

ANNUAL PROGRESS REPORT

For Calendar Year 1991

USDA-ARS
NATIONAL GERMPLASM REPOSITORY
33447 Peoria Road
Corvallis, OR 97333

Presented July 7 and 8, 1992

Dr. Kim Hummer, Research Leader/Curator
Dr. Barbara Reed, Cryopreservation, Plant Physiologist
Dr. Patricia Buckley, Microbiologist (Temporary)
Dr. Henrietta Chambers, Research Horticulturist (Temporary)
Bill Doerner, Agricultural Technician - Integrated Pest Management
Judith Flynn, Secretary
Ray Gekosky, Biological Aid - Field Assistant
Donna Gerten, Computer Programmer - Information Systems Manager
Jay Goodwin, Biological Technician - Seed Management
Vacant, Agricultural Technician - Plant Propagator
Carolyn Paynter, Tissue Culture Technician
Joseph Postman, Plant Pathologist
Joe Snead, Agricultural Technician - Field Manager
Dr. Maxine Thompson, Research Horticulturist (Temporary)

Brian Courtney, Biological Aid (Temporary)
Traci DeWilde, Biological Aid (Temporary)
Aaron Henderson, Biological Aid (Temporary)
Nancy Higgins, Biological Aid (Temporary)
Lisa Hunt, Biological Aid (Temporary)
Elizabeth Langham, Biological Aid (Temporary)
Erin McConnell, Biological Technician (Temporary)
Wes Messinger, Graduate Student
Yeo, Dennis, Graduate Student
Xiao-Ling Yu, Graduate Student
Dr. Francis Lawrence, Collaborator
Dr. Mel Westwood, Collaborator

Personnel Changes

Kim E. Hummer, Research Leader/Curator

Personnel Changes

At present we have three part time visiting scientists working at the Corvallis Repository. Dr. Maxine Thompson and Dr. Henrietta Chambers are studying the cytology and taxonomy of Rubus and Mentha. Dr. Pat Buckley is examining internal contaminants of in vitro cultured plants. We are very pleased that we have the opportunity to work with these fine scientists in their specialized fields.

We have recently hired a full time maintenance worker, Dennis Vandeveer. This position was somehow overlooked in the original planning of the repository. Now that we have two fields and will have two buildings to care for. This is a much needed position. Dennis has come to us after a navy career and is starting to get our facilities in ship shape. He has already made sure that our backup diesel generator is on line for emergencies and has scheduled its routine maintenance. He is keeping our boiler, multizone unit and greenhouse coolers in tip-top condition. We welcome him to this new and long needed position.

Vonda Peters, our plant propagator, resigned to take care of her new infant son. In addition Jim Chandler finished his final temporary assignment in May and left us for his blueberry farm. We wish them both good luck and best wishes. With these vacancies we have recently redistributed position responsibilities somewhat and have hired Lisa Hunt to an Agricultural Science Research Technician Position in charge of the screenhouse collections. In addition we have hired Dennis Magnello in a second technical position responsible for the greenhouses and plant distribution. These both are critical positions to the repository operation and we look forward to filling these in a permanent capacity.

We have started a program with "Work Unlimited" where we contract the services of a handicapped individual. Lisa Wakefield has been assisting us with maintaining our plant collections in our screenhouses and greenhouses. With her help of weeding and demossing our plant collections are in great shape. We are pleased to provide an environment where she can work back into society.

This year we have two part-time volunteers working at the repository. This is the first year that we have used volunteer assistance in maintenance of the plant collections.

Physical Plant

The development of our new acreage is proceeding well. Our Area Administrative Office has provided money to finish the perimeter fencing this year. The old house will be moved from the property this summer and we will construct a poll building field station in it's place. Our hard working field crew has staked out and planted our Ribes cultivars and species collections. We

have been working with Dr. Haunold and his technicians to begin the establishment of a hop yard for the *Humulus* germplasm collection.

We are expanding the offices in the headhouse to accommodate the Technical staff working in the greenhouse and screenhouse areas. During the past year we have added an alarm system to our walk-in coolers and replaced the greenhouse swamp-coolers. Screenhouse doors have been replaced and the houses and screening have been checked for holes and repaired. We are due for exterior painting of the facility next year and replacement of the screen and screenhouse roofing within five years.

