

**ANNUAL REPORT FOR [CY 2004](#)**  
**USDA ARS**  
**National Clonal Germplasm Repository**  
**33447 Peoria Road, Corvallis, OR 97333-2521**  
**Phone 541.738.4200 FAX 541.738.4205**  
[khummer@ars-grin.gov](mailto:khummer@ars-grin.gov)  
<http://www.ars-grin.gov/cor>

Permanent **Federal Staff**

**Bruce Bartlett**, Ag. Sci. Tech., Plant Distribution  
**Nahla Bassil**, Geneticist-Plants  
**Douglas Cook**, Computer Specialist  
**Raymond Gekosky**, Ag. Sci. Tech. Field  
**Kim Hummer**, Research Leader/Curator  
**James Oliphant**, Bio. Sci. Tech., Greenhse. Mgr.  
**Carolyn Paynter**, Bio. Sci. Tech., Tissue Culture  
**Yvonne Pedersen**, Secretary  
**Joseph Postman**, Plant Pathologist/Pear Curator  
**Barbara Reed**, Research Plant Physiologist  
**Joe Snead**, Ag. Sci. Tech., Field Manager  
**Dennis Vandever**, Facilities Manager

**Temporary Staff and Students**

**Marley Adkins**, Office, Wk. Study  
**Patricia Compton**, Bio. Sci. Aid, Seed Lab  
**Stacy Cook**, Bio. Sci. Aid, Seed Lab  
**Tristan Conway**, Bio. Sci. Aid, Tissue Culture  
**Jeffrey D'Achino**, Bio. Sci. Aid, Tissue Culture  
**Janine de Paz**, Bio. Sci. Tech, Tissue Culture  
**Andrew Fisher**, Bio. Sci. Aid, Greenhouse  
**Melissa Fix**, Ag. Sci. Aid, Greenhouse  
**Jason Fumasi**, Ag. Sci. Aid, Plants  
**Barbara Gilmore**, Bio. Sci. Tech, Genetics  
**Skylar Hartwig**, Work Study, Greenhouse  
**Jennifer Holbert**, Bio. Sci. Res. Aide  
**Jason Hotchkiss**, Bio. Sci. Aid  
**Ryan Kelso**, Field, Wk. Study  
**Kayly Lembke**, Bio. Sci. Aid, Sat. Academy  
**Andrew Lurcero**, Wk. Study, Tissue Culture  
**Isabela Mackey**, Bio. Sci. Tech., Genetics  
**Sonja McMackin**, Bio. Sci. Aid, Tissue Culture  
**Taza Munci-Jarvis**, Bio. Sci. Aid, Wk. Study  
**Christine Neou**, Bio. Sci. Aid, Genetics  
**Meghan Oakes**, Ag. Sci. Aid, Plants  
**Nick Olszyk**, Bio. Sci. Aid, Tissue Culture  
**Jack Peters**, Plant Physiologist, Seed Lab



**Temporary Staff and Students (cont.)**

**Astrid Peterson**, Computers, Wk. Study  
**Mamta Sircar**, Bio. Sci. Aide, Tissue Culture  
**Debra Tyson**, Ag. Sci. Aid, Greenhouse  
**Marisa Wahnsiedler**, Work Study, Tissue Culture  
**Deborah Provenzano**, Receptionist  
**Corey Robbins**, Bio. Sci. Aid, Field  
**Laura Schumacher**, Bio. Sci. Tech, Tissue Culture  
**Zak Weinstein**, Seed Lab, Sat. Academy  
**Tyler Young**, Bio. Sci. Aid, Greenhouse

**Graduate Students and Visiting Scientists**

**Hailu Aynalem**, GRA, Tissue Culture  
**Peter Boches**, GRA, Genetics  
**Nina Castillo**, GRA, Horticulture  
**Sandhya Gupta**, NBPGR, India  
**Andrey Sabitov**, VIR, FEES, Russia  
**Jodi Smith**, GRA, Horticulture  
**Esther Uchendo**, GRA, Horticulture  
**Nan Wang**, GRA, Horticulture

**Collaborators**

**Maxine Thompson**  
**Francis J. Lawrence**

# Annual Report for Calendar Year 2004

## Table of Contents

- Repository Staff
- Major Accomplishments
  - Service
  - Research
- Administration
  - Budget and Staffing
  - EEO/CR/Outreach
- Facilities and Security
- Awards
- Training
- Promotions
- Travel
- Visitors

### Germplasm Collections and Research

- In vitro culture/Cryopreservation
- Molecular Genetics
- Plant Pathology and Tree Fruit Collections
- Field Operations
- Plant Distribution
- Screenhouse/Greenhouse Collections
- Quarantined Plants
- Seed Program
- Information Management/Computer Operations
- Publications and Presentations

## Major Accomplishments for 2004

### Service

1. Dr. Kim Hummer, Research Leader, and hop breeder Dr. John Henning (ARS National Forage Seed Lab) **convened the First International ISHS *Humulus* (hops) Symposium** from August 1 through 7, 2004, in Corvallis. More than 100 participants from 13 countries attended. Hop researchers presented 22 oral and 15 posters, sharing the latest information on hop production, genetics, pests and diseases. They toured hop germplasm and breeding projects and research laboratories in the Pacific Northwest. The symposium was co-sponsored by USDA/ARS, the International Society for Horticultural Science (ISHS), Oregon State University, the Hop Research Council, Anheuser Busch Inc., Heineken, and John I. Haas Inc.

2. For the second year in a row, Bruce Bartlett, Plant Distribution Manager, broke records for distribution, **shipping 3,091 items for 402 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. **DNA shipments emerged as the most shipped form of germplasm for foreign requestors this year.**

3. Joseph Postman (USDA/ARS National Germplasm Repository, Corvallis, Oregon), Paul Meyer (Morris Arboretum, Philadelphia, Pennsylvania), Marina Mosulishvili (Institute of Botany, Tbilisi, Georgia) and Giorgi Arabuli (State Museum of Georgia, Tbilisi, Georgia) participated in a **plant germplasm expedition to the Republic of Georgia**. Eight of 18 provinces were visited from September 19 to October 10, 2004. The team collected 136 plant and seed samples, and 94 herbarium vouchers representing 43 different plant genera. Seed and plant samples have been deposited at appropriate USDA/ARS Germplasm Repositories for conservation, and also shared with arboretums, botanic gardens and researchers.

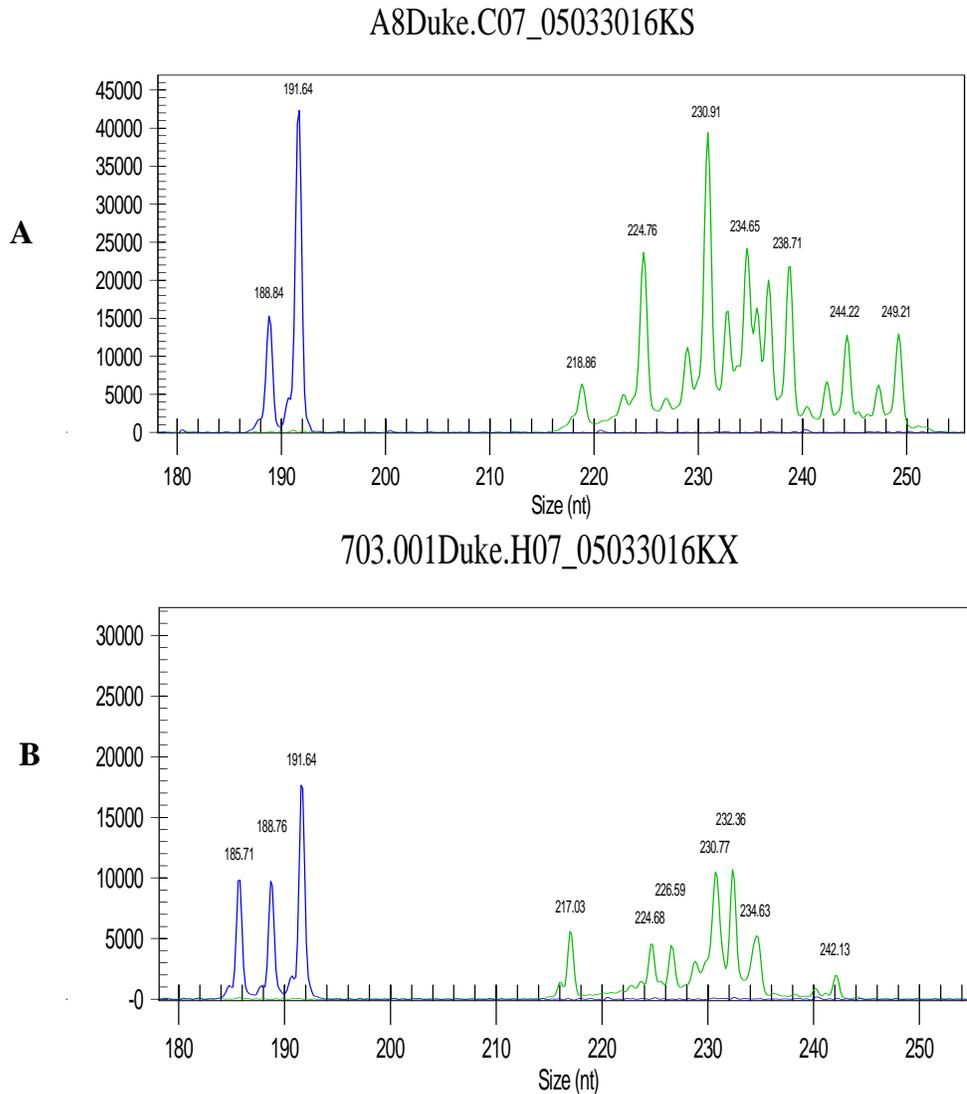
4. Dr. Kim Hummer (USDA/ARS NCGR, Corvallis), Dr. Tom Davis (University of New Hampshire), Dr. Hiroyuki Iketani (National Institute of Fruit Tree Science, Japan), and Dr. Hiroyuki Imanishi (Akita University, Japan) participated in a **plant germplasm expedition to Hokkaido, Japan**, to collect genetic resources of temperate small fruits from July 7 through July 28, 2004. This was under a bilateral agreement between the USDA ARS and the MAFF in Japan. They collected 100 seed and plant samples of temperate fruits, including *Actinidia* (hardy kiwifruit), *Fragaria* (strawberry), *Ribes* (currant), *Rubus* (blackberry and raspberry) and *Vaccinium* (blueberry and cranberry).

