Minutes of Root and Bulb Vegetable Crop Germplasm Committee Meeting
Tuesday, 22 July 2008, 10:00 AM-12:00 PM
Salon 2, Rosen Plaza Hotel
Orlando, Florida

Chair: Dr. Christopher Cramer

Attendees	AFFILIATION	EMAIL ADDRESS
Mark Bohning	USDA-ARS	mark.bohning@ars.usda.gov
Peter Bretting	USDA-ARS	peter.bretting@ars.usda.gov
Chris Cramer	New Mexico State Univ.	cscramer@nmsu.edu
Barbara Hellier	USDA-ARS; W6	barbara.hellier@ars.usda.gov
Maria Jenderek	USDA-ARS; NCGRP	maria.jenderek@ars.usda.gov
Edmundo Mercado-Silva	Univ. Autonoma de Queretaro	Mercado@uaq.mx or mercasilva@yahoo.com.mx
Kathy Reitsma	Iowa State Univ.; NCRPIS	kreitsma@iastate.edu or kathleen.reitsma@ars.usda.gov
Larry D. Robertson	USDA-ARS; PGRU	larry.robertson@ars.usda.gov
Gayle Volk	USDA-ARS; NCGRP	Gayle.Volk@ars.usda.gov

These minutes are respectfully submitted by K. Reitsma

AGENDA

1. Current membership list
2. Sub committee reports (Cramer, Simon)
3. Update of RBV germplasm at Geneva, NY (Larry Robertson)
4. Update of RBV germplasm at Ames, IA (Kathy Reitsma)
5. Update of RBV germplasm at Pullman, WA (Barbara Hellier)
6. Status of garlic descriptor list (Hellier)
7. Status of garlic virus evaluation (Hellier)
8. Progress of cryopreservation of garlic accessions at NCGRP (Jenderek)
9. 2008 National Germplasm Resources Laboratory Report (Mark Bohning)
10. 2008 National Program Staff Report (Peter Bretting)
11. Tunisia collection trip (Simon)
12. Status of short-day onion accession regenerations and long term project funding (Cramer)
13. Status of 2007 germplasm evaluation proposal (Cramer)
14. Status of phenotypic and molecular marker evaluation of new garlic accessions (Simon/Hellier)
15. Upcoming RBV conferences and activities

1. Current Membership
Chris asked if anyone knew of potential new CGC members? We are seeking a balance of government, university, and industry members. The RBV- CGC is experiencing a decrease in non-governmental members. No one is in line to take over *Allium* breeding at Texas A&M with Leonard Pike's retirement, and the same is true with Bill Randle at University of Georgia. Irwin Goldman's administrative position at University of Wisconsin does not allow him time for breeding, and suspect Jack Staub's replacement will not be involved in breeding. Ellen Peffley was removed from the list, and Bill Randle will be removed if Chris does not get a response from him by next year. Augustin Agraz, ConAgra, (California) was suggested as a possible new member.

Chris proposed that the CGC meet with ASHS every other year after the *Allium* and *Daucus* subcommittees meet with their respective commodity groups. We hope to get more industry participation by having these subcommittees meet at their crop specific conferences because many of these people do not attend ASHS.

2. Subcommittee Reports
Allium and *Daucus* commodity meetings have not yet occurred, therefore no subcommittee reports are available.

3. Update of RBV germplasm at Geneva, NY (Larry Robertson) – Appendix 1
Larry mentioned that the *Allium* collection is now at 65% available (up from 40% availability last year). Regeneration activities are down this year due to budget constraints and crop priority issues.

4. Update of RBV germplasm at Ames, IA (Kathy Reitsma) – Appendix 2

5. Update of RBV germplasm at Pullman, WA (Barbara Hellier) – Appendix 3

6. Status of garlic descriptor list (Hellier)
The following three sets of descriptors for *Allium* on now on GRIN:

ALLIUM-GARLIC – for *A. sativum* and *A. longicuspis*
ALLIUM – for onions (for bulb and bunching onions – *A. cepa* and *A. fistulosum*)
ALLIUM - WILD - for all other species of *Allium*

7. Status of garlic virus evaluation (Hellier)
(Please see Item 5, Update of RBV germplasm at Pullman, WA.) Publication of the results of this evaluation in Plant Health Progress is pending. The evaluation showed there varying levels of infection from clean to heavy infection. *Fusarium* was also found in earlier studies. Please note, this is not newly infected germplasm, but infected germplasm received by Pullman. Protocols to clean up the collection still need to be developed, and there is currently no funding for the work.

