

ANNUAL PROGRESS REPORT
USDA/ARS NATIONAL CLONAL
GERMPLASM REPOSITORY
33447 Peoria Road
Corvallis, OR 97330

Calendar year 1989

Presented June 19 and 20, 1990

Dr. Kim Hummer, Research Leader/Curator
Dr. Barbara Reed, Cryopreservation

Jim Chandler, Biological Technician
Bill Doerner, Integrated Pest Management
Ray Gekosky, Small Fruits/Physical Plant
Donna Gerten, Information Manager
John, Orlowsky, Greenhouse Manager
Carolyn Paynter, In Vitro
Joseph Postman, Plant Pathologist
Joe Snead, Field Manager

Dr. Norman James, Collaborator
Dr. Francis Lawrence, Collaborator
Dr. Mel Westwood, Collaborator

Dr. Henrietta Chambers, *Mentha* temporary
Dr. Patricia Buckley, In vitro temporary
Lisa Hunt, In vitro temporary
Mary Jo Lundsten, In vitro temporary
Nancy Higgins, Virus testing temporary
Lon Rombough, Greenhouse temporary
Brandon Owens, Greenhouse temporary
Ted Hake, Field temporary
Ron Reisner, Clerk temporary

Personnel Changes

In March we hired Mr. Ray Gekosky to fill a Biological Aide position which will assist in the small fruits field and with our physical plant maintenance. Ray comes to us from the Forest Service where he worked for several years.

Our secretary, Mickey Hooton, has left us to return to her native state of Idaho. We appreciated the help and assistance that she gave us through her several year stay in Oregon, and wish her the best of luck in her return to Idaho. Until a replacement is recruited, Mr. Ron Reisner will be assisting us at the front desk on a part time basis. We hope to place a new permanent recruit by August 1990.

Dr. Francis (Whitey) Lawrence, our valued Germplasm Enhancer and USDA Small Fruit Breeder, retired at the end of May 1990. His horticultural expertise and pleasant demeanor will be missed greatly. He is leaving us in the middle of Strawberry season, but assures us that he will be available for consulting and collaboration. We wish him the best of health and life in his retirement.

The small fruit commissions from the Pacific northwest have approached Congress about new appropriations for a small fruit research center. Judging from congressional gossip, a proposal reduced from the original will probably fly. New monies will probably be appropriated for FY 91 for an applied small fruit breeder (a replacement for Dr. Lawrence) and a small fruit virologist (replacement for Dr. Richard Converse who is retiring in December 1990.) These positions will most likely be stationed in Corvallis at existing facilities, since new construction dollars are not likely to be forthcoming during FY 91.

Physical Plant

Our buildings and screenhouses are almost 10 years old now and we are rotating portions for repainting. The outside of the screenhouses were repainted in 1989. Swamp coolers are being repaired constantly and will need to be replaced in coming FYs. A great staff team effort constructed low cost screenhouse benches from channel iron, cinder blocks, and 2 x 6's. These benches will ease our screenhouse weed problem and get our plants up to where we can deal with them. Two sets of screenhouse doors have been rotated to open in the reverse direction. This will allow the outer door to close prior to opening of the inner door - which is the way these doors were meant to work originally! This will help keep out potential insect vectors.

We are negotiating the purchase of 40 acres of land about 0.5 miles north of the repository on Peoria Road. Money has been approved by congress, program staff and administration staff for purchase during FY 90. We are presently negotiating with the owner over the purchase price.

Our next largest constraint is getting to be laboratory space. To remedy this we plan to roof in the walkway between our present lab and the headhouse. This would provide space to house larger laboratory equipment such as big freezers and incubators. We also hope to install one new walk-in cooler dedicated to in vitro storage. Both of these would be improvements of existing buildings rather than new construction per se.

Budget

Our FY 89 base funding was \$743,425. The FY 90 budget was reduced by \$97,000 from the FY 89 budget. This money was earmarked specifically for specific

cooperative agreements for clonal germplasm evaluation. The Gramm-Rudman 3.4% cut also reduced our budget so our operating base for FY 90 is \$638,695. We anticipate another 2.5% Gramm-Rudman cut for FY 91.

