

ANNUAL REPORT FOR 2002

National Clonal Germplasm Repository

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Ray Gekosky and Jason Fumasi prune blueberries.

Annual Report for Calendar Year 2002

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A. Repository Staff

Permanent Federal Staff

Bruce Bartlett, Ag. Sci. Res. Tech., Plant Distribution
Nahla Bassil, Geneticist
Douglas Cook, Computer Specialist
Judith Flynn, Program Assistant/Secretary
Raymond Gekosky, Ag. Sci. Res. Tech. Field
Kim Hummer, Research Leader/Curator
James Oliphant, Ag. Sci. Res. Tech., Greenhouse Manager
Carolyn Paynter, Bio. Sci. Lab Tech., TC Technician
Joseph Postman, Plant Pathologist/Pear Curator
Barbara Reed, Research Plant Physiologist
Joe Snead, Ag. Sci. Res. Tech., Field Manager
Dennis Vandever, Facilities Manager

Graduate Students and Visiting Scientists

Hailu Aynaham, Graduate Student, Tissue Culture
Peter Boches, Graduate Student, Genetics
Jodi Jackson, Graduate Student, Horticulture
Deric Picton, Graduate Student, Horticulture
Nan Wang, Graduate Student, Horticulture
Nese Okut, Visiting Scholar from Turkey

Temporary Staff

Angela Burrignt, OSU Lab Work Study
Jeffrey D'Achino, Bio Aide, TC Lab (part time)
Janine dePaz, Bio. Sci. Aide, TC Lab
Krystal Dunlap, Work Study, Office
Melissa Fix, Ag. Sci. Aide, Greenhouse
Jason Fumasi, OSU Field Work Study
Simon Hare, OSU Distribution Work Study
Beth Liegel, Bio. Aide
Karen McGuire, Volunteer, Office
Meghan Oakes, Ag. Sci. Res. Aide, Plants (part time)
Shilpa Prem, Bio. Sci. Aide, TC Lab (part time)
Tony Tomlinson, Office Automation Clerk
Debra Tyson, Ag. Sci. Aide, Greenhouse
Matthew Zlatnik, Bio. Sci. Aide
Ryan Kelso, Work Study
Megan Kitner, Volunteer

B. Major Accomplishments

Service

- Bruce Bartlett coordinated the distribution of 3,007 accessions as cuttings, runners, scions, rooted plants, in vitro cultures and seed packages to 257 recipients around the world. This is the largest amount of accessions that have been distributed in one year from NCGR-Corvallis since establishment in 1981.
- Joseph Postman, Paul Meyer (Morris Arboretum of the Univ. of PA) and Alan Whittemore (USDA NA) joined Ashot Charchoghlian and his colleagues at the Armenian Institute of Botany for 19 days of joint plant explorations in eight Armenian provinces. More than 200 seed accessions and herbarium specimens representing 85 plant genera were collected. After the trip several hundred *Phyloxera* resistant grape rootstocks were donated to Armenian researchers. In early 2003, the Armenian Ministry of Agriculture donated 31 seedlots of *Vitis* and 44 of *Prunus*, *Pyrus*, *Cydonia* and *Malus* to the NPGS.
- Jim Oliphant, Douglas Cook, and Jodi Jackson collected native North American hops from 54 locations the Colorado and New Mexico in September 2002. Seedlings from these hops are being screened for powdery mildew resistance and essential oil content.
- Barbara Reed, Jeff D'Achino, Lee Narver, and Nese Okut developed procedures to cold acclimate and cryopreserve hop meristems by slow cooling. Meristems from 20 *Humulus* core accessions were cryopreserved and shipped to NCGRP for long-term storage.

Research

- Verticillium wilt fungus, *Verticillium dahliae*, was eliminated from field, greenhouse and *in vitro*-grown mint plants through meristem excision. Disease development on *in vitro* plantlets was documented. *In vitro*-grown mint accessions were tested for *V. dahliae* and found to be disease free. This study shows that *V. dahliae* can be easily detected both *in vitro* and *in vivo*. *Verticillium*-free plants can be produced from infected greenhouse or *in vitro* meristems 3-5 mm in size. Wang, N. and B.M. Reed. 2002. Development, Detection, and Elimination of *Verticillium dahliae* in Mint Shoot Cultures. HortScience. 38:67-70.
- The anthocyanins, phenolics, and antioxidant content of 70 blackberries, black currants and blueberries were determined. Black raspberries had the highest anthocyanin and antioxidant capacity (ORAC); Marionberry had the highest anthocyanin level of the black berries tested. Wild blueberries from the Florida-Georgia border were very high. Black currants were high in total phenolics. Moyer, R., K. Hummer, C. Finn, R. Wrolstad, and B. Frei. 2002. Anthocyanins, phenolics, and antioxidant capacity in diverse small fruits: *Vaccinium*, *Rubus*, and *Ribes*. J. Agric. Food Chem. 50: 519-525.
- Nahla Bassil established a high throughput DNA and molecular marker analysis laboratory for RAPDs, AFLPs and microsatellites. She and Peter Boches developed blueberry microsatellite markers that can distinguish between the closely related cultivars 'Earliblue' and 'Bluecrop'. Nahla's laboratory is collaborating with USDA and University scientists in developing new microsatellite loci in blueberry and hazelnut.
- Foliar application of oil reduces powdery mildew severity in black and red currants. Hummer, K. E. and D. Picton. 2001. Oil application reduces powdery mildew severity in red and black currants. HortTechnology 11(3):27-28.

C. Administration

Staff and EEO/CR

During CY 2002, we employed 21 federal personnel. About one half of our federal work force was female. This past year the unit supported 5 graduates and employed 10 undergraduate, or high school students, five of which are female, through work-study, internship or other programs.

In September 2002 we hired Dr. Nahla Bassil, as our new Geneticist (Plants). Nahla has set up a molecular genetics laboratory in our facility. She supervises Peter Boches, as a Graduate Research Assistant Master's Candidate in the Horticulture Department.

At the end of January 2003, Judith Flynn, our Secretary, retired to take on family life and travels. (Best of luck to Judy. Thank you for your 14 years of service to the Repository!). In February 2003, we hired Deborah Provenzano as a part-time receptionist and in May 2003, we hired Yvonne Pedersen as our secretary. We welcome these folks to help manage the front desk activities.

We obtained a grant from the Hop Research Council for evaluation of hop seed genetic resources. Jodi Jackson switched from her position as 180-day Biological Laboratory Technician to become a Graduate Research Assistant in the OSU, Department of Horticulture, to work on this assignment.

Outreach

During the course of the year we trained a physically challenged (multiple sclerosis) African-American individual returning to the workplace. We hired a blind individual as a term Office Clerk for a project involving optical scanning technology for digitizing plant information records. We had one Asian, one Russian, one Turkish and one Ethiopian on staff at the Repository in 2002.

Our greenhouse and office staff worked with three programs to train physically or mentally challenged students or individuals. We worked with 6 high school students in the Philomath High School Transition Team program, 10 students in the Corvallis High School Wings program and two individuals from Work Unlimited. These students helped maintain our greenhouse and screenhouse plant collections and record characterization and evaluation data.