### Research

1. Dr. Barbara Reed and her laboratory developed a **modified encapsulation-dehydration cryopreservation protocol** based on the replacement of cold acclimation with high-sucrose pretreatment for the long-term storage of ***Ribes* germplasm**. Screening genotype responses at the time of storage demonstrated regrowth  $\geq 60\%$  for 15 genotypes, and only 4 genotypes had regrowth of 0 to 28%. Additional genotypes were added to the USDA cryopreserved *Ribes* collection.

2. Dr. Nahla Bassil and her graduate student, Peter Boches, developed microsatellite markers in blueberry. These **molecular markers for blueberry are now publicly accessible on GRIN**.

This took a team effort between our molecular genetics laboratory, our IT staff and the GRIN team in Beltsville. SSR marker descriptors (13) for 56 cultivars of blueberry were uploaded. These data can be seen at: [http://www.ars-grin.gov/cgi-bin/npgs/html/desc\\_form.pl?111](http://www.ars-grin.gov/cgi-bin/npgs/html/desc_form.pl?111) Besides making this fingerprinting data publicly available to blueberry researchers, this provides a structure that other Repositories could use, should they choose to upload molecular data to the GRIN system for their crops. These markers are now being used by blueberry researchers and growers for cultivar identification.



**Fig. 1.** Fragment analysis of mis-labeled Chilean ‘Duke’ (A) and authentic ‘Duke’ maintained at the NCGR (B) at the two SSR loci NA961 (green) and VCC\_J1 (blue).

3. Dr. Reed and her laboratory characterized the **response of 12 diverse *Humulus lupulus* L. genotypes to the iron formulation used in the growth medium** during medium-term cold storage. In standard storage conditions the average length of storage for hops is  $14.1 \pm 3.5$  months. Evaluation of 12 genotypes after 6 months indicated that the plantlets grown with standard MS iron were greener and growth-condition ratings (mean  $>4$ ) were similar to the initial ratings (5). Plants on either concentration of sequestrene iron declined at both 3 and 6 months

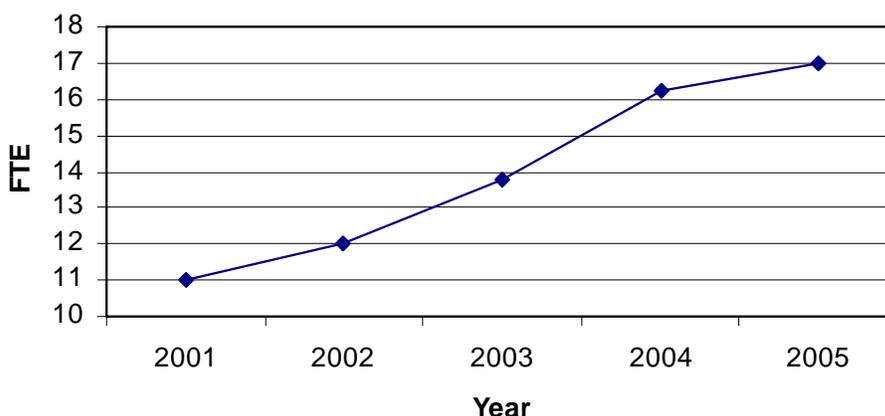
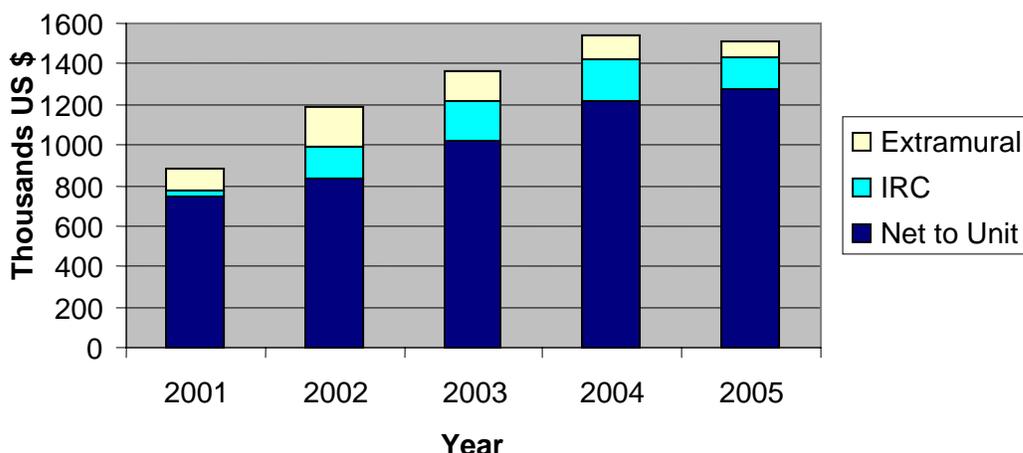
(mean <3). Decline in growth condition was much greater for several genotypes stored on medium with sequestrene irons than those on MS iron.

4. Drs. Andrey Sabitov, Tom Davis and Kim Hummer confirmed that **wild strawberries collected from Iturup Island, Russia, in 2003, were *Fragaria iturupensis* Staut**, the only known native Asian octoploid species. These strawberries, along with other wild strawberry species from the Kurile Islands and Japan, could provide insight to the phylogeny of the American octoploid strawberry genome.

5. Joseph Postman, working in collaboration with Yannis Tsanetakis and Bob Martin, detected 6 viruses in the NCGR mint collection. **Three viruses, not previously reported from mint in North America, were detected in a variegated *Mentha* × *gentilis* clone.** Genomic sequences indicated that one was a new potexvirus, the second was a new closterovirus and the third virus was *strawberry latent ringspot virus* (SLRSV), a European virus not previously known to occur in North America.

6. Dr. Kim Hummer and Jodi Smith **evaluated more than 2100 wild hop seedlings for resistance to powdery mildew.** Specific lots from Manitoba, Saskatchewan, and North Dakota had high percentages of foliar resistance in the greenhouse. Many of these showed foliar and cone resistance in the field. Three Kazakhstani seedlings demonstrated an unusual hypersensitive response and will be tested further for potential germplasm release.

### NCGR Funding



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

Amount	Purpose	Source
7,500	Pear/Apple identification Azores – Nahla/Kim	DOD
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 – Barbara Reed	ARS-OIRP
3,000	Travel grant for presentation in Argentina	RED BIOS, Argentina
3,500	Travel grant for Azores Technical Review	DOD
74,700	Total	

## **FY 2004**

24,500	Blueberry Evaluation for molecular markers	NW Center for Small Fruit
11,000	Former Soviet Union Science Cooperative program	ARS-OIRP
20,000	Evaluate hops for powdery mildew	HRC
27,880	Mint virus identification	MIRC
20,000	Japan plant collection	USDA Exploration Grant
16,000	Georgia plant collection	USDA Exploration Grant
<hr/>		
119,380	Total	

### **Administrative overview**

#### **Staffing Changes**

We had two permanent technical staff changes during CY 2004. Carolyn Paynter, Biological Science Laboratory Research Technician, who worked in support of Dr. Barbara Reed's laboratory, retired after 16 years of service. Also, Raymond Gekosky, Agricultural Science Research Technician, who worked with Joe Snead to maintain the field collections for 12 years, resigned to take a job with the U.S. Forest Service in Colorado. Both of these folks devoted many years to the Repository team and mission and will be sorely missed. We wish both well in their future endeavors. Deb Provenzano, our part-time Receptionist, finished her two-year term appointment in February 2005. We thank her greatly for filling the interim vacancy prior to the recruitment of our permanent secretary, Yvonne Pedersen. We recently recruited Jeanine DeNoma to replace the Carolyn Paynter position. Missy Fix was selected as a permanent Agricultural Science Research Technician a new position established to work in our Greenhouse/Screenhouses; we are in the process of recruiting for a term Agricultural Science Research Technician for the field crops.

