

**ANNUAL PROGRESS REPORT**  
**REGIONAL PROJECT W-6**  
**CY 1999**

USDA - ARS  
**National Clonal Germplasm Repository**  
33447 Peoria Road  
Corvallis, Oregon 97333-2521  
Telephone: 541.750.8712  
Fax: 541.750.8717  
hummerk@bcc.orst.edu

<http://www.ars-grin.gov/cor>



**Permanent Federal Staff**

**Bruce Bartlett**, Ag. Sci. Res. Tech., Plants  
**Douglas Cook**, Computer Specialist  
**Judith Flynn**, Program Assistant/Secretary  
**Raymond Gekosky**, Ag. Sci. Res. Tech.  
**Kim Hummer**, Research Leader/Curator  
**James Oliphant**, Bio. Sci. Res. Tech, Plants  
**Carolyn Paynter**, Bio. Sci. Lab Tech., Plants  
**Joseph Postman**, Plant Pathologist/Curator  
**Barbara Reed**, Plant Physiologist  
**Joe Snead**, Ag. Sci. Res. Tech., Plants  
**Dennis Vandever**, Maintenance Technician

**Temporary Staff – Students - Interns**

**Yongjian Chang**, Graduate Student, OSU  
**Jeanine DeNoma**, Research Assistant, OSU  
**Angela Gellatly**, Biol. Science Aid; Plants  
**Francis Lawrence**, Collaborator  
**Michael Le**, Lab Work Study, OSU

**Karen Leger**, Greenhouse Work Study, OSU  
**Alicia Leytem**, Biol. Science. Aid  
**Lora Liegel**, High School Intern; Volunteer  
**Katy Lindstrom**, Lab Intern, Sat. Academy  
**Sam Ly**, Lab Work Study, OSU  
**Deric Picton**, Graduate Student, OSU  
**Kim Riha**, Greenhouse Work Study, OSU  
**Alanna Robbins**, Ag. Science Aid-Plants  
**Valerie Stanik**, Biol. Science Aid; Lab  
**Judah Switzer**, Biol. Science Aid; Plants  
**Scott Thompson**, Field Work Study, OSU  
**Chih-Wei (Valen) Tsao**, Grad. Student OSU  
**Emily Vollmer**, High School Intern;  
Volunteer  
**Nan Wang**, Graduate Student, OSU  
**Amy Wasson**, Office Work Study, OSU  
**Brian Yoss**, Office Work Study, OSU  
**Monika Zweifel**, Lab Intern, OSU

## **Staffing Changes**

Kim E. Hummer

Over the course of the CY 1999, we had one change in our permanent staff positions. Our Category 3 (Support Scientist) Plant Pathologist position underwent a desk audit by ARS personnel staff. Upon recommendation from our Position Classifier, and with approval from our Area Director, this position was converted to a Category 4 Service Scientist. This position is now considered to be an SY position for budget planning and other administrative aspects. The Repository now has three scientists, a Supervisory Research Horticulturist, Research Plant Physiologist, and a Plant Pathologist.

During 1999, 29 employees were on the NCGR payroll, including 14 women, 4 Asians, 16 students (graduate, undergraduate, and high school levels). The Repository has 11 permanent full-time federal positions including three Scientists, five Technicians, a Program Assistant, a Facilities Maintenance Technician, and a Computer Specialist. In addition, the Repository budget sponsored a part-time Research Assistant for the hop tissue culture and virus testing through a Research Support Agreement with the Oregon State University, Department of Horticulture. The Repository had 2 high school volunteers during the year, and one scientific collaborator. In addition, Dr. Whitey Lawrence provided excellent volunteer collaboration and Drs. Mel Westwood, Maxine Thompson and Henrietta Chambers provided volunteer services that were greatly appreciated.

## **Promotions**

Two Repository staff members were promoted during CY 1999. Dr. Barbara Reed's position and performance was reviewed by an ARS peer research evaluation panel committee. Upon review of her considerable efforts in cryogenic preservation and in vitro culture research, and her international acclaim and scientific recognition, the panel recommended that Dr. Reed be promoted to GS-14. Congratulations, Barbara!

In association with the conversion from Support Scientist to Service Scientist, Joseph Postman, our Plant Pathologist, was promoted to GS-12. Joseph's responsibilities which previously included the plant pathology, information and greenhouse management, now include the Curation of the Repository pome fruit collection as well. (Kim Hummer will continue as curator for the small fruit, nut, and specialty crops collections.)

Best wishes to both scientists for a productive new century!

## **Budget and Fiscal**

By Kim E. Hummer

During 1999, the Corvallis Repository base funding was given a \$15K increase by the National Program Leader for Germplasm, for a total of \$771K for FY 2000. With promotions and pay act increases percent in salary remains about 78%. This high salary percentage forced reduction of 1.3 FTE temporary, part-time, and student positions for FY 2000, relative to that of FY 1999. The planned FY 2000 staff for the Repository has been reduced to 11 FTE federal employees and one half-time graduate student. Additional student and part-time help will be sought with funding through grants or other temporary sources.

In 1999, the Repository received a record amount of specifically earmarked extramural funding from several sources. The majority of this funding was for repair of the roofs of greenhouses and screenhouses and their replacement with new polycarbonate (lexan). Cooperative research projects included initial work in developing pear cultivar identity analysis using simple sequence repeats of DNA (with USDA-ARS Geneva, NY); cryopreservation of grasses (with USDA-ARS Corvallis, OR);

verticillium detection of in vitro cultured mint (A. M. Todd, Oregon); initial establishment of evaluation plots for strawberries (NASGA, Florida).

**FY1999 Extramural funding**

\$ 1,500	Development of SSR for pears (cooperating with Geneva, NY – additional amount sent to Geneva)	Nat’l Program Staff Eval. grant
160,000	Replace greenhouses 1, 2 glass with lexan	ARS Headquarters
160,000	Replace greenhouses 3, 4 glass with lexan	ARS Headquarters (EOY funds)
60,000	Re-roof screenhouses 5, 6, 7, and 10	ARS Headquarters (EOY funds)
21,000	Greenhouse/screenhouse heating, shading	Nat’l Program Staff
15,000	Temporary funds for base funding increase	Nat’l Program Staff
5,000	Computer upgrades	PWA (EOY funds)
7,000	Research on cryopreservation of Grasses	USDA ARS NFSPRC, Barker
10,000	Research on verticillium detection of in vitro cultures	A. M. Todd (Through OSU Agriculture Research Foundation)
1,000	Strawberry evaluation grant	N. A. Strawberry Growers
<u>3,000</u>	Summer High School Intern	Saturday Academy, Portland
443,500		

**New Acquisitions**

By Kim E. Hummer

During 1999, 230 new accessions were added to the NCGR collections. New *Actinidia* and *Pyrus* accessions topped the list, then *Vaccinium*, *Rubus* and *Fragaria*, *Humulus* and *Ribes*. Responsibility for *Actinidia*, the hardy kiwifruit, also known as Chinese gooseberry, was transferred from the Repository in Davis, California. This group of plants is much better adapted to the Corvallis climate than to the hot summers of Davis. The hardy *Actinidia* consist of two taxonomic sections and about 10 species. The Corvallis Repository now has four of the ten species represented including about 65 cultivars. The Repository will place emphasis on obtaining a broader diversity of species and will be obtaining improved cultivars from the Russian far east, and from China.

In *Corylus*, the big find of the year by Dr. Shawn Mehlenbacher’s laboratory was the identification of 7 clones with resistance to eastern filbert blight. Five of these clones were present in the Repository collection but two others were acquired from Dr. Mehlenbacher. These clones will provide a diverse range of germplasm for breeding to develop a commercial quality nut with blight resistance.

In *Fragaria*, Dr. Jim Hancock coordinated a broad research project with a number of scientists across the country. These scientists examined a number of recently collected wild species representatives for morphological traits at many locations. The results of their research identified a “strawberry super-core.” This super-core is now part of the Repository collection and will be available to researchers who wish to survey a range of species for diverse responses to treatment conditions.

More than a dozen new collections of native American hops *Humulus lupulus* var. *lupuloides* were donated by Dr. Richard Hampton from wild collections that he made throughout North America. This germplasm was collected and donated as seed.

For *Pyrus*, the Repository received about 30 low chilling cultivars that are now available as dormant scionwood. In addition, 4 Asian pears were released from quarantine.

In *Ribes*, four European cultivars were released from National Plant Germplasm Quarantine. In *Vaccinium*, new species representatives were received from the Pacific Northwest as well as Asia. Dr. Creighton Gupton sent a number of releases from his blueberry breeding program in Mississippi.

## **Safety**

The year started out with a safety quiz for Repository staff members concerning the location of fire extinguishers and alarm pulls. The Repository staff, coordinated by Barbara Reed, Carolyn Paynter, and Joe Snead, updated the chemical inventory list, MSDS sheets, and eliminated excess chemicals. We spent about \$10,000 or 1.3 % of our total budget on safety purchases. About half of that amount was facility improvements for ADA access. Ergonomic concerns were discussed at length. Back braces, wrist braces and other ergonomic aids were purchased to assist staff members in repetitive tasks. Computer working spaces were rearranged according to information from our location safety officer, Mike Leahy, to avoid or reduce strain on wrists, shoulders, and backs.