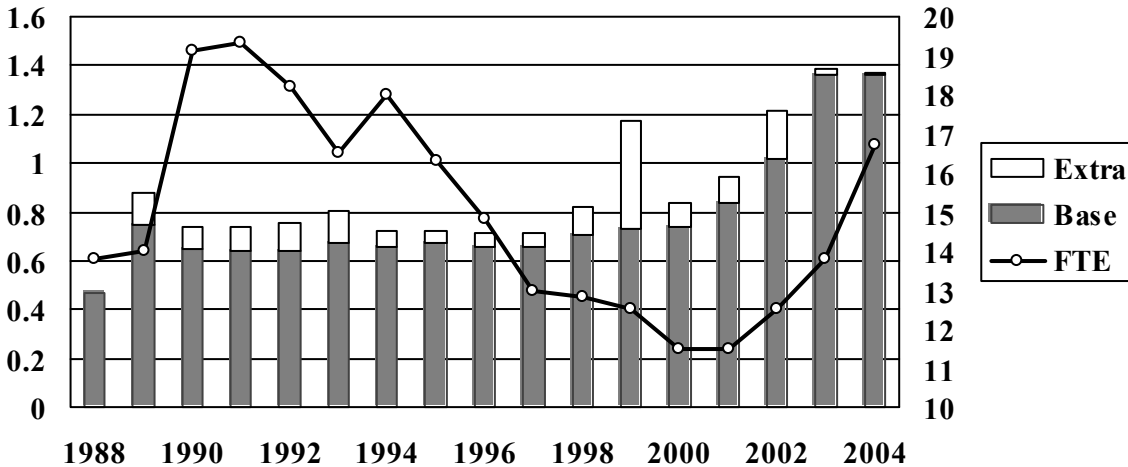
Budget

In FY 2002 a base funding increase was specified by Congress for genetic resource programs. In FY 2003, we received another base increase. Peter Bretting, our Program Leader for Germplasm, distributed a funding increase of \$178 K to our unit, bringing our "net to unit" total to \$1.4 million. Our IRC (administration charges, facilities, utilities) are about \$200 K, leaving \$1.2 million for program. With the new increase our specific objectives were directed to manage seed propagated samples of genetic resources assigned to this site; to modify current protocols or develop new methods for optimal genetic resource management of this seed; coordinate conservation efforts with other sites in the National Plant Germplasm System.

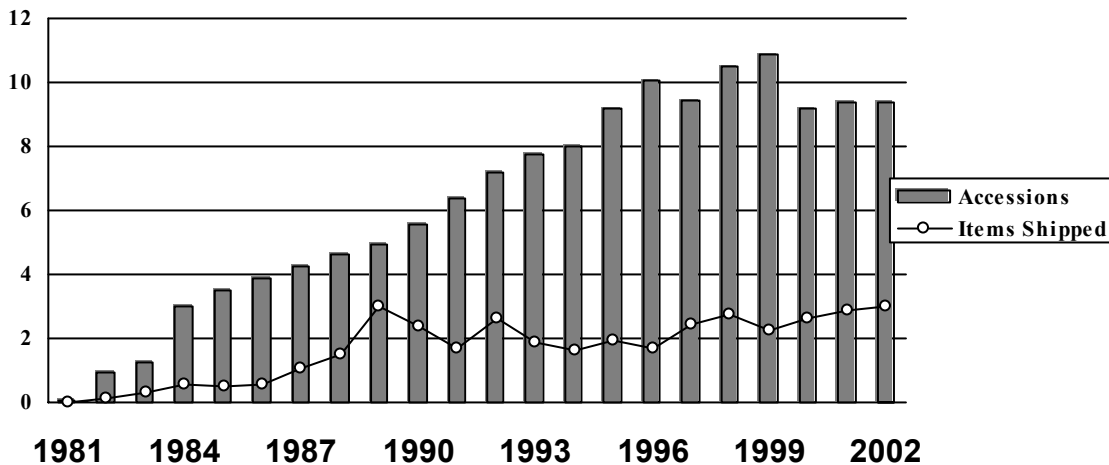
Looking towards the future, the FY 2003 budget has brought us additional funding with

Funding and Staffing at the NCGR Corvallis
Funding in \$ million

Federal FTE



Total Accessions and Distribution
Amount in 1,000



Facilities and Security

By Dennis Vandever and Kim Hummer

We have had a very busy year with facilities maintenance. We greatly appreciate the funding received from ARS headquarters to replace and upgrade our main electrical panel and back-up power generator with switch gear. Now all of the electrical supply for the Repository – including the pump for the water supply – is connected to our back-up diesel power generator.

With local repair and maintenance funding we have replaced rotted outside T-111 siding

on all of the screenhouses with vinyl and have installed turbine vents critical for summer cooling. In our main building complex we have replaced window blinds, ceilings, and performed routine interior painting. At the North Farm we installed a new furnace and vehicle lift at the building.

We have walled in the hallway between the main building and the headhouse doors for security purposes and are refurbishing the former growth chamber room into a workspace and office for the new Plant Physiologist position.

We had a lot of vehicle maintenance activity including rebuilding backhoe cylinders and replacing the clutch in the John Deere 2355 tractor. With end-of-year funding from the Pacific West Area, we were able to purchase a new flat-bed truck (which we expect to arrive any day).

Security

Security has been a large issue since the terrorist attacks of 9/11. The Tiger Security Assessment Team visited our site and an Office of Inspector General representative also separately assessed our unit during 2002. All visitors now sign in at the front desk and staff and visitors now wear identity badges. We have replaced our signs at the main gate emphasizing the conservation of plant genetic resources.



We are continuing to have a problem with local thefts. We have added outside lighting for parking area and front gates and installed high security locks. We have installed burglar alarms in our tractor barn. We are working closely with the Oregon State Police, Oregon State University Campus Police, and the Linn County Sheriff's Department concerning improved security.

Awards

Compiled by: Deborah Provenzano

Melissa Fix-For improving the plant organization, seasonal maintenance and cleanliness of Repository screenhouses, and for extra effort in the construction of new screenhouse benches. Presented in February, 2003.

Jason Fumasi-Took complete responsibility for field irrigation for the season. This included repairs, new installation, scheduling and record keeping. The benefited several research units and Oregon State University Horticulture. Presented in August, 2002.

Ray Gekosky-Took it upon himself to clean up NCGR landscape beds, prune shrubbery and apply bark mulch. The appearance of the grounds is greatly improved. Presented in May, 2002.

Kim Hummer-was awarded a Quality Step Increase in 2002. She was also given a promotion from GS-13 to GS-14 during 2002.

Debra Tyson-For improving the plant organization, seasonal maintenance and cleanliness of Repository screenhouses and for extra effort in the construction of new screenhouse benches. Presented in February, 2003.

Barbara Reed- Received a Plant Fellow award from the Society for In Vitro Biology – Plant Section on Monday June 2, 2003. This award recognizes members who have made outstanding contributions to plant science research, teaching or administration.

Training

Compiled by Deborah Provenzano

Bruce Bartlett, Ray Gekosky and James Oliphant - for Pacific Northwest Ag. Chemistry, Toxicology and Policy Short Course; Use of pesticides and their effects on environment, pet, people, etc. Lane County Extension Service, Eugene, OR on February 11, 2002.

Ray Gekosky-for Eastern Filbert Blight. How to identify disease which is in the Willamette Valley. OSU/Lane County Extension Office, Eugene, OR. on February 20, 2002.

