

ANNUAL PROGRESS REPORT
REGIONAL PROJECT W-6
CY 2000

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National Clonal Germplasm Repository
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Carolyn Paynter, Bio. Sci. Lab Tech., Plants
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Dennis Vandevveer, Maintenance Technician

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Staff and EEO/CR

By Kim Hummer

During FY 2000, we had no personnel changes in our 11 permanent federal positions. We employed 22 individuals in temporary, part-time, or student positions; and had three volunteers, one visiting scientist on sabbatical leave, and one scientific collaborator. The temporary positions included four federal temporaries, and a part-time research assistant, three graduate research assistants, and nine work-study interns, sponsored through Oregon State University. In addition, three high school interns (Saturday Academy) were trained during the summer.

During the course of the year, two mentally challenged individuals, two Oregon Jobs Plus candidates (returning to work after welfare), and one physically handicapped (multiple sclerosis) were employed or were trained at the Repository. The racial mix included 4 Asians, 1 black, and 32 whites. We had 13 females and 24 males on our staff.

At the end of the year, Joe Snead, our Field Manager, was diagnosed, during his occupational health maintenance program check-up, with a hearing shift. Joe has since filed a Worker's Compensation claim for on-the-job hearing loss. Pending the decision by Worker's Compensation, the ARS Human Resources Division has advised us to place Joe on a 120-day unclassified detail away from loud machinery. Ray Gekosky has been placed on detail as field manager. Area has approved the recruitment of a temporary WG-4 farmer for additional field assistance.

Budget

By Kim Hummer

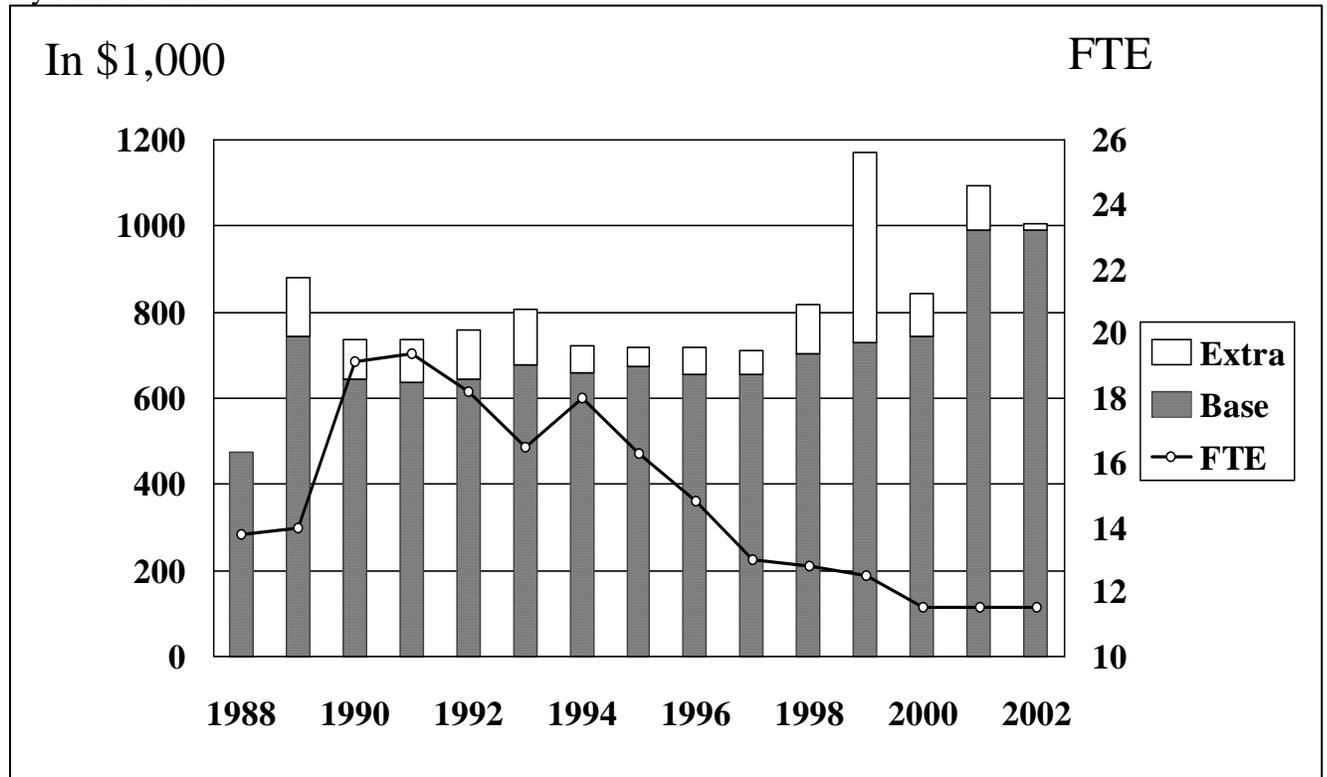
A base funding increase was specified for Corvallis (and fourteen other germplasm repositories) by Congress. Peter Bretting, our Program Leader for Germplasm, provided a funding increase of \$198 K bringing our budget total to \$991 K. With this new budget the cost of our permanent federal staff is about 67% . We received We had hoped to hire 4 permanent technical staff members (in vitro culture, seed technologist, virus-testing assistant, field helper). Another need is to have another scientist for germplasm evaluation (molecular and morphological identity). We must have an additional base funding increase to hire any permanent positions.

FY 2000 Extramural funding

\$27,000	Orchard Pruner, Irrigation Equipment	PWA
23,000	Purchase of year-end equipment	National Program Staff
9,500	Determination of RAPD markers for Cr gene	Northwest Center for Small fruit
3,800	Evaluation of stylet oil to control rust and mildew in <i>Ribes</i>	Northwest Center for Small Fruit
7,000	Two Student Apprentices	Oregon Saturday Academy
10,000	Pear evaluation for viroids	USDA Germplasm Evaluation grant
<u>9,000</u>	Cryogenic preservation of grasses	USDA Germplasm Evaluation grant
98,300		