## **Facilities 1999**

By Dennis Vandever

This was a very busy year. Headquarters provided repair and maintenance funds for four greenhouses and four screenhouses. Although these contracts were coordinated through our Area Office, the Repository staff had a great challenge to continue operation and maintenance of the plant collections "as usual" although these 8 houses were under repair. The Repository R&M funds (4% of base) were allocated to complete roof repair of the main building among other repairs.

In March, we replaced vent controllers, gear drives and shafts for the ridge vents in greenhouses 1 and 4. In April, we invited the Corvallis Fire Department to assist us in a fire and safety inspection. The JD 6200 tractor had a major wheel problem that was fixed and our JD 2355 tractor had to go in for clutch repairs. I repaired numerous hydraulic leaks on tractors and attended a water rights course in Keizer, Ore. We installed computer automation of our greenhouse irrigation system.

In May, we upgraded the lobby doors to meet American's with Disabilities Act requirements by installing automatic door openers. Other exit doors were modified with panic bars. The annual fire alarm system test was performed and one new fire bell was installed. The Valley Fire Department sent a representative here for our annual fire extinguisher testing. We recycled hazardous waste. We hosted a contractor's site visit for replacement of our greenhouse roofs with polycarbonate (lexan).

In June, the building was fumigated for carpenter ants. We had an underground locate done in preparation for trench digging for an underground storm drain system and new propane gas lines. In July the heating system was drained and the hot water recirculation pipes feeding the screenhouses were removed. We hosted a contractor's site visit for repair of screenhouse roofing. The main building roof coating project was begun. Our chain saw and weed wacker were stolen from our storage building. We filed a police report.

In August, propane gas line installation was begun. New heaters were installed in screenhouse 8, 9 and 10. Reroofing of screenhouses 9 and 10 was begun. In September, re-roofing for screenhouse 9 and 10 was completed. Re-roofing for screenhouses 5, 6 and 7 was begun. Re-roofing for greenhouse 1 begins. Follow-up spraying for carpenter ants performed. Screenhouse 7 roof completed.

In October, old heaters were removed from screenhouse 7 and new circulating fans were installed. Several hot water re-circulation lines were welded. An aging HVAC air compressor was replaced with a new twin unit. We received a security threat concerning ecological terrorists. We met with the Linn County Sheriff's Department and requested additional support from them if needed. No terrorist activity materialized.

In November, the screenhouses were completed. Old heaters were removed from screenhouses 10, 5 and 6 and new heaters were installed. Circulation fans were installed in screenhouses 10, 5 and 6. The hot water heating system was filled, tested for leaks and was brought on line. New heaters were placed on line and thermostats were adjusted.

In December, final tests were performed on the generator in preparation for the Y2K roll over. The lower radiator hose was replaced. The screenhouses were inspected and the contract was completed. The new HVAC Compressor had problems and was repaired under warranty. All fuel tanks were topped off. A false burglar alarm occurred in the shop on December 25, 1999.

### **Computer/Information Management**

By Doug Cook and Kim Hummer

Three new computer workstations were purchased this year (two desktop and one laptop). In total, twelve of fifteen workstations operate with Pentium (586) or higher CPU's with memory upgrades to 16 megabytes or higher. By the end of December 1999, ten stations were upgraded to Office 97 software including the Outlook email program. Twelve PC workstations were converted to Windows 95 or Windows 98 operating systems. One Power Mac, four PC 486s and two 386s use other software. Four LaserJet printers are available to users at the Repository. Three printer repairs, two hard drive replacements, minor computer configuration repairs, network cable rerouting and custom database program modifications occurred during the year. All workstations, the fileserver, ethernet hubs and internet router now have power backup supplies.

<b><u>Table GRIN Records Activity during CY 1999</u></b>		
<b><u>GRIN Area</u></b>	<b><u>Created</u></b>	<b><u>Modified</u></b>
Accession/Inventory/Obs	3,703	1,460
Distribution/Cooperator	3,830	666
Total	7,533	2,126

### **Annual Field Report 1999**

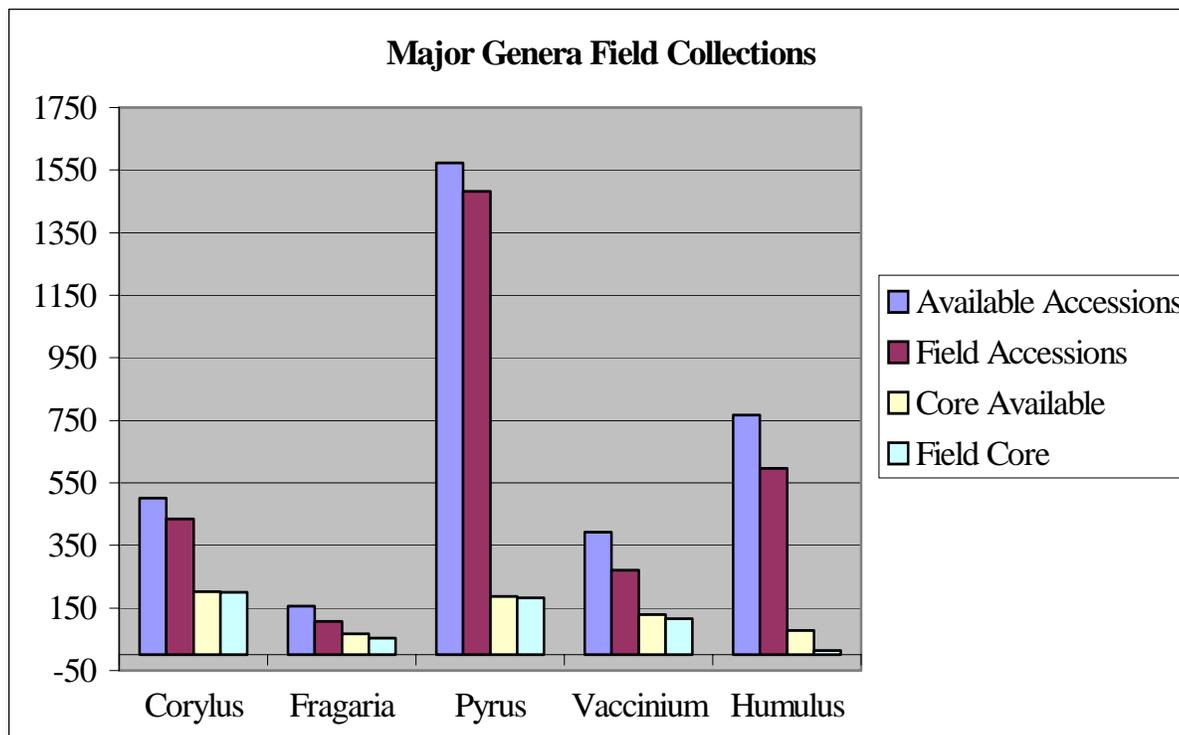
by Ray Gekosky and Joe Snead

The field collections contain a high percentage of the available plant accessions. (Fig. 1). This last year only a few new or replacement accessions were planted in the field. A *Fragaria* evaluation plot was planted in the fall. Considerable time was spent establishing a new *Ribes* research block on the North Farm and removal of the Chinese *Rubus* block. A shortage of labor due to budget constraints continues to be a challenge.

The cooperation between our facility and Oregon State University, Department of Horticulture, Lewis Brown Farm staff remains high. Our field collections continue to be used by a variety of plant researchers. Several acres of land lent to Dr. Chad Finn for *Rubus* seedling evaluation have been vacated and are being cleaned up and fallowed for a year. Some swale land bordering the *Pyrus* field has been given to Dr. Shawn Mehlenbacher for a long-term *Corylus* species collection. Turf care in the *Vaccinium* field is still handled by Dr. Tom Cook and his turf students.

Many changes have occurred on the North Farm this past year. Two research projects from the Horticultural Crops unit have established research facilities on the North Farm. Last spring, a greenhouse for the IR4 Ornamental evaluation project and screenhouse for grape insect research were built near our equipment shop. A portable trailer office was installed. Utilities are being shared between each of the structures.

Dr. Maxine Thompson, emeritus Professor of Oregon State University, is using several acres on the North Farm for a honeysuckle evaluation trial. Oregon State University Horticulture Department will provide the farming services.



### Fragaria

In September an acre of fallow ground was worked. A small portion of land was planted with 108 accessions of strawberries. These accessions have not yet been observed here at the repository. Three plants of each accession were planted in a hill type system. The replicates were planted one foot apart with three feet between each accession. An eight-foot turf strip will be maintained between each plant row. They were planted in the fall of 99 with observations to begin in the spring of 2000. The planting has room for 42 additional accessions this spring.

### Vaccinium

Several more field cultivars tested positive for the blueberry scorch virus. These plants have been removed from the field and will be replaced with clean duplicates from our screenhouse collection.

### Corylus

Applications of fungicides and oil continue as a preventative for eastern filbert blight. One spray to control filbertworm took place in May. The designated core collection was detail pruned to invigorate scionwood growth for collection, distribution and grafting. Due to time constraints the rest of the field collection was lightly hedged and not pruned in 99.