Joseph Snead-Western Small Fruit Pest Conference-learn new IPM procedures. Sakuma Bros. Farms; Burlington, WA.

The North Safety Respiratory “Train the Trainer” program – understand the effects of 42 CFR Part 84; employer responsibilities under 29 CFR 1910.143; use/limitations of various respiratory products under these regulations. Norwest Safety; Eugene, OR, January 9, 2002.

Dennis Vandever-Contracting Officer’s Representative Course, Assist the contracting officer as delegated; Oversee contract performance and report accordingly to the Contracting Officer. Training took place in Phoenix, Arizona in September 2002.

Travel

Compiled by: Deborah Provenzano

Joseph Postman, Deric Picton and Joe Snead- to Blaine, Washington, for Western Small Fruit Pest Meeting. (Jan. 10-12, 2002)

Kim Hummer and Jodi Jackson- to Gleneden Beach, Oregon, to present talk to the Hop Research Council Annual Winter Meeting. (Jan. 28-30, 2002)

Barbara Reed- to Whakatane, New Zealand, to set up research collaboration on "Cryopreservation of Apical Meristems. (Mar. 1-12, 2002)

Kim Hummer- to Beltsville, Maryland, to attend Liaison Committee Meeting for NPGQC. (Mar. 5-10, 2002)

Barbara Reed- to Poland, Germany and Kazakhstan, for her FAS Cryopreservation technology project. (Mar. 28-Apr. 23, 2002)

Joseph Postman- to Hilo, Hawaii, to attend WCC-20 Fruit Virus Workers Conference and to Maui, Hawaii, to collect native small fruit germplasm. (May 16-20,2002)

Douglas Cook and Bruce Bartlett- to Beltsville, Maryland, for GRIN training. (May 20-24, 2002)

Joseph Postman- to Beltsville, Maryland, to attend CGC, PGOC and Armenia exploration planning. (June 2, 8, 2002)

Kim Hummer- to Beltsville, Maryland, to attend CGC Chair and PGOC; also to give invited talk. (June 3-7, 2002)

Barbara Reed- to Orlando, Florida, for Tenth International Association for Plant Tissue Culture and Biotechnology Congress. (June 23-28, 2002)

Nahla Bassil- to Corvallis, Oregon, for interview of position as Geneticist at NCGR. (July 11-13, 2002)

John Vogel- to Corvallis, Oregon, for interview of position as Geneticist at NCGR. (July 14-16, 2002)

John Erpelding- to Corvallis, Oregon, for interview of position as Geneticist at NCGR. (July 17-20, 2002)

Judith Flynn- to Orlando, Florida, for 2002 Federally Employed Women Pre-Conference Special Emphasis Program Manager Training. (July 20-24, 2002)

Deric Picton- to Milwaukee, Wisconsin, for the 2002 American Phytopathology Society Annual Meeting. (July 27-31, 2002)

Jodi Jackson- to Yakima, Washington, to attend the Hop Research Council Meeting. (July 31, 2002)

Kim Hummer- to Davis, California, to attend the W-6 Western Regional Germplasm Meeting. (July 31-Aug. 2, 2002)

Kim Hummer- to Toronto, Canada, to attend International Horticulture Congress and ASHS to present an invited paper; also APS meeting. (Aug. 11-17, 2002)

Joseph Postman and Paul Meyer- to Armenia, to collect fruit, nut and woody landscape species. (Aug. 27- Sept. 18, 2002)

Jodi Jackson, James Oliphant, Douglas Cook-to Colorado and New Mexico, to collect wild American Hops (*Humulus lupulus* var. *neomexicanus*) (Sept. 9-19, 2002)

Dennis Vandever- to Phoenix, Arizona, for the Contracting Officer's Representative Course training. (Sept. 15-21, 2002)

Joseph Postman- to Frankfort, Kentucky, to attend the Second International Pawpaw Conference and report on pawpaw research in Corvallis. (Sept. 20- 25, 2002)

Dennis Vandever- to Seattle, Washington, for the Washington State Plant Engineering and Maintenance Show. (Sept. 26-27, 2002)

Nahla Bassil- to Bend, Oregon, for the Annual 2002 Center for Gene Research and Biotechnology Fall Retreat covering molecular bioscience. (Sept. 26-29, 2002)

Kim Hummer and Judith Flynn- to Phoenix, Arizona for the Research Leaders/Secretary Conference and present a speech. (Oct.21-25, 2002)

Joseph Postman- to Biloxi, Mississippi, for NCR-22 and Small Fruit CGC Meeting. (Oct. 23-25, 2002)

Barbara Reed and Nahla Bassil- to Oakland, California, for visit to the PWA Region facility. (Nov. 18-20, 2002)

Kim Hummer- to Portland, Oregon, for Northwest Center of Small Fruit Research Annual Meeting. (Dec.2-3, 2002)

Plant Explorations

1. Joseph Postman (USDA NCGR-Corvallis), Paul Meyer (Morris Arboretum of the University of Pennsylvania) and Alan Whittmore (USDA National Arboretum) joined Ashot Charchoglian and his colleagues at the Armenian Institute of Botany for 19 days of joint plant explorations in eight Armenian provinces. The focus of this trip was to survey and collect temperate fruit, nut, and woody landscape genera. More than 200 seed accessions and herbarium specimens representing 85 plant genera were collected for use at U.S. institutions. After his return, Postman arranged for shipment of several hundred Phyloxera resistant grape rootstocks to Armenia to give researchers tools to protect against this advancing pest. In early 2003 the Armenian Ministry of Agriculture donated 31 seedlots of Vitis and 44 seedlots of Prunus, Pyrus, Cydonia and Malus to the USDA National Plant Germplasm System. These seeds were distributed to appropriate NPGS Repositories. Funding was provided by USDA Market Assistance Program, Yerevan, Armenia.

2. Jim Oliphant, Greenhouse manager, led a Repository expedition to collect native North American hops from the southern Rocky Mountain region of the United States in September, 2002. He was accompanied by Douglas Cook, IT specialist, and Jodi Jackson, Graduate Student. They collected native hops from 54 locations throughout Colorado and northern New Mexico. This domestic resource may provide useful genetic material for developing improved hop cultivars that are resistant to powdery mildew. Expedition was funded by a USDA ARS plant exploration grant and CRIS 5358-21000-029-00D.

Visitors

Compiled by: Deborah Provenzano

About 542 people toured through the Repository during Calendar Year 2002. Guests arrived in large and small groups including two visitors from North Carolina State University, OSU Botany and Plant Pathology Farm in Corvallis, a scientist from Rutgers University. Fourteen students from West Albany High School. Five students from Shasta College in Redding, CA. Fifteen students from OSU Horticulture Department in Corvallis studying Plant Breeding. Sixty-nine students from Corvallis High School Horticultural classes. Linn-Benton Community College brought 10 students, OSU's class of Food Science and another class of LBCC Horticulture class of 10 students, and OSU Horticultural class of 22 students. We also had numerous visiting scientist from all over the world including Hungary; Santiago, Chile; Manila, the Philippines; Amsterdam, The Netherlands; Stuttgart, Germany; two scientists from Italy; two scientists from Sweden; New Zealand, and Cheffes, France.

