

**USDA-ARS  
NATIONAL CLONAL GERMPLASM REPOSITORY  
Corvallis, Oregon**



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**ANNUAL PROGRESS REPORT**

**REGIONAL PROJECT W-6 CY 1996**

**Bruce Bartlett**, Ag. Sci. Res. Tech., Plants  
**Jamie Bergen**, High School Volunteer  
**Troy Buell**, Screenhouse Work Study, OSU  
**Henrietta Chambers**, Collaborator  
**Yongjian Chang**, Graduate Student, OSU  
**Douglas Cook**, Computer Specialist  
***Brian Courtney***, Computer Specialist Trainee  
**Jennifer Curtis**, Lab Work Study, OSU  
***Jeff Darbut***, Biological Science Aid  
**Jeanine DeNoma**, Research Assistant, OSU  
**Yeuxiu Feng**, Visiting Scientist  
**Judith Flynn**, Program Assistant  
**Raymond Gekosky**, Ag. Sci. Res. Tech.,  
**Jorge Gerrero**, Field/Lab Work Study  
**Sharon Hope**, Farm Laborer, OSU  
**Kim Hummer**, Research Leader/Curator  
**Lisa Hunt**, Ag. Sci. Res. Tech., Plants  
**Matt Johnson**, Biological Science Aid  
**Jie Luo**, Grad. Research Asst.  
**Francis Lawrence**, Collaborator

**Sara LeRoy**, Office Work Study, OSU  
**Wes Messinger**, Graduate Student, OSU  
**Jessica Mentzer**, High School Intern  
**Dale Nyman**, Work Unlimited  
**Brian Olson**, Biological Science Aid  
**Carolyn Paynter**, Bio. Sci. Lab Tech., Plants  
**Derek Peacock**, Graduate Student, OSU  
**Joseph Postman**, Plant Pathologist  
**Leslyn Rasmussen**, Biological Science Aid  
**Barbara Reed**, Plant Physiologist  
**Charlie Simon**, Office Work Study, OSU  
**Heidi Solberg**, Screenhouse WkSt, OSU  
**Joe Snead**, Ag. Sci. Res. Tech., Plants  
**Tyler Sparks**, Office Work Study, OSU  
**Piyarak Tanprasert**, Grad Student, OSU  
**John Thornburg**, Lab High School Intern  
**Dennis Vandever**, Maintenance Technician  
**Avery Wilkins**, Biological Science Aid  
**Troy Witherrite**, Field Work Study, OSU

(The Repository permanent staff is in bold and underlined. Temporary federal employees are italicized.)

**Facilities**

By Dennis E. Vandever and Kim E. Hummer

1996 was a year of flooding in Corvallis and at the Repository. Three times during the year the Repository was located on an "island" in the "sea" of the Willamette River. Road access to the Repository was blocked in mid-February, mid-November, and on December 31, 1996. Fortunately, the buildings were not flooded. Although the species pear collection spent November and most of December under water, the dormant trees withstood the "wet feet" without damage. Some refrigerators, walk-in coolers, boiler and backup generator were turned off for several days in case electrical connections would flood and short-circuit. Thankfully, the water did not reach that level. The seeds and in vitro collections

which are stored in these freezers are in good condition. Discussion will continue about improving the security and stability of the freezers and coolers.

Repair on the roofs of screenhouse 7 and 8 were begun. The contractor defaulted. We hope to get a contract to complete the roof repair in 1997. Leaks have appeared around the skylight in the main building foyer. The roof was repaired in several places but the complete leak has not yet been found and repair continues.

Plumbing, electricity, phone, and fire alarm systems were installed in the building at the North Farm. The office and restroom have been completed including lights and hot water. Bay lighting was installed in the shop area. All lights are T-8 fluorescent meeting EPA's "Green Light" requirements. All that remains is minor finish work around windows. The building is 98% complete. The North Farm is used by the Repository, and in collaboration with scientists at the Horticultural Crops Research Laboratory, the National Forage Seed Laboratory, and the Oregon State University Department of Horticulture.