We have had to change our phone system this past year. With delays to install new phone lines, our number changed two months later than expected. Our connections continue to be faint. The pre-ring time is large so sometimes we will answer and the person calling us will have hung up from waiting so long. We hope to get used to this new system and correct difficulties.

Budget

Our base funding in FY 91 was \$640,878 and in FY 92 was \$643,505. With salary adjustments and increased utilities and no baseline funding increase, our operating dollars are quite tight this year. The Area Office provided \$15,000 to complete our fence, and Program Staff provided \$31,000 to fund Specific Cooperative Agreements with University scientists. In addition \$10,000 was provided by USDA-APHIS to arrange for a workshop on the Risk Assessment of Ribes Importation. We are also helping to coordinate \$10,000 through Oregon State University for IBPGR to draw up a statement of safe movement of small fruit germplasm.

With the projection of a continued base funding our alternative is to reduce the amount of temporary positions at the repository. If our budget remains fixed at present levels by FY 95 we have projected that we will not be able to fund temporary positions at our facility. We have at present a permanent staff of 12 with about 12 part-time positions (about 6 FTE) during the course of the year.

Last year I initiated a plan requesting three additional curators for the facility. With the present economic climate that looks like a virtual impossibility. I still hope that a tree-fruit curator position could be separated from the small fruit curator position for our facility. As our collections increase in depth additional curatorial judgement is needed to direct germplasm collection and preservation.

NGR Distribution Summary, 1991

Erin McConnell, Plant Propagator

During 1991, 1,706 germplasm accessions were sent to requestors. Materials was shipped to requestors both within the U.S. and abroad (Fig. 1). Roughly two-thirds of the distributed germplasm went to U.S. requestors, with the remaining third distributed internationally. Almost all requests for *Humulus* came from outside the U.S., particularly Zimbabwe. Requests for

Vaccinium germplasm were about equally divided between U.S. and foreign requestors. Requests for the other genera held by the Repository came from requestors within the U.S. A variety of individual researchers and organizations, both public and private were the recipients. Figure 2 presents a breakdown of accessions sent by material type. Germplasm was most often requested in the form of plants, scionwood, or seeds.

Preparation of clonal germplasm for distribution requires effort and care. For each of the 335 scionwood accessions that were sent in 1991 up to 6 pieces of scionwood were collected and capped. They were then inspected by APHIS and packaged to prevent drying during shipment. For plants, 5 to 10 cuttings were collected at the appropriate time of year, rooted for several months under mist, potted and grown until they were hardy enough for shipment. Pyrus, Fragaria, and Rubus were the genera most frequently requested (Fig. 1).

Figure

Items Shipped 1991 by Genus

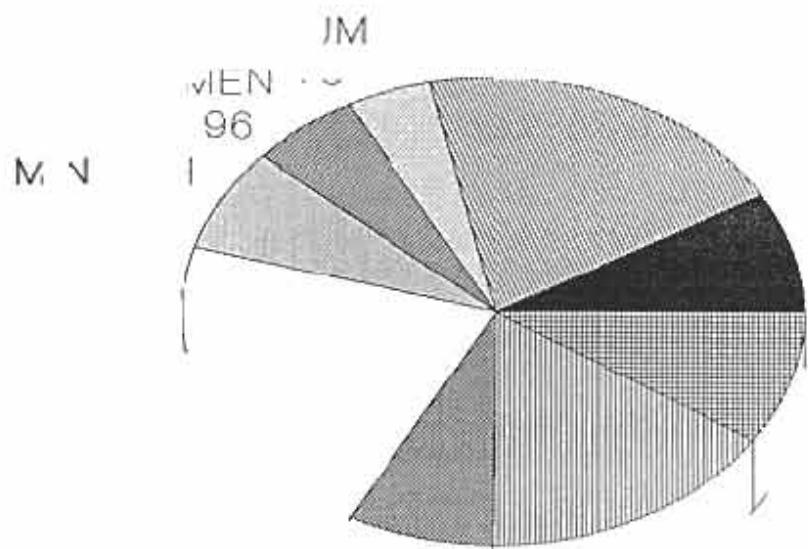
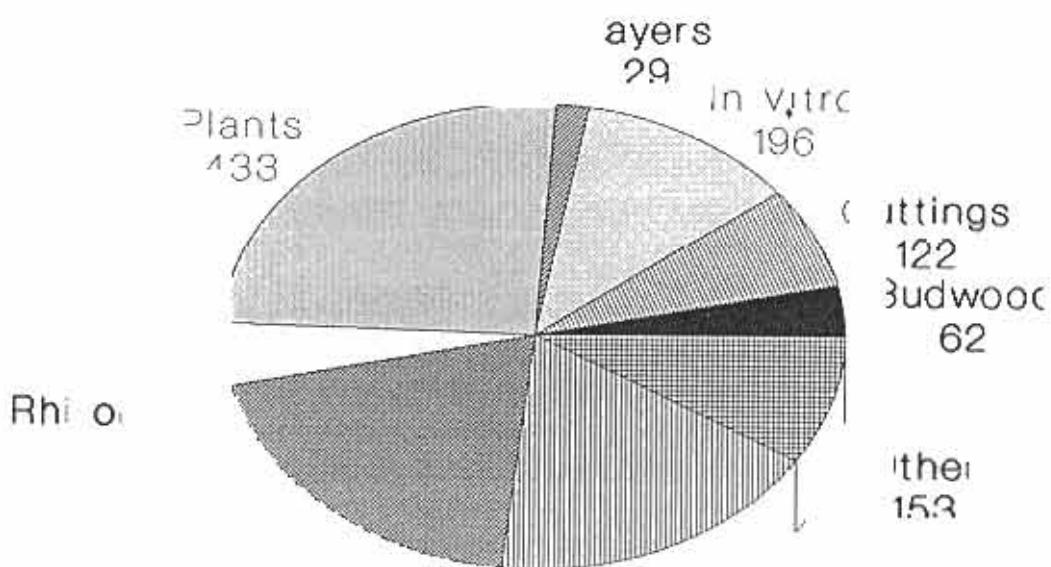