D. Germplasm Collections and Research

Small Fruit Collections

By Kim Hummer and Joseph Postman

New Accessions in 2002:

Fragaria – 27 new inventory records (25 clones, 2 seedlots)

Including 8 native North American selection from J. Hancock, 2 seedlots from the Russian far east; 8 replacement cultivars and selections from Plant Research International in the Netherlands.

Ribes – 87 new accessions (11 clones, 76 seedlots). New clonal accessions were primarily black currant cultivars from A. Sabitov in Vladivostok, Russia. New seedlots include 8 accessions from two recent expeditions to Armenia, and many native *Ribes* collected by Sabitov from the Khabarovsk and Amur region of Russia.

Rubus – 34 new accessions (11 clones, 23 seed). New clones include 4 red raspberry cultivars from Chaim Kempler out of the British Columbia breeding program and 3 raspberry cultivars recently freed of viruses by the USDA small fruit certification program in Corvallis. New seed accessions include 10 samples collected in the wild by Postman et al. representing 3 *Rubus* species native to Armenia, 8 samples collected by Sabitov representing 4 *Rubus* species from the Russian far east, and 3 samples of *R. hawaiiensis* from Maui.

Sambucus – 2 new seedlots (*S. ebulus*, *S. nigra*) collected in Armenia.

Vaccinium – 15 new accessions, all seed. Sabitov donated 10 accessions from the Russian far east, including several from Sakhalin Island. We also received a seedlot of *V. myrtoides* from Canada that had been collected in the Phillipines, and a seedlot of *V. exul* that had been collected in South Africa.

Tree Fruit and Nut Collections

By Joseph Postman

New Accessions in 2002:

Corylus – 63 new accessions (50 clones, 13 seedlots) – Seedlots include 2 samples of *C. sieboldiana* var. *mandshurica* from Russia; 10 samples wild collected or purchased in markets in Armenia; and 1 native *C. americana* from Nebraska. Most of the clonal accessions came from S. Mehlenbacher and represent many cultivars and wild selections of *C. avellana* from central Asia and Russia, Mehlenbacher also donated 11 *C. cornuta* trees grown from seed collected throughout the mid-west and eastern parts of Canada and the U.S. The Morris

Arboretum in Philadelphia provided scions from 6 selections of *C. fargesii* that had been collected during an expedition to China several years ago. These are the first representatives of this unusually attractive hazelnut species at the Repository.

Cydonia – 11 new clonal accessions from Turkmenistan, provisionally released from quarantine in Beltsville

Mespilus – 6 new accessions: Two old French medlar cultivars donated by C.T. Kennedy of the California Rare Fruit Growers; 4 seedlots collected during the 2002 expedition to Armenia. These represent the first wild-collected *Mespilus* accessions in the NPGS.

Pyrus – 74 new inventory records (57 clones, 17 seedlots), including 48 clones provisionally released from quarantine that originated in India, China, Russia, Turkmenistan, Pakistan and England; 6 heat-treated meristem trees to replace virus infected clones; 2 cultivars from the Canadian Clonal Gene Bank not present at NCGR; a seedlot of *P. ussuriensis* from Primorye, Russia; and 16 seedlots from recent expeditions to Armenia mostly representing native *P. communis* v. *caucasica* and *P. salicifolia*. *P. salicifolia* has been under-represented and was a welcome addition to the *Pyrus* collection.

Status of the NCGR Pear Collection (includes some not available due to quarantine):

- 1635 trees in field (+39 since 2001)
- 1560 clones available for distribution (-68 since 2001)
- 43 non-hardy trees in greenhouse
- 1262 cultivars/selections (1069 are available for distribution, up from 906 in 2001)
 - 134 Asian cultivars (102 are available for distribution, up from 92)
 - 792 European cultivars (699 are available, up from 623)
 - 167 Rootstock selections (139 are available, up from 128)
 - 72 European x Asian hybrids
- 61 clones are maintained in greenhouse as pome fruit pathogen isolates
- 292 total seed accessions (+16 since 2001)
- 190 seed accessions available for distribution (seed count > 125)

***Pyrus* Evaluations and Observations**

We received funding from NPGS in 2002 to assay core pear clones for susceptibility to powdery mildew (*Podosphaera leucotricha* (Ell. & Ev.) Salm.) in collaboration with Robert Spotts at OSU Hood River. More than 200 core clonal genotypes (3 reps each) had previously been propagated on potted seedling rootstock for scab susceptibility evaluation. These trees were taken to Hood River inoculated with powdery mildew, and evaluated for symptoms. Of the 600 inoculated trees, 223 trees had 3 or more mildew infected leaves.

The work on pear scab susceptibility continued by rating core accessions in the NCGR

orchard for symptoms of leaf scab early in the growing season, and for fruit scab in late summer.

The identities of 11 cultivars were verified, either by visiting foreign pomologists, or by comparisons to published literature.

In Vitro Culture and Cryopreservation

By Barbara Reed

The tissue culture lab continues to initiate, multiply, store, and maintain cultures of many accessions in vitro. Accessions are added to the collection as time permits. We are sending accessions to NCGRP for backup in vitro storage and for cryopreservation. We have discarded a large number of cultures because they were contaminated and we are recollecting from the screenhouse and field collections. The new Laboratory Assistant, Janine de Paz, is learning techniques and adding to the collections.

In Vitro Collection Status as of December 10, 2002

<i>Genus</i>	<i>Total in vitro</i>	<i>Meristems Cryopreserved</i>	<i>Axes/Pollen Cryopreserved</i>
<i>Corylus</i> (Hazelnut)	38	0	6 axes/63 pollen
<i>Fragaria</i> (Strawberry)	166	0	
<i>Humulus</i> (Hops)	59	10	12 pollen
<i>Mentha</i> (Mint)	142	0	
<i>Pycnanthemum</i> (Mountain Mint)	8	0	
<i>Pyrus</i> (Pear)	196	106	36 pollen
<i>Ribes</i> (Currant, Gooseberry)	26	4	
<i>Rubus</i> (Raspberry, Blackberry)	193	47	
<i>Vaccinium</i> (Blueberry, Cranberry)	124	0	
Total	952	167	6 axes/111 pollen

We are collaborating with the laboratory of Dr. E.E. Benson at the University of Abertay in Dundee, Scotland on a *Ribes* cryopreservation project. In this project 18 genotypes of 9

species were cryopreserved in a pilot project long-term genebank at the University of Abertay. Only 4 of the 22 genotypes had low or no recovery from the cryopreservation procedure used.

A special international project on the cryopreservation of *Ribes* was initiated with funding from the USDA Foreign Agricultural Service. Scientists from Kazakhstan, Germany, Poland, and the UK were trained in cryopreservation techniques in 2001. In 2002 Dr. Benson and I visited their laboratories and evaluated the initial stages of the project. Collaboration on the in vitro storage and cryopreservation of fruit germplasm with the Kazakh Institute of Horticulture and Viticulture was initiated in 2002. Barbara Reed will be assisting Institute scientists in learning and implementing cryopreservation techniques and storing native germplasm.

We finished the collaboration with Reed Barker on grass cryopreservation in mid 2002. With the assistance of Nan Wang and Jeff D'Achino we cryopreserved 23 *Cynodon* (Bermuda grass) accessions in 2001 and 2002. Posters on the cryopreservation and cold storage of grass germplasm were presented at the 2002 joint meeting of the Society for In Vitro Biology and the International Association of Plant Tissue Culture and Biotechnology.