#### **Budget and Fiscal**

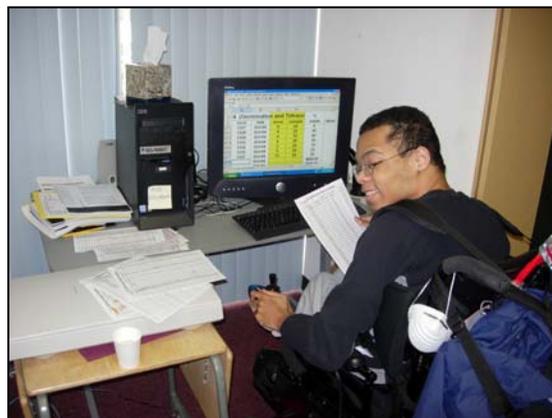
The FY 2006 Presidential budget proposed about 20% cut that would eliminate our molecular marker identification program (Congressional add-on in FY 2002.) We hope that these funds will be reinstated. We anticipate a non-program specific, across the board cut of a lesser degree, at the end of FY 2005. To accommodate such budget cut we would eliminate student or part-time positions. Our scientists continue to seek extramural funding for graduate students and additional research projects.

### **View from the Front Office**

The Repository is maturing beyond its teen-age years: it's been 23 years since our 1981 dedication and 25 years since ground was broken for facilities construction. The Repository collections and staff have achieved international recognition for representing global genetic diversity for our eight major genera. Crop committees have defined core collections and are proceeding to address gaps in species with planned plant collecting expeditions. Evaluations of plant materials are progressing and emphasize documentation of horticultural identity through morphology, digital images and molecular marker analysis. Plant distribution is increasing to record levels despite increased quarantine challenges. DNA was the most frequent form of distribution to foreign requestors this past year due to several collaborative research projects! Great concerns continue for the security of the collections because of newly emerging diseases. Funding is sufficient but looming cuts portend upcoming challenges to the operation. The innovative staff is dedicated to the mission and will approach the future with experience and vigor. The Repository's mission stands in strong support of the new age of Specialty Crops in American Agriculture.

## EEO/CR/Outreach

The unit's federal permanent and term staff totals 16.25 FTE. During FY 2004 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 75% female 12% Hispanic and 25% Asian employees. Our three graduate students in training include 1 of Ethiopian extraction, 1 female, 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 also work with The Native American Marine and Social Science (NAMSS) program at Oregon State University to train Native American Students in the sciences. We are actively working with private, Oregon State Vocational Rehabilitation and high school programs in recruitment, hiring and training of disabled individuals, such as Tyler Young, Bio.Sci. Aid (**photo to right**).



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. In August 2004, we completed a collaboration with Kentucky State University on a 5-year 1890's Capacity Building Grant for evaluation of *Asimina* (Pawpaws) for antioxidants.

Dr. Barbara Reed, our Plant Physiologist, was selected for PWA EEO Supervisor award for 2004, for her mentorship of students in the study of science and technology.

## Facilities and Security

By Dennis Vandever and Kim Hummer

In January 2004 we had several days of snow and freezing rain. Unfortunately, we lost a pipe due to freezing. Jeff Hayes, Physical Security Specialist, ARS Homeland Security, and his team visited in September. They proposed a number of security upgrades for the facilities at NCGR. The ARS homeland security office will provide funding for these upgrades.

Major accomplishments for 2004 include:

- Removal of the double doors in the group office for security and environmental concerns.
- Replacement of ceiling tiles, flooring and painted the group office to improve the working environment.
- Installation of a world map in the lobby area and framed to the wall. It can be seen from the parking lot and add to the appearance of the area.
- Replacement of the ceiling tiles, wall paper and cove base in the lobby and hallways; numerous failed office windows were replaced.
- Replacement of the East fence line on the N. farm.
- Replacement of the north farm gate with an electronic controlled, power gate. This system includes both keypad and card lock access. The gate now stays closed at all times.
- Certification of the fire and burglar alarm systems, generator load testing and service.

- Replacement of a large area of asphalt in the driveway and the parking lot and driveway resealed. Re-striping front and rear parking lots was also completed.
- Replaced the rain gutters on the screenhouses
- Constructed a shelter for irrigation water treatment; installed underground dedicated water lines to the houses.
- Installed additional roof vents in the screenhouses for added cooling in the summer months.
- Replaced the R-12 cooling equipment for the walk-in coolers with new R-22 systems.
- Replaced the main hot water heater with a new, larger capacity, energy efficiency unit.
- Added one more security light to the front of the main building to better illuminate the front parking lot.
- Provided regular scheduled maintenance on all vehicles and tractors. Safety inspections were completed on all vehicles.
- Performed numerous repairs to tractors and farm equipment.

#### **Awards 2004**

Compiled by: Yvonne Pedersen

Jim Oliphant, Spot Award for outstanding mentorship and training the physically and mentally challenged individuals in the preservation and evaluation of greenhouse plant collections at the NCGR-Corvallis; awarded February 2004.

Barbara Reed, Extra Effort Award for an extra personal effort in coordinating research efforts between NCGR-Corvallis and NCGRP-Ft. Collins for developing a unified approach in germplasm preservation; awarded March 2004.

Missy Fix, Quality Step Increase for performing beyond the expectations of all position elements; awarded April 2004.

Ray Gekosky, Performance Bonus Award for extreme helpfulness to other ARS and Oregon State University Research Units and highly superior performance; awarded May 2004.

Laura Schumacher, Extra Effort Award for exceptional service maintaining in-vitro laboratory activity at NCGR in the summer of 2004 in addition to research duties; awarded July 2004.

Barbara Reed, Certificate of Appreciation from the Saturday Academy Apprenticeships in Science and Engineering for 10 years of mentoring high school students in the summer program; September 2004.

Barbara Gilmore – Spot Award for recognition of her outstanding performance in training Ph.D. student Deric Picton in AFLP analysis and linkage mapping in Ribes and for instructing intern Matt Gunn in SSR analysis in Fragaria and for her superior job in managing the molecular genetics laboratory; awarded October 6, 2004.

Deborah Provenzano, Spot Award for excellent effort in the meeting arrangements for the summer scientific symposium hosted by the USDA-ARS-NCGR-Corvallis; awarded October 5, 2004.

Yvonne Pedersen, Spot Award for excellence in organizing and coordinating the Summer Scientific Symposium hosted by the USDA-ARS-NCGR-Corvallis; awarded October 14, 2004.

Barbara Reed, PWA EEO/CR Award for her outstanding effort in mentorship and training of students to encourage pursuit in scientific careers; awarded December 31, 2004.

Barbara Reed, Performance Bonus Award for exceeding in her assigned performance plan; awarded December 31, 2004.

Joseph Postman, Performance Bonus Award for exceeding in his assigned performance plan; awarded December 31, 2004.

Nahla Bassil, Performance Bonus Award for exceeding in her assigned performance plan; awarded December 31, 2004.

### **Training 2004**

Compiled by: Yvonne Pedersen

Jim Oliphant, Ray Gekosky and Joe Snead – Portland, Oregon for the North Willamette Horticulture Society Annual Meeting; January 2004.

Bruce Bartlett – Eugene, Oregon to attend the PNW Entomology and Plant Pathology Short Course; February 2004.

Ray Gekosky, Joe Snead, Jim Oliphant, and Missy Fix – Corvallis, Oregon to attend the Non-Crop Vegetation Management Course and receive credits toward pesticide applicator recertification; February 2004.

Kim Hummer - Davis, California to assist with the evaluation committee for the Davis RL/Curator position; March 2004.

Ray Gekosky, Jim Oliphant, and Joe Snead; Pesticide Informational Course to obtain certification credits for applicator's license; April 2004.

Bruce Bartlett, Melissa Fix, Jim Oliphant and Joe Snead-OSU non-crop vegetation management course, various issues all pertinent to NCGR work. 2004.

Yvonne Pedersen-Site Publisher, online training; October 2004.

Yvonne Pedersen-CATS training at AO office; November 2004.

Doug Cook and Missy Fix, GRIN training; May 2004

Jack Peters – to Tunica, Mississippi to take training to earn an AOSA Tetrazolium Analyst Certification and site visit to NCGRP in Ft. Collins, Colorado; June 2004.

All employees, AgLearn training, Security Awareness and Ethics Training; September 2004. For purchase card holders there was additional training with the upgrading of PCMS and with the adoption of the CATS (CRIS Allocation Tracking System) software system.

## Promotions

- Nahla Bassil from GS-11 to GS-12 Effective June 2004
- Jim Oliphant from GS-7 to GS-8 Effective April 2004
- Missy Fix from GS-3 to GS-4 Effective August 2004
- Barbara Reed from GS-14 to GS-15. Effective December 2004

## Travel 2004

Compiled by: Yvonne Pedersen

Jim Oliphant, Ray Gekosky and Joe Snead – Portland, Oregon, for the North Willamette Horticulture Society Annual Meeting; January 2004.

Nahla Bassil – San Diego, California, for the Plant and Animal Genome XII Conference; January 2004.