### **Personnel**

By Kim E. Hummer

Our permanent staff remained stable in 1996, however, the total amount of temporary and student help continued to decline following the trend of the past several years. Total federal and state FTE for 1996 was 14.85, down from 16.5 in 1995. Thirty-nine individuals (including volunteers) worked at the Repository during 1996; 15 were female; 4 were Asian; 1 Hispanic; 1 developmentally disabled; 23 were students.

Yuexiu Feng, a Pear Breeder and scientist from the Shaanxi Fruit Research Station, Shaanxi, China, spent 6 months studying the pear collection at the Repository. She worked with the Repository staff in evaluating the plants for pear scab and other disease and morphological data.

Without a funding increase we will be without temporary helpers in FY 1998 and will seriously need to redirect program effort in FY 1999.

## Special Awards for 1996

- Feb *Dennis Vandever* received an USDA award “For Personal Contribution to the Benefit of the USDA-ARS NCGR During the Recent Flooding of the Willamette River Onto Repository Property.”
- Mar *Ray Gekosky* received an USDA award “For 10 Years of Service.”
- Joseph Postman* received an USDA award “For 10 Years of Service.”
- Oct *Carolyn Paynter* received an USDA award “For Diligent Efforts to Improve Safety at NCGR & For Outstanding Service on the Location Safety Committee.”
- Dec *Dennis Vandever* received an USDA award “For Invaluable Service to the USDA-ARS NCGR During the Flooding of the Willamette on November 13 & 14, 1996; For Monitoring & Protecting the Repository Facilities Despite Personal Risk.”
- Dec. *Jeanine DeNoma* received an award “For Invaluable Service to the USDA-ARS NCGR During the Flooding of the Willamette on November 14, 1996; Ms. DeNoma, at personal risk crossed the flooded roads to come to make certain that an experiment on cryopreservation was performed on the required day. She stayed throughout the evening until the experiment was finished. Her dedication & selfless action to forward science is hereby recognized.

## **Budget and Fiscal**

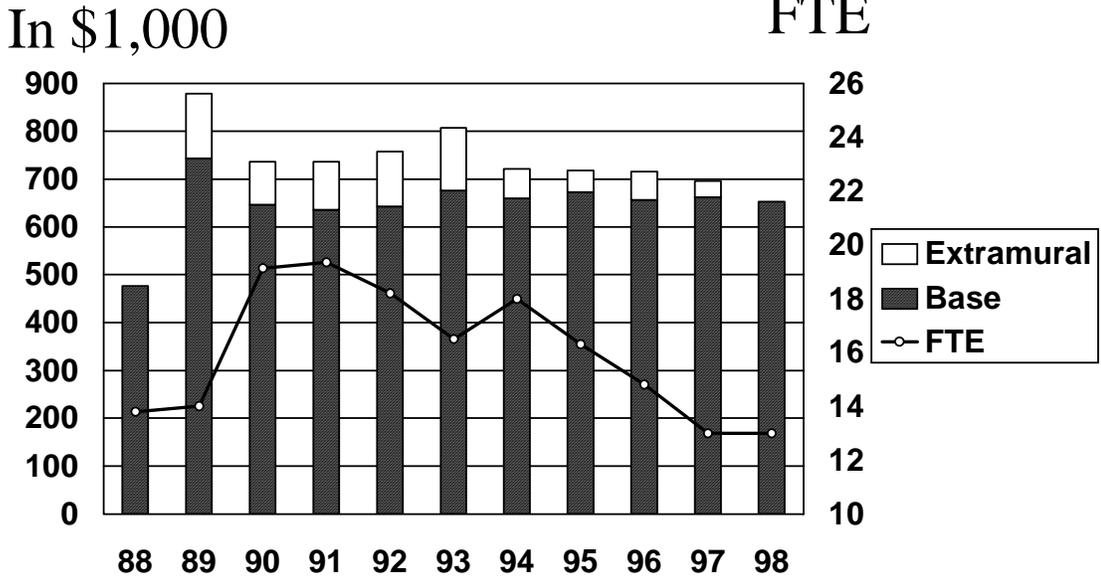
By Kim E. Hummer

FY 1998 ARMP planning projects \$691k , a slightly lower “net to location” base funding than FY 1997. Because two other units at our location are projecting large cuts, our IRC, which is leveled proportional to base funds at the location, is projected to increase. Our salary costs will increase because of the federal pay-act and from promotions. Utilities and phone charges will increase. Because of these, **our FY 98 discretionary operational funds are projected to drop from to 8%.** This provides very limited operating funds. The President’s budget for FY 1998 requests \$50k increase for our unit. We hope that congress approves this increase just to keep our discretionary funds at the status quo.