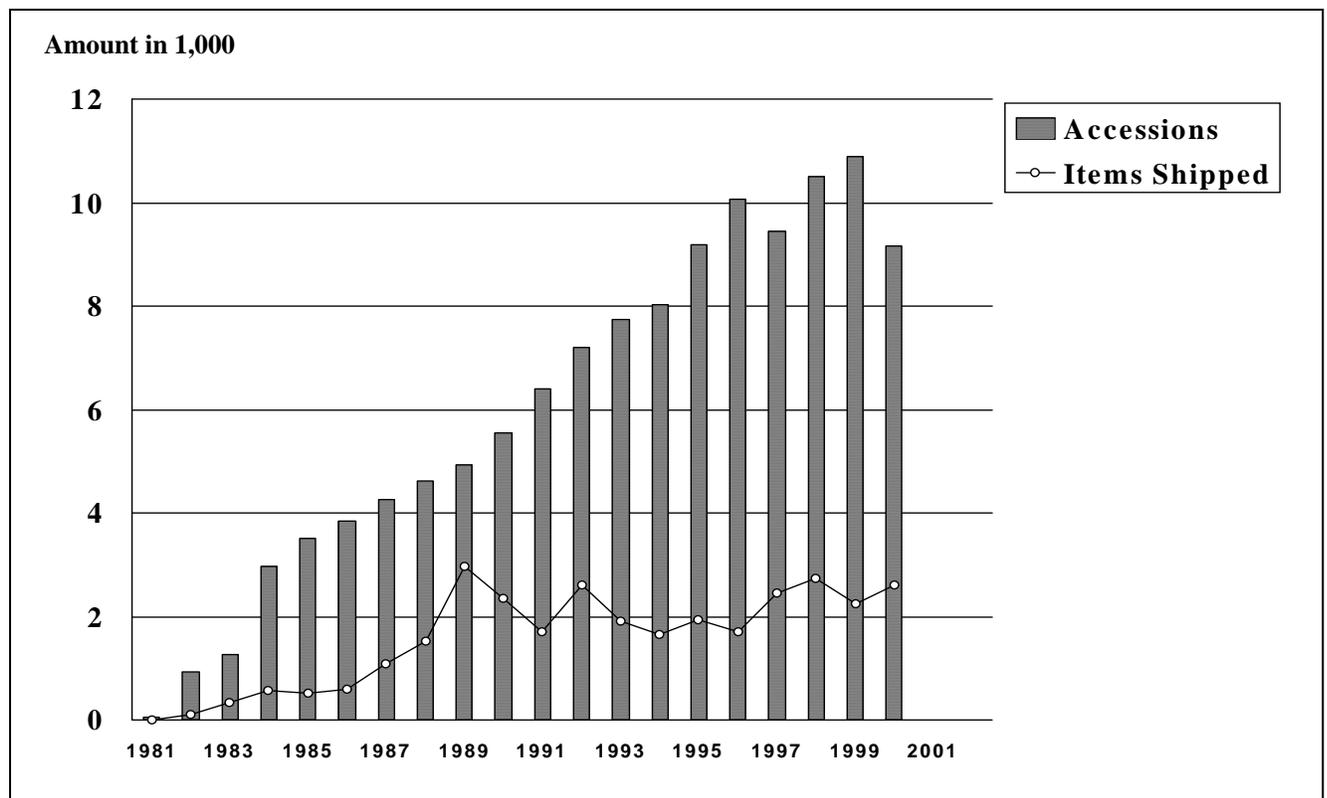
Funding and Staffing at the NCGR Corvallis

By Kim Hummer



Total Accessions and Distribution

By Kim Hummer



New Accessions of Small Fruits and Specialty Crops

By Kim Hummer

During 2000 we received more than 475 new inventories of small fruit and specialty crops. We added 198 virus tested *Humulus*; 110 *Fragaria*, including donations from Drs. Jim Ballington, Stan Hokanson, and Chad Finn; 96 *Ribes*, including species from New Mexico as well as releases from quarantine; 49 *Rubus*, including unusual species donated by Dr. Bernadine Strik, and collected wild in Kazakhstan; and 9 *Vaccinium*, including US selection numbers and cultivated sorts.

Facilities 2000

By Dennis Vandever

We had another busy year. We are continuing the effort in energy conservation. Numerous light fixtures have been converted to electronic ballasts and several low pressure sodium light fixtures have been replaced with high pressure sodium in the greenhouses. Also, a number of offices have been equipped with lighting motion detectors. Movable shades were installed in two of the sky lights to reduce heat load in the summer but to allow light in the winter.

In January, We installed a new power distribution panel in boiler room for the addition of needed circuits. In February, We installed panic bars on lobby and side doors in accordance with NFPA. In March: Gravel was applied to parking areas at North farm. In April, We coordinated with the Linn County Sheriff's office concerning another ecological terrorist threat. In May, We installed sky light blinds in lobby. Conducted annual fire alarm system certification and conducted our annual fire alarm drill/training. We performed a major spring cleaning. In July, the entrance to the North farm was asphalted. In August, The jeep went in to the shop for engine repairs. We gravelled the remaining roads at the North farm. In September, the ADA project for the rest rooms awarded. In October, We upgraded the environmental computer system with a newer computer and Windows compatible software. Repair John Deere finish mower. Replaced valve cover gaskets on 89 Dakota. In November, a gas heater for group office was purchased. Vinyl siding was installed on the South side of headhouse. In December, repair work and cleaning was performed on the growth room heat pump and a new UV light tube was installed in the unit.

Computer/Information Management

By Doug Cook and Kim Hummer

Two new computer workstation replacements were purchased this year (desktop PC 686s). All 386 PC computers have been removed from service. In total, fifteen of sixteen workstations operate with Pentium (586) or higher CPU's with memory at 16 megabytes or higher. One workstation (PC 486) operates Travel and Attendance Programs. One workstation runs on Macintosh OS 7.5 and the rest (PC 586/686) on Win95/98.

In 2000 a switch was made from using a Backup Tape machine to using CD ROM recordings for the Fileserver nightly data backup. Two printer repairs, two hard drive replacements, one cooling fan replacement and minor computer configuration repairs. Three new software programs were purchased (OmniPage Pro 8 Upgrade, Key CAD v.3.0 and Greenhouse Environment Manager Link v.1.7.0 by Q-COM.)

Table

GRIN Records Activity during CY 2000

<u>GRIN Area</u>	<u>Created</u>	<u>Modified</u>
Accession/Inventory/Obs	4,924	33,683
Distribution/Cooperator	3,603	1,039
Total	8,527	34,722

Annual Field Report 2000

by Ray Gekosky

The field collections continue to grow and expand and overall are in good condition. We maintain our collections on OSU's Lewis and Brown Farm and the Repository's North Farm.

Lewis Brown Farm (Pyrus, Corylus, Vaccinium, and Fragaria) - Cooperation between our facility and Oregon State University, Department of Horticulture, remains high and is imperative in meeting the goals for our field management.

Pyrus - The *Pyrus* collection continues to be the most difficult management challenge. The trees are overgrowing their space and will again need a major cut to constrain their aggressive growth. This will probably happen in the summer of 2001. This pruning and hedging should help with the fruit load problem of the last couple of years. We have had many broken branches from heavy fruit load resulting in unwanted structure distortion. The repository has purchased a new self- powered boom (Gillison's Orbit Lift) to prune with attached chain saw and loppers in the upper canopies. We will cut out the thicker branches that cannot be hedged and then hedge the remainder of the tops and sides to maintain at a height of ten to twelve feet. A big challenge is to accomplish this with a two person crew while maintaining all the field collections.

Approximately fifty trees were removed during the winter because of duplication or having been replaced with virus free trees. Approximately this many accessions were added to the field. New labels have been purchased and should be installed sometime in 2001. The old labels are nailed into the trees and haven't worked out well. The new labels will be independent of the tree on 16inch metal stands with corrugated plastic slipping snugly onto the tops of the metal stands. We have used these for one season in our *Fragaria* collection and it seems like they will hold up very well to the environmental influences.