We began a project funded by the Hop Research Council to cryopreserve 25 core *Humulus* accessions in 2002-2003. Dr. Barbara Reed, Jeff D'Achino and Dr. Nese Okut are working on this project. Core accessions were initiated as needed, multiplied, cold acclimated and cryopreserved by slow cooling.



Storage Dewars for grass and hops cryopreservation

Molecular Genetics

By Nahla Bassil

- **Laboratory establishment.** The genetics laboratory was established and new equipment was tested and is in excellent working condition. Our laboratory is equipped for high throughput DNA extraction and molecular marker analyses including RAPDs, AFLPs and microsatellites. Allele size determination by capillary electrophoresis is carried out at the central services core facility at Oregon State University.
- **DNA extraction.** High throughput DNA extraction methods were tested on four genera, *Corylus*, *Pyrus*, *Fragaria*, and *Vaccinium* that were first identified for molecular analyses.
- **Microsatellite analysis.** Microsatellite analysis was chosen as the molecular marker to use for genetic fingerprinting. Microsatellite-containing sequences for *Corylus*, *Pyrus*, and *Fragaria* were subsequently identified from GenBank. The development of simple sequence repeat (SSR) markers will be carried out using 40 *Fragaria* sequences, and 25 *Pyrus* SSR-containing sequences. Ten *Corylus*, four *Alnus* and twelve *Betula* SSR-containing DNA sequences were identified and will be used to develop microsatellite markers and to study cross-species amplification.
- **Collaborations.** Dr. Jeanine Rowland has generously provided us with unpublished SSR-containing blueberry expressed sequence tags (ESTs). M.S. student Peter Boches has used these EST sequences to develop the first polymorphic microsatellite loci in *Vaccinium* and to determine their usefulness in genetic diversity assessment of the blueberry gene pool, with an emphasis on northern highbush cultivars. Blueberry populations were kindly supplied by Dr. Chad Finn to determine segregation of the microsatellite loci that are developed. We continue to collaborate with Dr. Shawn Mehlenbacher on developing new microsatellite loci obtained from an enriched hazelnut library. Characterization of hazelnut cultivars and species using molecular markers will provide genetic fingerprints for the accessions. The information will be used to assess genetic variability in the collection, and address the many suspected cases of duplication.
- **Graduate Student Project.** Peter Boches designed 25 primer pairs from *Vaccinium* ESTs. The primers were used to amplify DNA from 10 *Vaccinium* species: *V. corymbosum*, *V. corymbosum* L. f. *ashei*, *V. ovatum* Pursh., *V. arboreum* Marshall, *V. oldhami* Miq., *V. elliotii* Chapm., *V. simulatum* Small, *V. virgatum* Aiton, *V. bracteatum* Thunb., as well as in *V.* hybrid ‘Flordablue’. Initial analysis of five highly polymorphic loci in a group of historically important cultivars of *V. corymbosum*, including ‘Pioneer’, ‘Rubel’, ‘Stanley’, ‘June’, ‘Earliblue’, ‘Weymouth’ and ‘Bluecrop’ was congruent with pedigree analysis and successfully distinguished between the closely related ‘Earliblue’ and ‘Bluecrop’. Blueberry ESTs provided SSR loci that will be useful for genetic diversity assessments as well as for cultivar and species identification.

Plant Pathology

By Joseph Postman

- More than 90% of our *Corylus*, *Humulus*, *Pyrus*, and *Vaccinium* **core** collections are available as virus tested plants.
- Medlar (*Mespilus germanica*) cultivars have been found to be commonly infected with apple chlorotic leafspot virus (= pear ringpattern mosaic).
- Blueberry scorch carlavirus has continued to spread slowly in our *Vaccinium* field collection. One infected accession was detected in 2002 and subsequently destroyed. All screenhouse accessions have tested negative.
- Pear core collection was evaluated for resistance to powdery mildew and pear scab.

Corylus- Added 27 clonal hazelnut accessions in 2002. New accessions and untested clones were assayed for Apple Mosaic Virus by ELISA. 94 accessions were tested. A single infected tree was detected which had been recently received from Oregon State University (OSU 693.117). 100% of core accessions and 89% of all accessions have tested negative for ApMV.

Fragaria – Added 22 clonal strawberry accessions. 93 accessions were tested by graft inoculation to Alpine. No new infected plants were detected. Bob Martin's lab has been using our infected strawberry collection to characterize the viruses involved in strawberry pallidosis disease.

Humulus – Added 206 clonal hop accessions. 93 accessions were tested by ELISA for apple mosaic, American hop latent, hop latent and hop mosaic viruses (376 ELISA samples). All new accessions received from the USDA breeding program were tested as well as many of the European accessions in post-entry quarantine. Most of the USDA accessions tested positive for multiple viruses. Only 9 accessions of the 51 from Germany that were tested had positive ELISA results, and these 9 were only infected with hop mosaic virus. The native North American accessions that were received late in the season have not yet been tested.

Mespilus – Added 2 new medlar accessions. 6 accessions were tested by graft bioassay to Nouveau Poiteau pear indicator. Two accessions tested positive for ringpattern mosaic (apple chlorotic leafspot virus) bringing to 9 the number of NCGR medlar clones that are known to be infected with this virus. A heat-treated meristem clone of the Italian cultivar 'Puciu Big' tested negative for ringpattern mosaic and has been added to the collection.

Pyrus - Added 27 clonal pear accessions. 173 bioassays were performed in 2002:
88 accessions tested by graft inoculation to *Malus micromalus*, 1 new infected accession identified
36 accessions tested by graft inoculation to Nouveau Poiteau, 7 new infected accessions identified
49 accessions tested by graft inoculation to *Pyronia veitchii*, 7 new infected accessions identified

Rubus – Added 7 new clonal accessions. Performed 458 ELISAs to detect raspberry bushy dwarf virus (139 assays), tomato ringspot nepovirus (138 assays), tobacco streak ilarvirus (92 assays)

and tobacco ringspot ilarvirus (89 assays). No new infected accessions were identified. Detected TomRSV in wild collected *Rubus hawaiiensis* from Maui in collaboration with Bob Martin. This may be the first report of that virus on the Hawaiian Islands.

Vaccinium – Performed 497 ELISAs on field and screenhouse plants to detect blueberry scorch carlavirus (331 assays), tobacco streak ilarvirus (135 assays), and tomato ringspot nepovirus (31 assays). One field plant (Avonblue) along with adjacent plants was destroyed after it tested positive for the scorch carlavirus, indicating that this virus has not yet been eliminated from our field planting.

Summary of Clonal Collections and Virus Status Updated 1 May 2003

	Total Plants	Change Since Last Year	Percent Virus Tested	Percent Virus Infected	Percent Untested	Core Plants	Percent Virus Tested Core	Percent Virus Infected Core
<i>Corylus</i> :	584	+27	89.0	0.7	10.3	172	100.0	0.0
<i>Cydonia</i> :	84	+20	19.00	4.8	76.2	45	28.9	8.9
<i>Fragaria</i> :	1239	+22	62.9	16.4	20.7	500	80.0	14.0
<i>Humulus</i> :	474	+206	28.5	2.7	68.8	90	91.1	5.6
<i>Mentha</i> :	428	0	3.0	4.0	93.0	50	14.0	2.0
<i>Mespilus</i> :	23	+2	52.2	30.4	17.4	16	50.0	43.8
<i>Pyrus</i> :	1658	+27	75.3	8.1	16.6	198	90.4	8.1
<i>Ribes</i> :	753	+113	4.3	11.2	84.5	208	4.8	13.0
<i>Rubus</i> :	718	+7	85.8	8.9	5.3	251	88.4	10.0
<i>Vaccinium</i> :	638	+96	71.9	0.5	27.6	234	91.5	0.4

"Virus Tested" includes plants that have tested negative for several important viruses, and plants that have been produced by heat-therapy and meristem culture.