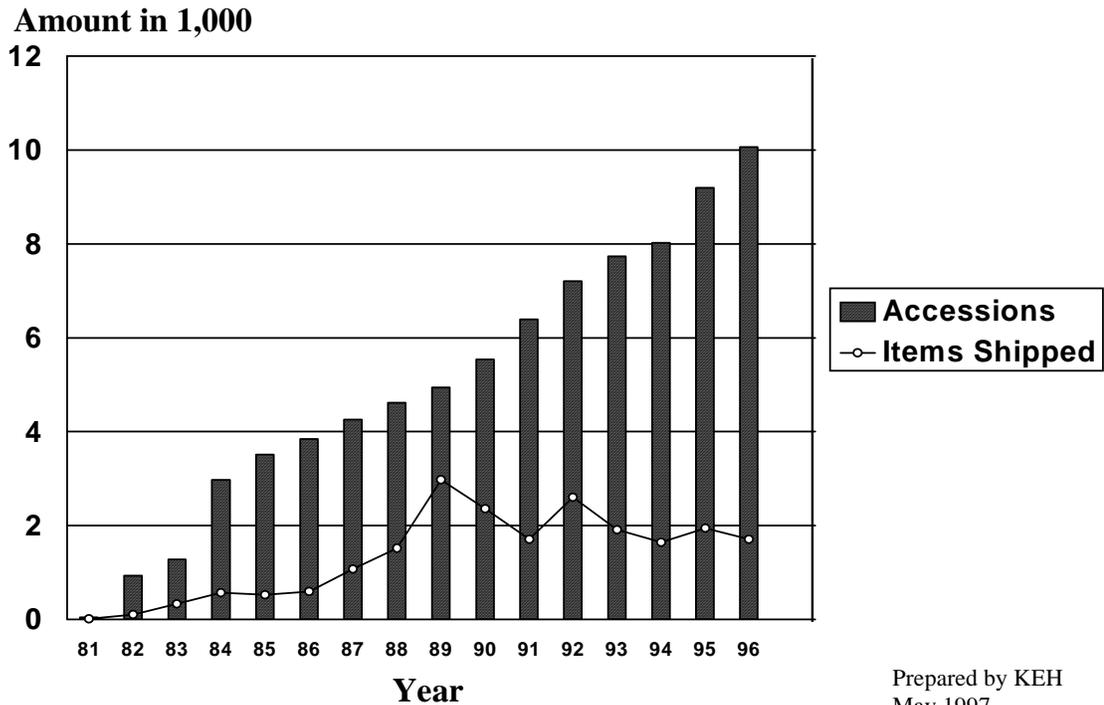
The number of accessions in our collection continues to increase. The number of orders for plant distribution seems to be leveling but postage and phytosanitary certification costs are increasing. Staff involvement to get these orders out has is more involved because of increased demands of foreign phytosanitary certificates and intellectual property rights. We have fewer FTE to manage the collections than we had in previous years. We project that 15 FTE are needed to manage 10,000 clonal accessions. We need additional permanent technical support for our collections. A minimum of \$750k base funding would be required to support this staffing.

USDA-ARS National Clonal Germplasm Repository  
Corvallis, Oregon

## Funding and Staffing



## Accessions and Distribution



Prepared by KEH  
May 1997

By Kim E. Hummer

At the end of 1996 the Corvallis Repository had a total of 10,064 accessions and 12,971 inventory items. The total accessions will continue to increase to obtain a better representation of the diversity of assigned genera.

### New Acquisitions

Three USDA-sponsored plant exploration expeditions, among other sources, increased the holdings of the Corvallis Repository during 1996. The Repository added 434 new accessions, while the inventory items increased by 536. New *Fragaria* lead the list (180 new accessions), with increases in *Rubus*, *Vaccinium* and *Ribes* next. Thirty-four new Pear accessions were received along with eight new *Corylus*.