Corylus - Eastern Filbert Blight is of great concern here in Oregon. We have put on two sprays this spring as a prophylactic preventative. The blight has been spreading from Washington since 1970 and has been reported as far south as Salem. We continue to constantly monitor our collection for any sign of this serious disease. Core plants that were layered unsuccessfully in 1999 were harvested successfully in 2000 – better late than never. A few of these were sent to a backup collection in Parlier, CA with the remainder going to various different requests. Due to labor constraints no pruning except for sucker control was done in the field this year. This may affect scionwood availability for next season.

Vaccinium - Blueberry Scorch Virus continues to be of concern and positive tests resulted in removal of more plants from the field. The plants removed have yet to be replaced but should be in 2001. Approximately 10 new accessions made it to the field in 2000.

Fragaria - Observations were made during 2000 and will continue through 2001.

Repository's North Farm (Ribes, Humulus, and Minor Genera) - We have had more interest in the use of our land and have added a couple of new users. Jim Fisher from OSU's Department of Entomology has established about one-half of an acre of *Fragaria* for a root weevil study and Carolyn Scagel from Agriculture Research Service's Horticulture Crops Research Lab is using some of our landscape area for a nutrition study on a variety of woody perennials. Maxine Thompson, emeritus Professor of Oregon State University, has expanded (one quarter acre) her honeysuckle evaluation trial and Chad Finn from the Horticulture Crops Research Lab has added about three acres of blackberry seedlings.

Ribes - The *Ribes* collection has rebounded after getting cut completely down to the crowns in 1998. Special care pruning has been needed to get the plants structurally firm and upright. The eriophyoid mite which was responsible for this cutting is still found in the field and is controlled using JMS oil sprays. The oil sprays also help with powdery mildew and aphids. No sprays were done in 2000 for the sawfly or caneborer. Approximately twenty new accessions were added to this field collection.

Humulus - John Henning ,Agriculture Research Service's *Humulus* Geneticist, and his technicians have been responsible for the collection on our North Farm.

Minor Genera - The big change in 2000 for Minor Genera has been the addition of the *Actinidia* to the field collections. In June we planted 62 clones at 16ft spacings and 12ft rows with 6ft turf strips between the rows. They were also planted on 2ft hills to minimize root rot. Trellising will be done in 2001 – we plan to use a 3 wire t-bar type trellis system. Overhead irrigation will be needed for spring frost protection.

Screenhouse/Greenhouse Collections

By Jim Oliphant

- Evaluation of propagation methods for *Rubus*, *Ribes*, and *Vaccinium*.
- Repair and replacement of irrigation, benches, and mist beds.
- Improved methods of weed, pest, and disease control to reduce the amount of applied pesticides.

Facility Improvements

The reglazing of 8 of the 10 houses was completed by December 1999. The benches in the *Rubus* house were replaced and a new rebar trellis system was installed. New wiring for the Screenhouse drip irrigation system was installed. The drip systems in the screenhouses were reconnected, repaired, and upgraded. Plants were moved back into their proper house, reordered, and inventories updated. New mistbeds were constructed to replace the previous set up that had been dismantled during reglazing.

Plant Collections

ACTINIDIA -- *Actinidia* is being established in the field. Our plan is to maintain a back-up collection in the screenhouse at least until the field plants are several years old. Of the 88 clones received 86 are established in the screenhouse.

CORYLUS -- Temporary back-up trees of all new young field trees and virused clones of *Corylus* are maintained under screen. Before a new accession can be planted in the field it must be grafted and layered until the scion is on its own roots. Scionwood of core clones is also grafted and maintained in a greenhouse as needed for tissue culture source material. Currently, 58 accessions are grafted and ready for TC harvest.

FRAGARIA -- All clonal accessions of *Fragaria* are maintained under screen. After problems with soil pH and fertility, it was decided to separate the core into species and cultivars so these groups could be managed differently. The noncore is being managed as species. We have also initiated a 3-year repropagation cycle using runners.

HUMULUS -- All virus free core clonal accessions of *Humulus* are maintained in the screenhouse. Currently, 97 clones are established in the screenhouse, and an additional 9 virus isolates are maintained in the virus screenhouse.

MENTHA -- All clonal accessions of *Mentha* are maintained under screen. We have initiated a 3-year repropagation cycle via cuttings.

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 85 clones in the screenhouse, 26 are non-hardy and 55 are virus isolates.

RIBES -- All core or non-hardy clonal accessions of *Ribes* are maintained under screen. To date 196 of the 231 core accessions are established in the screenhouse.

RUBUS -- All clonal accessions of *Rubus* are maintained under screen. We have initiated a 3-year repropagation cycle via cuttings, tip layers, or root division. Propagation success by each method is being recorded. We have also begun propagating the noncore to maintain all *Rubus* as 2 pots per accession to increase security of the collection.

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. Currently, 342 of an estimated 385 accessions are established in the screenhouse.

Clonal Accessions maintained in the Greenhouses and Screenhouses as of May 2001

	Total # Acc.	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>	88	0	0	79	92	25	33	455	3	35	0	14
<i>Corylus</i>	101	58	57	87	86	29	29	70	0.5	0	0	0
<i>Fragaria</i>	1267	501	40	1205	95	716	56	5250	31	455	3	154
<i>Humulus</i>	130	71	55	120	92	35	27	455	3	35	0	14
<i>Mentha</i>	431	51	12	428	99	245	57	1155	7	70	0.5	32
<i>Pycnanthemum</i>	32	20	62	32	100	0	0	175	1	35	0	10
<i>Pyrus</i>	440	24	6	241	60	179	44	350	2	350	2	100
<i>Ribes</i>	355	228	64	284	80	70	20	1120	7	280	2	96
<i>Rubus</i>	726	302	42	672	93	312	43	2975	18	385	2	176
<i>Vaccinium</i>	397	211	53	377	95	139	35	2450	15	420	2.5	94
Other¹	87	17	20	40	46	69	79	140	1	140	1	40
Total	4054	1483	37	3565	88	1819	45	14595	87	2205	13	730

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

Quarantined Plants

At this time we have 278 accessions in quarantine.

- 28 *Corylus* accessions. 9 accessions are in post entry, 19 accessions in State of Oregon Quarantine.
- 1 *Fragaria* accession.
- 1 *Mespilus* accession.
- 205 *Pyrus* accessions: 31 Provincial Release accessions to be planted in the field, 1 Provincial Release accession that is virused and needs to undergo heat therapy, and 173 accessions that are here from Beltsville on Joseph Postman's permit for heat therapy to remove viruses.
- 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.
- 3 *Rubus* accessions.

Plant Distribution“2000 Highlights”

By Bruce R. Bartlett

- 2,602 items were shipped as seeds, cuttings, runners, scionwood, rooted plants and tissue culture.
799 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 2000 have been or will be shipped.
23% of all items shipped were sent to foreign requestors.
- 70% of total accessions shipped in tissue culture form were sent to foreign requestors(not including tissue culture accessions sent to NSSL).