Nahla Bassil – Las Vegas, Nevada, for paper presentation at the Mint Industry Research Council Annual Meeting; January 2004.

Kim Hummer – New Orleans, Louisiana, to attend the PWA National Scientific Leadership Meeting and Annual Recognition Program; January 2004.

Joe Snead, Ray Gekosky and Jim Oliphant – Portland, Oregon, to attend the Oregon Horticulture Society pesticide training. Earned credits toward certification in pesticide/herbicide application; January 2004.

Joseph Postman – South Africa to attend the IXth International Pear Symposium; January 2004.

Bruce Bartlett – Eugene, Oregon, to attend the PNW Entomology and Plant Pathology Short Course; February 2004.

Nahla Bassil – Albany, California, to attend the PWA New Scientist Workshop; February 2004.

Jim Oliphant – Albany, California, to attend PWA EEO Team Award Winner; February 2004.

Kim Hummer – Portland, Oregon, for Winter Hop Research Council Meeting; February 2004.

Kim Hummer – Portland, Oregon, to attend/speak at the Western Cultural Landscape Workshop; March 2004.

Barbara Reed – Whakatane, New Zealand; visited laboratory of New Horizons, formerly Trees and Technology for consultations on cold storage and cryopreservation of clonally propagated trees; March 2004.

Kim Hummer and Joseph Postman – Eugene, Oregon, to attend the Intellectual Property and the Law and Politics of Global Food Supply symposium; April 2004.

Kim Hummer – Beltsville, Maryland, to Fruit Lab Review and grad student visitation; April 2004.

Kim Hummer – Palmer, Alaska, to serve on the Location Technical Committee of the USDA, Agricultural Research Service, Subarctic Agricultural Research Unit in Fairbanks, Alaska, and the Arctic, Subarctic, and Alpine Plant Genetic Resources Conservation, Research, and Information Management Project in Palmer, Alaska; April 2004.

Barbara Reed – Orlando, Florida, to attend the Plant Micropropagation-Technology and Production meeting; May 2004.

Kim Hummer – Portugal and Spain to attend the 8<sup>th</sup> International Vaccinium Symposium; May 2004.

Doug Cook and Missy Fix – Atlanta, Georgia, to attend GRIN meeting; May 2004.

Barbara Reed – San Francisco, California, to attend the In Vitro Biology World Congress; May 2004.

Nahla Bassil – South Carolina to attend the International Rosaceae Genome Mapping Consortium; May 2004.

Joseph Postman – Beltsville, Maryland, to attend the PGO and Crop Germplasm Committee Chairs Meeting; June 2004.

Nahla Bassil – Barcelona, Spain, to attend the 6<sup>th</sup> International Congress on Hazelnut; June 2004.

Jack Peters – to Tunica, Mississippi, to take training to earn an AOSA Tetrazolium Analyst Certification and site visit to NCGRP in Ft. Collins, Colorado; June 2004.

Kim Hummer and Tom Davis – Hokkaido, Japan, on USDA sponsored plant exploration and collection; July 2004.

Barbara Reed – Kazakhstan and Kyrgyzstan to make site visits for work on grant for ISTC, August 2004.

Joseph Postman – Columbia, Missouri, to attend the North American Fruit Explorers and Northern Nut Growers Association Annual Meeting; August 2004.

Joseph Postman and Paul Meyer – Tbilisi, Georgia, on a Joint US-Republic of Georgia Plant Exploration; September/October 2004.

Nahla Bassil – Newport, Oregon, to attend the Center for Gene Research and Biotechnology (CGRB) Fall Retreat; September 2004.

Kim Hummer – Davis, California, to attend the Synthesis Workshop on Global Horticulture Challenges; October 2004.

Kim Hummer – Purdue, Indiana, to the Committee on Small Fruit and Viticulture Research and Extension Meeting; October 2004.

Kim Hummer and Nahla Bassil – Boise, Idaho, to attend the NCSFR Annual 2004 Conference; December 2004.

Kim Hummer – Azores, present talks and advise Technical Working Group of the ACIP (Azores Cooperative Initiatives Program) in Ponta Delgada, Sao Miguel Island and Angra, Terceira Island, Portugal; December 2004.

### **Visitors to NCGR 2004**

by: Yvonne Pedersen

During Calendar Year 2004, 478 people came through the Repository's doors. Guests arrived in large or small groups, or as individuals. The Repository hosted the Western Regional W-6 Technical Advisory Committee meeting in June (photo at right).



Some groups used the Repository for their annual meetings such as the Oregon Hop Council and the Oregon Sweet Cherry Commission. Educational tours ranging from groups of 8 to 18 came from Oregon State University 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: 7 from China, 3 from the United Kingdom, 1 from Thailand, 1 from South Africa, 4 from Japan, 4 from New Zealand, 1 from Germany, 1 from Poland, 1 from Sweden, 1 from the Netherlands, 1 from the Philippines, 4 from Columbia, 1 from Turkey, 1 from Ecuador, 3 from Argentina, and 5 from Chile. Also, there were 4 graduate students working at the National Clonal Germplasm Repository from India, Ethiopia, Nigeria, and the Philippines.

## Germplasm Collections and Research

### In Vitro Culture and Cryopreservation

By Barbara Reed (Barbara Reed and Janine de Paz in photo at right.)



The tissue culture lab continues to initiate, multiply, store, and maintain cultures of many accessions *in vitro*. We are sending accessions to NCGRP for backup *in vitro* storage and for cryopreservation. Technician Janine de Paz continues adding accessions to the collections each year as time and plant materials permit. We are also replacing many accessions that have been in culture for over 10 years. Technician Carolyn Paynter retired in the fall of 2004 after 16 years at NCGR.

The numbers of accessions in each genus remained steady due to several factors. First we added an additional bacteriological screen to detect latent contaminants. This eliminated quite a few *Vaccinium* accessions as well as some from other genera. Second, we discarded cultures that were not thriving. We will recollect accessions from both these groups next year. This gives us greater assurance that the plants we keep, as well as the plants we send, are free of bacteria and actively growing. The health of the source plants is very important to the vigor of plants *in vitro*, so we will selectively collect from the healthier plant collections and wait for improvement in less vigorous or diseased plants. We will concentrate on collecting core cultivars for the *in vitro* collection.

### *In Vitro* Collection Status as of December 15, 2004

Genus	Available Core accessions	Core accessions <i>in vitro</i>	Total accessions <i>in vitro</i>
Corylus	171	24	41
Fragaria	519	154	186
Humulus	94	76	94
Mentha	47	44	161
Pyrus	218	111	214
Pycnanthemum	15	12	23
Ribes	216	76	82
Rubus	297	133	204
Vaccinium	255	76	93
Total	1832	706	1098

We collaborated 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. Technician Laura Schumacher finished the final experiments for this project and the manuscript was accepted for publication in the journal *In Vitro Cellular and Developmental Biology – Plant*. The objectives of the study were to: Determine the critical steps of the protocol with respect to its successful implementation for the cryostorage of diverse plant collections; Test the applicability of the approach for the two major commercial groups of *Ribes*, black currants and gooseberries; Ascertain the effectiveness of cryopreserving *Ribes* germplasm using a modified encapsulation/

dehydration (E-D) protocol that substitutes sucrose pre-treatment for cold acclimation; and Explore the potential for its implementation in the creation of a small-scale gene bank for a diverse selection of *Ribes* genotypes.

With the assistance of technician Laura Schumacher we completed the final experiments for the *Cynodon* cryopreservation manuscript and it was submitted to Crop Science. A diverse group of Bermuda grass accessions was tested to determine if cryopreservation by encapsulation and dehydration would be appropriate for long-term germplasm storage. Nineteen of the cryopreserved accessions (76%) had greater than 40% regrowth while the rest had 20 to 38% regrowth. Thirty shoot tips of each of 25 *Cynodon* accessions are now held in LN storage at the National Clonal Germplasm Repository (NCGR) Corvallis. Fifty additional cryopreserved shoot tips of each of the 25 accessions are held in long-term storage at the National Center for Germplasm Resources Preservation (NCGRP) in Fort Collins, Colorado.

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 is assisting Institute scientists in implementing cryopreservation techniques and storing native germplasm. The project was extended for three additional years.

Visiting scientist Dr. Sandhya Gupta worked in the lab April 1, 2004-2005. Dr. Gupta examined the efficacy of two cryopreservation techniques on *Rubus* and *Fragaria* genotypes.

Two new students are beginning PhD programs: Esther Uchendu (Ford Foundation Fellowship) will study the effect of antioxidants on cryopreservation protocols; Nina Castillo (Fulbright Fellowship) will study the genetic fidelity of cryostored *Rubus* meristems and do some additional genetic studies on *Rubus* in cooperation with Dr. Bassil. Graduate student Hailu Aynalem is completing his MS studies by spring.



Photo at right (L-R): Jodi Smith, M. S. Candidate under Dr. Kim Hummer; Ester Uchendu, Ph. D. Candidate under Dr. Barbara Reed; Sandhya Gupta, visiting scientist from India.