Figure 2

Items Shipped 1991 by Material Type



Cryopreservation

Barbara Reed, Plant Physiologist

Data from experiments to determine if ABA could substitute for cold hardening treatments was presented at ASHS, Gordon Conferences, and Cryobiology Meetings. Initial studies showed that there was no effect of ABA as compared to cold hardening, and additional experiments showed that there was no interaction between ABA and the cytokinin BA. Tests now underway will look at higher ABA levels, then ABA studies will be completed.

Nearly 50 *Pyrus* accessions were screened for cryopreservation response. Results will be analyzed this winter. Initial results show moderate survival on most accessions.

Preliminary work with vitrification techniques shows good initial results. This area will be pursued further next year.

Histological studies of *Rubus* meristems following cryopreservation have shown the regrowth of apical or lateral buds and not regrowth from callus tissue.

Cold Storage

The Cold Storage collection continues to expand. We are modifying our procedures to accommodate the increased size. Inventory is now rotated with two genera (one large and one small) done each month. Each genus gets three rather than four inventories each year except for *Mentha* which is done twice.

Analysis of the *Rubus* cold storage collection and several experiments in progress are being analyzed for publication. It appears that cultures stored at 4°C with 12 hour days are in significantly better condition after 15 months than those in darkness at 4°C but survival rates were the same. Cultures in 20 mm tubes were in better condition with higher survival rates than those in bags but the contamination rate was 15% compared to 0% for bags. At 18 months there were no significant differences between any of the treatments. Genotype differences were apparent for the four accessions tested.

A second group of cultures stored only in bags did not show significant differences between 4°C light and dark conditions, however light grown cultures were one point higher than the dark grown cultures.

Some accessions that did not survive well in 4°C cold were tested for storage at growth room temperatures with reduced nitrogen concentrations in the medium. The best storage times were obtained with 20 ml medium per bag section and 25-50% of the MS medium nitrogen levels. Unfortunately this did not really improve on the cold storage time, but it will be something to consider for those which store for less than 9 months.

Ribes collections are stored in both 4°C and -1°C dark conditions. The data will be analyzed this winter, but initial results favor the lower temperature.

To accommodate a range of storage conditions the new cold room facilities should have lighting and capability for lower temperatures.

Tissue Culture

The tissue culture collection has many new accessions due to an active collection program this spring and summer. The *Humulus* and *Mentha* collections are essentially complete while the *Fragaria* collection is rapidly growing. Collecting concentrated on accessions which have been requested as well as accessions not in storage. Plants which did not runner were treated with GA and light to induce runners, a method which we will continue to use as needed. Additional *Vaccinium* accessions were also added to the collection with special emphasis on cranberries and requested blueberries. A few *Rubus* requests were collected, however most collecting in this genus will wait until Dr. Thompson completes her identity verifications.