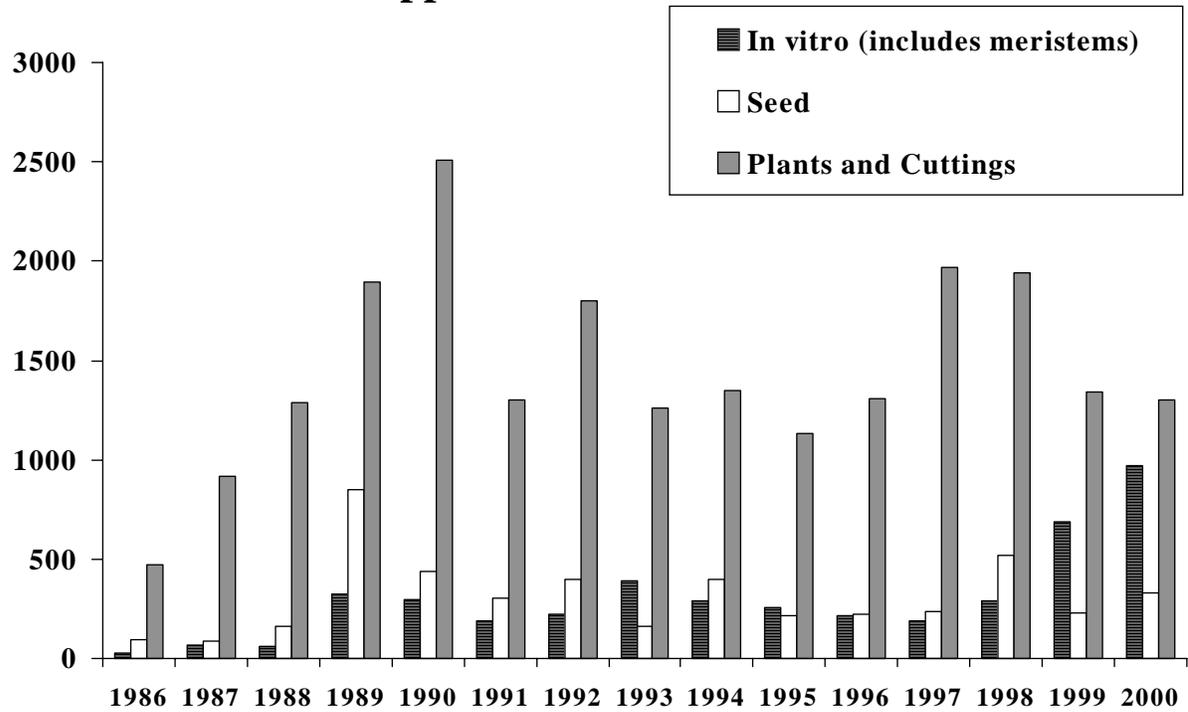
The NCGR-Corvallis continues to distribute plant germplasm within the United States and at the international level. At the time of this printing, we have distributed 2,232 items as seeds, cuttings, runners, scionwood, rooted plants and tissue culture from 2000 requests (Fig. 4). This represents 79% of the total number of items requested for 2000. Additional material will be shipped in CY 2001 from 2000 requests.

During CY 2000 2,602 plant items were shipped. Three items from request year 1997 were shipped, 116 from 1998, 378 from 1999, and 2,105 from 2000. The total postage paid for domestic and international shipping was \$1,159.31 (Table 2). The total cost for Federal Express was \$742.14 and the total paid to the Oregon Department of Agriculture for 46 Phytosanitary Certificates was \$460.00.

Table 2. Expenditures for Plant Distribution from 2000-1995.

Year	Total items Shipped	Postage	FedEx	PC's	Total	Shipping cost per item
2000	2602	\$1,159.31	\$742.14	\$460.00	\$2,361.45	\$0.91
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

Number of Items Shipped



Plant Pathology

By Joseph Postman

- *Humulus* Virus Cleanup Jeanine DeNoma continued hop virus cleanup until she left in August. During the last year, 186 meristem derived hop sub-clones were moved from tissue culture to the greenhouse. A hop screenhouse collection has been established representing 106 genotypes, of which 91 have tested negative for common hop viruses.
- Pear Blister Canker Viroid Detection
 - ❖ In collaboration with Lech Skrzeczkowski - WSU, Prosser, Washington, and Ricardo Flores - University Politecnica de Valencia, Spain; 269 *Pyrus* accessions (including nearly all core plants) were tested for PBCVd using cDNA probe. Ten infected clones were detected, all European cultivars. Infected cultivars originated in 5 European countries and several U.S. states. No infected Asian cultivars were detected out of 34 tested. We also examined a population of plants resulting from therapy trial, seedlings from infected clones, and a possible association with stony pit disease. Nearly all heat-treated meristem plants from infected Nouveau Poiteau and Kalle tested positive. All 29 o.p. seedlings from infected Kalle tested negative. Several severe isolates of stony pit virus, which according to the literature have been associated with bark symptoms, tested positive.
- Quarantine Pear – Virus Cleanup
 - ❖ 23 pear and quince clones derived from heat treated meristems were returned to Beltsville. 8 additional meristem plants, representing 6 clones were recovered from tissue culture and will be returned to Beltsville in early 2001. New staff at NPGQC are now up to speed and therapy activities for quarantine pear and quince will return to that lab.
- ELISA
 - ❖ 2329 ELISA results were recorded, about half of these from the *Fragaria* screenhouse collection. Other samples included *Humulus* (489), *Rubus* (398), *Vaccinium* (324) and *Corylus* (93).
- Bioassay
 - ❖ 86 graft inoculation results were recorded for *Pyrus*.

Summary of Clonal Collections and Virus Status – 24 April, 2001

<i>Genus</i>	Total Number of Plants	Percent Virus Tested	Percent Virus Infected	Core Plants	Percent Virus Tested Core	Percent Virus Infected Core
<i>Corylus</i>	539	81.5	0.7	173	98.8	0.6
	50	32.0	8.0	38	34.2	10.5
<i>Cydonia</i>						
<i>Fragaria</i>	1209	64.4	17.1	487	82.1	13.8
<i>Humulus</i>	657	25.3	1.1	86	95.4	2.3
<i>Mentha</i>	430	3.0	3.9	50	14.0	2.0
<i>Mespilus</i>	21	52.4	23.8	17	41.2	29.4
<i>Pyrus</i>	1622	76.6	7.8	201	89.6	7.5
<i>Ribes</i>	627	5.1	13.1	218	3.2	13.8
<i>Rubus</i>	712	86.1	7.7	303	88.8	8.3
<i>Vaccinium</i>	537	74.3	0.4	222	91.4	0.5

Table does not include duplicate accessions or misidentified plants

“Virus Tested” includes plants that have been produced by heat therapy and meristem culture but have not been re-indexed.

Pome Fruit Collections

By Joseph Postman

- New Accessions
 - ❖ 51 pears added to inventory.
 - ❖ Includes 36 trees from heat therapy (29 accessions), 3 accessions released from Beltsville quarantine, 2 cultivars from old Spanish missions in California, and several heirloom pears donated by Oregon fruit enthusiasts. Seedlings were grown from wild pear species collected in Hungary and Israel.
- Propagation
 - ❖ Non-hardy *Pyrus* accessions which are maintained in the screenhouse and the pome fruit pathogen collection (about 75 accessions) were re-grafted onto new rootstocks to replace aging pot-bound trees.
 - ❖ Heat treated pears which are established on seedling rootstock in the greenhouse and have tested negative for viruses were re-grafted onto OHxF 333 for field planting. Several existing pear accessions were also re-propagated to be moved to new field locations. (about 100 accessions altogether)
 - ❖ More than 125 new pear trees were planted in the field this year.
- Identity Verification
 - ❖ 100 species accessions were compared to taxonomic descriptions and identities were verified for 74 of these.
 - ❖ Eleven trees were marked as IDX and removed from the field collection.
 - ❖ Identity verification notes collected with Mel Westwood in 1995 for 68 accessions were added to the inventory database.

