 92% of all tissue culture accessions shipped to domestic requestors.
- 170 seed accessions were sent to NCGRP as backup. This is 26% of all seed accessions shipped to domestic requestors.
- 85% of accessions requested in 2005 were shipped.
- 23% 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 315 or 7% of the total number of accessions shipped.
- Scionwood (21%), Seed (18%) and *In Vitro* (10%) were the top three forms sent to domestic requestors.
- Seed (26%), *In Vitro* (24%) and DNA/leaves (20%) 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 2005 which represent some accessions requested from 2001 up to and including 2005. Information is also presented that represents all accessions requested only during CY 2005. At the time of this printing, we have distributed 4,674 items as seeds, cuttings, runners, scionwood, rooted plants, tissue culture and DNA from 2005 requests. This represents 85% of the total number of items requested for 2005. Additional material will be shipped in CY 2006 from 2005 requests.

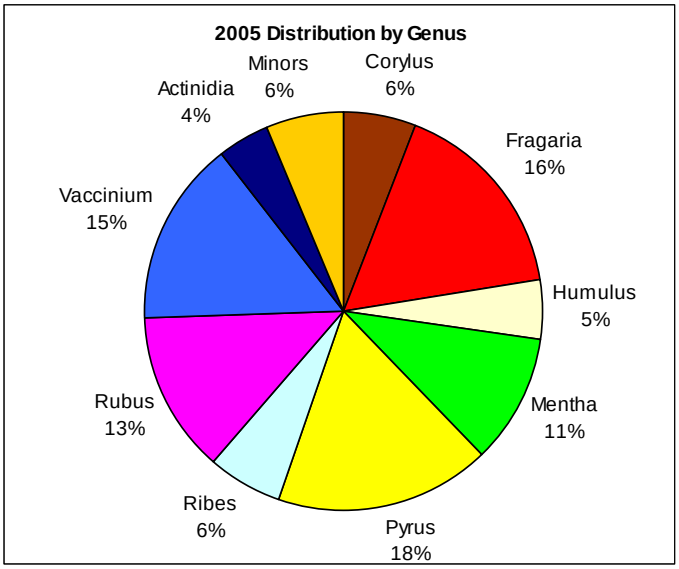
CY 2005 was another new record for the number of items shipped. Almost 1,000 more plant items were shipped in CY 2005 than in 2004. There were also increases in the amount of seed and *in vitro* accessions sent. Only DNA material showed a decrease.



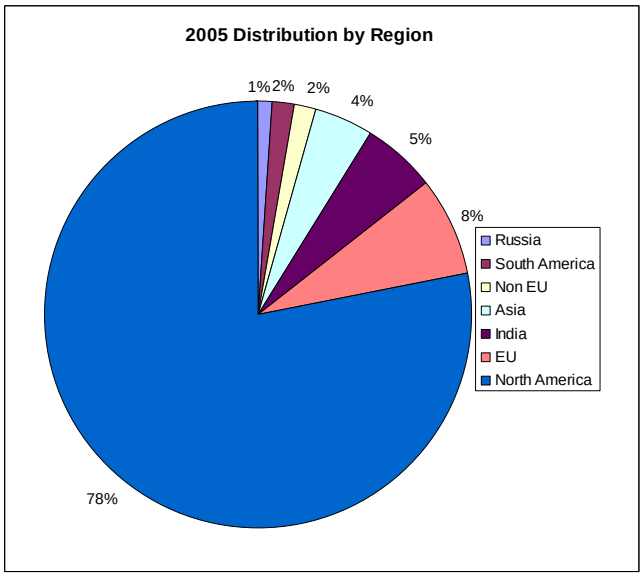
Material requested in a given year may require more than one year before the item is shipped. This is due to the fact that we have very diverse holdings and are a clonal facility. At times plant material needs to be propagated from our mother plants in order to have items in a form that is sufficient for shipping. This is especially true for international requests. However, 85% to 90% of items requested will be shipped within two years of the original request. During 2005, two items from request year 2001 were shipped, 19 from 2002, 60 from 2003, 857 from 2004 and 3,697 from 2005.

Domestically, the highest plant requests were for *Pyrus, Fragaria* and *Vaccinium* in that order. Internationally, *Rubus, Vaccinium* and *Fragaria* were most requested.