Approximately 30 core plants were layered in the field. Successfully self-rooted trees will be sent to the station at Parlier, CA as a backup collection and distribution order. Overhead irrigation was

used along with drip for the extra water needed for the layering process. The success rate on the layers was poor due to several factors. The primary reason was a very large nut crop that reduced vegetative growth.

### Ribes

The plants were pruned back into a reasonable shape after undergoing complete removal to their crowns the previous year. Their growth went uncontrolled for one season and many of the vigorous shoots could not support themselves. Thus we had a lot of bent and fallen stems with outward growth along the ground. Special care pruning was needed to get upright shoots off the previous years growth.

### Pyrus

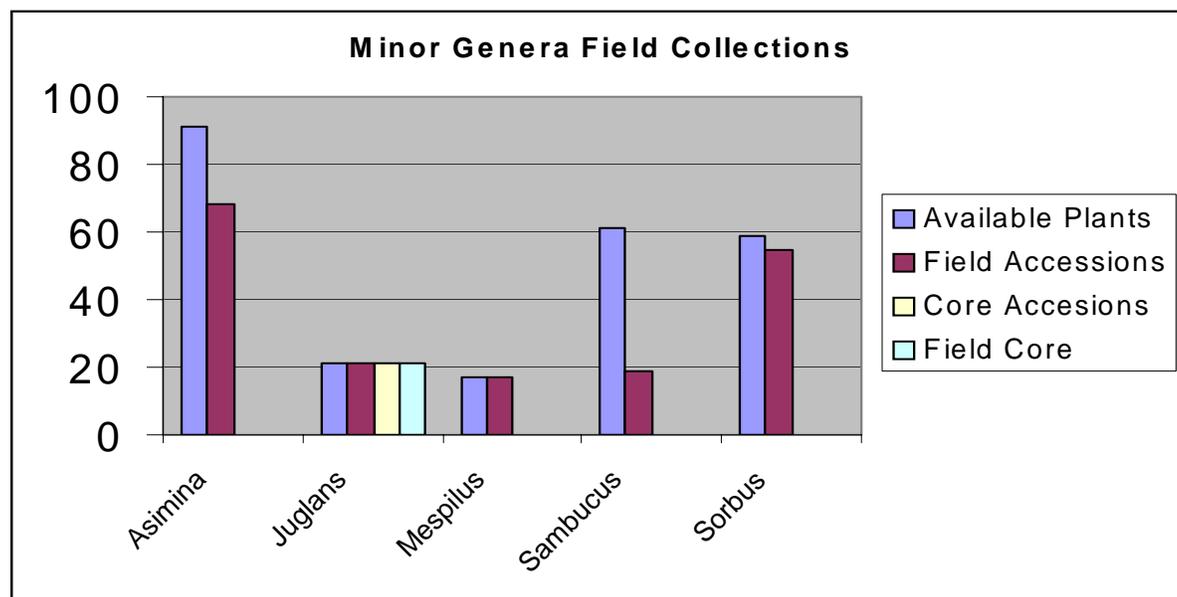
This planting continues to evolve into a planting with a single tree per accession. Many duplicate accessions were removed in the fall. The trees were lightly hedged in the late winter and the core accessions were hand pruned. The fruit crop was the best it's been in many years.

### Rubus

The Chinese seedling block was removed this year. The removal process spanned the entire growing season. The plants were sprayed with herbicide and then later mowed to ground level. The crowns were undercut and then removed. The plot was irrigated to promote regrowth. It was then sprayed with herbicide twice during the summer. The ground was worked again in the fall and the rows hilled up in preparation for a new hardy kiwi planting in the spring of 2000. There will probably be one more general herbicide application in the spring with spot applications to continue as needed.

### Other Field Plantings

The minor genera planting is now well established and looking good. It continues to be of great interest to visitors. The Paw Paw Trial block was in its fifth leaf this last year. We lost trees again this year to "Blue Stain Fungus." There was a small crop on specific accessions.



Field Collections	Infield Open Spaces	Field Expansion Space	Field Size (Acres)
<i>Corylus</i>	45	58	3.2
<i>Fragaria</i>	22	+250	0.25
<i>Pyrus</i>	385	154	6.5
<i>Ribes</i>	92	132	2.2
<i>Vaccinium</i>	94	112	1.2
<i>Cydonia</i>	4	12	0.1
<i>Juglans</i>	2	12	0.5
<i>Humulus</i>	unknown	75	2.0
<i>Mespilus</i>	4	6	0.1
<i>Sambucus</i>	12	6	0.1
<i>Sorbus</i>	7	20	0.2

### **Special Awards for 1999**

August	Angela Gellatly	For superior work in repair and cleaning of landscape in preparation for upcoming White Pine Blister Rust Conference. Work was highly motivated, self started and quickly accomplished.
September	Alicia B. Leytem	For the outstanding effort and overall quality of work, attention to detail and self-motivation in the maintenance of the greenhouse plant collection.
October	Judith M. Flynn	For Excellence in the preparation for and the coordination of the White Pine Blister Rust Interdisciplinary Scientific Meeting held in Corvallis, OR on September 8-10, 1999.
November	Michael Leahy	For great personal effort to increase the safety consciousness of the staff of USDA ARS National Clonal Germplasm Repository.

### **Screenhouse/Greenhouse Collections**

By Jim Oliphant

#### **1999 Highlights:**

- Establishment of new screenhouse collections of *Actinidia*, *Humulus*, and *Ribes*.

- Reglazing and other improvements of the greenhouses and screenhouses to provide more optimum growing environments.
- Improved methods of weed, pest, and disease control to reduce the amount of applied pesticides.

### **Facility Improvements**

The roofs of four greenhouses and four screenhouses were replaced with polycarbonate this year. This will provide increased solar radiation and greatly improve the vigor of the collection. The screenhouses were converted from hot water to propane heating. This will allow us to maintain lower temperatures in the screenhouses thereby reducing heating costs without compromising the health of the collection. All screenhouses now have high output fans installed for better horizontal airflow. Channeled spring lock was applied to the ends of all screenhouses for attachment of plastic film. This stops the damage of repeated nailing of lath and allows faster winterizing of the screenhouses. The benches in the *Rubus* house were replaced with plastic wood, increasing both bench area and number of accessions that can be maintained in the screenhouse. An automated side vent and an internal thermal/shade curtain were installed in our propagation greenhouse. These features will allow better control of the growing environment.

### **Plant Collections**

#### **Actinidia**

Actinidia is a new genus that has yet to be established in the field. Our plan is to maintain temporary back-up plants until the field plants are established. Of the 69 clones received 63 are established in the screenhouse, many with additional plants ready for the field.

#### **Corylus**

Temporary back-up trees of all new young field trees and virused clones of *Corylus* are maintained under screen. Before a new accession can be planted in the field it must be grafted and layered until the scion is on its own roots. Scionwood of core clones is also grafted and maintained in a greenhouse as needed for tissue culture source material. Currently, 60 accessions are grafted and ready for harvest. Scionwood of all core accession is also being grafted and layered for the off-site back-up collection at Parlier, CA, currently 38 clones are grafted and ready for layering.

#### **Fragaria**

All clonal accessions of *Fragaria* are maintained under screen. A strawberry field evaluation was initiated. For this study, approximately 180 clones were identified for evaluation, of these, 126 clones (70%) were propagated and planted in the field. Most of the clones that could not be propagated did not produce runners. This is a problem with some clones when grown in pots. A cyclamen mite biological control experiment was performed with the predatory mite, *Neoseiulus fallacis*, using the core collection. The results showed the predatory mite is effective against two-spotted mite but only partially effective against cyclamen mite. A combination of pesticide sprays and predatory mites may offer the best control.

#### **Humulus**

Our strategy is to eventually maintain a virus free collection of all core *Humulus* accessions. Currently, 54 clones are ready to be moved into the screenhouse, with an additional 9 virus isolates to be maintained in the virus screenhouse.

## Mentha

All clonal accessions of *Mentha* are maintained under screen.

## Pyrus

Permanent back-up trees of all non-hardy clones, virused clones, and temporary back-up trees of all new young field trees of *Pyrus* are maintained under screen. Of the 83 clones in the screenhouse, 25 are non-hardy and 58 are virus isolates.

## Ribes

Our intent is to maintain all core or non-hardy clonal accessions of *Ribes* under screen. To date over 90% of the *Ribes* core has been propagated and 67% of the 231 core accessions are established in the screenhouse.

## Rubus

All clonal accessions of *Rubus* are maintained under screen. Prostrate, nodal rooting, clones were repotted into deep flats and are being maintained on separate benches. This prevents these clones from being shaded out by the more typical upright clones.

## Vaccinium

Our goal is to maintain all core, named cultivars, and non-hardy clonal accessions of *Vaccinium* under screen. The collection is undergoing repropagation of all blueberry clones and all accessions have been reduced to a single pot. Additional cultivars needed for the screenhouse have been propagated from the field and will be established under screen in summer 2000. Currently, 75% of an estimated 408 accessions are established in the screenhouse.