## **Molecular Genetics**

By Nahla Bassil

Laboratory technician Barb Gilmore is routinely extracting and quantitating DNA in 96-well plates. DNA is sequenced in the genetics lab using Beckman CEQ 8000. Christine Neou, a student intern, is evaluating EST-SSR primers for fingerprinting European and Japanese pear accessions. Peter Boches, an MS graduate student, has used 28 SSRs to develop unique fingerprint in 72 important cultivars of blueberry. We continue to develop and evaluate microsatellite primers in order to generate reliable molecular markers for fingerprinting accessions from various genera including:

*Corylus*

Previously developed SSRs in the hazelnut were used by Tufan Gokirmak, a graduate student in Horticulture, to identify duplicate hazelnut accessions. The SSRs were used to develop genetic fingerprints for important hazelnut genotypes.

We continue to collaborate with Dr. Shawn Mehlenbacher and Dr. Roberto Botta on developing additional microsatellite loci to use in construction of a hazelnut linkage map.

### *Fragaria*

Twenty-five EST-SSR primer pairs previously designed were tested for cross-species amplification in twelve accessions of strawberry: two *F. vesca*, one *F. iinumae*, two *F. chiloensis*, two *F. virginiana* and five *F. x ananassa*. We are evaluating single-locus polymorphic SSRs for their ability to fingerprint the supercore collection.

We collaborated with Dr. Kevin Folta and Dr. Kim Lewers on developing additional SSR markers from an EST library of 'Festival'. Some of these primers were placed on a diploid linkage map of strawberry in collaboration with Dr. Dan Sargent. These primers and additional strawberry primers developed in our lab will be tested for polymorphism in parents of 'Delmarvel' x 'Selva' strawberry mapping population available from Dr. Kim Lewers.

### *Pyrus*

Primer pairs were designed for 18 pear EST sequences obtained from GenBank and the optimum annealing temperature was determined by gradient PCR. The SSR primers amplified a product in eight cultivars of *P. communis*, three cultivars of *P. pyrifolia* and one *Pyrus* hybrid. Out of 15 primer pairs that amplified fragments of the expected size, 9 are polymorphic. We are using these 10 polymorphic SSRs to fingerprint 60 accessions of pear.

We are collaborating with Lobke Vanwynsberghe in using microsatellite markers to study genetic diversity in the Malaceae family.

### *Humulus*

Sixteen EST-SSR primer pairs were designed in hops. They were used to study genetic diversity in 48 accessions of European and wild American hops.

### *Vaccinium*

#### Graduate Student Project (Peter Boches)

Peter Boches developed SSRs from an EST library of 'Bluecrop' floral buds provided by Dr. Lisa J. Rowland. He also implemented a protocol for SSR-enrichment of a genomic library in 'Bluecrop' which led to the development of an additional 10 robust SSRs to the previous 20 EST-SSRs.

Cross-species amplification was evaluated in nine taxonomic sections of the genus *Vaccinium* using 44 EST-SSR primer pairs. EST-SSR loci originating in *V. corymbosum* were most easily amplified in section *Cyanococcus* and least easily amplified in section *Oxycoccus*.

Phylogenetic inference based on SSR analysis using 5 EST-SSRs indicated that *V. elliotii* is divergent from *V. corymbosum*.

## **Tree Fruit and Nut Collections**

By Joseph Postman

### **New Accessions in 2004:**

*Corylus* – Seed of wild *C. avellana* was collected in the Republic of Georgia (4 accessions) and 1 seedlot of *C. americana* was received from the state of Illinois. Seedlings of *C. colurna* (1 accession) and *C. avellana* (4 accessions) generated from seed collected in Armenia in 2002 were planted in our field collection. Four recent cultivar releases were received from Oregon State University (Gamma, Delta, Epsilon and Zeta).

*Cydonia* – Seed of wild *C. oblonga* was received from the trans-Caucasus region including 1 from Armenia and 2 from Georgia. Seedling populations from each of these have been established in the greenhouse and are being grown on for establishment in the field. The old American quince cultivar 'Meech's Prolific', the Russian 'Aromatnaya' and the Iranian 'Isfahan' were added to the clonal collection in 2004. The NCGR *Cydonia* collection now includes 67 named cultivars and 46 seedling selections from many geographic regions. This

collection is now probably the most diverse *Cydonia* germplasm collection in the world.

*Mespilus* – Seed from wild medlar populations were collected in Georgia. We are attempting, with difficulty, to germinate representative samples. Large fruited cultivars ‘Breda Giant’ and ‘Westerveld’ were obtained from a commercial nursery.

*Pyrus* – Seed of *P. salicifolia* (4 accessions) were collected in the Republic of Georgia, and seed of *P. communis* ssp. *caucasica* (14 accessions) were collected in Georgia and Armenia. John Wells donated seed of *P. betulifolia* (Du Li) that he brought back from Shaanxi, China, and is reputed to be useful as a cold-hardy and dwarfing rootstock for Asian pears. A population of seedlings is ready to be planted in our field. Nearly 2 dozen interesting pear clones were released from quarantine and received at NCGR in 2004 including samples collected during expeditions to India, Pakistan, and Turkmenistan. Several long-lost heirloom cultivars including ‘Bloodgood’, ‘Winter Bartlett’, and the ‘Shannon’ pear were located and propagated. Several English perry pears not available in North America have been received as provisional quarantine releases. Maxine Thompson collected a number of pears in Pakistan in 1988, and ‘Shogori II’ which was her favorite among these was fully released from quarantine this year.

#### **Pome Fruit Collections – Organization, Evaluation and Observations:**

- Researched history of intergeneric *Pyrus* x *Sorbus* and *Pyrus* x *Cydonia* hybrids. Determined several to be duplicates and others to be unique. Presented info in a talk to the North American Fruit Explorers in August.
- The *Cydonia* and *Mespilus* clonal collections were re-propagated and planted in a new field collection on a wider spacing (see Field Report). New *Cydonia* field trees are all self-rooted.
- Continued to re-propagate and re-locate pear trees in the clonal field collection to eliminate trees from even number spaces, and move cultivar or species representatives inadvertently planted with the wrong group.
- Identities of 37 clonal pear accessions were evaluated visually. Five incorrectly identified plants were noted. Suspected duplicate clones were also evaluated genetically using SSR patterns (see Genetics Report).
- Generated seedling populations of select *Pyrus* and *Cydonia* species seed accessions for field planting (see Field Report). Some of these were seedlots with very small numbers of seeds that will be more secure as growing trees and also provide a future opportunity for seed regeneration from controlled crosses.

## Plant Pathology

### By Joseph Postman

***Corylus*** – New accessions were tested for ApMV (30 samples). All were negative. Eastern Filbert Blight has been found nearby in Corvallis, within 2 miles of NCGR *Corylus* field collection. The *Corylus* collection is scouted for symptoms using mobile pruning tower several times/year and as of March 2005 EFB has not been observed at NCGR.



Joseph Postman (L), Megan Oaks

***Fragaria*** – The Strawberry virus collection used by Yannis Tsanetakis and Bob Martin to characterize pallidosis disease, strawberry necrotic shock virus (distinct from TSV), and associate Apple *mosaic virus* with strawberry leaf curl disease. PCR based diagnostic tools are in place in Martin's lab and serological tests are under development.

***Mentha*** – In collaboration with Yannis Tsanetakis and Bob Martin, we detected 6 viruses in our mint collection, 3 of which are new to science. Three viruses not reported previously from mint in North America were detected in a variegated *Mentha* × *gentilis* clone. Genomic sequences indicated that one was a new potexvirus, the second was a new closterovirus and the third virus was Strawberry *latent ringspot virus* (SLRSV), a European virus not known to occur in North America. Variegated *M. x gentilis* (= 'Golden Ginger Mint') plants were obtained from several commercial nurseries in different parts of the U.S. and all tested positive for the potexvirus found in the Repository clone. The closterovirus and SLRSV were found in some but not all of the nursery plants. Plants from nearby commercial peppermint fields were found to be free of SLRSV, but some were infected with the new closterovirus. Three NCGR mint clones with mild veinbanding symptoms were also found to be infected with *tobacco ringspot virus* by PCR, and this was confirmed by ELISA. A variegated 'Ginger Mint' from an Oregon nursery with atypical symptoms did not contain any of the viruses found in the other 'Golden Ginger Mints.' Cloned dsRNA from this plant revealed the presence of a second new closterovirus and a flexivirus, belonging to the genus *Vitivirus*. Once we had a PCR for the second closterovirus we also found it in symptomless plants from other sources.

***Pyrus*** – 37 samples were tested by bioassay for latent viruses.

***Rubus*** – Nearly 1500 samples were tested by ELISA. The greenhouse collection was tested or re-tested for apple mosaic, cherry leafroll, raspberry bushy dwarf, and tobacco ringspot viruses. Cherry leafroll not detected, clearing one of the hurdles to distribution of *Rubus* to the EU.

***Sambucus*** – Cherry leafroll was confirmed in many accessions, providing good positive controls for future ELISA testing.

***Vaccinium*** - The NCGR field collection was monitored twice by ELISA during the growing season for blueberry scorch and blueberry shock viruses. For first time in 5 years blueberry scorch was not detected in the collection. Blueberry shock however was found in two plants which were subsequently destroyed. This pollen-borne virus has become well established in the Corvallis area and will be an annual concern.