Over the last three years accessions of *Fragaria* and *Rubus* sent to European Union (EU) countries declined significantly because the EU has required additional virus tests. Also due to the possibility of harboring viruses, *Rubus* seed now must originate from a tested source. 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 and DNA from all genera are allowed entry to the EU. However, Japan, South Korea, India and the Russian Federation are not as restrictive and therefore reflect the high numbers of *Rubus* and *Fragaria* still being sent internationally.

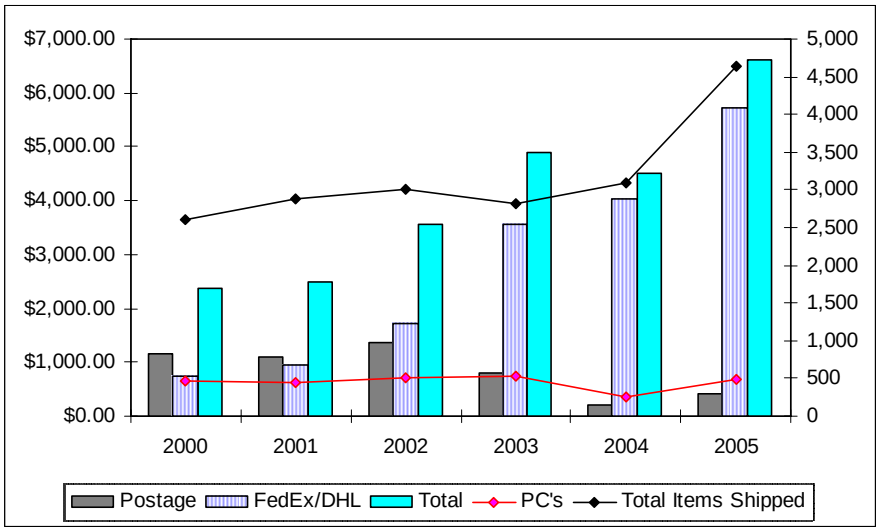


During CY 2005 we shipped plant accessions to twenty six countries including the United States. By region, most material was sent to North American destinations (78%). Of that total less than 1% was sent to Canada. The EU is represented by Austria, Belgium, Denmark, Germany, Italy, the Netherlands, Poland, Portugal, Spain, Sweden and the United Kingdom. Asia is represented by Japan and South Korea. The non-EU nations are Armenia, Norway and Romania. The countries of Argentina, Brazil and Chile represent South America. Plant material was also sent to Morocco, New Zealand and Australia but values are not represented in the pie chart since the total amount sent was less than 1% of the total.



The total postage paid for domestic and international shipping was $408.83. The total cost for Federal Express/DHL was $5,735.89 and the total paid to the Oregon Department of Agriculture for 48 Phytosanitary Certificates was $480.00. The total cost of shipping plant material in CY 2005 was $6,624.72. This is an increase of about $2,130.00 over CY 2004 but reflects the increase in the number (1,544) of items sent over 2004. The cost per item sent in CY2005 was slightly less than 2004.

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 are using DHL for all international plant shipments (excluding Canada). DHL is 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

Some of the main initiatives for the year were:

- Rearrangement of collections to maximize available growing space.
- Development of new growing media that is free of fir bark as a component.
- Introduction of *Rubus* propagation success information to our inventory database.
- 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.
- Continued efforts to reduce plant stress with additional internal shading and by power washing the insect screening, to increase airflow.

Greenhouse/Screenhouse Maintenance

Over the past year each of the houses was thoroughly cleaned. Extensive efforts in weed control through spray and burning have truly paid off. To increase air flow all screening was power washed. This effort should assist during the summer months in maintaining the house temperatures. Outside the houses weed control was brought to a maximum which will aid in keeping the insides weed free. Throughout the year repairs were made to irrigation lines and side screens. Areas of dry rot were brought to the attention of the facility manager for repair.

Actinidia

Actinidia is maintained in the screenhouse, as a back-up collection until the field plants are established. Currently 68 of the 153 clonal *Actinidia* accessions are being maintained under screen. An additional 21 accessions were readied for placement in the field. There were 29 new accessions received and repropagated this year. This year, we discarded our first set of 45 accessions of screenhouse backup plants for plants that are well established in the field.