8. Progress of cryopreservation of accessions at NCGRP (Jenderek)
There are currently 245 accessions of *Allium sativum* and *A. longicuspis* with 52 unique accessions backed up at NCGRP in cryopreservation. NCGRP attempts to cryo-preserve 20

accessions of garlic annually. Last year 18 accessions were successfully cryo-preserved (two have fungal infection and therefore are not considered as "successfully" preserved). Priority for cryo-preservation is to focus on virus free material first. It is believed it is also important to back up virus-infected material - though yield is affected, one still gets production and can replace the infected germplasm with virus free material later.

9. 2008 National Germplasm Resources Laboratory Report (Mark Bohning) – Appendix 4

Mark highlighted a few items from his report. There were 15 applicants for the position once held by Allan Stoner, and they hope to be able to fill this position soon. John Wiersema, who is responsible for GRIN taxonomy, is now housed with NGRL. Work has begun on developing a new version of GRIN called GRIN-Global. This is a cooperative effort with Global Crop Diversity Trust, USDA-ARS, and Bioversity to develop a freely available, open-source software, scale-able database (can run on PC or larger network) for any country to use. DBMU and the North Central Regional Plant Introduction Station (Ames) are cooperating on the development with input from NPGS sites with curators, IT specialists, Maize GDB, and stakeholders. The timeframe for site software completion is 2009 and 2010 for completion of the public side of GRIN-Global. An electronic bulletin board has been established for suggestions from NPGS curators and stakeholders to aid in the development of GRIN-Global. You can find more information at the following URLs. (There are videos available at the Wiki URL.)

http://cool.ars-grin.gov/gringlobal/forums/

http://cool.ars-grin.gov/gringlobal/wiki/index.php/Main_Page

10. 2008 National Program Staff Report (Peter Bretting) – See Appendix 5

11. Tunisia Collection Trip (Simon)

Phil Simon was not able to attend this meeting due to preparations for a second collecting trip to Tunisia in August 2008. He submitted the following report to Chris Cramer.

Tunisia *Daucus* germplasm evaluation by Phil Simon – 2008

(Progress to July)

Plant Materials: 32 *Daucus* seed samples collected in Tunisia, May, 2007 (2 cultivated carrot).

Phenotypic Evaluation

Evaluation is underway in the greenhouse for all entries, and carrots are being grown at the University of Wisconsin Hancock Experiment Station and University of California Kearney Agricultural field Station. No alternaria leaf blight infection is attacking Wisconsin fields yet. Nematode resistance evaluation in California indicated no resistance to *Meloidogyne incognita* among 24 entries that germinated well. Followup evaluation is underway for remaining entries were germination is very slow.

Molecular marker evaluation

ITS sequence of species was as published previously. Variation among entries for microsatellite markers, carotenoid biosynthetic enzyme genes, and SCARs linked to the P_1, *Rs, Mj-1, Y,* and Y_2 genes, and the mitochondrial genome is underway.

Cytological evaluation

Evaluation of several accessions each of *D. sahariensis,* and *D. syrticus* was completed. *D. durieua* seed did not germinate yet. Evaluation included chromosome counts and FISH localization of the centromeres, 45s and 5s rRNA sites and was compared to 7 *Daucus* species and 8 other Apiaceae. Chromosome counts were 2n = 18, as was previously published. Interestingly, the centromere FISH marker that only works on *D. carota* and *D. capilliofolius* also hybridizes with all centromeres of *D. sahariensis,* and *D. syrticus,* in spite of the fact that their ITS sequence indicates they are relatively distantly related to carrot.