This table DOES NOT include duplicate accessions or misidentified plants.

This table DOES include accessions that are not available due to quarantine, insufficient inventory, or virus infection.

Field Operations

By Joe Snead, Ray Gekosky, and Bob Pucillo

It was a very productive year in the field. We were aided by a dry fall and year end. We were also able to accomplish some extra tasks because of some volunteer help in the spring.

***Corylus* Field**

- Revised field locations scheme to allow for sequential number of future rows
- Relabeled entire collection to the new field locations
- Transplanted large field specimen trees from Dr. Shawn Mehlenbacher.
- Started a new section of field in old *Rubus* block and added drip irrigation system
- Planted 44 new accessions from Dr. Mehlenbacher
- Hedged one side of each row to promote scionwood growth
- Used propane burner to control weeds in plant row
- Used Rinieri in row cultivator to control weeds during summer
- Reduced herbicide use by at least 66%
- Used the propane burner reduced herbicide or hand labor in sucker control.

***Fragaria* Field**

- Cleaned field up for spring evaluations
- Herbicided the field after fruiting season
- Mowed plants down and rototilled beds
- Worked the ground and seeded turf in the fall

Old *Rubus* Seedling block

- Reclaimed old *Rubus* seedling block from Small Fruits Breeding program
- Worked on weed control all summer long
- Worked ground extensively in fall
- Planted cover crop in fall
- More weed control needed before future use for plot land

***Vaccinium* Planting**

- Relabeled entire field
- Propane burner was used several times to control spring weed flush.
- Hand held propane and tractor mounted burner used to burn back horsetail
- Significant reduction of herbicide use, summer spot sprays only
- Ten accessions planted in the field in 2002

***Pyrus* Field**

- Finished topping last 40% of species collection and removed brush.
- Topped entire cultivar collection and removed brush
- Hedged one side of the entire planting to promote scionwood growth
- Raised the lower branch canopy of all the species trees

- Relabeled entire pear collection
- In the fall detail pruning of 30 % of the cultivar collection
- Removed about twenty duplicates from the field
- Dug stumps to accommodate new tree planting
- Sixty two new trees were planted in 2002
- Used propane burner twice to control early spring weeds
- Used Rinieri in the row cultivator for summer weed control
- Reduced herbicide use by 66%
- Used a new reduced risk codling moth attractant. Controlled two generations with good success. Missed the third generation.
- Significantly reduced populations of pocket gophers and ground squirrels.
- Collected perry pear samples for plant requests.

***Actinida* Field**

- Trained plants to a cordon system as they grew to the center wire.
- Used propane burner for early season weed control
- Use frost protection for first time in spring of 2002
- Installed drip system to supplement overhead irrigation
- Relabeled plants
- Added twenty-two plants in the fall
- Installed tree guards for winter protection

***Ribes* Field**

- Used propane burner for early spring weed control
- Expanded field area in cultivar section to accommodate future growth
- Worked ground in expansion area and planted turf
- Contacted Corvallis disposal for 5 loads of leaves for mulching

***Ribes* Research Field**

- Balled and burlapped specimen plants for distribution order.
- Undercut planting and removed barerooted plants
- Sprayed out field
- Subsoiled, plowed and disked the field in the fall
- Final prepped the ground with several passes with the Roterra
- Seeded grass and fertilized in the fall

***Asimina* Field Trial**

- Removed variety trial research planting.
- Retained examples of specific genotypes

Proposed *Pyrus* Species Field

- Worked 7.5 acres ground for pre-planting preparation
- Planted about 5.5 acres of turf that will be used for plot ground in 2003

- Planted two acres a cover crop

Other New Plot Ground

- Maintained the old back forest area on north farm
- Prepared additional ground for Dr Fisher next to his *Fragaria* plot
- Cleared about an acre of stumps and roots
- Rough graded the area and left it to settle over the winter

North Farm Activities

Fencing

- Planned replacement of fence line
- Contacted neighbors
- Cleared land of brush, blackberries, and some trees in preparation
- Had land surveyed and marked for fencing

Irrigation Pipe Storage

- Installed gravel road to and around irrigation racks
- Built Cedar storage building close to racks for fitting storage

North Farm Entrance

- Filled area between road and fence with soil and replanted turf
- Built up planting beds outside of front gate and mulched the area

Cooperative Efforts

- Moved excess river rock using dump truck and tractor.
- Removed excavation soil from greenhouse construction site.
- Removed greenhouse waste soil pile.
- Mowed grass on a regular basis around greenhouse area.
- Reseeded the turf area torn up by greenhouse construction

Plant Distribution

By Bruce R. Bartlett

- 3,007 items were shipped as seeds, cuttings, runners, scionwood, rooted plants and tissue culture.
- 481 tissue cultured accessions, from eight genera, were sent to the Center for Plant Genetic Resources and Preservation in Ft. Collins, Colorado as backup.
- 18 *Corylus* plants were sent to the National Arid Land Plant Germplasm Resources Unit in Parlier, California for backup.
- 75% of accessions requested in 2002 have been shipped.
- 21% of all items shipped were sent to foreign requestors.

- Seed (24%) and tissue culture (23%) were the top two forms shipped to foreign requestors.
- 69% of total accessions shipped in tissue culture form were sent to foreign requestors (not including tissue culture accessions sent to CPGRP).

In 2002 the NCGR-Corvallis distributed a record number of accessions – more than any other year of the 22 years that the Repository has been in existence. We distributed 3,007 items as seeds, cuttings, runner, scionwood, rooted plants and tissue culture from 2002 requests (Fig. 2). This represents 75% of the total number of items requested for 2002. Additional material will be shipped in CY 2003 from 2002 requests.