### Clonal Accessions maintained in the Greenhouses and Screenhouses as of December 1999

	Total # Accessions	Core		Available		Single Plants With No Back-Up		Square Feet Occupied		Expansion Space		
		# Ac.	%	# Ac.	%	# Ac.	%	Sq. Ft.	% Total	Sq. Ft.	% Total	# Pots
<i>Actinidia</i>	64	0	0	64	100	635	52	245	1.5	140	1	36
<i>Corylus</i>	21	2	9	9	43	296	43	70	0.5	0	0	0
<i>Fragaria</i>	1223	487	40	1179	96	189	44	4810	29	685	4	221
<i>Humulus</i>	125	57	46	125	100	118	32	455	3	245	1.5	75
<i>Mentha</i>	433	47	11	430	99	260	86	1190	7	140	1	56
<i>Pycnanthemum</i>	33	15	45	33	100	68	23	175	1	35	0	10
<i>Pyrus</i>	304	13	4	161	53	0	0	350	2	350	2	100
<i>Ribes</i>	296	210	71	223	75	0	0	770	5	490	3	144
<i>Rubus</i>	682	297	44	633	93	31	76	3045	18	455	3	169
<i>Vaccinium</i>	373	207	55	344	92	12	36	2660	16	210	1	47
<i>Other</i> <sup>1</sup>	41	3	7	35	85	19	90	140	1	140	1	40
<b>Total</b>	<b>3595</b>	<b>1338</b>	<b>37</b>	<b>3236</b>	<b>90</b>	<b>1628</b>	<b>45</b>	<b>13910</b>	<b>83</b>	<b>2890</b>	<b>17</b>	<b>858</b>

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

JMO 16-01-00

## Quarantined Plants

At this time we have 137 accessions in quarantine. One *Rubus* species was released in 1999.

- 95 *Pyrus* accessions: 11 Provisional Release accessions to be planted in the field, 5 Provisional Release accessions that are virused and need to undergo heat therapy, and 79 accessions that are here from Beltsville on Joseph Postman's permit for heat therapy to remove viruses.
- 2 *Rubus* accessions: an additional accession was released in 1999.
- 40 *Ribes* accessions: 3 accessions have not been released, 37 accessions have been released by APHIS but are being maintained as "in-house quarantine" because of their virus status.

## Plant Distribution

By Bruce R. Bartlett

### 1999 Highlights:

- 2,260 items were shipped as seeds, cuttings, runners, scionwood, rooted plants and tissue culture.
- 479 tissue cultured accessions, from seven genera, were sent to the National Seed Storage Laboratory in Ft. Collins, Colorado as backup.
- 85% of accessions requested in 1999 have been or will be shipped.
- 56% of all items requested and shipped are designated as "core" germplasm.
- 24% of all items shipped were sent to foreign requestors.
- 67% of total accessions shipped in tissue culture form were sent to foreign requestors (not including tissue culture accessions sent to NSSL)

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 1,558 items as seeds, cuttings, runners, scionwood, rooted plants and tissue culture from 1999 requests (Fig. 4). This represents 65% of the total number of items requested for 1999. Additional material will be shipped in CY 2000 from 1999 requests.

During CY 1999 2,260 plant items were shipped. Five items from request year 1995 were shipped, 3 from 1996, 29 from 1997, 580 from 1998 and 1,643 from 1999. The total postage paid for domestic and international shipping was \$1,222.24 (Table 2). The total cost for Federal Express was \$433.73 and the total paid to the Oregon Department of Agriculture for 62 Phytosanitary Certificates was \$620.00.

**Table 2. Expenditures for Plant Distribution from 1999-1995.**

Year	Total items			Shipping		
	Shipped	Postage	FedEx	PC's	Total	cost per item
1999	2260	\$1,222.24	\$433.73	\$620.00	\$2,275.97	\$1.00
1998	2743	1,037.54	735.41	410.00	2,182.95	0.81
1997	2632	1,622.35	619.73	800.00	3,042.08	1.16
1996	2028	1,656.15	330.06	700.00	2,686.21	1.32
1995	1974	1,523.23	135.78	556.00	2,215.01	1.12

The total number of plant items shipped in 1999 dropped slightly to 2260 after four years of steady increases (Table 2). The amount spent for Federal Express decreased slightly while the amount

spent for postage and Phytosanitary Certificates (PC's) increased slightly. The amount spent per plant item shipped also increased in 1999.

The diverse nature of plant accessions at NCGR-Corvallis presents an ongoing challenge. Items may be pending for as long as three years. The coordination of foreign import permits (IP), seasonal availability and slow growth of some accessions contribute to delays in plant shipment. As of February 3, 2000, 28% of the 1999 requested plants are pending, 5% are listed as not available and 2% have been cancelled. Shipment records from 1993 to 1998 show that a total of 80% to 86% of plant requests will eventually be shipped. Total plant shipments from 1999 should continue this trend.

We continue to backup our germplasm at NSSL. During 1999, 479 accessions from *Corylus*, *Fragaria*, *Humulus*, *Mentha*, *Ribes*, *Vaccinium*, and *Pycnanthemum* were sent to NSSL as backup.

Tissue culture represented less than 12% of the total distributed accessions, however, it was one of the most requested and shipped forms for foreign requestors. A number of factors have contributed to the rise of tissue culture as a favored form by foreign requestors. European and South American IP restrictions are less for tissue culture plants in contrast with other forms. Situations where *Pyrus* scionwood would be prohibited due to the presence of fireblight (*Erwinia amylovora*), tissue culture may be accepted. Many accessions in tissue culture are also virus tested and therefore may satisfy IP restrictions. Tissue culture accessions are durable in shipment and may be shipped most any time of the year except during periods of extreme heat and cold. Many countries will restrict the shipment of woody plants to the dormant period while these same plants if in tissue culture could be sent throughout the year.

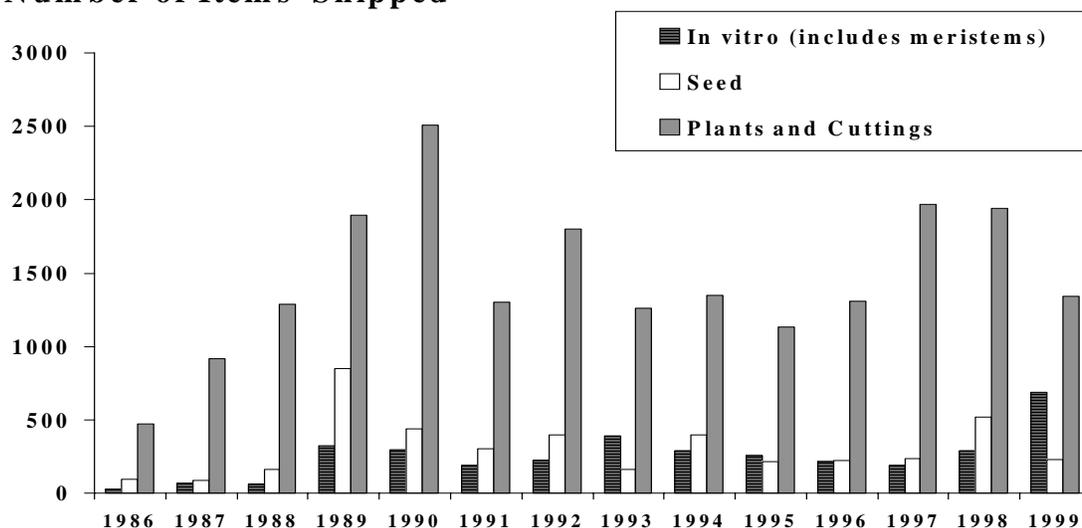
Seed of some genera (e.g. *Rubus*) now are prohibited from being shipped to New Zealand, France and Germany unless the virus status of the mother plants is known. Because much of our seed collection was gathered on plant explorations, the virus status of the mother plant is unknown and we can not therefore state that the seed is virus free. All of these factors have contributed to increasing the value of tissue culture over other forms when shipping to foreign destinations.

A trend from 1991 to 1993 showed that about 20% of items requested in a given year could/would not be shipped. The unavailability of a given accession when requested and complications associated with IP's account for most of the reasons for cancellation. Considerable effort was made beginning with 1994 to work more closely 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, 17% for 1995 and 96, 12% for 1997 and no worse than 14% for 1998. This trend should continue for 1999 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, 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) and to 2,983 in 1997. The total number of items requested rose higher yet in 1998 to 3,613 and decreased to 2,415 in 1999. 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. In 1997, foreign requestors asked for 22% (643 items) of all items ordered, 27% (983 items) in 1998 and 27% (644 items) in 1999.

Over the past eight years (1999-92) accessions from *Fragaria* have been the most often requested based on a percentage of total items requested (21%). *Pyrus* was the second most requested (18%) followed by *Ribes* and *Rubus* at 15%. *Mentha*, *Vaccinium*, Minor genera (total), *Corylus*, and *Humulus* then follow in descending order. In 1999 the above mentioned trend continued except for *Rubus* where requested accessions fell to 6<sup>th</sup> position at 6%.