Interspecific crosses

Two to three accessions from each of *D. sahariensis,* and *D. syrticus,* were evaluated for crossability by making reciprocal attempted crosses of carrot onto *D. sahariensis* and *D. syrticus.* Small seed formed but germination has not yet been attempted.

12. Status of short-day onion accession regenerations and long term project funding (Cramer)

Even though funds are not currently available, Peter Bretting encouraged Larry Robertson and Chris Cramer to write up a new short-day onion regeneration SCA (Specific Cooperative Agreement) to have in place for when funds become available.

13. Status of 2007 Germplasm evaluation proposal (Cramer)

The field evaluation part of the proposal to look for redundancy has been completed for this year and will be repeated next year. Forty-four accessions were evaluated for redundancy, and bulbs of approximately 20 accessions were saved. Additional funding is needed to continue with the evaluation and regeneration. Ted Kisha is working on the molecular evaluation of relatedness of accessions. Some have been found to be related, others not.

New germplasm evaluation proposals need to be to Chris by November. Please see his email of 11 July 2008 “FW: FY 2009 RFP for Crop Germplasm Committees”.

RBV-CGC priorities? High priority should be given to short-day onion regenerations and collection. Need to add this to the CGC’s crop vulnerability statement. What are the priorities for *Allium* and *Daucus*? Chris said he will pose this question to the *Allium* group at the *Allium* meetings and have Phil pose the question to the attendees at the carrot meeting.

14. Status of phenotypic and molecular marker evaluation of new garlic accessions (Simon/Hellier)

Barbara reported that the molecular work has been completed, but that she is waiting for the results from Phil Simon. The phenotypic evaluation conducted in Pullman is also complete.

15. Upcoming RBV conferences and activities

2008 National *Allium* Research Conference; Savannah, GA; December 10-13, 2008.
http://www.caes.uga.edu/events/narc/

33rd International Carrot Conference; Garden Grove, CA; January 18-21, 2008
http://groups.ucanr.org/carrotconf2009/

Next Root and Bulb Vegetable CGC meeting to be announced. (Chris has spoken with Mark Bohning about the possibility of arranging a web-based CGC meeting for 2009.)

Allium Collection of the PGRU at Geneva, New York

July 2008

Orlando, Florida

Status of Collections

Currently there are 1304 accessions of *Allium* maintained at the Northeast Regional Plant Introduction Station at Geneva, New York (Table 1). The taxa of *Allium* in the U.S. National Plant Germplasm System (NPGS) maintained at Geneva are *Allium cepa*, *A. fistulosum,* and amphidiploids of hybrids of *A. cepa* and *A. fistulosum* with each other and several other species. The current backup status of the Geneva *Allium* collection at the National Center for Genetic Resources Preservation is also given in Table 1. In 2005/2006 Dr. Christopher Cramer of New Mexico State University acquired 85 accessions of short-day onion that were recently received at PGRU. These were tested for germination and 20 were identified that needed seed regeneration (see below).

Table 1. Taxa of *Allium* maintained at Geneva, New York

Taxa	G*	PI	Total	Number accessions backed up NCGRP
Allium cepa var. *cepa*	388	768	1156	519
Allium fistulosum	53	76	129	38
Allium total	448	856	1304	567

*Geneva local number, not yet PIed.

Regeneration Activities

Regenerations conducted the past three years are detailed in Table 2. The current SCA with Dr. Christopher Cramer at New Mexico State University (NSMU) was conducted for regeneration of short day onions with NMSU during 2006/2007 and has been extended for another season (2007/2008). The objective of this cooperative research project this past year was to regenerate 60 accessions of the short-day *Allium cepa* collection maintained at the Plant Genetic Resources Unit (PGRU) of Geneva. Eight accessions had bulbs transplanted for seed production and 52 accessions were sown for production of bulbs for seed production in 2009.

Forty-five accessions and germplasm lines were sent to the NMSU onion breeding program to be used in the SCA project titled “Determining redundancy in short-day, onion accessions in the current collection.” Bulbs were saved from 20 accessions and lines that had either low germination rates or a low amount of seed on hand for seed production.

Germplasm Distribution

Between May 1, 2007 and July 1, 2008 a total of 503 samples of 348 accessions were distributed in 31 domestic and 11 foreign orders (Table 3).