- Status of *Pyrus* collection at end of 2000
 - ❖ 1599 accession in the field
 - ❖ 43 non-hardy accessions in the screenhouse
 - ❖ 250 accessions *in vitro*
 - ❖ 268 seed accessions in freezer
 - ❖ European Cultivars – 732
 - ❖ Asian Cultivars – 115
 - ❖ Hybrid Cultivars – 67
 - ❖ Rootstock Clones – 150

Web Page Information

By Joseph Postman

- ❖ Prepared expanded NCGR catalogs in February, updated catalogs in July.
- ❖ Helped prepare *Ribes* Diagnostic Tool
- ❖ Posted 1999 annual report to web
- ❖ Developed pomology watercolors web resource for NCGR crops
- ❖ Loaded high-resolution ‘Pears of New York’ images and modified PONY web page.

Laboratory Report 2000

By Carolyn Paynter and Barbara Reed

Collections:

For the *in vitro* collection we are concentrating on the core collections, requests, and accessions that are at risk in the field or screenhouse collections. General maintenance of the *in vitro* collection is the main priority. We add additional accessions to the collections as time and staffing permit, however collecting activities have slowed due to tight budgets. We are now staffed with part-time high school and college student help. We are adding to the cryopreserved collection as funding, time, and personnel are available.

In Vitro Collection Status as of April 2001

Genus	Core in vitro	Total in vitro	Meristems Cryopreserved	Axes/Pollen Cryopreserved
<i>Corylus</i>	27	40		6 axes/63 pollen
<i>Fragaria</i>	190	260		
<i>Humulus</i>	67	130	6	12 pollen
<i>Mentha</i>	37	186		
<i>Pycnanthemum</i>	12	12		
<i>Pyrus</i>	116	245	106	36 pollen
<i>Ribes</i>	29	57	5	
<i>Rubus</i>	142	235	47	
<i>Vaccinium</i>	127	162		
Total	747	1327	164	6 axes/111 pollen

Carolyn worked with Bruce Bartlett to fill many *in vitro* requests in 2000-2001 (see Distribution section for details).

We were involved with training many visiting scientists and students. During the summer we sponsor high school students through the Oregon "Saturday Academy" Internships in Science and Engineering program. Tory Fitchett from West Albany High School learned lab techniques and developed his "work ethic" as a lab helper for 8 weeks. Tory's internship was paid for by grants to the Saturday Academy program. In the fall Mathew Zlatnik, a Philomath High School Senior, volunteered in the lab. He learned sterile technique, media preparation, and assorted tasks. He did a science project studying the effect of calcium gluconate on shoot-tip necrosis in *Humulus* cultures. Noah Von Borstel, work-study student from OSU, is also learning lab techniques.

Research Advances:

M.S. student Nan Wang and Barbara Reed completed a project on the detection and elimination of *Verticillium* infections of mint. Fungal infections of plants can sometimes be symptomless and are passed unnoticed by vegetative propagation. This study was to determine if latent infections of *Verticillium dahliae* are possible in mint plants and tissue cultures. Roots of mint greenhouse plants and shoot cultures were inoculated with *V. dahliae* conidial suspensions to study symptom development, detection, and elimination of the fungus. There were significant differences in the appearance of control and infected shoot cultures at all infection levels for the four cultivars tested. Disease symptom ratings were proportional to the *V. dahliae* inoculum density. Infected shoot cultures were stunted at and above 10^3 conidia/ml. 'Scotch Spearmint' stems became thicker and split at 10^3 to 10^5 conidia/ml. *V. dahliae* was reisolated from infected shoot cultures at all levels of inoculum and no fungus could be isolated from any control cultures. *Verticillium* infections were easily detected by plating stems on potato dextrose agar. Meristems (0.5 to 15 mm) from infected *in vitro* and greenhouse plants were isolated and screened for fungus. Meristems of 3-5 mm length produced the most *Verticillium*-free cultures. The effectiveness of meristem tip culture also depended on the initial inoculum level and the cultivar. Meristems from *in vitro*-infected spearmint cultivars at 10^2 and 10^3 conidia/ml were 100% *Verticillium* free. However, only 42% were *Verticillium*-free for 'Black Mitcham' and 54% for 'Todd's Mitcham' peppermints. Infected greenhouse plants produced *Verticillium*-free cultures from 79% of 'Black Mitcham' and 90% of 'Todd's Mitcham' meristems. This study shows that *V. dahliae* can be easily detected both *in vitro* and *in vivo*. *Verticillium*-free plants can be produced from infected greenhouse or *in vitro* meristems 3-5 mm in size. Funding for part of this project came from A.M. Todd Inc.

Ph.D. student Yongjian Chang and Barbara Reed improved *Pyrus* germplasm cryopreservation for difficult genotypes by developing a protocol with abscisic acid and extended cold acclimatization. The initial protocol of 1 wk of cold hardening (Reed, 1990) was effective for 60% of 250 genotypes tested. This new technique will allow for cryostorage of most of the 100 remaining genotypes. Meristems of many pear genotypes can be successfully cryopreserved following one week of cold acclimatization, but an equal number do not survive the process or have very little regrowth. Alternating-temperature shoot acclimatization for 2 to 5 weeks significantly increased post-cryopreservation meristem regrowth of 8 difficult to cryopreserve pear genotypes and recovery remained high for up to 15 weeks acclimatization. The LT_{50} of shoots acclimated for 10 weeks with alternating-temperatures was -25°C ; constant-

temperature was -14.7°C ; and the non-acclimated control was -10°C . Six to 10 wk of LT were required for reaching high cryopreservation recovery of cryopreserved *P. cordata* meristems. ABA and LT treatments produced significant synergistic effects on both cold hardiness and cryopreservation recovery. ABA shortened the LT requirement for high cryopreservation regrowth from 10 wk to 2 wk.

ABA concentration (μM)

Growth of cryopreserved *in vitro*-grown *Pyrus cordata* shoot tips after 3-wk culture with various ABA treatments followed by 0, 1, or 2-wk low temperature (LT) treatment (22°C with 8-h light ($10\ \mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$) and -1°C 16-h darkness) on the same medium. N = 60; means \pm standard deviation. (Chang and Reed, 2001)

In 1999 Yongjian Chang and Barbara Reed developed a cryopreservation protocol for *Lolium* and *Zoysia* grass germplasm and stored 10 accessions of each. No long-term storage of clonal grass was available to breeders prior to this development. This technique has the potential to provide long-term storage for PVP clonal grass accessions. This clonal germplasm is very important for both research and industry, however preservation of these cultivars in the greenhouse or field can be problematic due to possible contamination from runners or seeds. Many original stocks of early cultivars of grass species are no longer available due to difficulties in preserving clonal genotypes. Ten *Lolium* and ten *Zoysia* grass clones were successfully stored as a test of the method. Now in conjunction with Reed Barker of the National Forage Seed Research Laboratory and funding from the Grass CAC we are storing about 40 clonal stocks each of *Lolium* (Rye grass) and *Cynodon* (Bermuda grass) germplasm.