## Number of Items Shipped



## Virus Indexing

By Joseph Postman

At the end of 1999, approximately 90% of our *Corylus*, *Pyrus* and *Vaccinium* core accessions, 85% of *Rubus* core accessions and 80% of *Fragaria* and *Humulus* core accessions are available as virus tested plants. The numbers are not dramatically different from 1998, with small changes due to the arrival of new “untested” plants, detection of additional infected plants, and the movement of heat treated meristem plants into the collection to replace infected clones.

The total number of unique clonal accessions of our 8 major genera increased by 2.9% during 1999 to 6205. This reflects the arrival of new accessions, and the identification and elimination of redundant clones and clones with intellectual property rights. During 1999 the total number of virus tested clones **decreased** by 2.9% to 3427, virus infected clones **increased** by 2.7% to 532, and untested clones **increased** by 13.2% to 2246 (for the 8 major genera). The decrease in number of virus tested plants is due primarily to the elimination of many virus tested clones protected by intellectual property rights. Most of the increase in known infected plants is from the detection of strawberry mild yellow edge virus in new strawberry accessions. *Corylus* and *Vaccinium* remain our “healthiest” collections with fewer than 1% known virus infected plants. The table at the end of this section itemizes the total number of clones in each of these major collections and the number of virus tested, virus infected and untested plants.

**Virus Status of NCGR CORE Collections at the end of 1999**

	<b>Core Plants</b>	<b>Percent Tested</b>	<b>Percent Infected</b>
<i>Corylus</i>	179	92.2%	1.1%
<i>Fragaria</i>	497	76.7%	13.9%
<i>Humulus</i>	80	78.8%	12.5%
<i>Mentha</i>	50	14.0%	2.0%
<i>Pyrus</i>	202	91.6%	4.0%
<i>Ribes</i>	219	2.7%	14.2%
<i>Rubus</i>	303	85.2%	8.6%
<i>Vaccinium</i>	221	92.3%	0.5%
<i>Cydonia</i>	38	34.2%	10.5%
<i>Mespilus</i>	16	43.8%	31.3%

- "Virus Tested" includes plants that have tested negative for several important viruses, and plants that have been produced by heat-therapy and meristem culture.
- This table DOES NOT include duplicate accessions or misidentified plants.
- This table DOES include accessions that are not available due to quarantine, insufficient inventory, or virus infection.

**1999 Highlights:**

- Strawberry mild yellow edge virus was detected in 22 additional *Fragaria* clones, bringing to 210 the number of infected accessions in this genus. Our 69 infected Core accessions are receiving 1<sup>st</sup> priority for virus elimination therapy.
- Heat therapy of the *Humulus* core collection has been remarkably successful. 55 Core accessions have been replaced with heat-treated, meristem derived plants to date. While the original field plants were nearly all infected with multiple viruses, nearly 100% of the plants resulting from virus therapy continue to test negative by ELISA.
- Therapy of *Pyrus* continues to be a success story also. 15 heat-treated replacement clones were added to the NCGR collection, and 7 heat-treated clones were returned to the National Plant Germplasm Quarantine Center in Beltsville as we continue our efforts to assist with their virus clean-up. About two dozen additional heat-treated quarantine pear and quince clones are ready to be shipped to Beltsville in early 2000.
- Several additional blueberry plants infected with blueberry scorch carlavirus were detected in our *Vaccinium* field collection, indicating that this virus continues to spread slowly. All infected plants were removed, and field screening will begin again in spring of 2000.
- Apple chlorotic leafspot virus (= pear ringpattern mosaic) has been detected by bioassay in 5 of our medlar (*Mespilus germanica*) accessions. This may be the first report of this common virus in this host.

**Crop Specific Indexing/Therapy Activities during 1999**

*Corylus*

Heat therapy was completed for the last remaining apple mosaic virus infected clone in the collection. Six trees have been established from heat treated shoot-tips and will be re-tested by ELISA in 2000. In collaboration with John Maas and colleagues at the ARS Fruit Lab in Beltsville, samples from hazelnuts infected with a stunt disease were examined for the presence of phytoplasmas. This disease has been spreading slowly in northern Oregon for more than 30 years. No pathogen has ever been associated with the disease, however the symptoms are characteristic of those typically caused by phytoplasmas. Three unique phytoplasmas were detected using PCR and RFLP analysis. The causal relationship of each phytoplasma with the disease is not yet clear, as some of the phytoplasmas were also present in healthy samples. We reported in Plant Disease this new host for Clover Yellow Edge Phytoplasma. (Jomantiene, R., **J.D. Postman**, H.G. Montano, J.L. Maas, R.E. Davis, K.B. Johnson. 2000. First report of clover yellow edge phytoplasma in *Corylus* (Hazelnut). Plant Disease 84:102.)

### ***Fragaria***

*1999 ELISA:* All *Fragaria* clones not previously tested (236 plants) were assayed for strawberry mild yellow edge virus (SMYEV) by ELISA, and 22 additional infected plants were identified. This brings to 67 the number of accessions known to be infected with this common strawberry virus. Plants testing negative in 1999 numbered 151, bringing to 691 the total number of plants that have tested negative for SMYEV.

*1999 Bioassay:* 78 plants were tested by graft inoculation to Alpine and 52 plants were tested by graft inoculation to UC-11. One clone was newly identified as virus infected by bioassay.

*Therapy:* During 1999, 18 plants representing 7 clones were successfully regenerated following heat therapy and meristem culture. To date, 39 infected strawberry accessions have been replaced with heat-treated meristem plants produced at this repository.

The percentage of strawberry accessions listed as "Virus Tested" dropped slightly in 1999 with the detection of more additional infected clones than were replaced with heat-treated clones.

Phytoplasma-like symptoms (green flower petals, fruit phylloidy) noted in 1998 on a new accession were examined by PCR in collaboration with colleagues at the ARS Fruit Lab in Beltsville. A phytoplasma new to this host was detected and subsequently reported in Plant Disease. (Jomantiene, R., J.L. Maas, E.L. Dally, R.E. Davis, **J.D. Postman**. 1999. First report of clover proliferation phytoplasma in strawberry. Plant Disease 83:967.)

### ***Humulus***

New accessions and heat treated plants were tested by ELISA for apple mosaic virus (149 samples), American hop latent virus (149 samples), hop latent virus (149 samples), hop mosaic virus (73 samples) and prunus ringspot virus (13 samples) for a total of 533 ELISA samples processed in 1999. New antisera against hop mosaic virus and the hop isolate of prunus ringspot virus were obtained from the Washington State University lab in Prosser to replace exhausted supplies at the repository.

Thirty-two heat treated plants, representing 14 core accessions were added to the collection in '99, bringing to 63 the number of accessions (55 core) that have been successfully regenerated following heat therapy and apical meristem culture. Only one heat treated plant has tested virus positive so far, out of the 127 heat treated plants that have been established in the greenhouse. This highlights the dramatic success that we have had in eliminating viruses from infected hop clones.

### ***Mentha***

No virus testing in 1999. 8 core accessions have been observed to exhibit virus-like symptoms not corresponding to known reported mint viruses.

### ***Pyrus***

181 Graft Bioassays were completed in 1999 including:

52 on *Malus micromalus*

59 on *Pyronia veitchii*

58 on Nouveau Poiteau

Ten new accessions were found to be infected with one or more viruses. Many of these were low-chill cultivars that came from a collector in Texas.

During 1999, 44 accessions were put through heat therapy, and 91 meristem cultures were established from these. 32% of these accessions were quarantine plants for our National Germplasm Quarantine lab in Beltsville. 15 heat-treated replacement clones were added to the NCGR collection, and 7 heat-treated clones were returned to the Quarantine Center in Beltsville. About two dozen additional heat-treated quarantine pear and quince clones are ready to be shipped to Beltsville in early 2000.

A small population of seedlings has been established from two pear blister canker infected clones. These seedlings will be assayed in 2000 using a cDNA probe to determine whether the viroid has been seed transmitted.

Approximately 92% of our core *Pyrus* clonal accessions are presently available as 'Virus Tested' plants. Only 8 core *Pyrus* clones are virus infected and await therapy in 2000.

### ***Ribes***

The *Ribes* core collection has begun migrating into the screenhouse after being propagated from our field plot (see screenhouse report). Since the primary clonal collection has been maintained in the field, most of this collection is listed as "Untested" for viruses. As plants become established under screen, annual observations will again be made for symptoms of gooseberry veinbanding virus, and bioassays by mechanical inoculation to *Chenopodium quinoa* will be performed for core accessions. ELISAs are available for several European nepoviruses, and will be implemented if additional resources become available. A.T. Jones at SCRI in Scotland is using some of our veinbanding infected clones to evaluate a new laboratory test for this virus.

Three heat treated clones survived our virus therapy regimen and were added to the collection in 1999. We have 34 virus infected core accessions which along with a handful of post-entry quarantine plants continue to be our first priority for therapy in 2000.

### ***Rubus***

Nearly 80% of our clonal collection, and 85% of our core collection is listed as virus tested. During 1999 we tested 50 clones by mechanical inoculation of *C. quinoa*, and detected 2 infected plants. During 2000, we would like to look at different tissue culture media for recovery of meristems following heat therapy. This has become a limiting factor to the further success of virus therapy of *Rubus* at NCGR with 33 infected core accessions waiting for their turn in the heat chamber.