Nearly 60 *Pyrus* accessions have been tested for rooting on three or four different hormone treatments. Approximately all will root on some combination of treatments. This material will be analyzed when the final tests are completed.

Some experimental work was carried out with *Ribes* accessions which do not elongate in culture. Changes in media types, agar levels and hormones were all unsuccessful. Additional work is planned as time permits. Requests for in vitro materials continue at a high level.

Internal Contaminants in the Tissue Culture Laboratory

Patricia Buckley, Microbiologist

Current increasing interest in plant-associated bacteria led us to seek information and solutions to the problem of internal contaminants in micropropagated plants. During 1991, our emphasis was placed on the detection, isolation and characterization of bacteria from some persistently contaminated mint shoot explant cultures and elimination of these contaminants from the plantlets with antibiotic treatment. Early recognition of contamination was improved by incubating freshly obtained explants in liquid medium at pH 6.9 instead of the usual 5.7. Cloudiness indicating bacterial growth was often detectable within three days.

When the contaminating organisms were isolated on standard bacteriological medium in pure culture, they were characterized by morphology, enzymology and physiology. Identification of the isolates was aided by the use of 18 diagnostic tests and comparison with eight known organisms, including three xanthomonads, two pseudomonads and one representative each from the genera *Erwinia*, *Agrobacterium* and *Enterobacter*.

Treatment included immersion of freshly cut shoot tips in broth containing one or more of the antibiotics streptomycin, gentamicin, and neomycin at levels which have been recommended for plant tissue culture use. Streptomycin, which appeared to be more promising in freeing the plants from contamination, required a high concentration (1000 ug/ml) for effectiveness. Some plants showed bleaching and marked growth retardation in response to the drug at this level. Plants were affected by gentamicin and neomycin at levels considerably below those deemed phytotoxic.

During 1992, we plan to test two other reportedly useful antibacterial compounds, rifampicin and nalidixic acid, and to determine nontoxic dosages for effective treatment.

GRIN-Corvallis Interface

D.M. Gerten, Computer Specialist

NGR-Corvallis has had a fully integrated local plant germplasm database, modelled on the GRIN system, since 1989. We have developed programs and routines whereby we can upload and/or download data to and from the local system and the GRIN on a turnkey basis. All of our accession, inventory, distribution and cooperator information is available in current form on the GRIN in the same manner as though this were our primary database. The majority of our observation data is available on GRIN as well, although more records will be loaded this summer, particularly disease and pest data from our field collections.

The main divergence between our system and the GRIN is in the GRIN's ability to emulate a fully relational database. The DBMS we use, FoxPro, is an Xbase language product and is a 'flat-file' type. This type of program has limited querying abilities between related files. A relational DBMS is capable of utilizing Structured Query Language (SQL) to easily pull data from related tables (files) for a user-specified type of display or output. We can produce the same types of output with a flat-file system, however, this requires several to many steps involving file linkages, indexing, updates and intermediates before producing the desired result. In a relational DBMS, querying is easier, more elegant in concept and the results are dynamic rather than static.

By 1994 the GRIN will be migrating to Oracle, a fully relational DBMS in use in many corporate data centers. We are currently considering changing to this product ourselves in order to 1) be more fully compatible with the GRIN and 2) to take advantage of SQL and the power of a relational DBMS. The Oracle product works on many different types of hardware platforms and operating systems. We look forward to increasing the sophistication and data processing capacity of the NGR-Corvallis local system in the coming years.

GRIN-NPGR-CORVALLIS STATUS REPORT 1991

D.M. Gerten, Database Manager

Record types loaded to and/or updated on GRIN throughout the year

<u>RECORD TYPE</u>	<u>GENUS</u>	<u>DATE</u>	<u>COMMENTS</u>
COOPERATORS		01/07	15 new records
		01/15	1325 records, all updated
		03/04	11 new records
		05/06	29 new records
		07/11	17 new records
		09/12	12 new records
		11/25	53 new records
ACCESSION	All genera	01/07	202 new and updated
	All genera	03/01	376 new and updated
	Mentha	04/16	196 new and updated
	All genera	05/01	475 new and updated
	All genera	07/02	184 new and updated
	All genera	09/10	320 new and updated
	All genera	11/19	362 new and updated
	Humulus	12/09	469 new
	All genera	12/23	345 new and updated
INVENTORY	All genera	01/09	1403 In Vitro records new and updated
	All genera	03/04	All new and updated
	All genera	05/01	All new and updated
	All genera	07/08	All new and updated
	All genera	09/12	All new and updated
	All genera	11/21	All new and updated
	All genera	12/24	All new and updated