Regrowth of 4-wk cold acclimated meristems of *Lolium* and *Zoysia* cultivars cryopreserved by encapsulation-dehydration after 6-h air dehydration (17.6 moisture content).

Cultivars	Regrowth (%)	
Lolium	Elka	93
	Linn	67
	Mann	79
	SR	75
	4400	86
Zoysia	Cavalier	80
	DH 96-12	70
	Diamond	22 (71) ^z
	El Toro	91
	Palisades	95

z Initial plants tested were hyperhydric /watersoaked. The second group (tested with improved growth conditions) was physiologically normal. (Chang, Barker, and Reed, 2000)

Employee Awards CY00

By Judith Flynn

Bruce Bartlett – For extra effort in expediting the international distribution of plant germplasm for the Corvallis NCGR. April 1999 – March 2000.

Carolyn Paynter – For assuming additional responsibilities for the maintenance of the *Humulus* in vitro collection on short notice and expediting their propagation and storage. August 1- November 30, 2000.

Judith Flynn, Raymond Gekosky, Jim Oliphant, Carolyn Paynter, Joseph Postman and Joe Snead – For excellence in preparation and presentations for the International Society of Horticultural Scientists 5th International Hazelnut Conference. August 20, 2000. Each employee

received eight hours leave.

Joseph Snead - For public service in reporting a hazardous spill on Peoria Road. October 30 – November 6, 2000.

Foreign Travel Report for CY00

By Barbara M. Reed

Travel dates: August 21-September 10, 2000.

1. Consultation requested by Dr. E.E. Benson, Biotechnology Dept. University of Abertay-Dundee. Presented a workshop on vegetative propagation of hazelnuts to local conservationists on the island of Hoy.

Dr. Benson requested assistance with the initiation and micropropagation of an endangered *Corylus* from Hoy, Scotland. The University of Abertay-Dundee covered expenses while in Dundee and Hoy. Dr. Reed has considerable experience with the tissue culture of many hazelnut species and cultivars and is one of the few scientists in the world working with this genus. This visit was coordinated with the SLTB meeting in England to save on expenses.

2. SLTB meeting in Ambleside, England.

Invited speaker for the Society for Low Temperature Biology “Implementing Cryogenic Storage of Clonally Propagated Plants”.

Airfare and per diem expenses were covered by the society. Dr. Reed spoke on cryopreserved germplasm storage in the USA. The meeting focus was on cryopreserved storage of germplasm and Dr. Reed was the only American attending.

1. The UAD and the Society for Low Temperature Biology paid the expenses.
2. I was be the only ARS employee involved.
3. I organized my work and my staff so that my absence will have little impact on the functioning of my unit.

Meetings and Presentations during CY99

By Judith Flynn

Bruce Bartlett, Douglas Cook and Joseph Postman – To discuss and gather new information on Germplasm Resource Information Network System.

Joseph Postman – Reviewed GRIN-Windows prototype and chaired GRIN Advisory Committee Meeting (*GRIN Meeting, Beltsville, MD, Oct. 22-26, 2000.*)

Douglas Cook – To discuss germplasm resource information network Verson 3 (*GRIN site meeting, Beltsville, MD, July 31 – August 2, 2000.*)

Judith Flynn – To present handbook updates to and annual meeting of PWA Secretarial and Support Staff Advisory Council (*PWA Secretarial and Support Staff Advisory Council, Riverside, CA, March 7-10, 2000.*)

Judith Flynn – To attend ARS National Secretary Meeting – Odyssey 2000 and present our PWA Handbook. (*ARS National Secretary Meeting, Odyssey 2000, Hunt Valley, MD, April 30 – May 7, 2000.*)

Kim Hummer – To present White Pine Blister Rust research also toured Driscoll Strawberry Associates, Inc. (*51st Annual Western Small Fruits Pest Conference, Oxnard, CA, February 10-12, 2000.*)

Kim Hummer – To present reports on the NCGR-Corvallis small fruit collection. (*North American Small Fruit Convergence, Primm, NV, February 14-17, 2000.*)

Kim Hummer – To attend the Plant, Microbial, and Insect Genetic Resources, Genomics, and Genetic Improvement National Program Workshop. (*Program 301 Workshop, Atlanta, GA, April 3-6, 2000.*)

Kim Hummer – To present ARMPS to PWA Administrators at PWA office; To give NCGR report to Plant Germplasm Operations Committee; To present poster on *Actinidia* genetic resources to American Association of Horticultural Scientists. (*ARMPS Review at PWA office, Albany, CA, July 18, 2000; Plant Germplasm Operations Meeting, Beltsville, MD, July 19-22, 2000; American Association of Horticultural Scientists meeting, Orlando, FL July 23-27, 2000.*)

Kim Hummer, Richard Moyer and Deric Picton – To present, “Development of Winter Hardy Blackberry Through Genetic Engineering” and “Oil Control of Powdery Mildew and White Pine Blister Rust in *Ribes*” to the annual conference on small fruit. (Annual Conference for Northwest Center for Small Fruit Research and the Annual Technical Meetings, Kennewick, WA, Nov. 27-29, 2000.)

Kim Hummer – To give NCGR report at the NCR-22 Meeting and facilitate at the Crop Protection and Quarantine National Program and Crop Production National Program. (*NCR-22 Meeting, Columbus, OH, Oct. 25-28, 2000 and National Program Review Workshop, San Diego, CA, Oct 29-Nov. 3, 2000.*)

Joseph Postman – To attend and present “Small fruit Virus ‘Jeopardy’ to 51st Annual Western Small Fruits Pest Conference. (*51st Annual Western Small Fruits Pest Conference, Oxnard, CA, February 10-14, 2000.*)

Joseph Postman – To co-host the WCC-20 Fruit Virus Meeting and present a summary of NCGR-Corvallis activities and a tour of NCGR facilities. (*WCC-20 Fruit Virus Meeting, Portland, OR, May 15-18, 2000.*)

Joseph Postman – To present NCGR Report to the W6-Technical Advisory Committee at the W6-Technical Advisory Committee Meeting. (*The W6-Technical Advisory Committee Meeting, [Palmer] Wasilla, AK, June 25-28, 2000.*)

Joseph Postman – Presented poster on phytoplasma associations with hazelnut stunt disease (*International Hazelnut Conference; Corvallis, OR; Aug. 2000.*)

Joseph Postman – Prepared poster on NCGR-Corvallis Virus Tested Pear Germplasm which was presented by David Sugar. (*International Pear Conference; Bologna, Italy; .September 2000.*)

Joseph Postman – To research and collaborate with National Agricultural Library staff on digital imaging of pomology watercolors. (*Beltsville, MD, Oct 28-Nov 2, 2000.*)

Barbara Reed – To present, “Cryopreserved Storage of Clonal Germplasm; The Promise is Fulfilled” and to convene a symposium at the International Congress on In Vitro Biology. (*International Congress on In Vitro Biology Meeting, San Diego, CA, June 9-16, 2000.*)

Barbara Reed - To discuss and assist with clonal cryopreservation processes. (*National Seed Storage Lab, Fort Collins, CO, Aug. 14-16, 2000.*)

Barbara Reed – To collaborate on cryopreservation studies-*Ribes*; (*Glasgow, Scotland, August 20-24, 2000*); & Hoy hazel trees; (*Orkney Isles, UK, August 27-28, 2000*); and present, ‘Implementing Cryogenic storage of clonally propagated plants’; (*Ambleside, UK, September 1-10, 2000*).