### Quarantine Plants

The repository has been working through USDA-APHIS and Oregon State regulations to import plants from foreign countries. At the close of 1996 we had 104 accessions in post-entry and other quarantines. The plants are tested for viruses and other disease agents and are inspected annually by APHIS representatives. Pathogen negative plants may be released after two growing seasons. This table shows the plants in quarantine at the end of 1996 listed by genus code:

	<u>Cor</u>	<u>Fra</u>	<u>Rib</u>	<u>Rub</u>	<u>Pyr</u>	<u>Sor</u>	<u>Vac</u>	<u>Intergeneric Crosses</u>
Accessions	6	12	52	1	18	11	1	1
New Accessions received in 1996	0	10	8	0	0	5	0	0

### **Plant Distribution**

By Bruce R. Bartlett

The NCGR in Corvallis continues with its mission to distribute plant germplasm within the United States and internationally. At the time of this printing, we have distributed, for 1996, a total of 1,705 items as seeds, cuttings, runners, scionwood, rooted plants and tissue culture. This number represents 75% of the total number of items requested (2,291) for 1996.

The diverse nature of plant accessions at NCGR-Corvallis present an ongoing challenge to fill all requests in a timely manner. Items therefore, may be pending for as long as three years. The coordination of foreign import permits (IP), seasonal availability and slow growth of some accessions all contribute to delays in plant shipment. Eleven percent of 1996 requested plants are still pending and 9% are listed as not available. Shipment records from 1993 to 1996 show that a total of 80% to 86% of plant requests will eventually be shipped.

A trend from 1991 to 1993 showed that about 20% of items requested in a given year would not be shipped. The unavailability of a given accession when requested and complications associated with IP's account for most of the reasons why items will not be shipped. Considerable effort was made beginning with 1994 to more closely work with requestors to select alternative accessions to those not available. Since that time, the number of items not shipped has dropped to 15% for 1994 and 95. This new trend should continue for 1996 requested items. We continue to work with all requestors in improving plant shipment.

The total number of items requested was stable during 1993 (2,513) and 1994 (2,507), dropped slightly in 1995 to 2,076 and rose again to 2,291 in 1996 (domestically shipped *Humulus* have not been added to 1995 or 1996 totals and may represent an additional 150 items for each year). In 1996 and 1995 foreign requestors asked for approximately 40% of all items ordered. This is significantly more than the previous trend of 25% from 1992 to 94. As of this printing, 60 requests and approximately 685 total items have been ordered for 1997.

Over the past five years (1996-92) accessions from *Fragaria*, *Pyrus*, *Ribes* and *Rubus* were the most often requested in descending order based on a percentage of the total number of items requested. Over this five year period accessions from *Fragaria* represented 24% of all accessions requested. The second most requested genus, *Pyrus*, represented 18%. However, in 1994 *Ribes* was the most often sought genus and *Fragaria* was fourth. The number of *Vaccinium* accessions requested dropped from 314 in 1992 to 77 in 1995 and rose slightly to 112 in 1996. *Corylus* accessions requested increased from 141 to 203 during the period of 1992 to 1995 but dropped to 94 in 1996. Requests for our other major and combined minor genera have varied only slightly over the past five years.

### **Alternate Germplasm Storage**

By Barbara M. Reed

#### Cryopreservation

Research continued on the cryopreservation of *Ribes* meristems. Collaboration with researchers Dr. Erica Benson and Dr. Rex Brennan, in Scotland was very useful. We were coauthors of a poster presentation at the Society for In Vitro Biology (SIVB) meeting in June.

An improved vitrification protocol for *Ribes* was developed using pretreatment immersion of meristems. This improved method was developed by Jie Luo as part of his MS Thesis and then was used to cryopreserve four *Ribes* accessions. These lines are now stored in liquid nitrogen at NSSL. Mr. Luo presented his results at the SIVB meeting.

Pear meristems from the in vitro collection were cryopreserved and sent to NSSL for long-term storage in liquid nitrogen. These meristems provide a base collection for the clonally propagated pear collection. Research assistant Jeanine DeNoma is coordinating this project and has been assisted by OSU doctoral student Yongjian Chang. Together they have tested over 60 accessions, prepared and sent cryopreserved meristems of 20 pear accessions to NSSL in 1996. Two *Rubus* accessions were also sent.