<u>RECORD TYPE</u>	<u>GENUS</u>	<u>DATE</u>	<u>COMMENTS</u>
DISTRIBUTION (order header and order item records)		01/07	All done 1990 orders
		03/05	All done 1990 orders
		05/06	All done 1991 orders
		09/12	All done 1990 orders
		11/91	All done 1991 orders
		12/26	All done 1990 orders
			All done 1991 orders
OBSERVATIONS			
	Ribes	01/24	19 obs records from a Vermont study on WPBR resistance (88?)
	Vaccinium	02/20	211 records from D.M. Boone's Cranberry study (WI, '88)
	Vaccinium	02/20	16 records from Meyer and Ballington's leafhopper study ('90)
	Vaccinium	02/20	490 obs records (NCGR, '90)
	Corylus	03/11	753 records from S. Mehlenbacher (88-90)
	Corylus	03/11	2,262 obs records (NCGR, '90-91)
	Pyrus	04/01	18,396 obs records NCGR Fruit evals. ('87-88)
	Mentha	05/07	63 obs records from Henny Chambers ('91)
	Fragaria	05/09	83 obs records from Daley, Wood, Boone (OSU, '88)

<u>RECORD TYPE</u>	<u>GENUS</u>	<u>DATE</u>	<u>COMMENTS</u>
	Rubus	05/09	322 obs records from Daley, Wood, Boone (OSU, '88)
	Pyrus	05/22	1,002 obs records (NCGR, '91)
	Rubus	06/14	28 records from Carlos Fear disease evaluations ('90)
	Ribes	08/14	413 obs records (NCGR, '91)
	Corylus	11/27	115 obs records (NCGR, '91)

Total obs records loaded: 24,173 records

RANGE	Ribes	03/01	700+ new and updated
	Fragaria	06/10	900+ new and updated
	Rubus	07/01	1000+ new and updated
	Vaccinium	08/06	735 new and updated
	Corylus	09/19	415 new and updated
	Mentha	11/25	460 new and updated
	Humulus	12/10	746 new and updated
OTHER	Ribes	04/20	Accession records PI'd
	Fragaria	06/20	Accession records PI'd
	Rubus	07/30	Accession records PI'd
	Vaccinium	09/10	Accession records PI'd
	Corylus	11/19	Accession records PI'd
	Mentha	12/15	Accession records PI'd
	Humulus	12/23	Accession records PI'd

Virus Indexing, Pyrus Evaluation

J. D. Postman

Virus Indexing - Virus Therapy

Sixty percent of the clonal accessions of our 6 major fruit and nut genera are presently listed as virus negative (Table 1). The number of virus tested plants steadily increases each year, but with the influx of new accessions, and the discovery of infected accessions among them, the percent of untested and infected accessions tends to fluctuate considerably. Each virus infected clone that is detected may result in a therapy effort followed by additional virus indexing of

multiple offspring, another influx of new accessions to test. With nearly 500 virus infected accessions awaiting therapy, I must be selective about which plants are heat treated. Virus negative species material may be more easily replaced with new seedlings, and some infected cultivars can be replaced from other sources. In general the priorities for indexing are (1) quarantine material, (2) heat treated clones, (3) other new accessions, and (4) older accessions that require additional testing. 1992 will see a scaling back of *Pyrus* activity, and a significant effort to test all appropriate small fruit and *Mentha* accessions on *Chenopodium quinoa*. Barbara Samson assisted with virus indexing, tissue culture and pear evaluation. Brian Courtney assisted with *Pyrus* indexing and tissue culture.

Corylus Apple mosaic virus (ApMV) continues to be the only significant virus disease of *Corylus*, and to date has only been found in post-entry quarantine material from western Europe. Presently the collection is 83% virus negative. One year ago that figure was 72%. Data collection is complete on a several year study with S. Mehlenbacher on transmission of ApMV in seed and pollen, and relative incidence of this virus in arriving European clones. We have determined that seed transmission of ApMV is common, but we have not been able to document pollen transmission.