Lectures provided by NCGR Staff in CY00

Kim Hummer was a guest lecturer for Oregon State University Horticulture 251, “Introduction to Fruits” undergraduate course in the Fall 2000. There were twenty-six students in the class. Kim joined all the sessions, but specifically lectured on *Ribes* and *Pyrus*.

NCGR Personnel Travel During CY99

By Judith Flynn

Bruce Bartlett, Douglas Cook and Joseph Postman – To discuss and gather new information on Germplasm Resource Information Network System. (*GRIN Meeting, Beltsville, MD, Oct. 22-26, 2000.*)

Douglas Cook – To discuss germplasm resource information network Version 3 (*GRIN site meeting, Beltsville, MD, July 31 – August 2, 2000.*)

Judith Flynn – To present handbook updates to and annual meeting of PWA Secretarial and Support Staff Advisory Council (*PWA Secretarial and Support Staff Advisory Council, Riverside, CA, March 7-10, 2000.*)

Judith Flynn – To attend ARS National Secretary Meeting – Odyssey 2000 and present our PWA Handbook. (*ARS National Secretary Meeting, Odyssey 2000, Hunt Valley, MD, April 30 – May 7, 2000.*)

Kim Hummer – To present White Pine Blister Rust research also toured Driscoll Strawberry Associates, Inc. (*51st Annual Western Small Fruits Pest Conference, Oxnard, CA, February 10-12, 2000.*)

Kim Hummer – To present a report on the status of the small fruits collection at the Repository. (*North American Small Fruit Conference, Primm, NV, February 14-17, 2000.*)

Kim Hummer – To attend the Plant, Microbial, and Insect Genetic Resources, Genomics, and Genetic Improvement National Program Workshop. (*Program 301 Workshop, Atlanta, GA, April 3-6, 2000.*)

Kim Hummer – To present ARMPS to PWA Administrators at PWA office; To give NCGR report to Plant Germplasm Operations Committee; To present poster on *Actinidia* genetic resources to American Association of Horticultural Scientists. (*ARMPS Review at PWA office, Albany, CA, July 18, 2000; Plant Germplasm Operations Meeting, Beltsville, MD, July 19-22, 2000; American Association of Horticultural Scientists meeting, Orlando, FL July 23-27, 2000.*)

Kim Hummer, Richard Moyer and Deric Picton – To attend annual conference on small fruit. (Annual Conference for Northwest Center for Small Fruit Research and the Annual Technical Meetings, Kennewick, WA, Nov. 27-29, 2000.)

Kim Hummer – To give NCGR report at the NCR-22 Meeting and facilitate at the Crop Protection and Quarantine National Program and Crop Production National Program. (*NCR-22 Meeting, Columbus, OH, Oct. 25-28, 2000 and National Program Review Workshop, San Diego, CA, Oct 29-Nov. 3, 2000.*)

Joseph Postman – To attend and present, “Small Fruit Virus ‘Jeopardy’” to 51st Annual Western Small Fruits Pest Conference. (*51st Annual Western Small Fruits Pest Conference, Oxnard, CA, February 10-14, 2000.*)

Joseph Postman – To process pear blister canker samples with Lech Skrzeczkowski. (*Prosser, WA, May 3-6, 2000.*)

Joseph Postman – To co-host the WCC-20 Fruit Virus Meeting. (*WCC-20 Fruit Virus Meeting, Portland, OR, May 15-18, 2000.*)

Joseph Postman – To present NCGR Report to the W6-Technical Advisory Committee (W6-Technical Advisory Committee Meeting. (*The W6-Technical Advisory Committee Meeting, Wasilla, AK, June 25-28, 2000.*)

Joseph Postman – To research and collaborate with National Agricultural Library staff on digital imaging of pomology watercolors. (*Beltsville, MD, Oct 28-Nov 2, 2000.*)

Joseph Postman – To move plants from Washington to NCGR, Oregon and site visit. (Puyallup, WA, Dec. 6-8, 2000.)

Barbara Reed – To present, “Cryopreserved Storage of Clonal Germplasm; The Promise is Fulfilled” and to convene a symposium at the International Congress on In Vitro Biology. (International Congress on In Vitro Biology Meeting, San Diego, CA, June 9-16, 2000.)

Barbara Reed - To discuss and assist with clonal cryopreservation processes. (National Seed Storage Lab, Fort Collins, CO, Aug. 14-16, 2000.)

Barbara Reed – To collaborate on cryopreservation studies-*Ribes*; (Glasgow, Scotland, August 20-24, 2000); & Hoy hazel trees; (Orkney Isles, UK, August 27-28, 2000); and present, ‘Implementing Cryogenic storage of clonally propagated plants’; (Ambleside, UK, September 1-10, 2000).

Dennis Vandever – To pick up vehicle and supplies at Pendleton Area Location. (Pendleton, OR, March 13-15, 2000.)

Dennis Vandever – Indoor Air Quality Training. (Seattle, WA, July 25-27, 2000.)

Dennis Vandever – To transfer plant material from NCGR-Corvallis to Parlier, CA National Arid Land Plant Genetic Resources Unit for plant backup. (Parlier, CA, October 16-18, 2000).

Personnel Training for CY00

By Judith Flynn

Bruce Bartlett – PNW Integrated Pest Management Short Course. To know latest methods on all pesticide spectrum; Spray tanks; personal protection equipment; I.P.M. techniques; Water quality protection; new pesticide tracking law; water issues for the lower Willamette Valley; Landscaping to reduce pesticide problems. Jan.

Bruce Bartlett, Ray Gekosky Jim Oliphant, Joe Snead – Pacific Northwest Entomology and Plant Pathology short course: Soil biology and pesticide issues – disease control. February 2, 2000, Eugene, OR.

Ray Gekosky, Joe Snead – Attended the Lingonberry Conference to understand market standards in Europe and Canada; Variety Trials; Market Opportunities. March 9, 2000, Eugene, Oregon.

Ray Gekosky, Joe Snead – Second Annual Small Fruit Grower’s Workshop. March 17, 2000, Vancouver, WA.

Dennis Vandever – To receive indoor air quality training. July 25-27, 2000, Seattle, WA.

In CY2000 Ray Gekosky, Jim Oliphant and Joe Snead were on the Occupational Health Maintenance Program (name has now officially changed to Health and Surveillance Maintenance Program).