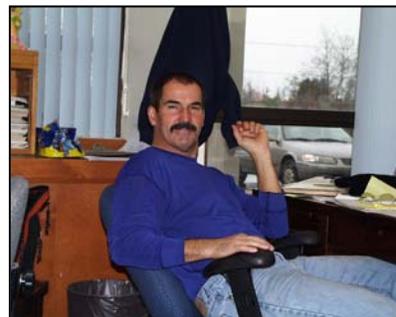
## Virus Germplasm Collections

The Repository's collection of germplasm borne viruses and virus-like pathogens has become a valuable resource for fruit plant certification programs, disease diagnostic labs and pathogen research projects. During the past 8 years, we have shipped 248 plant or tissue samples specifically for their virus isolates. Nineteen of these samples were shipped in 2004. In the most recent proceedings of the ISHS International Symposium on Small Fruit Virus Diseases (Acta Horticulturae No. 656, 2003), 4 different research papers acknowledged samples received from the Corvallis Repository that were vital to their research results. We presently maintain 70 pome fruit clones, 44 *Fragaria* clones, 20 *Rubus* clones, 14 *Vaccinium* clones, and smaller numbers of *Mentha*, *Humulus*, *Ribes* and *Corylus* clones as virus positive control isolates.

## Field Operations 2004

By Joe Snead

Weather, diseases, insects, and weeds are the main influencing factors in our field operations. The cultural methods that are applied determine how well the plants grow with these influences. In February 2004 we had a snow and ice storm. Orchard plantings that were regularly pruned had little damage. Some of the landscape plantings suffered. The field crew top worked the ornamental pears at the entrance to Lewis Brown Farm and cleaned up the entrance pines that received extensive damage. The Mugo pines and old large pear trees in the landscape required heavy pruning or removal.



Diseases are playing an ever increasing role in the field operations. Eastern filbert blight is present in the Willamette Valley. Strikes were confirmed last year within 2 miles of the Repository. Now we are closely monitoring our trees. Last year we spent about 16 hours in the field scouting. This year we scouted about 24 hours. To date no evidence of the disease has been detected in our filbert orchard. Last spring I put on five cover crop sprays. In the collection the trees leaf out at a varied rate. For this reason more sprays are required than in a commercial orchard.

The *Vaccinium* field is another field that has been under disease siege the last few years. This last year blueberry scorch virus was not detected. Cover sprays for aphids and eradication of infected plants may have helped with the good results. Now blueberry shock virus is showing up in the field collection. It is pollen born and much harder to control.

An insect success story has taken place in the *Ribes* collection with the control of *Ribes* Cane Borer. For the last two springs the field crew has applied a twist-tie infused with pheromone. The pheromone works by causing mating confusion. The infestation level of the larvae was dramatically reduced in both years. In both years the field crew counted cane borer larvae during the dormant months to help with the scientific study.

Over the last few years the field operations have experimented with different methods of weed control. The alternate methods are effective but short lived. They require additional passes through the field. We reduced pesticide use but it required additional time. Time and labor are at a premium. This last year we returned to a little more herbicide use. At the same time we have started mulching the plantings. Last year the *Ribes* cultivars were heavily mulched with sawdust. This helped control weeds quite a lot. This year we mulched the *Ribes* species planting. Besides weed suppression the mulch helps with moisture retention. We went from weekly irrigation to bi-weekly irrigation. We have a mulching operation on each farm.

Several new plantings were added this last year. Ground was leveled across the road from the blueberries for a *Lonicera* (edible fruited honeysuckle) planting. The area will accommodate up to fifty accessions. Eighteen accessions that we received from Dr. Maxine Thompson were planted. A new red raspberry planting with raised bed was established for two hundred

accessions. Presently about sixty cultivars are planted. A smaller raised bed field for fifty black cap raspberries was established. About twelve accessions are planted in this field. Large amounts of mulch and wood chips were incorporated in to the mounds for moisture retention and disease suppression. A little under a third of the North farm was surveyed and rows marked out for a new expanded minor genera block and new *Pyrus* species block. In the spring four rows of young *Cydonia* were planted. Some of the old minor genera plants were moved with a tree spade to new locations. Extra minor genera plants were planted in a hedgerow along property lines. The hedgerows were planted to reduce concerns of pesticide drift for several neighbors with organic households.

The field crew helped measure and evaluate *Vaccinium* fruit data. Twice weekly during the fruiting season accessions were picked when the bush was considered at the height of its crop ripeness. One cup weights and cup berry counts were taken and average berry weight was determined. Samples of ten fruit diameters were recorded. Butternut tree and fruit data were also taken. Tree trunk diameters were recorded along with canopy width and tree height. Ten nut samples were collected and weights for whole husk, bare nut, kernel, and shell were recorded. Percentages were figured for kernel to shell weight. The ten nut samples were also measured for nut size, length, and width for whole husk and bare nut. The nuts were also photographed in husk, bare nut, and cut length and width cross sections. The bare extracted half kernels were also photographed.

Development of the North Farm has continued. The eastern fence was moved onto the property line. This property line borders on forest land and required brush and small tree removal. It required cutting crests and filling several significant low spots. An additional acre of farm land was created out of the wooded area at the back of the farm. This will be for a Butternut species block. Additional land was given to the IR-4 project to expand their container growing area. The cooperation of the users is at a very good level. Each field is growing at a slow but steady rate.

### **Plant Distribution**

By Bruce R. Bartlett

“2004 Highlights”

- 3,091 items were shipped as seeds, cuttings, runners, scionwood, rooted plants, tissue culture and DNA.
- 308 tissue cultured accessions were sent to the National Center for Genetic Resources and Preservation (NCGRP) in Ft. Collins, Colorado as backup. This is 91% of all tissue culture accessions shipped to domestic requestors.
- 73% of accessions requested in 2004 have been shipped.
- 17% of all items shipped were sent to foreign requestors.
- Requests for DNA samples of our accessions began in 2003 and has increased in 2004 from 80 accessions (3%) to 562 (18%) of the total number of accessions shipped.
- Scionwood (24%), Seed (15%) and DNA (13%) were the top three forms sent to domestic requestors.
- DNA (42%), Hard Cuttings (16%) and Seed (15%) 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. At the time of this printing, we have distributed 2,809 items as seeds, cuttings, runners, scionwood, rooted plants, tissue culture and DNA from 2004 requests (see Fig.). This represents 73% of the total number of items requested for 2004. Additional material will be shipped in CY 2005 from 2004 requests.

During CY 2004 3,091 plant items were shipped. Six items from request year 2001 were shipped, 6 from 2002, 480 from 2003, and 2,599 from 2004. Domestically, items from *Pyrus*, *Fragaria* and *Vaccinium* in decreasing order were sent the most. Internationally, the order was *Vaccinium*, *Fragaria* and *Humulus*. Over the last two years *Fragaria* and *Rubus* have dropped significantly in numbers sent to European Union (EU) countries. Due to the possibility of harboring viruses *Rubus* seed is prohibited. In addition the EU has increased the list of viruses for which *Rubus* and *Fragaria* accessions arriving from the United States must be tested. 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.

The total postage paid for domestic and international shipping was \$4,888. The cost for Federal

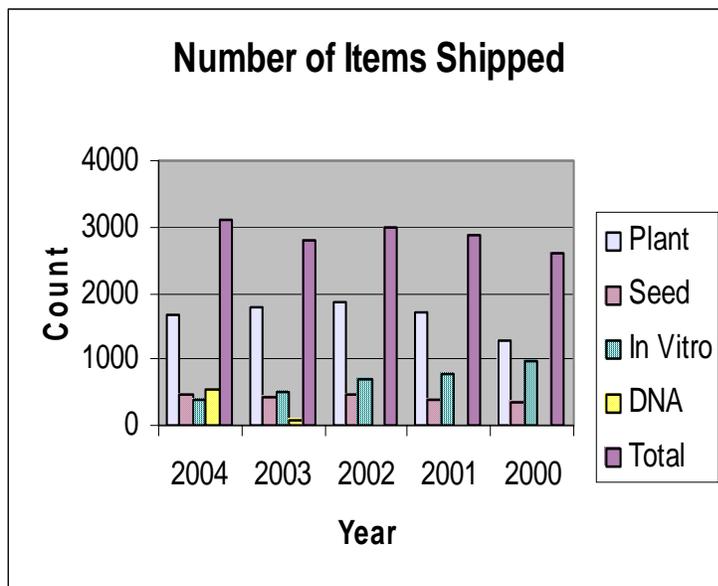


Bruce Bartlett (L), Lucas Dodge

Express/DHL was \$3557 and the amount paid to the Oregon Department of Agriculture for 26 Phytosanitary Certificates was \$260. We use Federal Express (Priority Overnight) for most domestically shipped items and plants sent to Canada (International Priority). Since September 2003, we use DHL for 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 domestic and international shipments.