### ***Vaccinium***

259 *Vaccinium* samples were tested by ELISA during 1999 including:

85 for blueberry shock ilarvirus  
88 for blueberry scorch carlavirus  
86 for blueberry leaf mottle virus

During the summer of 1997, one clone in our field collection was found to be infected with blueberry shock ilarvirus (BBSIV) and about a dozen plants were found to be infected with blueberry scorch carlavirus (BBSCV). All infected plants were removed from the field. ELISA tests were repeated in 1998 and only two plants were found to be infected with BBSCV. These were in the same rows from which infected plants were removed previously. Testing in the field in 1999 detected 5 additional clones infected with BBSCV which were also removed. Greenhouse counterparts for all of these infected clones remain free of the virus. ELISAs will be repeated earlier in the 2000 growing season, and hopefully we will be able to eliminate any remaining infected plants before additional aphid transmission is likely.

Lingonberries (*Vaccinium vitis-idaea*) are being promoted as an alternative to cranberries, and many acres are being planted in the Pacific Northwest. There are no reports on virus diseases of lingonberries, nor is there any literature on the susceptibility of this crop to the viruses that affect blueberries. To determine whether lingonberries are susceptible to several blueberry viruses, two *V. vitis-idaea* cultivars were graft inoculated with shoots from infected blueberries. Preliminary ELISA results show that blueberry shock ilarvirus was transmitted rapidly to lingonberry. Follow-up indexing for the other viruses will commence during the coming growing season.

### **Minor Genera**

Five *Mespilus* accessions are infected with apple chlorotic leafspot virus (= pear ringpattern mosaic), and two of these have been put through heat therapy plus apical meristem tissue culture. Heat treated trees are established in the greenhouse, to be indexed in early 2000.

**Summary of Collections and Virus Status for Accessions Received Through December 1999**

<b>GENUS</b>	<b>Total Accessions</b>	<b>Seed Lots</b>	<b>Plants</b>	<b>Virus Tested</b>	<b>Virus Infected</b>	<b>Untested</b>
CORYLUS ACCESSIONS	514	2				
Virus status of Corylus plants:			507	373	1	133
FRAGARIA ACCESSIONS	1537	328				
Virus status of Fragaria plants:			1166	679	210	277
HUMULUS ACCESSIONS	680	29				
Virus status of Humulus plants:			641	90	17	534
MENTHA ACCESSIONS	496	50				
Virus status of Mentha plants:			442	13	21	408
PYRUS ACCESSIONS	2018	304				
Virus status of Pyrus plants:			1655	1273	128	254
RIBES ACCESSIONS	902	342				
Virus status of Ribes plants:			558	30	86	442
RUBUS ACCESSIONS	1802	1055				
Virus status of Rubus plants:			716	565	67	84
VACCINIUM ACCESSIONS	1126	594				
Virus status of Vaccinium plants:			520	404	2	114

		<b>Percent Tested</b>	<b>Percent Infected</b>	<b>Percent Untested</b>
Corylus Plants:	507	73.6%	0.2%	26.2%
Fragaria Plants:	1166	58.2%	18.0%	23.8%
Humulus Plants:	641	14.0%	2.7%	83.3%
Mentha Plants:	442	2.9%	4.8%	92.3%
Pyrus Plants:	1655	76.9%	7.7%	15.3%
Ribes Plants:	558	5.4%	15.4%	79.2%
Rubus Plants:	716	78.9%	9.4%	11.7%
Vaccinium Plants:	520	77.7%	0.4%	21.9%

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

This report DOES NOT include duplicate accessions or misidentified plants.

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

## **Laboratory 1999**

By Barbara M. Reed

**Major problem or issue:** Need for improved germplasm storage. We are developing cryopreservation and *in vitro* cold-storage methods to backup our germplasm collections.

**Most significant accomplishment this year:** Transferring useable cryopreservation protocols to plant genetic resource labs around the world

**Major accomplishments over the life of the project.** We improved cryopreservation techniques for more sensitive genotypes of *Pyrus* so more genotypes can now be stored.

**Technology transfer:** We provided cryopreservation training for seven students and technicians at the South Pacific Commission Laboratory in Suva, Fiji. Provided training in prevention of plant tissue culture contamination to 24 Pacific Island Tissue Culture Scientists at a workshop in Apia, Samoa.

**Impact:** Our cryopreservation techniques are applicable to most temperate-fruit germplasm. They can now be used at laboratories around the world to store clonal germplasm.

**Most Important Publication for 1999:** Kumar, M.K., Barker, R.E., and Reed, B.M. Morphological and molecular analysis of genetic stability in micropropagated *Fragaria x ananassa* cv. Pocahontas. *In Vitro Cellular and Developmental Biology - Plant* 35: 254-258. 1999.

### **Tissue culture**

This year Valerie Stanik assisted Carolyn Paynter in the laboratory. She assisted with repropagation, collecting and initiating cultures, and storage of *in vitro* cultures. With the assistance of Saturday Academy Intern Katy Lindstrom, we initiated new cultures of *Corylus*, *Fragaria*, *Pyrus*, *Rubus*, *Ribes*, and *Vaccinium*. Joe Snead and Bruce Bartlett collected the *Pyrus* and *Corylus* budwood in January. Carolyn stored it and after a month of additional chilling it was hot water treated before forcing (*Pyrus*) or grafting (*Corylus*).

We outgrew our backup cold storage collection in Bob Martin's cold room at the Horticultural Crops Laboratory and will now send our backup cold storage collection to NSSL.

### **Cryopreservation**

Yongjian Chang continued work on *Pyrus* cryopreservation. He defended his dissertation December 21. We completed a collaborative project with Dr. Reed Barker at the National Forage Seed Research Laboratory to determine cryopreservation protocols for clonal grass germplasm.

A preliminary study of pear seed cryopreservation by Sara Schwanke, our 1997 ARS Research Apprentice found that most of the cold stored (-20 °C) seed were not viable. 1998 apprentice Rebecca Shala continued the study for a school science fair project. Rebecca studied cryopreservation of freshly harvested 'Bosc' pear seeds. She found excellent survival of both cryopreserved seeds and control (non-frozen) seeds. There was no cracking or chipping of the seeds. With these results we feel safe in storing viable seeds in liquid nitrogen.

Growth and composition of the *in vitro* germplasm collection at NCGR 1989-1999

Genus	1989	1991	1993	1995	1997	In Vitro (Core)	1999					
							Cryopreserved					
							NCGR			NSSL*		
Axes	Pollen	Meri- stems	Axes	Pollen	Meri- stems							
<i>Corylus</i>	14	22	40	40	27	40 (31)	4	54		4		
<i>Fragaria</i>	149	356	366	388	149	300 (250)						
<i>Humulus</i>	0	83	69	61	45	66 (47)				12		1
<i>Mentha</i>	75	398	361	321	287	258 (51)						
<i>Pyrus</i>	70	161	165	166	167	244 (112)		36	27			79
<i>Ribes</i>	1	110	95	100	99	61 (32)						4
<i>Rubus</i>	255	213	272	326	244	271 (161)			14			3
<i>Vaccinium</i>	30	78	105	130	108	191 (153)						
Minor genera												
<i>Cydonia</i>	1	1	1	1	1	1						1
<u>Pycnanthemum</u>						16 (16)						
Total Accessions	595	1422	1474	1533	1127	1448 (853)	4	100	41	4	12	88

\* A long-term collection of 100 meristems per genotype is stored at the National Seed Storage Laboratory and accessions are added as they become available. (core accessions)

## **Miscellaneous**

I presented two invited talks, two posters, and chaired two discussion sessions at the JIRCUS/IPGRI Joint International Workshop on Cryopreservation of Tropical Crops in Tsukuba, Japan in October. Yongjian and I presented research at the Society for In Vitro Biology meeting in June. I presented results of our cryopreservation research at the joint meeting of three cryobiology societies in July.

I continue to be an Associate Editor for HortScience and a Reviewing Editor for *In Vitro-Plant*. I was recently elected Secretary of the Society for *In Vitro* Biology.

## **Foreign Travel Reports for CY99**

<u>Barbara Reed</u> , Plant Physiologist	May 1-8, 1999	Apia, Fiji
	May 6-17, 1999	Western Samoa
Sponsors' names	1) Pacific Regional Agricultural Project 7	
	2) South Pacific Commission	

Week-long training in Apia, Fiji was a hands-on workshop designed to train the lab personnel so cryopreservation could begin on the taro and sweet potato collections. The fourth training course was held at University of South Pacific, Western Samoa.

Barbara Reed, Plant Physiologist                      July 9-26, 1999    Marsielle and Montpellier, France

Attended the joint cryobiology congress: Verbally presented, "Improved Liquid Nitrogen Tolerance and Cold Hardiness of Pear (*Pyrus cordata* Desv.) Plantlets *In vitro* at the Cryo'99, Marsielle; a joint meeting of France Cryo, the Society for Low Temperature Biology - unusual opportunity to interact with foreign scientists, especially European scientists in the cryobiology field. Also, visited INRA and ENSAM Laboratories in Montpellier.