Table 2. Regenerations of *Allium*

Place/Year/Type	*Allium cepa* var. *cepa*	*Allium fistulosum*	*Allium* total
Geneva			
Seed 2006	55	7	62
Seed 2007	64	5	69
Seed 2008	62	8	70
Bulbs/Plants 2006	70	5	75
Bulbs/Plants 2007	85	11	96
Bulbs/Plants 2008	49	3	52
Cooperators/NPGS Sites			
Seed 2006	45	0	45
Seed 2007	42	0	42
Seed 2008	8	0	8
Bulbs 2006	30	0	30
Bulbs 2007	0	0	0
Bulbs 2008	52	0	52
Total Seed Production			
Seed 2006	100	7	107
Seed 2007	106	5	111
Seed 2008	70	8	78

Table 3. Distribution of the Geneva *Allium* collection 2007/2008

Type/Statistic	*Allium cepa* var. *cepa*	*Allium fistulosum*	*Allium* total
Domestic			
Orders	26	8	32
Accessions	176	24	204
Samples	191	32	229
Foreign			
Orders	5	3	6
Accessions	225	26	251
Samples	248	26	274
Total			
Orders	31	11	38
Accessions	303	41	348
Samples	439	58	503

North Central Regional Plant Introduction Station
Root and Bulb Vegetable CGC Report
Orlando, FL
July 22, 2008
Submitted by K. R. Reitsma

DAUCUS

Statistics for the NCRPIS collection are found in the table below. Collection availability is at 80% with 84% of the collection backed up at the National Center for Genetic Resources Preservation (NCGRP) in Ft. Collins, CO. Thirty-one new accessions of *Daucus* were received since the last CGC report in 2007. One accession was collected in Georgia by Ned Garvey, and 30 accessions were collected in Tunisia by Phil Simon (including two new species: *D. sahariensis* and *D. syrticus*).

Taxon	New Accessions	PI Numbers	Ames Numbers	Total Accessions	Available	Backed up at NCGRP
D. aureus	1	7	3	10	2	4
D. broteri		10	4	14	10	11
D. capillifolius		1		1	1	1
D. carota	7	691	58	749 (778[a])	688	724
D. carota subsp. c*arota*		45	10	55	45	45
D. carota subsp. *commutatus*		3	1	4	3	3
D. carota subsp. *drepanensis*		2		2		1
D. carota subsp. *fontinesii i*[b]			4	4		
D. carota subsp. *gummifer*		2		2	2	2
D. carota subsp. *hispanicus*		2		2		1
D. carota subsp. maritimus		1	16	17		
D. carota subsp. *maximus*		6	10	16	2	2
D. carota subsp. *sativus*		2		2	2	2
D. carota var. *boissieri*		2		2	1	2
D. carota var. *sativus*		92	7	99	82	82
D. crinitus		5	7	12	3	3
D. durieua			1	1		
D. glochidiatus		1		1		
D. guttatus		17	3	20	16	15
D. involucratus		3	1	4	3	2
D. littoralis		2		2	2	2
D. muricatus	8	1	13	14	1	2
D. pusillus		6		6	4	5
D. sahariensis	3		3	3		
D. syrticus	9		9	9		
D. unidentified species	3	1	45	46	36	36
Total	**31**	**902**	**195**	**1126**	**905**	**945**

[a] The total number of *Daucus carota* accessions is 778 when including 29 NSSL-numbered accessions sent to us by NCGRP in 2006 for regeneration due to low viability. Eleven of the 29 are currently available and will be assigned PI numbers.
[b] Nomenclature change: *D. carota* subsp. *fontinesii* formerly known as *D. carota* subsp. *hispidus*.