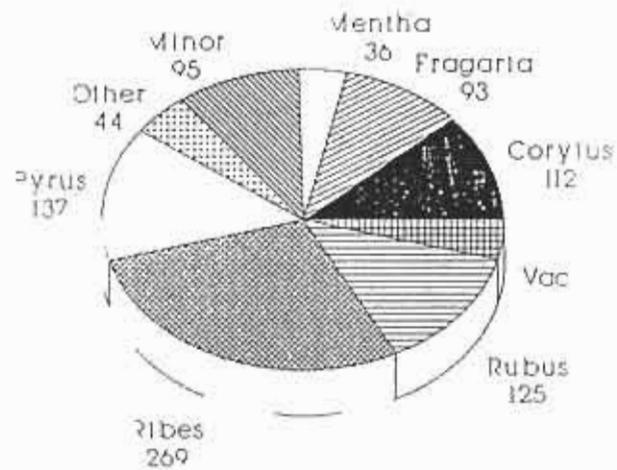
New Accessions

We have received about 680 exciting new accessions since January 1990. For *Corylus*, we have received 25 cultivars from Italy, Yugoslavia, and Spain. Dr. Shawn Mehlenbacher, Breeder at Oregon State University, assisted us greatly in obtaining this material. We had excellent grafting take (100%) on all cultivars received. This is a tribute to the good condition of the wood and to the excellent grafting skills of Jim Chandler. In *Fragaria*, Dr. Scott Cameron, Plant Physiologist from Washington State University, and his colleagues Drs. Tom Sjulín and Carl Shanks, collected 271 seeds and runners of *Fragaria chiloensis* from Chile for us in January. This greatly enlarged our collection and expanded the germplasm available to strawberry breeders world wide. They collected from more than 16 locations throughout the Chilean coast. Large white fruited Chilean strawberries were obtained. Several breeding programs around the country generously donated material from their collections. Dr. Galletta, USDA/ARS Beltsville, Md, provided 22 advanced MDUS selections along with about 25 other selections and older cultivars. Dr. Tom Davis from the University of New Hampshire, sent 18 selections of *F. vesca* and *F. virginiana*. Dr. Luby will be providing *F. virginiana* selections, from his graduate student, Margaret Stahler's recently completed work. One of my goals is to obtain, if possible, *Fragaria* from every state in our country. *Fragaria* is one North American genus that should be promoted, especially when people suggest that North America is poor in germplasm.

Oregon State Foundation Seed gave us 5 mint selections from the mint certification program. We also received 2 selections from South Africa and 1 from Brazil. About 65 new pear accessions were received. Dr. Richard Bell and Dr. David Sugar graciously provided cultivars from their plots in Kearneysville, WV and Medford, OR, respectively. Dr. Douglas Crowe in Nova Scotia provided 8 additional cultivars and Dr. David Hunter sent research wood of Harrow 609, which is soon to be released.

The *Ribes* collection continues to actively increase with wild collections from Chile and Mexico and with black currant cultivars from Dr. Adam Dale and Andy Vandenberg, in Ontario. We greatly appreciate the cuttings of 'Amos Black' and 'Baldwin' virus indicators which they provided for our National Plant Germplasm Quarantine Center in Maryland, and for our own testing program. Dr. Reckin also sent red and white currant cultivars from Germany. Dr. Hilde Nybom sent 14 seedlots of native Swedish *Rubus* germplasm from Fredriksal Botanical Garden. Dr. Naruhashi sent 4 oriental seedlots from Japan. Harvey Hall provided *Rubus glaucus* that was collected in Guatemala and Ecuador. In *Vaccinium*, Dr. Nick Vorsa donated 15 selections of a range of native blueberry species and 3 cranberry cultivars. Carolyn DeMoranville sent a number of cranberry cultivars from the Massachusetts Cranberry Experiment Station in East Wareham. We received many rabbiteye blueberries from Max Austin and other cultivars and selections from nurseryman Don Hartmann. Our facility is now nine years old and we remain in the increasing accession phase. I would estimate that our collections are increasing at about 1000 per year. We are happy to be able to continue to broaden our temperate fruit and nut germplasm base.

NEW ACCESSIONS By Genus



Total New Accessions:

NEW ACCESSIONS 1988-1989

000
800
600
400
200



Plant Germplasm Distribution

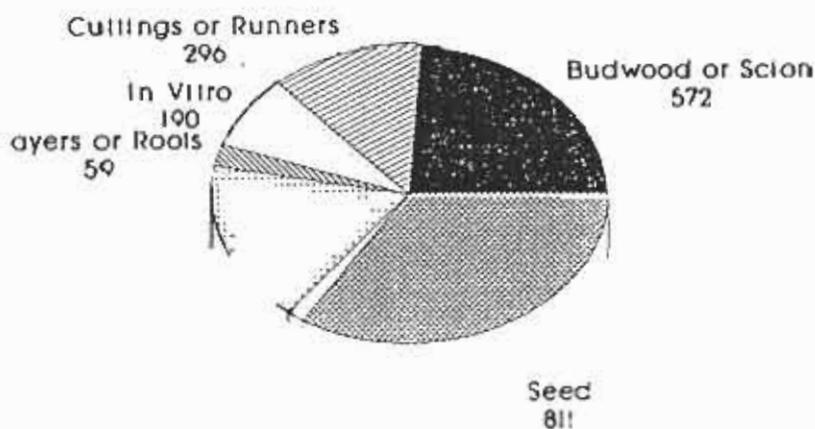
The total number of foreign countries receiving germplasm from our facility (25) did not increase from 1988, and the number of states receiving germplasm rose by only 2 (to 37) from last year's totals. The volume of requests has nearly doubled over last year. As of December 12, 1989, 357 orders had been received totaling 3651 items. Of these 2367 have been shipped to requesters, while 929 items remain in pending status. 310 items are unavailable.

Minor and other genera accounted for the majority (27%) of items shipped in 1989, followed by *Pyrus* (23%), *Rubus* (17%), *Fragaria* (14%), *Ribes* (8%), *Corylus* (4%), and *Vaccinium* and *Mentha* (3% each). The large amount of related genera shipped is due to the collection transfers of several genera to the National Arboretum and the RPIS at Ames, IA, for reassignment of priority sites.

Most items shipped as of 12/12/89 went to requesters in the US private sector, followed by US federal facilities, US state facilities, Foreign public facilities, Foreign private requesters, and finally International organizations.

Seed accounted for the largest percentage of propagule type distributed (34%). Next budwood and scionwood, rooted plants, cuttings and runners, then layers and roots. We also sent pollen and leaf samples to several requesters.

Distribution 1989 Material Shipped by Type



In vitro culture and Cryopreservation

The tissue culture lab is currently storing over 1000 accessions at 4°C and is actively adding to the cold storage collections. The addition of spring explants of *Mentha*, *Fragaria*, *Vaccinium*, *Ribes* and *Humulus* will greatly increase the cold storage collection by the end of the summer. The addition of 80 *Fragaria* accessions from Beltsville has also increased the number of cold stored plants in that genus and additional collecting from greenhouse collections this spring should increase our holdings to include nearly all of the collection. All of the cultivars of *Humulus* have been initiated into culture and will be added to the cold storage collection in the near future. The in vitro *Ribes* collection is nearly complete but study of the growth media for recalcitrant accessions is continuing.

Large numbers of requests for in vitro material continue to arrive. We respond to orders with the accessions which we have available. Due to the large volume of requests we do not keep back orders for accessions not currently in vitro. Many of the most popular cultivars are also the more difficult or slow to culture but will be sent as they multiply.

Work on alternative storage temperatures and media is in progress. These procedures are especially needed for *Rubus* which is highly variable in response to cold storage. Those accessions which do not respond well to 4°C storage will be grown under a variety of conditions in order to determine a suitable slow growth method.

Cryopreservation efforts continue to focus on *Rubus*. Screening of accessions for their response to cryopreservation has shown fairly wide variability. Efforts will focus on decreasing the variability to produce a standard technique for storage in liquid nitrogen. Additional studies are also in progress to increase our understanding of the effects of cryopreservation on meristems. The histology of the recovery process is being studied by Dr. Patricia Buckley who is currently working in the lab. Recovering meristems will be examined to determine the source and quality of new growth.

Germplasm Enhancement

Strawberry selection ORUS 4930 was released as 'Redcrest'. This cultivar is easily capped and has excellent freezing qualities. Strawberry selection ORUS 4688 is in grower trial for potential release in 1991.

Tissue cultured plants of the thorny 'Kotata' were irradiated with Co₆₀ and failed to show any thornless mutant types although a few small thornless areas, probably of a periclinal chimera nature, were noted on a few canes.

Root pieces of the raspberry 'Willamette' were treated with colchicine in an effort to produce a 4X clone of this cv for use in breeding. Several selections from red raspberry seedlings populations exhibiting polyploid phenotypes have been saved for evaluations.

GRIN and Our Local Computer System

We have installed a Novell ELS System II Local Area Network. This network supports seven users located throughout the facility, with a DA Turbo/386 computer with a 150 Mg hard drive as the file server.

We have started using the data base management software FoxPro (LAN version),

which emulates Ashton Tate's dBASE . This upgrades us from dBASE III+. We have been very pleased with our network and FoxPro so far. Greenhouse, screenhouse, field, and in vitro inventories are readily available to all staff members. Plant order or request information, historical accession records, and observation data are also available electronically. We have several word processors, so preparing our newsletter and our catalog of available accessions is convenient.