## **Meetings and Presentations during CY99**

Judith Flynn – Update the PWA Secretarial Advisory Handbook, ( *PWA Secretarial Advisory Council Meeting, January 18-22, 1999.*)

Kim Hummer – Clonal Genetic Resource Management, (*Biodiversity & Crop Improvement Seminar Series, Wooster & Columbus, Ohio, October 7-11, 1999.*)

Kim Hummer – (*1998 NCR-22 Small fruit and Extension Workers Meeting, Troutdale, OR, October 25-28, 1998.*)

Kim Hummer – (*1998 Northwest Center for Small Fruits Research Annual Conference, Boise, ID, December 1 & 2, 1998.*)

Kim Hummer – White Pine Blister Rust Infection Cycle of *Ribes* in Corvallis, OR (*50<sup>th</sup> Annual Western Small Fruits Pest Conference, Skamania, WA, 8-9 January, 1999 - Oral presentation.*)

Kim Hummer – (North American Strawberry Growers Association 1998 Annual Meeting, February 7-10, 1999)

Kim Hummer – Presented 1998 Annual Report to *Pyrus* Crop Germplasm Committee. (*Pyrus* Crop Germplasm Committee Meeting and Winter Pear Commission Research Meeting, Hood River, OR, February 15-18, 1999.)

Kim Hummer – (Pacific West Area Leadership Conference, Berkeley, CA, April 26-29, 1999).

Kim Hummer – Presented 1998 NCGR Annual Report, (W-6 Technical Advisory Committee Meeting, Pullman, WA June 20-22, 1999.)

Kim Hummer – Present Annual Report of the Corvallis Repository, (*Woody Ornamental Landscape Crop Germplasm Committee Meeting, Beltsville, MD, June 24-26, 1999*).

Kim Hummer – Submitted NCGR ARPMS Request, (*Location ARPMS Review Meeting, Pendleton, OR, July 6-7, 1999*).

Kim Hummer – Took part in Program 301 discussion and provided 1998 annual report of the NCGR at Corvallis, OR, (*National Program 301 Genomics and Germplasm Preliminary Review, PGO Meeting at National Small Grains Laboratory, Pocatello, ID, July 19-22, 1999*).

Kim Hummer – Attended American Society for Horticultural Science Annual Meeting and Presented a poster, moderated a workshop, attended committee meetings and presented the 1998 NCGR Annual Report, and attended the American Pomological Society Meeting, (*ASHS Annual International Meeting, Minneapolis, MN, July 27-August 1, 1999*).

Joseph Postman – Effect of three viruses on multiplication of raspberry in vitro. and Spread of blueberry viruses in NCGR field collection. (*50<sup>th</sup> Annual Western Small Fruits Pest Conference, Skamania, WA, 8-9 January, 1999 - Oral presentation.*)

Joseph Postman – (*Pear Crop Germplasm Committee Meeting and Winter Pear Researchers Meeting, February 15-18, 1999*).

Joseph Postman – Single and multiple virus infections reduce in vitro multiplication of ‘Malling Landmark’ raspberry. (*Congress on in vitro Biology, New Orleans, LA, June 5-9, 1999.*)

Barbara Reed – Cryopreservation of tropical plant germplasm current research progress and applications presented at the (*Japan International Research Center for Agricultural Sciences/The International Plant Genetic Resources Institute JIRCAS/IPGRI Joint International Workshop, Tsukuba, Ibaraki, Japan, October 14-27, 1998*)

Barbara Reed – Conducted workshop and trained students and technicians in cryopreservation techniques, (South Pacific Commission “Tarogen Project”, Apia, Fiji, May 1-8, 1999) and Conducted a workshop for regional tissue culture personnel on Bacterial Contaminants of Plant Tissue Cultures, (University of South Pacific, Western Samoa), May 9-17, 1999.

*Barbara Reed* – Exogenous abscissic acid and low temperature improve cold hardiness and liquid nitrogen tolerance of pear (*Pyrus cordata* Desv.) plantlets. *In vitro* Cellular and Developmental Biology 34: A. 1999 (*Society for In Vitro Biology*, New Orleans June 1999).

*Barbara Reed* – Improved liquid nitrogen tolerance and cold hardiness of pear plantlets *in vitro*. Cryobiology, Dec. 1999. Also, Response of tropical plant tissues to sucrose in desiccation based cryopreservation protocols Cryobiology, Dec. 1999. (*Joint meeting of the Society for Low Temperature Biology, The Society for Cryobiology, and the France Cryo*, Marseilles, France, 1999)

### **Meetings and Presentations during CY 1999**

#### **1999 Presentations:**

**Hummer, K.** Oral presentations at NPGS meetings including Pyrus CGC meeting, Hood River, OR, February 21, 1999; W-6 western region germplasm meeting, Pullman, WA, June 21, 1999; PGO, Aberdeen, ID, July 21, 1999; Small Fruit CGC Meeting, Minneapolis, Minn, July 29, 1999.

**Hummer, K.** Coordination and Introduction to “Beyond the call of duty.” Faculty and student seminar series, Department of Horticulture, Oregon State University, April, 12, 1999.

**Hummer, K.** Heritage Pears of the National Clonal Germplasm Repository. Poster presentation, American Society for Horticulture Annual meeting Minneapolis, Minn., July 28, 1999

**Hummer, K.** Coevolution or coincidence: unusual host-pathogen relationships in fruit and nut crops. Workshop Chairman, American Society for Horticulture Annual meeting Minneapolis, Minn., July 28, 1999

**Hummer, K.** Origin of white pine blister rust. National Plant Board Meeting, Portland, Oregon. August 16, 1999. (Oral Presentation)

**Hummer, K.** *Ribes*, pines, and white pine blister rust conference, Corvallis, Oregon. September 8-10, 1999. (Meeting convener and oral presentation).

**Hummer, K.** Summary of small fruit activity at NCGR for 1999. NCR-22 meeting. Dallas, TX, November 3, 1999. (Oral Presentation)

**Postman, J.D.** 1999. Effect of three viruses on multiplication of raspberry *in vitro*. Spread of blueberry viruses in NCGR field collection. 50th Annual Western Small Fruits Pest Conference, Skamania, Washington, 8-9 January, 1999 (Oral Presentation).

Tsao, C.V., **J.D. Postman and B.M. Reed.** Single and multiple virus infections reduce *in vitro* multiplication of ‘Malling Landmark’ raspberry. Congress on *in vitro* Biology, New Orleans, LA, June 5-9 1999.

Chang, Y. and **B.M. Reed**. Exogenous abscisic acid and low temperature improve cold hardiness and liquid nitrogen tolerance of pear (*Pyrus cordata* Desv.) plantlets. *In Vitro Cellular and Developmental Biology* 34: A. 1999. (Society for In Vitro Biology, New Orleans, June 1999)

**Reed, B.M.** and Chang, Y. Improved liquid nitrogen tolerance and cold hardiness of pear plantlets *in vitro*. *Cryobiology*, Dec. 1999. (Joint meeting of the Society for Low Temperature Biology, The Society for Cryobiology, and the France Cryo, Marseilles, France, 1999)

Dumet, D., Benson, E.E., **Reed, B.M.**, Engelmann, F, and P. Berjack. Response of tropical plant tissues to sucrose in desiccation –based cryopreservation protocols. *Cryobiology*, Dec. 1999. (Joint meeting of the Society for Low Temperature Biology, The Society for Cryobiology, and the France Cryo, Marseilles, France, 1999)

### **Personnel Training for CY99**

Raymond Gekosky, Joe Snead, and Dennis Vandever attended the Northwest Agricultural Show, January 26, 1999, Sublimity, OR.

Raymond Gekosky, Jim Oliphant, Joseph Postman and Joe Snead attended the 1999 Small Fruit Grower's Workshop – Pesticide Recertification Training, March 18, 1999, Washington State University; Vancouver, WA.

Bruce Bartlett, Jim Oliphant, Joseph Snead and Raymond Gekosky competed the IPM in Oregon Conference-Information/training on pesticides Use and Safety, April 6-7, 1999; Corvallis, OR.

Joseph Snead attended the Cider Workshop & Testing: Growing: Feasibility of commercial cider production & research & Organization needs. April 20, 1999, Woodinville, WA.

Raymond Gekosky, Joe Snead, and Dennis Vandever completed the Oregon Association of Water Utilities training on water rights, April 23, 1999, Keizer, OR.

Douglas Cook, Judith Flynn, Kim Hummer Whitey Lawrence, , Joseph Postman, Barbara Reed, Joe Snead, and Dennis Vandever completed the USDA-REE-ARS-HRD; REE Ethics Office December 17, 1999 1:30-3:00PM at the NCGR, Corvallis, OR.

Jim Oliphant and Joseph Postman attended the 1999 Ornamentals Northwest Seminar; Portland, OR.