Fragaria Since 1989, the number of clonal strawberry accessions has jumped from 475 to 677 and the virus indexing backlog is slowly shrinking. The collection is presently 51% virus negative. My goal is to test each strawberry clone using at least two leaf graft assays, one sap inoculation, and several ELISA tests. There are presently 75 infected accessions awaiting therapy. All *Fragaria* virus therapy is now being done in vitro, which has eliminated the runnering problem using the standard greenhouse method. A virus has been detected in two Chilean accessions that is different from common sap transmissible viruses. R. Martin, Agriculture Canada, Vancouver, is assisting in efforts to identify this pathogen.

Humulus There have been no recent virus efforts at NPGR with this genus since the collection is housed at a separate field location. The virus status of accessions are recorded as received.

Mentha The genus *Mentha* has very few reported virus diseases. A veinbanding disorder has been documented in about 13 NPGR accessions, and it's viral etiology has been demonstrated. A manuscript is nearly ready for review in collaboration with R. Stace-Smith and H. Chambers which reports that this disorder is caused by a previously undescribed virus. During 1991, *Mentha* was added to the long list of hosts of tomato spotted wilt virus (TSWV) and ELISA testing for the two strains of this virus was implemented. The vector of TSWV is the western flower thrip, and monitoring for virus carrying thrips was conducted by placing virus sensitive petunia, verbena and gloxinia plants in greenhouses and screenhouses. Although thrips are present at our facility, no virus spread was detected. I elevated Mint to "major crop" status this year by developing databases and

summarizing programs that are comparable and compatible with those used for the other major NPGR genera.

Pyrus This is the largest NPGR collection with the largest number of virus infected plants. Bioassays for certain pear viruses are very reliable, and therapy procedures have become routine, resulting in the replacement of nearly 400 virus infected accessions with heat treated plants. With the 1991 heat treated replacements (partially offset by newly arriving infected accessions) the pear collection is now 80% virus negative. *Pyrus* also has the smallest percent untested accessions. There are still 189 infected accessions, some of which have potential replacements in the pipeline.

Ribes With the recent introduction of a large number of gooseberry and non-black currants from England, *Ribes* now has the largest percent of infected accessions. 91 accessions, or 22% of the clonal accessions are virus infected. This is primarily due to the widespread occurrence of veinbanding virus as determined by simple visual observation during the appropriate growing season. An "exotic" virus was detected during routine indexing of this quarantine material on *C. quinoa*, which was subsequently identified as arabis mosaic virus. Arabis mosaic is a nematode (and possibly seed) transmitted virus that occurs in Europe but not in North America. ELISA testing was therefore initiated on the entire *Ribes* collection, and 4 cases of arabis mosaic were confirmed. Several additional accessions are still suspect.

Reversion is another disease that does not occur in North America, and is transmitted by an eriophyid mite. Eriophyid mites were discovered this year in our field collection. Although reversion disease is not known in the U.S., and this non-gall forming mite is not known to transmit the disease, efforts were increased to index for reversion, especially in the black currants. There is always the possibility that reversion has been introduced without its vector and has been lying dormant in a symptomless plant. We now have adequate numbers of the Baldwin indicator variety to investigate this possibility.

Several hundred black currant indicator plants were propagated and sent to Glenn Dale Maryland to be used in the indexing efforts on black currants that are currently in quarantine I traveled to Maryland in the spring to assist with the small fruit indexing.

Kubu The arrival of about 80 new clonal accessions during 1991 has swelled the backlog of this indexing intensive genus. The collection is presently 59% virus negative, with 80 infected accessions either awaiting therapy or part way through the program.

Vaccinium... Nearly all *Vaccinium* viruses can be detected by ELISA. New antisera are still awaited for red ringspot virus and several new viruses that researchers in the Pacific Northwest have recently described. There was essentially no *Vaccinium* virus activity at NPGR this year. The collection is presently listed as 51% virus negative and 48% untested.

***Minor
Genera***

The minor genera, true to their designation, received minor attention. Many of the pome relatives (*Cydonia*, *Mespilus* and *Sorbus* in particular) have been tested along with *Pyrus* on the same indicator plants. Several infected accessions have been identified in each genus, but no therapy has been attempted. *Sambucus* clones were received this year from R. Converse, some of which have been indexed and have known viruses, others which have been heat treated by him and are presumably virus negative.