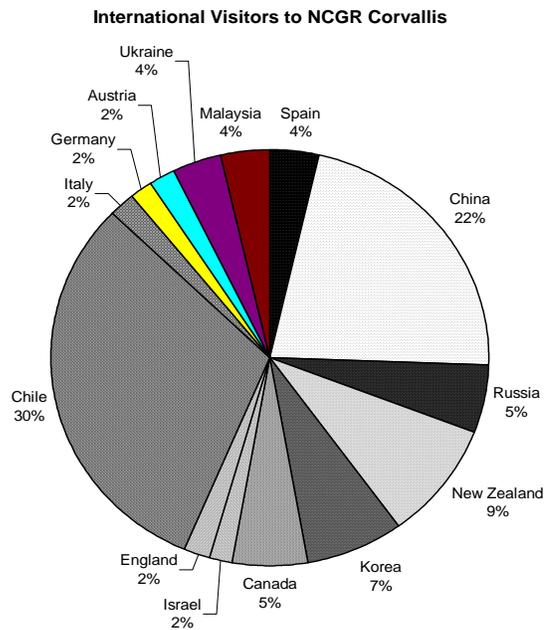
Technology Transfer, Community Outreach, and Visitors during CY00

By Judith Flynn

Reviewing the Repository guestbook we know we have had 465 people visit the facility. These folks arrive from as near as Oregon State University (undergrad and graduate classes) and as far away as New Zealand (Harvey Hall of Kiwaka Research Station, South Island). We provided many tours this year to such groups as: Philomath High School, Crescent Valley High School, Linn-Benton Community College, University of Idaho Horticulture Class, Master Gardener Groups,

The Repository staff again assisted the public by providing information, answering a multitude of questions and giving any type of specific tour they requested. A home-schooled group and Stayton High School students were given grafting demonstrations and hands-on experiences with greenhouse operations on different occasions.

Seventeen Chilean visitors were given an extensive tour of the Repository and discussed tissue culture, cryopreservation, and virus testing with the laboratory personnel. Two visitors from Kazakhstan were raspberry growers interested in the ideal cultivar for their climate and the most advantageous propagating materials to use and had many questions for the field staff.



Publications for CY00

Bell, R. and **Reed B.M.** In vitro Culture of Pear, September 2000. Acta Horticulturae. International Pear Symposium.

Chang, Y., Barker, R. **Reed, B.M.** Cold acclimation improves recovery of cryopreserved grass (Zoysia and Lolium sp.) 2000. Cryo-Letters. v. 21. p. 107-116.

Chang, Y. and **Reed, B.M.** Cold acclimation improves the cryopreservation of in vitro-grown *Pyrus* and *Rubus* meristems. 2000. In *Cryopreservation of Tropical Germplasm. Current research progress and application*, Engelmann F. and Takagi H., eds., Japan International Research Center for Agricultural Sciences and International Plant Genetic Resources Institute, Rome, Italy, 382-384.

Chang, Y. and Reed, B.M. Extended Alternating-Temperature Cold Acclimation and Culture Duration Improve Pear Shoot Cryopreservation *Cryobiology*. 2000. 40:311-322.

Chang, Y. and Reed, B.M. Pretreatments improve recovery of cryopreserved pear meristems. September 2000. *Acta Horticulturae*. International Pear Symposium.

Dumet, D., **Chang, Y., Reed, B.M.** and Benson, E.E. Replacement of cold acclimatization with high sucrose pretreatment in black currant cryopreservation. In *Cryopreservation of Tropical Germplasm. Current research progress and application*, Engelmann F. and Takagi H., eds., Japan International Research Center for Agricultural Sciences and International Plant Genetic Resources Institute, Rome, Italy, 385-387.

Hummer, K.E. Viking red currant. 2000. *Journal of the American Pomological Society*. v. 54(2). p. 54-56 (Cover also).

Hummer, K.E. History of the origin and dispersal of white pine blister rust. 2000. *HortTechnology*. v. 10(3). p. 515-517.

Hummer, K.E., Sniezko, R. Introduction to the *Ribes*, Pines, and White Pine Blister Rust Workshop. 2000. *HortTechnology*. v. 10(3). p. 514.

Hummer, K.E., Sniezko, R. Summary questions for the *Ribes*, Pines, and White Pine Blister Rust Workshop. 2000. *HortTechnology*. v. 10(3). p. 570.

Hummer, K. Hardy *Actinidia* Genetic Resources at the Corvallis Repository. 2000. *HortScience*. v. 35. p. 395. Abstract.

Hummer, K.E., Postman, J.D. Currant and Gooseberry Diagnostic Tool. 2000. Available from:
<http://www.ars-grin.gov/cor/Ribes/ribsymp/ribsymp.html>.

Hummer, K.E., Postman, J.D., *Ribes*, Pines, and White Pine Blister Rust Workshop. 2000. Available from:
<http://www.ars-grin.gov/cor/wpbrmeet.html>.

Jomantiene, R., **Postman, J.D.,** Montano, H.G., Maas, J.L., Davis, R.E., Johnson. First report of clover yellow edge phytoplasma in *Corylus* (Hazelnut). 2000. *Plant Disease*. v. 84. p. 102.

Reed, B.M. Genotype consideration in temperate fruit crop cryopreservation. 2000. In *Cryopreservation of Tropical Germplasm. Current research progress and application*, Engelmann, F. and Takagi, H., eds., Japan International Research Center for Agricultural Sciences and International Plant Genetic Resources Institute, Rome, Italy, 200-204.

Reed, B.M., Brennan, R.M. and Benson, E.E. Cryopreservation: an in vitro method for conserving *Ribes* germplasm in international gene banks. 2000. In *Cryopreservation of Tropical Germplasm. Current research progress and application*, Engelmann, F. and Takagi,

H., eds. Japan International Research Center for Agricultural Sciences and International Plant Genetic Resources Institute, Rome, Italy, 470-473.

Reed, B.M., DeNoma, J. and Chang, Y. Application of cryopreservation protocols at a clonal genebank. 2000. In *Cryopreservation of Tropical Germplasm. Current research progress and application*, Engelmann, F. and Takagi, H., eds. Japan International Research Center for Agricultural Sciences and International Plant Genetic Resources Institute, Rome, Italy, 246-249.

Reed, B.M. Cryopreserved Storage of Clonal Germplasm: the promise is fulfilled. In *Vitro Cellular and Developmental Biology*. 2000. v. 36. p. A16.

Reed, B.M. and Hummer, K.E. Long-term storage of hazelnut embryonic axes in liquid nitrogen. August 2000. Fifth International Congress on Hazelnut.

Reed, B.M. Implementing Cryogenic Storage of Clonally Propagated Plants. September 2000. Society for Low Temperature Biology.

Tsao, C.V., Postman, J.D., Reed, B.M. Virus infections reduce in vitro multiplication of 'Malling Landmark' raspberry. 2000. In *Vitro Plant*. v. 36. p. 65-68.

Wang, N., Reed, B.M. Detection and Elimination of *Verticillium* infections in mint. 2000. In *Vitro Cellular and Developmental Biology*. v. 36 p. A72.