#### Tissue Culture

Piyarak Tanprasert completed her MS Thesis on the detection, identification and elimination of bacterial contaminants of strawberry tissue cultures. These studies provided a new detection method for contaminated runner explants and produced a preliminary treatment plan for persistently contaminated plantlets. She presented her data at the SIVB meeting and at the International Symposium on Bacterial and Bacteria-like Contaminants of plant Tissue Cultures in Cork, Ireland.

Jessica Mentzer, our Junction City High School student, worked on hazelnut contaminants after school, on holidays and during the summer as an ARS Research Apprentice. She presented the research at the SIVB meeting and I presented similar data at the International Symposium on Bacterial and Bacteria-like Contaminants of Plant Tissue

Cultures in Cork, Ireland. Jessica won a travel award to attend the SIVB meeting. Her experience in the lab led her to major in microbiology at OSU this fall.

The *in vitro*-stored collection remains at about 1200 accessions. We are screening the collection for latent bacterial contaminants and discarding cultures if contaminants are detected. We are limiting collection of new or replacement cultures due to reduced personnel. Biological technician, Carolyn Paynter, coordinates all laboratory activities and inventories the cold-stored collection. Carolyn has greatly contributed to training the many visiting scientists and students that come to our facility.

### **Virus Indexing/Therapy**

By Joseph Postman

A large influx of new strawberry accessions during the last several years has resulted in a backlog of untested plants. *Ribes* clones are maintained only in the field with no screenhouse collection, so no attempt is made to index this collection for common virus diseases.

Genus	% Virus Tested Clones
<i>Corylus</i>	91%
<i>Fragaria</i>	59%
<i>Pyrus</i>	80%
<i>Ribes</i>	29%
<i>Rubus</i>	83%
<i>Vaccinium</i>	55%

During 1996, 305 pear and 75 small fruit accessions were indexed for viruses by bioassay and 85 small fruit accessions were tested by ELISA. 84 plants produced by heat therapy and meristem culture were added to the collection to replace plants which had been identified as virus infected. About 30 quarantined pear accessions were returned to the National Plant Germplasm Quarantine Center for reindexing after heat-treated meristem plants had been generated at NCGR-Corvallis in a cooperative effort to move *Pyrus* germplasm through the quarantine system.

About 200 *Fragaria* accessions, 200 *Pyrus* accessions, 100 *Ribes* accessions and 50 *Rubus* accessions are available only as virus infected plants.

Summary of Collections and Virus Status  
 For all inventory received through 31 December, 1996

GENUS	TOTAL ACCESSIONS	SEED LOTS	PLANTS	VIRUS TESTED*	VIRUS INFECTED	UNTESTED
CORYLUS	537	71	465			
COR clones			458	416	16	26
COR sdlg			7	7		
FRAGARIA	1502	318	1182			
FRA clones			1162	686	190	286
FRA sdlg			20	11		9
HUMULUS	802	13	788			
HUM clones			788	57	10	721
HUM sdlg						
MENTHA	505	49	455			
MEN clones			451	13	16	422
MEN sdlg			4			4
PYRUS	1983	265	1717			
PYR clones			1605	1292	211	102
PYR sdlg			112	63	3	46
RIBES	1047	314	732			
RIB clones			575	169	97	309
RIB sdlg			157	1	3	153
RUBUS	1740	934	805			
RUB clones			616	511	53	52
RUB sdlg			189	76	3	110
VACCINIUM	1093	450	643			
VAC clones			579	319	4	256
VAC sdlg			64	12		52
*** Total ***	9209	2414	6787	3626	606	2555

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

Please note: This report does not include duplicate accessions, infected clones that have been replaced with heat-treated plants, and misidentified plants.

**Database Management**

By Doug Cook

## Corvallis Local System

This year the computer systems at Corvallis achieved a new benchmark of functionality with the introduction of a direct link to the internet. With the purchase of equipment from and its installation by Oregon State University, the rewiring of 70% of the Novell network to ethernet and the connection of a T-1 phone line all workstations can now work directly on the GRIN system in Maryland.