Corylus

Temporary back-up 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, 124 accessions are being maintained.

Fragaria

All clonal accessions of *Fragaria* are maintained under screen. An additional backup set of supercore plants is maintained in the greenhouse. We are continuing our 3-year re-propagation cycle using runners. The non-core collection was moved and reorganized.

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

Permanent back-up trees of all non-hardy clones, virus infected clones, and temporary back-up trees of all new young field trees of *Pyrus* are maintained under screen. In an effort to free up

screenhouse space, non-hardy clones were repropagated in small tube-pots for field back-up and the screenhouse plants will eventually be discarded.

Ribes

The *Ribes* collection was relocated to SH8 which should provide the accessions better housing conditions. There are currently 491 accessions of *Ribes* of which 222 of the 235 core are housed under screen. This year 95 new accessions or replacements arrived. We repropagated 205 accessions this year.

Rubus

The clonal accessions of *Rubus* are separated in regard to their habitat needs. There are 137 non-hardy accessions (i.e. tropical, subtropical or high latitude habitats) that are maintained within the greenhouses. Those that are not restricted by their cold hardiness are housed in the screenhouses; at this time there are a total of 635 accessions of which 265 are core. We have established a 5-year repropagation cycle for *Rubus*. Repropagation continues with 115 accessions replaced in 2005 and 133 waiting to go out in 2006. Repropagation of 115 accessions by tip-layering, root division or cuttings was done in late 2005 for replacement of screenhouse plants in 2007, along with 24 new accessions or replacements which arrived this year. There are 33 accessions identified as having only one plant without backup. Of these 23 were new or replacements which were repropagated. We have robust data on clones that tip layer and some data on root cuttings (470 acc. with prop data; 272 acc. tip, 225 acc. root, 27 acc. both). This data is already proving valuable in our fall tip layering efforts and should be available on GRIN in the near future.

Vaccinium

Our goal is to maintain all core, named cultivars, and non-hardy clonal blueberry under screen. Additionally, all prostrate accessions, including lingonberry and cranberry are also maintained under screen. Due to blueberry shock virus and *Phytophthora ramorum* concerns, we are continuing the process of establishing the primary collection in the screenhouse. This process involves improved water quality, a non-bark soil less medium, increased container size, and improved sanitation. Currently, the entire screenhouse set are being re-propagated with 250 accessions established in their new media. Only 3 of the 239 core accessions remain in the field without a screenhouse plant. Cuttings and divisions of these 3 core accessions were collected this winter and are being established.

Clonal Accessions maintained in the Greenhouses and Screenhouses
(as of March 2006)

	Total # Accessions	Core		Available		Single Plants With No Back-Up	
		# Ac.	%	# Ac.	%	# Ac.	%
Actinidia	99	29	29	95	96	37	37
Corylus	124	15	12	110	89	55	44
Fragaria	1345	521	39	1287	96	705	52
Humulus	262	88	34	249	95	129	49
Mentha	448	52	12	442	99	244	54
Pycnanthemum	37	20	54	37	100	5	13.5
Pyrus	379	21	6	213	56	146	39
Ribes	568	236	42	502	88	53	9
Rubus	798	266	33	679	85	75	9
Vaccinium	540	239	44	499	92	167	31
Other[1]	76	21	28	49	64	38	50
Total	**4676**	**1508**	**32**	**4162**	**89**	**1654**	**35**

JMO 03-24-06

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

Quarantined Plants

- At this time we have 130 accessions in quarantine.

Status of Quarantined Accessions at the Repository

Genus	**Federal**	**State**	**In-House**
Corylus			2 NCGR
Fragaria	1 Departmental Permit		
Humulus		7 Directors Exemption	
Pyrus	73 Provisional Release		
Ribes	1 Post Entry		28 NCGR
Rubus	8 Post Entry		
Vaccinium	10 Post Entry		
Total	93	7	30

Seed Program

By Jack Peters

During the second year of seed lab operation we: 1) Finished initial viability testing on all of the major genera seed accessions; 2) Strategized and initiated a seed regeneration program with existing accessions (propagation from both greenhouse plants and stored seed, which are deemed valuable and limited as a resource); 3) Started some basic research regarding seed germination, seed dormancy, and long term seed preservation; 4) Maintained and distributed the current seed collection and added new accessions; 5) Sent a representative 'back up' sub-sample of the seed accessions with over 2000 seeds to the NCGRP in Fort Collins, CO. as a remote location storage site; 6) Collected research data for revising the Operations Manual, listing specific germination procedures.