#### Expenditures for Plant Distribution from 2004-2000.

Year	Total Items Shipped	Postage	FedEx DHL	PC's	Total	Shipping Cost Per Item
2004	3091	\$204	\$4,030	\$260	\$4,494	\$1.45
2003	2808	811	3,557	520	4,888	\$1.74
2002	3007	1,357	1,707	500	3,564	\$1.19
2001	2875	1,108	948	450	2,506	\$0.87
2000	2602	1,160	743	460	2,362	\$0.91



## Screenhouse/Greenhouse Collections

By Jim Oliphant and Missy Fix

- Propagation and regeneration of 719 accessions, especially *Fragaria* and *Rubus*.
- Successful control of root weevil and cyclamen mite infestations through a sustained IPM plan.
- Improved sanitation throughout facilities with an emphasis on weed control and suppression of powdery mildew, fungus gnats, and two-spotted mite.
- Installation of new acid-injection water supply for screenhouses and deionized water supply for greenhouse propagation to reduce water alkalinity and stabilize soil pH.
- Development of a strategy for maintaining the primary *Vaccinium* collection under screen.

### ACTINIDIA

*Actinidia* is a new genus for us and 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 153 accessions on site, 101 are established in the screenhouse, 87 are in the field, and 46 were established in the field in 2000.

### 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, 155 accessions are being maintained, 2 are in quarantine, 37 are for tissue culture, and 116 are recent quarantine releases being self layered for field planting.

### FRAGARIA

All clonal accessions of *Fragaria* are maintained under screen. An additional backup set of “Supercore” is maintained in the greenhouse. We are continuing our 3-year re-propagation cycle using runners. In 2004, 201 accessions were runner propagated, hot water treated, and replaced in the collection. Currently, we have 201 1-year crowns, 495 2-year crowns, 1 3-year crown, 467 4-year crowns, and 161 accessions with crowns older than 4-years. Of the 161 accessions with old crowns, only 17 remain to be runner propagated. Crown divisions of these 17 at risk accessions are now beginning their 2<sup>nd</sup> growing season.



Photo to right: Missy Fix in the greenhouse.

### HUMULUS

Clonal accessions of *Humulus* are maintained in the screenhouse. In 2004, all *Humulus* clones were moved up to 2 pots per accession. Of the 283 total accessions, 101 of the 122 virus-tested clones are established in the screenhouse with 2 pots. In addition to the 122 virus-tested clones, we have 36 infected clones and 125 untested accessions, including wild American seedlings, and new material. In 2004, 108 cutting-propagated clonal accessions were replaced in the collection.

### MENTHA

All clonal accessions of *Mentha* are maintained under screen. We are continuing our 3-year re-propagation cycle via cuttings. Currently, we have 152 6-month crowns, 118 2-year crowns, and 163 4-year crowns.

## PYRUS

Permanent back-up trees of all non-hardy clones, virus positive controls, and temporary back-up trees of all new young field trees of *Pyrus* are maintained under screen. Of the 101 clones in the screenhouse, 41 are non-hardy and 71 are virus isolates.

## RIBES

All core or non-hardy clonal accessions of *Ribes* are maintained under screen. To date, 207 of the 217 core accessions are established in the screenhouse.

## RUBUS

All clonal accessions of *Rubus* are maintained under screen. Accessions from tropical, subtropical, and high latitude habitats are maintained in the greenhouse. We are continuing our 3-year repropagation cycle via cuttings, tip layers, or root division. In 2004, 410 accessions were propagated and replaced in the collection. Currently, we have 410 1-year crowns, 126 2-year crowns, 3 3-year crowns, 92 4-year crowns, and 71 accessions with crowns older than 4-years. Of the 71 accessions with old crowns, 50 remain to be re-propagated. These 50 at risk accessions have been re-potted and are receiving special attention.

## 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 in the process of establishing the primary collection in the screenhouse. This process involves improved water quality, a non-bark soilless medium, increased container size, and improved sanitation. Currently, the entire screenhouse set of an estimated 431 accessions are being re-propagated with 81 accessions established in their new containers.

### Clonal Accessions maintained in the Greenhouses and Screenhouses as of March 2005

	Total # Accessions	Core		Available		Single Plants With No Back-Up	
		# Ac.	%	# Ac.	%	# Ac.	%
<b>Actinidia</b>	133	61	0	131	98	27	20
<b>Corylus</b>	155	43	28	136	88	67	43
<b>Fragaria</b>	1325	517	39	1270	96	597	45
<b>Humulus</b>	283	87	31	264	93	132	47
<b>Mentha</b>	439	51	12	436	99	288	66
<b>Pycnanthemum</b>	32	20	62	32	100	0	0
<b>Pyrus</b>	335	20	6	189	56	131	39
<b>Ribes</b>	401	208	52	342	85	79	20
<b>Rubus</b>	735	253	34	688	94	52	7
<b>Vaccinium</b>	432	218	50	400	93	126	29
<b>Other<sup>2</sup></b>	93	12	13	53	57	67	72
<b>Total</b>	<b>4363</b>	<b>1429</b>	<b>33</b>	<b>3941</b>	<b>90</b>	<b>1566</b>	<b>36</b>

JMO 03-17-05

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

At this time we have 303 accessions in quarantine.

Status of Quarantined Accessions at the Repository

<b>Genus</b>	<b>Federal</b>	<b>State</b>	<b>In-House</b>
<i>Corylus</i>			2 NCGR
<i>Fragaria</i>	1 Departmental Permit		
<i>Humulus</i>		18 Directors Exemption	
<i>Pyrus</i>	229 Provisional Release		
<i>Ribes</i>	1 Post Entry		33 NCGR
<i>Rubus</i>	9 Post Entry		
<i>Vaccinium</i>	10 Post Entry		
<b>Total</b>	250	18	35

**Seed Program**

By Jack Peters (photo at right)

The Seed Testing Laboratory at the NCGR is in the second year of operation. The initial first two phases of operation were successfully completed on schedule. They were to:

- I) Get the facility equipped with the seed testing equipment, instruments and accessories necessary to operate a functional seed lab
- II) Go through the seed accession inventory already on site (over 3,000 seed accessions) and process the seeds. This includes cleaning, counting, packaging, labeling, and filing All of the current in-house seed accessions have been processed during 2004



The third phase (III) of the seed project which generally includes ‘Test – Preserve – Increase – Evaluate – Improve - Disseminate’ is now underway and has multiple tasks assigned to the process:

1. To check, test, and evaluate the viability of the seed collection (particularly the core accessions) using Germination Tests, Tetrazolium Tests, or Excised Embryo Tests.
2. To enter, clean, count, test and store new seed accessions as they arrive at the Repository from various collectors, exchanges, or from internal collecting trips
3. To prepare and send subsets of seed germplasm to the NCGRP for off-site storage and preservation.
4. To initiate a workable seed increase program for accessions, which are dangerously low in number of seeds available for distribution or possess a significant importance for the collection.
5. To propagate plant material from seed sources or seed material from plant sources for the Repository germplasm collection when needed.

6. To conduct research to investigate new and improved methods for germination, breaking seed dormancy, seed storage techniques and seed longevity issues.
7. To collect seed quality data, revise outdated procedures and update the Seed Collection Management section of the Operations Manual.
8. To produce and generate seed science publications regarding relevant genera.

Parts 1 and 2 of Phase III were actively in process during 2004. Parts 3-5 were studied and researched and are ready for implementation in 2005. Parts 6-8 are in the investigative, early stages and some work on these started in 2004.

Viability tests were completed in 2004 on the all of the designated 'core' accessions and highly requested accessions for all of the major genera at the Repository. Three genera (listed below) have had *all* seed accessions evaluated for viability via the TZ Test in 2004:

<u>Genus</u>	<u>Accessions</u>	<u>Avg. Viability (%)</u>
<i>Fragaria</i>	375	70
<i>Humulus</i>	248	45
<i>Mentha</i>	53	75

Work is currently in progress on the genus *Pyrus* for viability testing. Other viability testing will follow, until the entire seed collection (including the minor genera) is evaluated for viability. From that point, a routine time period of three to five years for viability reevaluation and seed collection maintenance will be in place.

The seed accession inventory at the end of 2004 is as follows:

[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]

<u>Major Genera</u>	<u>Genus</u>	<u>Seed Accessions in Inventory at NCGR</u>
	<i>Rubus</i>	961
	<i>Vaccinium</i>	560
	<i>Ribes</i>	416
	<i>Fragaria</i>	375
	<i>Pyrus</i>	307
	<i>Humulus</i>	248
	<i>Mentha</i>	53
<b>Minor Genera</b>	All others	483
		<b>3328 = Total Seed Accessions</b>
(or over 25% of all NCGR germplasm accessions)		

The Molecular Lab in coordination with the Seed Lab at the NCGR is preparing to do DNA extraction and identification mapping on some germinated seedlings from some *Fragaria* seed samples stored in the seed collection. Coordination continues between these two units on this particular project.

# Information Management/Computer Operations

## Computer/Information Management

By Douglas Cook and Kim Hummer

### I. GRIN Records

**Table GRIN Records Activity during CY 2004**

<b>GRIN Area</b>	<b>Created</b>	<b>Modified</b>
Accession	6363	2854
Inventory	2988	7321
Observation/Voucher	2489	4
Pathogen	0	0
Distribution	7910	1624
Cooperator	165	40
<b>Total</b>	<b>19915</b>	<b>11843</b>



(L) Doug Cook, NCGR IT manager and Tom Loveday, HCRL IT manager.