### **Visitors, Technology Transfer and Community Outreach during CY99**

By Judith Flynn

Four hundred and fifty people visited the Repository during the course of CY99. Local visitors like the Native Plant Society of Corvallis came by and are always excited to learn of the NCGR genetic resource collections and expertise stored so close to their homes. Examples include many foreign folks who seek the Repository staff for specific information. Dr. Kovetz and Mr. Antman , from the Fruit Board of Israel, visited for information on pear rootstocks and cultivars resistant to fire blight. Representatives of two private sector companies came to visit the NCGR : HortResearch, Nelson Research Centre, Motueka, New Zealand and Oregon Exotics Nursery , Grants Pass, OR.

Classes from Oregon State University; Linn-Benton Community College, Linfield College, Willamette University, Philomath High School and Sellwood Middle School with major studies in Horticulture, Plant Physiology, Virology, Crop Science, Botany and Plant Pathology and Plant Breeding also visited.

On the NCGR campus, Joseph Postman & Jim Oliphant taught Corvallis High School Horticulture Class students how to propagate strawberry runners and check for the presence of mites and viruses. The Repository Library was used for Corvallis meetings such as a symposium for the cultural and historical aspects of foods, Marion County Master Gardeners, University of Nevada at Reno-Cooperative Extension, Master Gardeners; California Extension Agents and some California growers. Committee members of the Apple Crop Germplasm Committee; and Food Safety Volunteers & Extension were among the technical visitors.

### **Seminars and Conferences conducted by NCGR**

Kim Hummer coordinated the “Beyond the Call of Duty-Personal Profiles in the Conservation of Genetic Resources,” a seminar presented to the Faculty and Students of the Oregon State University, Department of Horticulture on April 20, 1999. Oral presentations were given by Drs. Mel Westwood, Maxine Thompson, Whitey Lawrence and Henny Chambers on aspects of their careers concerning genetic resources at the Corvallis Repository. Each of these Emeritus Scientists were presented with a plaque honoring their years of service to genetic resource conservation.

The NCGR White Pine Blister Rust Conference attracted approximately 50 scientists from across the U.S. and Canada, and was held in Corvallis and Cottage Grove, Oregon on September 8-10, 1999.

### **Events held at educational institutions by NCGR Staff**

Kim Hummer gave a 6<sup>th</sup> grade class presentation at Highland View Middle School in September and to a Corvallis High School Biology Class in November, along with mentoring a Corvallis High School student in a biology project studying *Asimina triloba*, pawpaw, fruits.

Joseph Postman conducted a lab on grafting fruit trees for the Philomath High School Botany class in March 1999, and a presentation on the characteristics of apples and pears for third graders at the Philomath Elementary School in October 1999.

### **Staff Volunteer Projects**

Bruce Bartlett and Judith Flynn volunteered at the Linn-Benton Youth Job Fair, December 16, 1999.

### **Publications for CY99**

Carter, J. and **K. E. Hummer**. Gooseberry mite infestation decreases the cold hardiness of dormant black currant flower buds. HortScience 34(2): 218-220. 1999

**Chang, Y. and B.M. Reed**. Extended cold acclimation and recovery medium alteration improve *Rubus* regrowth following cryopreservation. CryoLetters Nov/Dec 1999.

**Chang, Y. and B.M. Reed**. Cold acclimatization improves the cryopreservation of in vitro-

grown *Pyrus* and *Rubus* meristems. Proceedings: JIRCAS/IPGRI Joint International Workshop: Cryopreservation of tropical plant germplasm. Current research progress and applications. Accepted January 1999. (Proceedings)

- Chang, Y. and B.M. Reed.** Exogenous abscisic acid and low temperature improve cold hardiness and liquid nitrogen tolerance of pear (*Pyrus cordata* Desv.) plantlets. In *In Vitro Cellular and Developmental Biology* 34: A. 1999. Abst.
- Dumet, D., Benson, E.E., **Reed, B.M.**, Engelmann, F., and P. Berjack. Response of tropical plant tissues to sucrose in desiccation-based cryopreservation protocols. *Cryobiology*, Dec. 1999. Abst.
- Dumet, D., **Chang, Y., Reed, B.M.**, and E.E. Benson. Replacement of cold acclimatization with high sucrose pretreatment in black currant cryopreservation. JIRCUS/IPGRI Joint International Workshop: Cryopreservation of tropical plant germplasm. Current research progress and applications. Accepted January 1999. (Proceedings)
- Finn C, K. Wenstrom and **K. Hummer**. Crossability of *Rubus* species. *Acta Horticulturae* 505: In press. 1999
- Hummer, K.** and C. Rom. Preserving a Healthy Fruit Crop Industry in the United States. Part II. *Frt. Var. J.* 53(1): 210. 1999.
- Hummer, K. E.** and C. Finn. Third year update: *Ribes* susceptibility to white pine blister rust. *Acta Horticulturae* 505: In press 1999.
- Hummer, K. E.** and C. Finn. Recent *Rubus* and *Ribes* acquisitions at the USDA ARS National Clonal Germplasm Repository. *Acta Horticulturae* 505: In press. 1999
- Hummer, K.** Heritage Pears at the National Clonal Germplasm Repository at Corvallis. *Plant Gardens*. 14(1):50-51. 1999. AABGA Kennet Square, PA.
- Hummer, K.** First Clonal Germplasm Repository Reaches Adolescence. *Diversity* 14(3&4):20-21. 1999.
- Hummer, K. E.** 1999. Currant. In: W. Okie (ed.) Register of New Fruit and Nut Varieties List 39. *HortScience* 34(2):187-188.
- Hummer, K. E.** Gooseberry. In: W. Okie (ed.) Register of New Fruit and Nut Varieties List 39. *HortScience* 34(2):188. 1999.
- Hummer, K.E., J.D. Postman, J. Carter, S.C. Gordon.** Survey of Gooseberry Mite infestation in *Ribes* L. *HortScience* 34:678-680. 1999.
- Jomantiene, R., J.L. Maas, E.L. Dally, R.E. Davis, **J.D. Postman**. First report of clover proliferation phtoplasma in strawberry. *Plant Disease* 83:967. 1999.
- Kumar, M.K., Barker, R.E., and **Reed, B.M.** Morphological and molecular analysis of genetic stability in micropropagated *Fragaria x ananassa* cv. Pocahontas. *In Vitro Cellular and Developmental Biology - Plant* 35: 254-258. 1999.
- Martin, R.R. & **J.D. Postman**. Phytosanitary aspects of plant germplasm conservation. pp. 63-82 in E.E. Benson (ed.) *Plant Conservation Biotechnology*. Taylor and Francis Ltd. London., 1999.
- Messenger, W., A. Liston, and **K. Hummer**. 1999. *Ribes* phylogeny as indicated by restriction-site polymorphisms of PCR-amplified chloroplast DNA. *Plant Systematics and Evolution*: 217:185-195. (Also Cover photograph.)
- Postman, J.D. and K. E. Hummer**. Pears - Asian; Pears - European and Pear – Rootstocks. In W.R. Okie (ed.). Register of New Fruit and Nut Varieties - Brooks and Olmo List 39. *HortScience* 34(2):194-195. 1999.
- Reed, B.M.** *In vitro* storage conditions for mint germplasm. *HortScience* 34:250-252. 1999.

- Reed, B.M.** Genotype considerations in temperate fruit crop cryopreservation. Proceedings: JIRCAS/IPGRI Joint International Workshop: Cryopreservation of tropical plant germplasm. Current research progress and applications. Accepted January 1999. (Proceedings).
- Reed, B.M. and Chang, Y.** Improved liquid nitrogen tolerance and cold hardiness of pear plantlets in vitro. Cryobiology, Dec 1999. Abst.
- Reed, B.M., DeNoma, J. and Y. Chang.** Application of cryopreservation protocols at a clonal genebank. Proceedings: JIRCAS/IPGRI Joint International Workshop: Cryopreservation of tropical plant germplasm. Current research progress and applications. Accepted January 1999. (Proceedings)
- Reed, B.M., Brennan, R.M., and E.E. Benson.** Cryopreservation: An in vitro method for conserving *Ribes* germplasm in international genebanks. Proceedings: JIRCAS/IPGRI Joint International Workshop: Cryopreservation of tropical plant germplasm. Current research progress and applications. Accepted January 1999. (Proceedings)
- Reed, B.M., 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)
- Reed, B.M.** The Basics of *In Vitro* Storage and Cryopreservation. USDA-ARS, Corvallis, OR 1999. (Lab manual)
- Reed, B.M.** and P.M. Buckley. Tissue Culture Contaminants Handbook. USDA-ARS, Corvallis, OR, 1999. (Lab manual)
- Reed, B.M.** *In vitro* conservation of temperate tree fruit and nut crops. In: Plant Conservation Biotechnology pp. 139-154. (Ed. E.E. Benson). Taylor and Francis, London. July 1999 (BookChapter)
- Reed, B.M.** and M.A.L. Smith (Eds). Designing a Micropropagation System. *In Vitro Cellular and Developmental Biology – Plant* 35: 275-284.1999.
- Tsao, C.V., Postman, J.D., and B. M. Reed.** Single and multiple virus infections reduce in vitro multiplication of “Malling landmark’ raspberry. *In Vitro Cellular and Developmental Biology* 34: A. 1999. Abst.