Data uploading to GRIN continues on a quarterly basis. Adjustments are being made to accommodate recent GRIN accession record changes, particularly concerning the revised origin (particularly GEOCTY) definitions and source-history narratives. This work should be finished by late summer. This year all *Rubus* and Minor Genera accession data was updated and reloaded to GRIN. New accession records were loaded for *Humulus*. Pending Dr. H. Chamber's final word on the taxonomic status of our *Mentha* accessions, this data will be loaded to GRIN as well. We are collecting more observation information this growing season on pears, hazelnuts and small fruits. The data will be loaded to GRIN after workfiles are prepared. We are considering using the contracted data entry that Jimmie Mowder has available for a voluminous backlog of pear observation information so that this may also be loaded to GRIN.

Visitors at NCGR-Corvallis in 1989

We had about 300 visitors to the NCGR in 1989. We hosted the International Rubus/Ribes symposium (about 75 scientists) in the summer and the Cranberry Research and Extension Workers Conference (about 50) in the fall. Our visitors included Dr. Gu Ying from the Nanging Botanical Gardens in China, Dr. Nao Naruhashi, Rubus Breeder from Japan, Drs. Vitkovskij, Burmistrov, and Chvtov from the N.I. Vavilov Institute in Leningrad. University laboratory classes continue to visit. We have a class of 20 students every 2 months.

Research Projects underway at the Repository

1. Techniques to improve in vitro culture and storage of assigned genera.
2. Techniques to improve cryopreservation of meristems of assigned genera.
3. In vitro thermotherapy of *Fragaria*, *Rubus*, *Pyrus*, and *Ribes*.
4. Cold hardiness testing of *Corylus*, *Ribes*, and *Rubus*.
5. Seed germination rules for assigned genera.
6. Cryopreservation of *Corylus* and *Pyrus* pollen (in cooperation with NSSL).
7. Improved clonal propagation of *Ribes* and *Vaccinium* cuttings.
8. Tests for genetic stability of in vitro cultured and stored *Fragaria*.
9. Chromosome counts of *Mentha* for taxonomic verification and species distinction.
10. Viroid testing of domestic pears of Asian origin (with Dr. Hadidi, USDA/ARS).
11. Phenology of flowering and fruiting of *Pyrus*, *Ribes*, *Vaccinium*.
12. Pseudomonas susceptibility of pears.
13. Importation regulations and quarantine requirements for assigned genera.
14. Graft compatibility of *Pyrus* with other Pomoidea genera.

Posters and Oral Presentations

Hummer, Kim. Germplasm importation of small fruits/regulations and procedures 1989. 40th Annual Western Small Fruits Pest Conference, Welches, OR. January 11.

Hummer, Kim. *Rubus* germplasm at the National Clonal Germplasm Repository. 5th International *Rubus* and *Ribes* symposium, Corvallis, OR, 30 June 1989.

Hummer, Kim. Bloom sequence of *Pyrus* germplasm in Corvallis, OR. Annual meeting of the ASHS, Tulsa, OK. July-August 1989.

Postman, Joseph. Pear germplasm at the National Clonal Germplasm Repository. Home Orchard Society, Portland, OR, October 1989.

Postman, Joseph. Detection of viruses by ELISA following sample storage. 40th Annual Western Small Fruits Pest Conference, Welches, OR January 1989.

Reed, B.M. Effect of cold hardening and cooling rate on the survival of apical meristems of *Vaccinium* frozen in liquid nitrogen. ASPP. Toronto, July 1989.

Publications

Reed, B.M 1989. The effect of cold hardening and cooling rate on the survival of apical meristems of *Vaccinium* species in liquid nitrogen. *CryoLetters* 10:315-322.

Postman, Joseph. 1989. Incidence of viruses in the U.S. National Clonal Germplasm Repository *Ribes* and *Rubus* collections. *Acta Horticulturae* No. 262 November 1989 pp 217-222.

Hummer, Kim. 1989. *Rubus* germplasm at the National Clonal Germplasm Repository. *Acta Horticulturae* November No. 262 1989. pp 25 - 28.

Hummer, Kim. 1989. Fruit Germplasm Preservation. *HortScience* 24(2):190.