We have replaced our failing backup tape drive with a new one that has the added features of being able to copy the entire fileserver hard disk onto one tape, and, do auto backups at night when the system is not in use. One workstation has been upgraded to a standard that will accommodate the new Windows version for GRIN (due for beta testing in early 1997). The Macintosh station, the workhorse for graphics information loaded to GRIN, became doubly useful with the addition of an optical color scanner and a color printer. Both the data going to GRIN and the reports generated on site have taken on a professional quality thanks to the Mac and its peripherals.

This years hardware repairs included a system board replacement, a floppy drive replacement, two UPS fixes and two printers with major component replacements. Software capabilities on all of the workstations are falling into place with the final two stations upgrading to Windows 3.11. Five stations are receiving FoxPro for Windows; which will facilitate the efficiency of manipulating data locally and on GRIN simultaneously.

## GRIN Interactions

For the calendar year 1996 the following data record transactions with GRIN have taken place:

	<u>Data Table Type</u>	<u>Created</u>	<u>Modified</u>
Accession Area	ACC	427	1,001
	SMBR	21	0
	SRC	25	0
	AN	846	16
	AL	9	3
	NARR	16	8,447
	ACIT	2	0
	HAB	7	4
	PED	5	3
	subtotals	1,358	9,474
Inventory Area	IPR	112	111
	IV	482	1,499
	QUAR	3	2
	subtotals	597	1,612
Distribution Area	OACT	1,867	0
	ORD	1,389	1,764
	OI	2,021	1,597
	COOP	442	1,707
	subtotals	5,719	5,068
Observation Area	OB	728	0



- Francisco, CA, 20-28 June, 1996. **Piayrak Tanprasert** presented a poster and **Jessica Mentzer** gave a talk at the same meeting.
- Jul 14 **Kim Hummer** Chaired the Plant Germplasm Operations Committee Meeting and attended the Clonal Germplasm Committee Chairs Meeting in Beltsville, MD, 14-21 July, 1996.
- Jul 14 **Joseph Postman** went on a plant exploration journey to Harbin, Da Hinggan Mountain, Jiang Shan Jiao, Chang Bai Mountain, Kuan Dian and other remote regions of China investigating and collecting native *Rubus*, *Ribes*, *Vaccinium* and *Fragaria*, 14 July to 15 August, 1996.
- Jul 28 **Kim Hummer** went on a plant exploration trip to Cordova, Kodiak Island, Kenai Peninsula and other isolated areas of Alaska searching for wild strawberries (*Fragaria*) and other small fruit species from 28 July to 1 August, 1996.
- Sep 1 **Barbara Reed** attended the Bacterial & Bacteria-like Contaminants of Plant Tissue Cultures Conference, 1-8 September, 1996 in Cork, Ireland.
- Sep 8 **Barbara Reed** attended International Plant Genetic Resources Meeting, 8-16 September, 1996 in Rome, Italy. Paid for by the International Plant Genetic Resources Institute.
- Oct 6 **Kim Hummer** attended the 93rd Annual Conference of the American Society for Horticultural Science and give a presentation at the Small Fruit Crop Committee Meeting in Lexington, Kentucky, 6-10 October, 1996.
- Oct 24 **Barbara Reed** attended the Society for In Vitro Biology Board of Directors Meeting, Annapolis, Maryland, 24-28 October. Society for In Vitro Biology paid trip costs.
- Nov 16 **Barbara Reed** was invited to present a talk at the Annual Cryobiology Congress and confer with Dr. E.E. Benson about Collaborative Research in Oviedo, Spain 16-27 November, 1996. Cryobiology Congress paid costs while in Oviedo, Spain.
- Dec 1 **Barbara Reed** invited to be a resource person at the Endogenous Contaminants in Plant Tissue Culture Workshop, Apia, Western Samoa, 1-12 December, 1996. All expenses were paid by the Pacific Regional Agricultural Program.
- Dec 3 **Joseph Postman** attended the Germplasm Resources Information Network Workshop in Beltsville, Maryland 3-8, 1996.

### Technology Transfer

In January Dr. Barbara Reed began a 4 year term as an Associate Editor for HortScience. In June she began a 4 year term as a Member at Large on the governing board of the Society for In Vitro Biology.