Virus Collection

When a plant germplasm collection is indexed for latent viral pathogens, the plants with documented pathogen content become a useful resource as well. More than 50 different virus and virus-like pathogens have been detected in the various germplasm collections maintained at NPGC-Corvallis. With the recent retirement of R. Converse, and my agreement to maintain part of his virus infected small fruit collection, it seemed the perfect occasion to assemble and organize many of the infected accessions that I have been using as positive controls in my own work. Approximately 100 plants with assorted viruses and virus strains have been cataloged and their existence and availability is being publicized.

***Pyrus* Evaluations**

Between July 1 and November 1, the pear field was inspected at approximately weekly intervals and ripening dates were recorded for each accession. Fruit samples were harvested for clones for which we have fewer than two season's photographs on file. Over the course of several weeks in August, cultivars were evaluated for persistent pseudomonas damage from last winter and the occurrence of leaf and fruit scab.

Phenology Fruit ripening data for the years 1986 to 1991 were recently assembled into a single database with both julian dates and calendar dates for each year. I have plans to do likewise for bloom data and disease observations which are currently scattered in several different data files. The 1991 data will be loaded to GRIN. Earlier data is already loaded.

Fruit Photos During 1991, 202 fruit photos were added to our photo collection. The availability of photos by accession is documented in a photo database. We now have on file fruit photographs of 1147 accessions. My goal is to have photos from two different growing seasons for each accession, both cultivars and species. Presently 874 accessions have two or more years of photos.

Fruit Measurements Fruit measurements were made from 1987 through 1990 from samples (5 fruits) of each pear accession that was harvested. Measurements were electronically recorded for fruit weight, length, width and pedicel length. A computer program has generated means of these measurements as well as various ratios of these measurements by accession number. This data documents important size characteristics of pear fruits and will potentially be useful in a computerized key to pear species and cultivars.

NATIONAL CLONAL GERMPLASM REPOSITORY - CORVALLIS

1991 Virus Status Summary

GENUS	CLONES	PERCENT VIRUS NEGATIVE	PERCENT VIRUS POSITIVE	PERCENT UNTESTED OR INCONCLUSIVE
CORYLUS	400	82.75	3.50	13.75
FRAGARIA	677	51.11	11.08	37.81
HUMULUS	770	7.40	1.30	91.30
MENTHA	441	2.72	2.27	95.01
PYRUS	1466	79.95	12.82	7.16
RIBES	405	33.33	22.47	44.20
RUBUS	637	59.34	12.87	27.79
VACCINIUM	427	51.05	1.17	47.78
TOTAL	5223	—	—	—
MEAN		45.95	8.43	45.59

Virus negative includes accessions with virus status F, P and T.
J. D. Postman 12/23/91

Seed News

Jay Goodwin, Seed Technician

I'm the first seed technician the Repository has had, and I've been here for one year. Almost 2300 of the Corvallis Repository accessions are stored as seed, with 1900 of these seedlots representing major genera and the remaining 400 being seed of minor genera. Putting this quantity of seed in good order is proving a formidable task.

Our seed is stored at -20°C. Stored seed is packaged in a special envelope made of paper, aluminum foil, and plastic all laminated together. These envelopes are intended to be impermeable to moisture, both liquid and gaseous. Since our freezers are subject to frost build-up (just like the freezer in your fridge), and because moisture content and storage temperature are the two most important factors affecting the longevity of stored seed, I was concerned that our storage practices might not be adequate. After I had taken half a dozen of the special envelopes and filled them with water, and found that three quarters of them leaked (were not impermeable to moisture), I was very concerned about the viability of our stored seed.