Virus Elimination Efforts - 1989

J. Postman

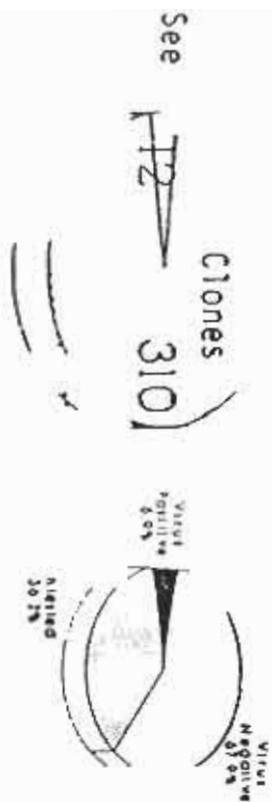
Genus	Plants Heat Treated	Meristems Made	'89 Meristems Established In Greenhouse	Added To Collection 1989 ^a	To Date
<i>Corylus</i>	19	44 ^b	25 ^b	11	11
<i>Fragaria</i>	9 (all in vitro)	48	15	30	43
<i>Pyrus</i>	113	473	126	25	344
<i>Ribes</i>	22	18	12	0	3
<i>Rubus</i>	24 (6 in vitro)	124		12	24

a These plants were not from 1989 meristems. These plants were produced in previous years, and most have been extensively indexed before being added to the collection.

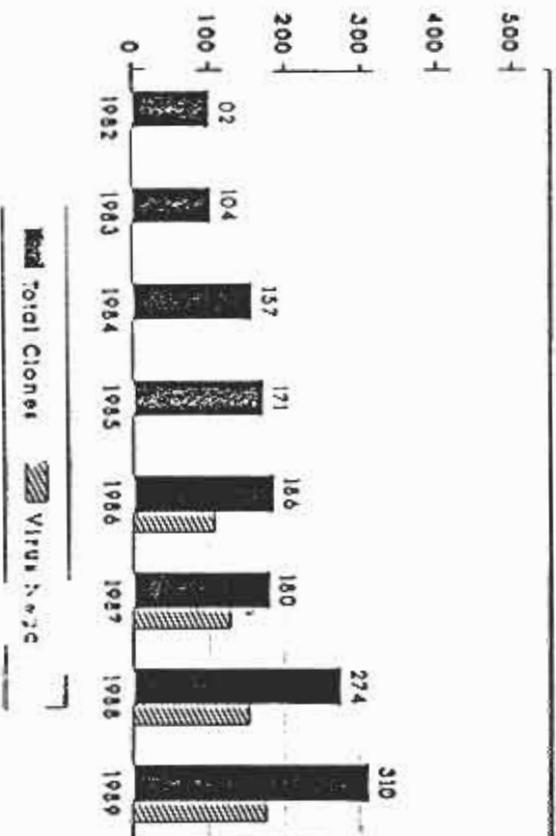
b Plus about 50 additional shoot tips that were "micro-grafted" in the greenhouse. None of the meristems survived. All plants established in the greenhouse were from micro-grafts.