This year there were 465 new accessions and other related data categories added to GRIN (1748 Accession Names, 545 Habitat, 130 Narratives, 839 Pedigree, 1 Quarantine, 1109 Source, 1473 Source Member and 425 Vouchers). There were 1351 new Inventory items, 1637 Inventory Actions and 2051 Observations added to GRIN. For Distribution there were 725 Orders, 6289 Order Items, 896 Order Actions and 165 Cooperator records add. Among 111 existing accession records, and other sub-categories, modifications were made during the year (447 Accession Name, 13 Habitat, 505 Narratives, 823 Pedigree, and 955 Source). There were 3573 Inventory, 3748 Inventory Action and 40 Cooperator records modified.

### II. Hardware and Infrastructure

Each of the 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 monthly 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, Alyrica, performed the install and configuration of the new fileserver. Alyrica will also provide consultation and troubleshoot server issues on demand.

Fileserver backup data is stored on an external hard-drive secured in a separate building. In addition, a second back-up hard-drive alternates monthly with the first. The hard-drive not in use is secured in an off-site ARS building. Numerous minor (and critical) computer software configurations and repairs took place.

### Publications 2004

Journal Articles and Websites

1. **Hummer, K.** 2004. Pawpaw. Register of Fruit and Nut Varieties, List 42. HortScience. 39(6):1512.
2. **Hummer, K.** and A. Sabitov. 2004. Genetic Resistance to Currant Borer in *Ribes* Cultivars. J. Amer. Pom. Soc. 58(4):215-219.
3. **Hummer, K.E., Postman, J.D.** 2004. Website for the American Pomological Society – Rev. <http://americanpomological.org>.
4. **Hummer, K.** 2004. First International *Humulus* Symposium. Chronica Hort. 45(1)22-23.
5. Kovalchuk I. Y. and **B.M. Reed.** 2004. *In Vitro* Cold Storage: A Reliable Method Of Stone

- Fruit Germplasm Preservation. In: Proc. Intern. Sci. Conf. The Strategy of Scientific Ensuring of Horticulture: Reality and Perspectives. Almaty Agricultural University, 2004. P. 136-140. (in Russian).
6. **Postman, J. D.** 2004. An Evergreen Huckleberry Industry near the Oregon Coast in the Early 20<sup>th</sup> Century. J. Amer. Pom. Soc. 58(3):147-151.
  7. **Postman, J. D.**, Tzanetakis, I.E., Martin, Robert R. 2004. First Report of Strawberry Latent Ringspot Virus in *Mentha* From North America. Plant Disease. 88:907.
  8. **Reed, B.M.** 2004. Strategies for Producing and Maintaining Clean Cultures. Educational web presentation. <http://www.ars-grin.gov/cor/>
  9. **Reed, B.M.** 2004. Cryopreservation by Encapsulation Dehydration. Educational web presentation. <http://www.ars-grin.gov/cor/>
  10. **Reed, B.M.** 2004. Cryopreservation by Slow Cooling. Educational web presentation. <http://www.ars-grin.gov/cor/>
  11. **Reed, B.M.** 2004. Cryopreservation by Vitrification. Educational web presentation. <http://www.ars-grin.gov/cor/>
  12. **Reed, B.M.** 2004. Working with Tissue-Culture Bags for Germplasm Storage. Educational web presentation. <http://www.ars-grin.gov/cor/>
  13. **Reed, B.M.**, A. Meier-Dinkel, I. Kovalchuk, S. Pluta, E.E. Benson. 2004. Evaluation of critical points in technology transfer of cryopreservation protocols to international plant conservation laboratories. CryoLetters. 25:341-352.
  14. Kusharenko, S. V., I.Y. Kovalchuk, T.T. Turdiev and **B.M. Reed**. Cryopreservation of Fruit and Small Fruit Germplasm by Vitrification. In: Proc. Intern. Sci. Conf. The Strategy of Scientific Ensuring of Horticulture: Reality and Perspectives. Almaty Agricultural University, 2004. P. 150-154. (in Russian).
  15. Sabitov, A. and **K. E. Hummer**. 2004. Summary of Currant Cane Borer Research at the USDA ARS NCGR in Corvallis, Oregon, United States during 2003-2004. *Защита растений* УДК634.72.632.9 pp. 457-462 in: Genetic Resources of Plant-Growing in the Far East, Vladivostok: Dalnauka.

### **Presentations, Abstracts, and Miscellaneous publications**

1. **Bassil, N. V.**, Botta, R., Mehlenbacher, S.A. 2004. Dinucleotide microsatellites of the European Hazelnut. Proceedings of the 6<sup>th</sup> International Congress on Hazelnut. p. 20. Abst.
2. **Bassil, N. V.**, **Gilmore, B. S.**, **Oliphant, J. M.**, Henning, J. A., **Hummer, K. E.** 2004. Genbank-Derived Microsatellite Markers in Hops. Proceedings of the First International Humulus Symposium. Corvallis, OR p. 5 Abst.
3. **Bassil, N. V.**, C. Neou, and J. D. Postman. 2004. Development of Pyrus microsatellite markers from GenBank Sequences. Proceedings of the 9<sup>th</sup> International Pear Symposium, Stellenbosch, South Africa. p. 42. Abst.
4. Gokirmak, T., Mehlenbacher, S. A., **Bassil, N. V.** 2004. Investigation of Genetic Diversity among European Hazelnut (*Corylus avellana* L.) Cultivars using SSR Marker. Proceedings of the 6<sup>th</sup> International Congress on Hazelnut. p. 22. Abst
5. **Hummer, K. E.** Wild *Humulus* Genetic Resources at the U.S. National Clonal Germplasm Respository. Proceedings of the First International Humulus Symposium. Corvallis, OR. p. 10. Abst.
6. **Hummer, K. E.**, Sabitov, Andrey, Cherbukin, Pavel, Vorsa, Nicholi. 2004. *Vaccinium* From Primorsky, Khabarovsk, Amursky, and the Sakhalin Territories, Russia. Acta Horticulture Proceedings. 8<sup>th</sup> International Symposium on Vaccinium Culture Programme book of abstracts. OP 11. Abst.
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8. **Hummer, K. E., Oliphant, J. M.,** Taylor, A., Deinzer, M., **Jackson, J.** 2004. Xanthogalenol and 4'-O-Methylxanthohumol Content of American Hop Species. Proceedings of the First International *Humulus* Symposium. Corvallis, OR. p. 36. Abst.
9. **Jackson, J., Hummer, K. E.,** Mahaffee, Walter F. High Temperature-Dependent Resistance to Powdery Mildew in Hops. Proceedings of the First International *Humulus* Symposium. Corvallis, OR. p. 26. Abst.
10. Mehlenbacher, Shawn A., Brown, Rebecca N., Nouhra, Eduardo R., **Bassil, Nahla V.** 2004. A Linkage Map for Hazelnut. Proceedings of the 6<sup>th</sup> International Congress on Hazelnut. p.45. Abst.
11. **Postman, J. D.,** Spotts, R.A., and Calabro, J. 2004. Pear Scab Resistance in *Pyrus* Germplasm. 9<sup>th</sup> International Pear Symposium, Stellenbosch, South Africa. p. 38.
12. **Postman, J. D.,** DeNoma, Jeanine, Reed, Barbara M. Detection and Elimination of Viruses in USDA Hop (*Humulus lupulus*) Germplasm Collection. Proceedings of the First International *Humulus* Symposium. Corvallis, OR. p. 17. Abst.
13. **Postman, J. D.** 2004. Plant Collecting Expedition to the Republic of Georgia. Invited presentation for the annual meeting of the Home Orchard Society. Portland, Oregon. November 2004.
14. **Reed, B. M.** Strategies for Producing and Maintaining Clean Cultures. In Vitro Cellular and Development Biology – Plants. 2004
15. **Reed, B. M.** 2004. In-Vitro Storage and Cryopreservation of Hops (*Humulus L.*) Germplasm. Proceedings of the First International *Humulus* Symposium. Corvallis, OR. p. 42. Abst.
16. **Reed, B. M. and Anynalem, H.,** 2004. Iron Formulation Affects In-Vitro Cold Storage of Hops. Proceedings of the First International *Humulus* Symposium. Corvallis, OR p. 43. Abst.
17. **Reed, B.M.** 2004. The Basics of *In Vitro* Storage and Cryopreservation. USDA-ARS, Corvallis, OR 1999. 39 pp. (Lab manual) Revised 2002 and 2004.
18. **Reed, B.M.** and P.M. Buckley. 2004. Tissue Culture Contaminants Handbook. USDA-ARS, Corvallis, OR 1999. (Lab manual) Rev.2002 and 2004.
19. **Reed, B.M., De Paz, J, Tsao, C.V., and C.L. Paynter.** (Eds) Lab Manual for the Tissue Culture Lab at the National Clonal Germplasm Repository, USDA-ARS, Corvallis, Oregon. 1999. (Lab manual) Rev. 2004.
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