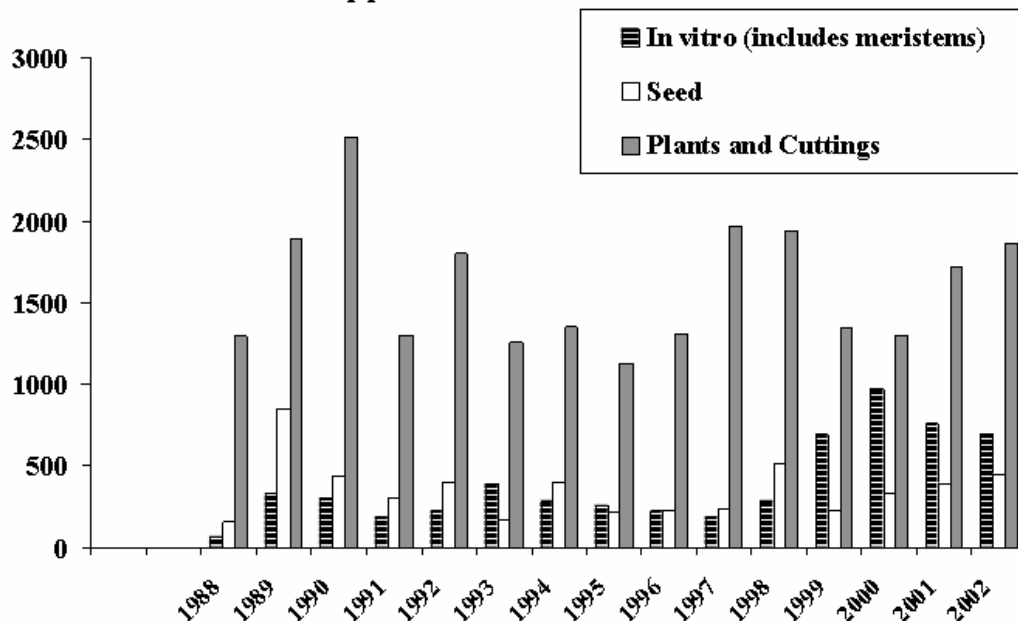
Nine items from request year 1999 were shipped, 11 from 2000, 728 from 2001, and 2,267 from 2002. Domestically, plant items from *Pyrus*, *Fragaria* and *Vaccinium* in decreasing order were sent the most. Internationally, the order was *Fragaria*, *Vaccinium* and *Rubus* with *Pyrus* being fourth. Due to concerns with fire blight (*Erwinia amylovora*) *Pyrus* is primarily sent as tissue culture or seed to foreign requestors.

The total postage paid for domestic and international shipping was \$1,356.71 (Table below). The total cost for Federal Express was \$1,706.89 and the total paid to the Oregon Department of Agriculture for 50 Phytosanitary Certificates was \$500.00. Domestic and international shipping costs were higher in CY 2002 due to the adoption of using Federal Express (Priority Overnight) domestically instead of USPS Priority and USPS Global Express Mail Service for international packages instead of USPS international airmail.

Expenditures for Plant Distribution from 2002-1995.

Year	Total Items Shipped	Postage \$	FedEx \$	PC's \$	Total \$	Shipping cost per Item \$
2002	3007	1,356.71	1,706.89	500.00	3,563.60	1.19
2001	2875	1,107.98	947.68	450	2,505.66	0.87
2000	2602	1,159.31	742.14	460	2,361.45	0.91
1999	2260	1,222.24	433.73	620	2,275.97	1.01
1998	2743	1,037.54	735.41	410	2,182.95	0.81
1997	2632	1,622.35	619.73	800	3,042.08	1.16
1996	2028	1,656.15	330.06	700	2,686.21	1.32
1995	1974	1,523.23	135.78	556	2,215.01	1.12

Number of Items Shipped



Screenhouse/Greenhouse Collections By Jim Oliphant

- Propagation and regeneration of 806 accessions *Fragaria*, *Mentha*, and *Rubus*.
- Rearrangement of *Fragaria* benches to accommodate more accessions. Replacement of old metal benches with plastic benches.
- Continued efforts to increase screenhouse/greenhouse integrity against aphid entry.

ACTINIDIA

Actinidia is a new genus that is being established in the field. Our plan is to maintain a back-up collection in the screenhouse at least until the field plants are established. Of the 138 clones received 77 are established in the screenhouse.

CORYLUS

Temporary back-up trees of all new young field trees and virused 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, 119 accessions are being maintained, 50 are in quarantine and 37 are for tissue culture.

FRAGARIA

All clonal accessions of *Fragaria* are maintained under screen. We are continuing our 3-year repropagation cycle using runners. In 2002, 490 accessions were runner propagated, hot water treated, and replaced in the collection. Currently, only 303 accessions with crowns older than 3-years remain to be repropagated.

HUMULUS

All virus free core clonal accessions of *Humulus* are maintained in the screenhouse. Currently, 125 virus free clones are established in the screenhouse and 117 wild American seedlings are being evaluated in the greenhouse.

MENTHA

All clonal accessions of *Mentha* are maintained under screen. We are continuing our 3-year repropagation cycle via cuttings. In 2002, 122 accessions were propagated and replaced in the collection. Currently, only 4 accessions with crowns older than 3-years remain to be repropagated.

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. Of the 102 clones in the screenhouse, 41 are non-hardy and 59 are virus isolates.

RIBES

All core or non-hardy clonal accessions of *Ribes* are maintained under screen. To date, 206 of the 218 core accessions are established in the screenhouse.

RUBUS

All clonal accessions of *Rubus* are maintained under screen. We are continuing our 3-year repropagation cycle via cuttings, tip layers, or root division. In 2002, 194 accessions were propagated and replaced in the collection. Currently, 286 accessions with crowns older than 3-years remain to be repropagated.

VACCINIUM

Our goal is to maintain all core, named cultivars, and non-hardy clonal blueberry under screen. Additionally, all lingonberry and cranberry accessions are also maintained under screen. Currently, 366 of an estimated 385 accessions are established in the screenhouse.

Clonal Accessions maintained in the Greenhouses and Screenhouses as of April 2003

	Total # Accessions	Core		Available		Single Plants With No Back-Up		Square Feet Occupied		Expansion Space		
		# Ac.	%	# Ac.	%	# Ac.	%	Sq. Ft.	% Total	Sq. Ft.	% Total	# Pots
<i>Actinidia</i>	120	0	0	100	83	22	18	490	2.7	0	0	0
<i>Corylus</i>	119	43	36	62	52	49	41	70	0.4	0	0	0
<i>Fragaria</i>	1291	505	39	1253	97	578	45	5711	31.7	385	3.3	132
<i>Humulus</i>	294	86	29	289	98	248	84	700	3.9	0	0	0
<i>Mentha</i>	434	51	12	432	100	282	65	1155	6.4	35	0.2	12
<i>Pycnanthemum</i>	32	20	62	32	100	0	0	175	1.0	35	0.2	10
<i>Pyrus</i>	285	25	9	178	62	118	41	350	1.6	0	0	0
<i>Ribes</i>	371	212	57	307	83	46	12	1155	6.5	140	0.9	48
<i>Rubus</i>	716	250	35	669	93	115	16	4430	24.2	260	1.5	154
<i>Vaccinium</i>	388	209	54	369	95	140	36	2590	14.1	210	1.7	60
Other¹	103	13	13	43	442	74	72	140	0.8	0	0	0
Total	4153	1414	34	3734	90	1672	40	16966	94.1	1065	5.9	416

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

Quarantined Plants

At this time we have 367 accessions in quarantine.

- 4 *Actinidia* accessions.
- 43 *Corylus* accessions. 16 accessions are in post entry, 27 accessions in State of Oregon Quarantine.
- 8 *Fragaria* accessions on Departmental Permit
- 1 *Mespilus* accession.
- 254 *Pyrus* accessions: all Provincial Release accessions
- 43 *Ribes* accessions: 10 accessions have not been released, 33 accessions have been released by APHIS but are being maintained as “in-house quarantine” because of their virus status.
- 4 *Rubus* accessions.
- 9 *Vaccinium* accessions.

Quarantined Plants

At this time we have 367 accessions in quarantine.