Dr. Reed participated in a discussion on the management of field and *in vitro* genebanks coordinated by the International Plant Genetic Resources Institute (IPGRI), and the Food and Agriculture Organization (FAO) of the United Nations in January. She was later asked to produce guidelines for management based on those discussions. The final draft was near completion at year end.

In June Dr. Reed assisted Mr. Weijian Liang, Economic Forestry Institute, Dalian, China, and his colleagues at Dalian Normal University, with tissue culture of several new hazelnut cultivars he has developed. The visit was sponsored by a grant to Mr. Liang.

In December Dr. Reed conducted a workshop in Western Samoa for South Pacific Island tissue culturists on "Endogenous Contaminants of Plant Tissue Cultures." The participants were from ten island nations which are developing small genetic resources laboratories. The workshop was sponsored by the Pacific Regional Agricultural Project (European Union) and the South Pacific Commission.

## **VISITORS**

Six hundred and seventy-six visitors representing 19 countries of the world were welcomed by the NCGR. Guests were greeted from Asia (China, Japan, Korea), Europe (Russia, Hungary, Switzerland, Latvia, Italy, Germany, Bulgaria, France, Albania, Slovakia, Netherlands, Turkey), New Zealand, United Kingdom, Canada and the United States.

All programs of horticulture, plant physiology, plant pathology, nursery management, and landscape techniques were actively supported by the Repository staff. University of Kentucky Horticulture Club, Albany Izzy's Leadership for Youth, Mapleton, Oregon High School, Oregon State University's Plant Breeding Class, Hoover Elementary 2nd Grade Class, Philomath, Oregon High School Botany Classes, University of Minnesota Class, and Linn-Benton Community College Pesticide Class each numbering from 5-100 individuals toured the Repository during 1996. The highlight of the year in review was our Open House and tour held 10 July 1996. Some folks took time to add remarks at the conclusion of their visits: "I had tons of fun", "Very interesting", "Loved it", and "I will be in touch to schedule a class visit next year". The Linn-Benton Community College again requested we participate in their 1996 Job Fair and NCGR personnel represented the Repository.

## NCGR PUBLICATIONS

- Benson, E.E., **B.M. Reed**, R.M. Brennan, K.A. Clacher and D.A. Ross. Use of Thermal analysis in the evaluation of cryopreservation protocols for *Ribes nigrum* L. germplasm. *Cryo-Letters*. 17:347-362.
- Chang, Y.** and **B.M. Reed**. 1996. Effects of cold acclimation on cryopreservation of *in vitro*-grown *Pyrus* and *Rubus* meristems. Fifth Plant Cold Hardiness Seminar. Abst.
- Finn, C., Kirsten Wennstrom, and **K.E. Hummer**. 1996. Crossability of 14 *Rubus* species with red raspberry and blackberry cultivars. *HortScience* 31(4). Abst.
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- Hummer, K.E.** and B. Strik. 1996. Strawberry genebank information on the worldwide web. 3rd International Strawberry Symposium. Veldhoven, The Netherlands. May 3, 1996. Abst.
- Hummer, K.E.** and C.E. Wright. 1996. Plant collecting for temperate small fruits in Alaska. NCGR-Corvallis, Oregon Station Report. 25 pp.
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- Luo, J. and B.M. Reed.** 1996. Protein effects on the survival of cryopreserved *Ribes* meristems. *Cryobiology* (In Press).
- Mentzer, J., P. Tanprasert, X. Yu, P. Buckley, and B.M. Reed.** Effects of Antibiotics on Internal Bacterial Contamination of Micropropagated Hazelnut. *In Vitro* 32:74A. Abst.
- Peacock, D. and K.E. Hummer.** 1996. Pregermination Studies with Liquid Nitrogen and Sulfuric Acid on Several *Rubus* Species. *HortScience*. 31(2):238-239.
- Pickett, P., **B.M. Reed**, R.M. Brennan and E.E. Benson. 1996. Cryopreservation: An *In Vitro* Method for Conserving *Ribes* Germplasm in International Genebanks. *In Vitro* 32:108A. Abst.
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