Viability tests were completed in 2005 on the all of the designated major genera except *Vaccinium* with approximately 80 accessions to finish.

Genus	Accessions	Approx. Avg. Viability (%)
Fragaria	375	70
Humulus	248	45
Mentha	53	75
Rubus	948	35
Ribes	395	60
Pyrus	225	75
Actinidia	37	60
Vaccinium	600	50

Seed inventory at NCGR is stored in chest freezers at -20°C. Seed accession samples are kept in foil/plastic lined bags and sealed to maintain low moisture content. General seed accession inventory (over 25% of all NCGR germplasm accessions) at the end of 2005 is as follows:

	Genus	Seed Accessions in Inventory at NCGR
Major Genera	*Rubus*	1121
	Vaccinium	748
	Ribes	475
	Fragaria	376
	Pyrus	318
	Humulus	270
	Mentha	53
	Actinidia	22
Minor Genera	All other genera	536
		3919 Total Seed Accessions

Seed germination chambers are maintained at three different temperature regimes at the NCGR. Various planting media, dependant on the genus is used. Upon emergence, seedlings are transplanted small pots and flats containing seedling soil and placed in the greenhouse for further growth. From this point, seed increase, plant propagation, and species identification programs

can commence. Currently, the Seed Laboratory is looking at the possibility of uploading seed viability test results directly to GRIN database, along with other pertinent accession information.

Computer/Information Management

By Douglas Cook and Kim Hummer

I. GRIN Records (As of 12/12/2005)

GRIN Records - Activity during CY 2005

GRIN Area	Created	Modified
Accession	3421	1921
Inventory	2351	9000
Observation/Voucher	4401	1110
Pathogen	0	0
Distribution	6276	1812
Cooperator	168	33
Total	16617	13867

During this year there were 145 new accessions and accession related data category records added to GRIN (915 Accession Names, 222 taxon assignments, 199 Habitat, 63 Narratives, 159 Pedigree, 751 Source, 967 Source Member and 1223 Vouchers). There were 989 new Inventory items, 1362 Inventory Actions and 3178 Observations added to GRIN. For Distribution there were 463 Orders, 5149 Order Items, 664 Order Actions and 168 Cooperator records added. Among 380 existing accession records, and other sub-categories, modifications were made during the year (500 Accession Names, 50 Habitat, 721 Narratives, 47 Pedigree, 1110 Voucher and 223 Source). There were 4486 Inventory, 4514 Inventory Action, 33 Cooperator, 210 Order and 1602 Order Item records modified.

II. Hardware and Infrastructure

All 21 workstations operate with Pentium (P3) or higher CPU's (with memory at 128 megabytes or higher) operating with Windows® XP-Pro. All workstations are equipped with uninterruptible power, anti-virus and firewall protection. Workstation operating software and protective software are updated at least on a weekly basis. A new DELL Poweredge 400SC fileserver with a Windows® Server 2003 OS was brought online. Six new workstations were purchased as replacements or added to service. An outside contractor performed the install and configuration of the new fileserver. Another contractor will provide consultation and troubleshoot server issues on a regular basis. Fileserver backup data is stored on an external hard-drive secured in a separate building. In addition, a second back-up hard-drive alternates weekly with the first. The alternate hard-drive not in use is secured in an off-site ARS building. Numerous computer software configurations and repairs took place.

Publications 2005

Journal Articles and Websites

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3. Gokirmak, T., Mehlenbacher, S., and **Bassil, N.,** 2005. Identification of Genetic Diversity Among European Hazelnut (*Corlyus avellana*) Cultivars with SSR Markers. Acta Horticulturae. 686:141-147.
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13. **Postman, J., Spotts, R.A., and Calabro, J.A**. 2005. Scab Resistance in *Pyrus* Germplasm. Acta Horticulturae. 671:601-608.
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17. Tzanetakis, I.E., **Postman, J.,** and Martin, R**.** 2005**.** Characterization of a Novel Member of the Closteroviridae Family from *Mentha*. Phytopathology. 95(9):1043-1048.
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