Corylus - 1989

Summary of Accession Totals and Virus Status

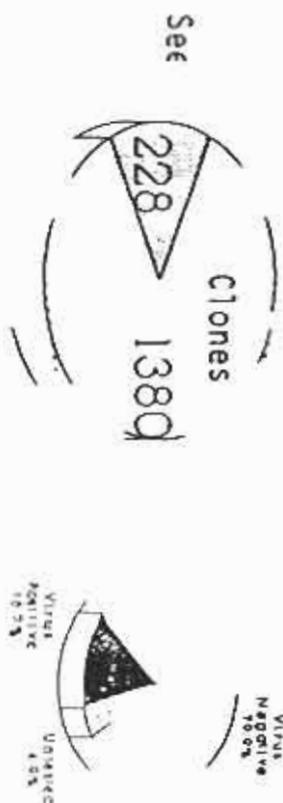


Corylus - Number of Clonal Accessions
and Virus Status - 1982 to 1989

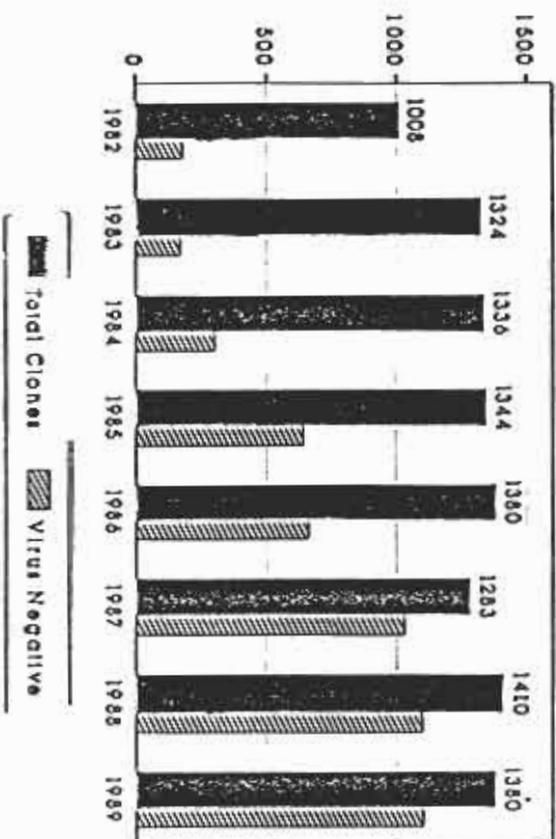


Pyrus - 1989

Summary of Accession Totals and Virus Status



Pyrus - Number of Clonal Accessions
and Virus Status - 1982 to 1989



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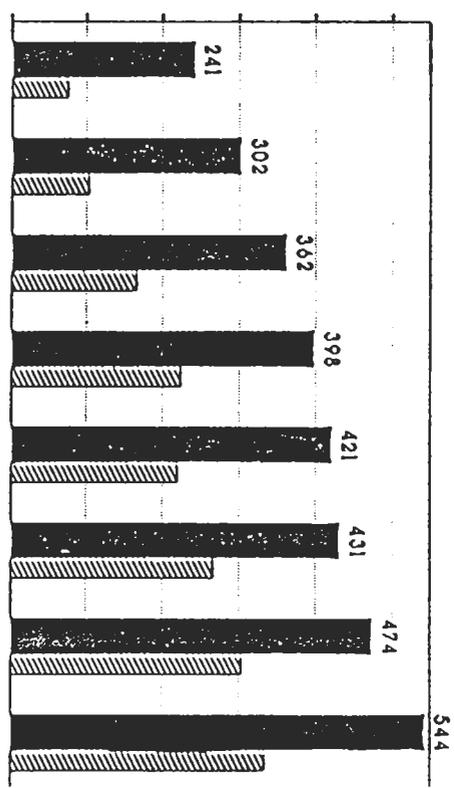
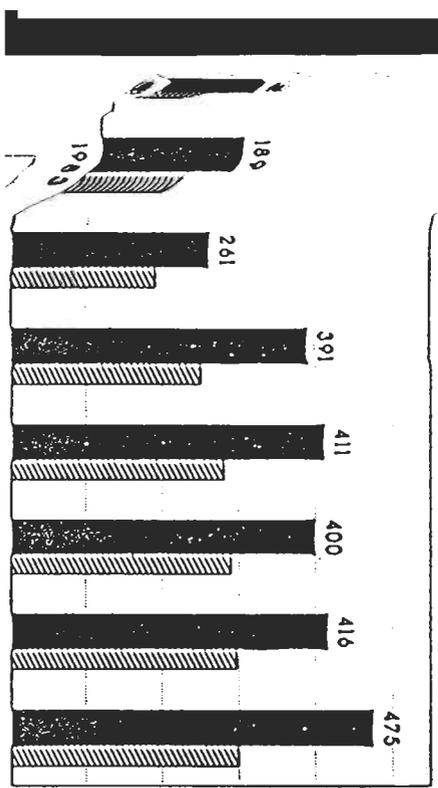
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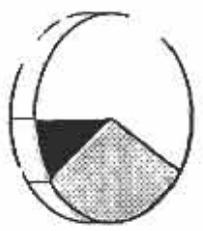
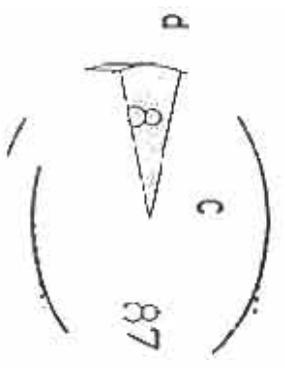
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Ruhus
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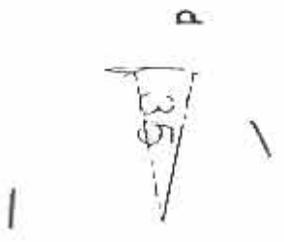
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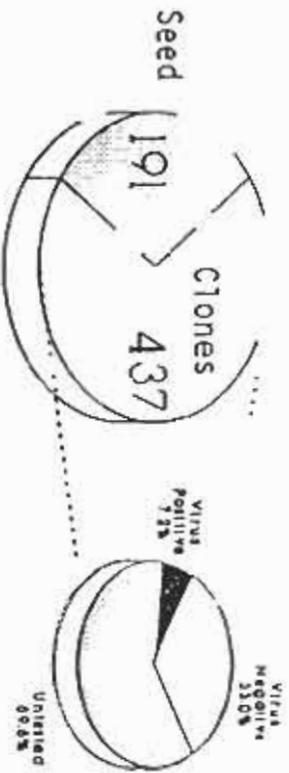