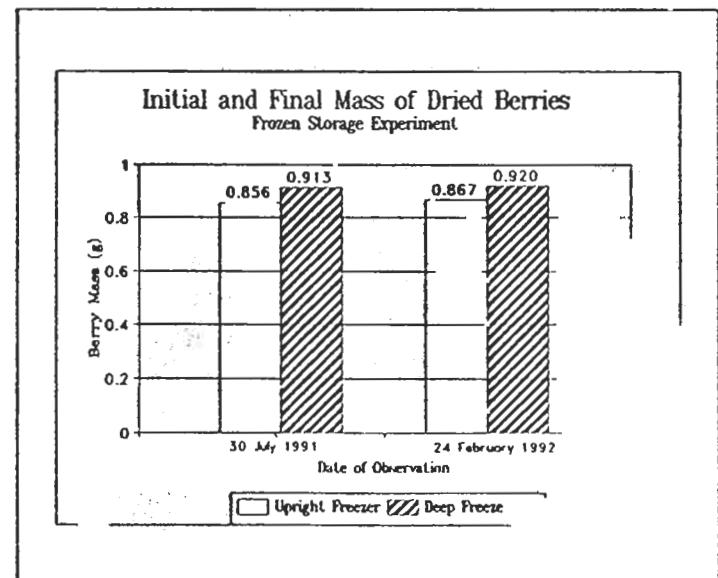
First, I started routinely monitoring temperatures in our freezers; second, I ran an experiment to determine whether stored seeds could absorb moisture while in the freezer. When I first started monitoring temperatures, both freezers were warmer than they should have been. Now they are operating at -20°C, and I check temperatures every two weeks.

To investigate moisture transfer to stored seeds, I dried fresh *Vaccinium* berries, weighed them, packaged them in the same way as stored seed, and put them in the freezer. (We have seed stored as both clean seed and dried fruit.)

If the dried berries were able to absorb moisture during storage, they would get heavier. I ran the experiment for seven months, checking the weight of the stored berries each week during the first three months, and every two weeks thereafter.

I'm happy to report that our storage methods seem adequate. There were no statistically significant changes in the weight of the dried berries during the seven months of the experiment.

Germination Hint: If you have the patience, 12 weeks of stratification at 5°C will promote a good germination response in most of the repository's seed that require stratification.



Mentha Collection

Henrietta Chambers

The chromosome survey of the collection is almost complete. This project began in early 1989. We have at least one count of each taxon, but many counts the well represented taxa. Some of the counts were old Plant Introduction seed collections from Afghanistan, Tunisia and Chile, some of which were only identified to genus, and recent collections which represented taxa new to the collection. The chromosome data will be prepared for publication in *TAXON*, Journal of the International Assoc. of Plant Taxonomists. A separate part of the chromosome study is in collaboration with Dr. Arthur O. Tucker, *Mentha* specialist from Delaware State University, Dover, Delaware. Chromosome counts of flowerbuds or root tips were collected for approximately twelve artificial hybrids of *Mentha arvensis* and *M. longifolia*. Also, 20 accessions of Tucker and others of *M. canadensis*, the native North American species which is thought to have originated as a hybrid species, have been counted.

We have corresponded with botanists and horticulturists regarding the six native species from Australia and New Zealand. By late 1991 we had word that three of the taxa would be enroute early in 1992. We are very anxious to include these species in the chromosome survey since some of the species have never been counted and others have only a single count or approximate count.

In July 1991 I presented a paper, "Progress in the Development of a *Mentha* germplasm collection " at the meetings of the American Society for Horticultural Science. I worked with the writers for Agricultural Research on an article about the mint collection that appeared in the January 1992 issue. A manuscript in preparation for submission to *Diversity* entitled "Mentha Genetic Resources and the Collection at USDA-ARS NGR-Corvallis" is expected to appear in the Summer 1992 issue. I also collaborated with a *Pycnanthemum* specialist, Jon J. Hamer, Oakwood College, Huntsville, Alabama, on a manuscript for *Tipularia*, the Journal of the Georgia Botanical Society.

NGR Visitors

Judith Flynn, Secretary

Three hundred and eighty-one guests were given a tour or visited with NCR personnel during calendar year 1991. Scientists, educators, and people in private industry from as far away as Russia, China, Mexico and New Zealand, farmers from the neighborhood and students from various schools and universities arrived at the Repository. In the most distinguished visitor category were Representatives Michael Kopetski, D-OR, and George Brown, D-CA. Mr. Brown, now chairman of the House Science, Space and Technology Committee, was

instrumental in the approval of dollars for establishment of germplasm repositories. He was quite aware of the emerging discipline of genetic resources and the value of the germplasm mission. The congressmen were given the complete tour of facilities and an opportunity to sample Oregon hazelnuts, lingonberry jam, cranberry juice, Bosc pears, red current jelly and other Oregon economically important small fruits. This visit was covered by the media. Other guests included Drs. Burmistrov, Kotschetkov and Nosulchak, three scientists on the Russian Germplasm Exchange Team. Also, many ARS administrators and collaborators arrived for the Technical Committee and W-6 meetings held in summer, 1991.