Status of Quarantined Accessions at the Repository

Genus	Federal	State	In-House
<i>Actinidia</i>	4 Post Entry		
<i>Corylus</i>	16 Post Entry	27 Director's Exempt.	
<i>Fragaria</i>	8 APHIS Dept. Permit		
<i>Mespilus</i>	1 Post Entry		
<i>Pyrus</i>	254 Provisional Release		
<i>Ribes</i>	10 Post Entry		33 NCGR
<i>Rubus</i>	4 Post Entry		
<i>Vaccinium</i>	9 Post Entry		
Totals	307	27	33

E. Publications and Presentations

Journal Articles

1. Gulen H., Arora, R., Kuden, A., Krebs, S. L. and **Postman, J. D.** 2002. Peroxidase isozyme profiles in compatible and incompatible pear-quince graft combinations. *J. Amer. Soc. Hort. Sci.* 127(2):152-157.
2. **Hummer, K.** and **Picton, D. D.** 2002. Pine blister rust resistance screening in *Ribes* germplasm. *Acta Horticulturae* 585(1):287-291.
3. **Hummer, K. E.** 2002. As American As Blueberry Pie. *Fruit Gardener* 34 (3): 6-7, 13.
4. **Hummer, K. E.** 2002. Maxine Thompson, Wilder Medal Winner. *J. Amer. Pom. Soc.* 56(4):242-243.
5. **Hummer, K. E.** 2002. Review of “Compendium of Nut Crop Diseases in Temperate Zones.” *HortTechnology* 12(3):519-520.
6. **Hummer, K. E.** 2002. Wild Berries of the West – A Review. *Fruit Gardener* 34 (3):13.
7. **Hummer, K. E.** 2002. Currants. In: W. Okie (ed.) Register of New Fruit and Nut Varieties list 41. *HortScience* 37(2): 256.
8. **Hummer, K. E.** and Barney, D. 2002. Currants: Comprehensive Crop Report. *HortTechnology* 12(3):377-387.
9. **Hummer, K. E.** and Lagerstedt, H. B. 2002. ‘Ennis’ Hazelnut. *J. Amer. Pom. Soc.* 56 (4):194-196.
10. **Hummer, K. E.** and **Picton, D. E.** 2002. Comparison of Control of Powdery Mildew in Gooseberries. *Proceedings of the Northwest Center for Small Fruits Research.* 10:26-27.
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12. Moyer, R. K., **Hummer, K.**, Wrolstad, R., Finn, C. 2002. Antioxidant compounds in diverse *Rubus* and *Ribes* germplasm. *Acta Horticulturae.* 585(2):501-505.
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14. Okie, W. R. and **Postman, J. D.** 2002. A directory of cultivars listed in the ‘Brooks and Olmo’ Register of Fruit and nut varieties since 1994. <http://hortweb.cas.psu.edu/aps/register.html>
15. **Postman, J. D.** 2002. Pears – European. In W. R. Okie (ed.). Register of New Fruit and Nut Varieties – Brooks and Olmo List 41. *HortScience* 37(2):260-262.
16. **Postman, J. D.** 2002. Hazelnut diseases caused by viruses, p. 49 in B. Teviotdale, T. J. Michailides and J. W. Pscheidt (eds.) Compendium of Nut Diseases in Temperate Zones. APS Press, American Phytopathological Society, St. Paul, MN.
17. **Postman, J. D.** and Sugar, D. 2002. Elimination of viruses from the USDA *Pyrus* germplasm collection. *Acta Horticulture.* 596: pp 529-530.
18. **Reed, B. M.** 2002. Photoperiod Improves Long-Term Survival of In-Vitro Stored Strawberries. *HortScience* 37: 811-814.
19. **Reed, B. M.** and **Hummer, K. E.** 2002. Genetic stability of strawberries in culture. pp. 98-101. In: S. Hokanson and A. Jamieson, (eds.) Strawberry Research to 2001. Proceedings of the 5th Strawberry Research Workers Conference. ASHA Press. Alexandria, VA.

20. **Reed, B. M.** 2002. Implementing Cryopreservation for Long-Term Germplasm Preservation in Vegetatively Propagated Species, p. 22-36. In: L. E. Towill and Y. P. S. Bajaj (eds.) *Biotechnology in Agriculture and Forestry: Cryopreservation of Plant Germplasm II*, Vol. 50. Springer-Verlag, Berlin.
21. **Reed, B. M.** and **K.E. Hummer**. 2002. Cryopreservation of *Ribes*, p.323-343. In: L.E. Towill and Y.P.S. Bajaj (eds.). *Biotechnology in Agriculture and Forestry: Cryopreservation of Plant Germplasm II*, Vol. 50. Springer-Verlag, Berlin.
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23. **Tsao, C.W.V.** and **B.M. Reed**. 2002. Gelling Agents, Silver Nitrate, and Sequestrene Iron Influence Adventitious Shoot and Callus Production from *Rubus* Leaves. *In Vitro Cellular and Developmental Biology – Plant* 38:29-32.

Abstracts and Presentations

1. **Aynalem, H. M.**, R.E. Barker, and **B.M. Reed**. Cold Storage of Micropropagated Bermuda grass. International Association of Plant Tissue Culture and Biotechnology. June 2002.
2. Benson, E.E., G. Sherlock, D. Dumet, **B.M. Reed**, J. M. DeNoma, W. Block, R. Worland, and H. Staines. Cryopreservation of *Ribes* species. IIR International Conference with the Society for Low Temperature Biology, May 13-15, Czech Republic. 2002.
3. **Picton, D.** and **Hummer, K. E.** RAPD markers for the Cr gene for resistance to *Cronartium ribicola* in *Ribes nigrum*. 2002. *Phytopath.* 92LS65. Pub. No. P-2002-0472-AMA.
4. **Postman, J.** 2002. Small Fruit Collection Updates. Western Small Fruit Pest Conference. Blaine, Washington, January 10-11.
5. **Reed, B.M.**, **N. Wang**, **J. D’Achino**, and R.E. Barker. In Vitro Preservation of Bermuda Grass Germplasm. In Vitro Preservation of Bermudagrass. International Association of Plant Tissue Culture and Biotechnology. June 2002.

Websites

1. **Hummer, K. E.** and **Postman, J. D.** 2002. <http://hortweb.cas.psu.edu/aps> Pomology web site managed for the American Pomological Society. (revisions and updates)
2. **Hummer, K. E.** and **Postman, J. D.** 2002. <http://www.ars-grin.gov/cor> Website for the USDA ARS National Clonal Germplasm Repository at Corvallis, Oregon. (revisions and updates)

F. Information Management/Computer Operations

Computer/Information Management

By Doug Cook and Kim Hummer

A major improvement in internet communication arrived with a full T-1 connection to Oregon State University. Data transfer rates increased from 56 kb/s to 1.5 Mb/s. New computer workstation replacements were purchased this year. In total, eighteen of twenty-seven workstations operate with Pentium (P2) or higher CPU's (with memory at 64 megabytes or higher) operating with Windows® 95/98/ME/2000/XP. All workstations are equipped with uninterruptible power, anti-virus and firewall protection. Security for the network fileserver and internet connectivity infrastructure was improved by placing the equipment in a windowless locked room. Fileserver backup data are stored on CDs at a secure off-site ARS building. Minor computer configuration repairs took place.

GRIN Area	Created	Modified
Accession/Inventory	1,719	1,226
Observations	121	0
Distribution/Cooperator	4,339	1,682
Total	6,179	2,908