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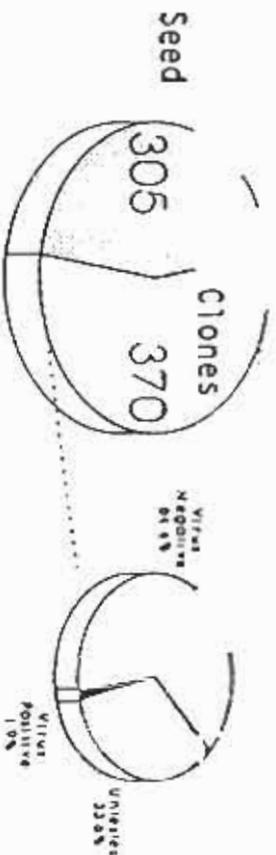


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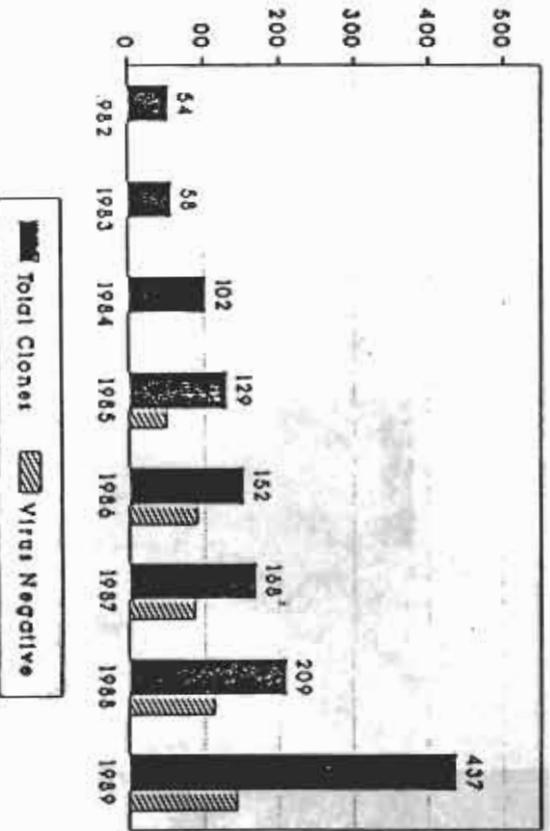
Ribes - 1989
 Summary of Accession Totals
 and Virus Status



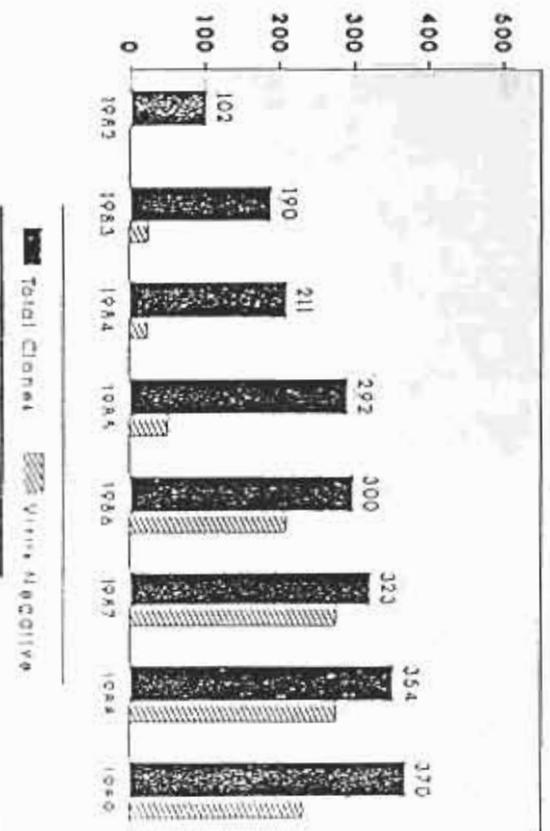
Vaccinium - 1989
 Summary of Accession Totals
 and Virus Status



Ribes - Number of Clonal Accessions
 and Virus Status - 1982 to 1989



Vaccinium - Number of Clonal Accessions
 and Virus Status - 1982 to 1989



NCGR-CORVALLIS COLLECTIONS

CODE	GENUS	SEED	CLONE	AVAILABLE TOTAL	DUAR	PATN	PROP	DUPL	ID? IDX	DEAD	REOR	RECO	LOW	SENT	TOTAL ACCESSIONS
** MAJOR															
COR	Corylus	1	155	156	111	0	41	28	3	36	42	0	4	1	422
FRA	Frasaria	53	416	469	0	13	29	49	16		14	2	11	0	611
HUM	Humulus	1	87	88	0	0	0	12	0	0	16	0	7	457	580
MEN	Mentha	34	366	400	0	0	12	32	102	5	3	0	0	0	578
PYR	Pyrus	80	1250	1330	4	2	152	519	75	4	16	0	144	1	2310
RIB	Ribes	124	195	319	208	0	18	21	8		29	6	47	0	660
RUB	Rubus	406	429	835	19	3	65	90	29	10	30	8	67	1	1166
VAC	Vaccinium	231	300	531	7	0	49	3	6	0	41	20	13	0	700
** Subtotal **															
		930	3198	4128	349	18	366	754	239	57	191	36	293	460	7027
** MINOR															
AME	Amelanchier	14	2	16	0	0	5	0	0	0	12	3	15	0	54
ARB	Arbutus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CYD	Cydonia		9	10	4	0	5	3	0	0	15	0	1	0	39
ERI	Eriobotrya	0	2	2	0	0		0	0	0	0	0	2	0	5
GAU	Gaultheria	11	0	11	0	0	2	0	0	0			1	0	15
GAY	Gaylussacia		0	1	0	0	0	0	0	0			0	1	3
MES	Mespilus	0	6	6	6	0	4	0	0	0	3	0	0	0	19
PER	Peraphyllum	2	2	4	0	0	0	0	0	0	1	0	2	0	7
PYC	Pycnanthemum	0	31	31	0	0	0	0	0	16	0	0	0	0	47
SAM	Sambucus	26	10	36	0	0	2	0		0		0	8	0	48
SR	Sorbus	17	6	23	15	0	32	2	0	0	11	0	29	0	112
. Subtotal **															
		72	68	140		0	51	5		16	44	4	59	0	349
** IGHYR															
FYN	X Pyronia	0	5	5	0	0	0	0	0	0	0	0	0	0	5
SDA	X Sorbaronia	0	0	0	0	0	2	0	0	1	0	0	0	0	3
SOB	X Sorbopyrus	0	4	4	0	0	0	0	0	0	0	0	0	0	4
IGX	Amelanchier hybr	0	0	0	0	0	7	0	0	0	0	0	0	0	3
** Subtotal **															
		0	9	9		0	5		0		0	0	0	0	15

SUMMARY OF SPECIES COMPLETENESS 1989*
Relative to GRIN approved species listings

GENUS	NCGR	GRIN SPECIE	% COMPLETE
		24	91%
		27	74%
Mentha	34	29	117%
		43	91%
		120	52%
		249	57%
		102	
Humu		2	

RECORDS LOADED TO GRIN

ND-OF-YEAR GRIN/NCGR-CORVALLIS STATUS REPORT 1989

RECORD TYPE	GENUS	DATE	COMMENTS
COOPERATORS		1/ 9/89	33 New records
		4/12/89	80 New records
		7/ 6/89	18 New records
		9/15/89	54 New records
		12/ 6/89	30 New records
ACCESSION	All Major	3/23/89	New and Updated records
		5/31/89	New and Updated records
		9/ 8/89	New and Updated records
		12/ 5/89	New and Updated records
	Pyrus	7/27/89	All records updated
Vaccinium	9/13/89	All records updated	
INVENTORY	All Major	3/24/89	New and Updated records
		6/ 1/89	New and Updated records
		9/17/89	New and Updated records
		12/ 1/89	New and Updated records
ORDERS		1/ 9/89	All DONE 1988 records
		4/12/89	All DONE 1988 and 1989 records
		7/ 6/89	All DONE 1988 and 1989 records
		8/30/89	All DONE 1988 and 1989 records
		9/15/89	All DONE 1989 records
		10/20/89	All DONE 1989 records
		12/ 6/89	All DONE 1989 records
OBSERVATIONS	Pyrus	8/ 8/89	Approx 26,000 records (86-89)
	Fragaria	8/15/89	Approx 2,000 records (89)
	Ribes	8/15/89	Approx 1,500 records (89)
SECONDARY ID	Pyrus	7/31/89	55 New records
	Vaccinium	10/16/89	Approx 400 new records
PREVIOUS NAME	Pyrus	/89	550 taxonomic changes