Regeneration:
Accessions regenerated at Ames in 2007 are awaiting viability test results before the seeds will be inventoried and stored for distribution. Forty *Daucus* accessions were planted in the Ames greenhouse in October 2007 for the 2008 regeneration cycle. Nine accessions failed to germinate, 12 were annuals, 15 were biennials, and 4 had mixed annual/biennial life cycles. Annual plants were pollinated by blue bottle flies and alfalfa leaf cutter bees in greenhouse isolation cages. Biennial plants of 19 accessions were

vernalized and transplanted to field cages in May 2008, and 25 annual accessions were started in the greenhouse and also transplanted to field cages in May. All field cages are being controlled pollinated using blue bottle flies, house flies, alfalfa leaf cutter bees, and/or honey bees. Approximately 30 accessions will be started in the GH this fall for regeneration in 2008.

We also received seed increases of 6 NSL-numbered accessions from Rob Maxwell (Seminis), and 1 PI-numbered and 5 NSL -numbered accessions from Roger Freeman (Nunhems). The NSL-numbered accessions will be assigned PI numbers and incorporated into the working collection at Ames. Sub-samples of these increases were sent to the NCGRP to replace their low-viability seed lots.

Distribution:
Since the last report in July 2007, we have fulfilled 32 *Daucus* requests, resulting in the distribution of 150 packets (135 accessions) for domestic orders and 68 packets (60 accessions) for foreign requests.

Special projects:

Selections planted in the 2007 *Daucus* observation plot focused on accessions with taxonomic issues where the species, subspecies, or variety was questioned. Review of accession taxonomy also occurs when an accession is regenerated. These taxonomic reviews resulted in the reidentification of 63 accessions since last year's CGC report and include 32 *Daucus* species changes, 29 *Daucus* subspecies/variety changes, and two accessions were determined to not be *Daucus* and therefore changed to unidentified-Apiaceae. These two unidentified accessions are now included in the Miscellaneous Umbels collection curated by David Brenner.

In January 2008, 298 Ames-numbered accessions were assigned permanent PI numbers in the series PI 652118 through PI 652415, which include many of the accessions collected by Phil Simon from Greece, Syria, and Turkey.

In the spring of 2008, 82 *Daucus* accessions were direct seeded as three reps each into a biennial observation field so that we could collect characterization data, herbarium specimens, and images on each accession. We had several heavy rain events immediately following planting. Some plots were washed out and most others had sporadic and poor germination. According to the National Weather Service, the first six months of 2008 has been the wettest on record for Iowa since record keeping started 136 years ago (the Ames area received 28.18 inches of precipitation through June, while the long-term average for the area is 16.51 inches). We have not collected any descriptor data or herbarium specimens, yet. We are hoping that we may be able to pool the plant populations in all three reps to be able to sufficiently represent each accession. We will attempt to collect digital leaf scans and data for eight descriptors on basal leaf samples for each accession. We will also collect root characterization data and data on the inflorescences if plants bolt and flower this year. These data and images will be loaded to GRIN. Our goal is to plant observation fields each year in order to collect data on all accessions in the collection.

PASTINACA

No new accessions of *Pastinaca* have been received, and no accessions are being regenerated in 2008. Of the 70 accessions in the collection, 51 are currently available for distribution and 47 accessions are backed up at the NCGRP. Nine packets (9 accessions) were distributed for four domestic orders in 2007. In January 2008, 46 Ames-numbered accessions were assigned permanent PI numbers in the series PI 652072 through PI 652117.

Status Report on the *Allium* Collection at the Western Regional Plant Introduction Station
Submitted to the Root and Bulb Crop Germplasm Committee
by Barbara Hellier (Curator) July 2008

There are currently 1025 accessions (465 PIs and 560 W6 numbers) in 106 species in the *Allium* collection at the Western Regional Plant Introduction Station in Pullman, WA. This collection contains both true seeded species and those maintained vegetatively. Of the 803 accessions of true seeded species, 407 are available for distribution. There are 222 vegetatively maintained accessions. These accessions are regenerated each year with availability determined after harvest and cleaning in September.

From July 1, 2007 to July 1, 2008, we received 8 new accessions, all from Dr Simon's collecting trip to Tunisia: 3 *A. sativum*, 4 *Allium sp*. and one *A. roseum* accessions. During the same time period, we distributed 85 seed packets of 62 accessions in 69 orders to 66 requestors. We also distributed 262 *A. sativum* and *A. longicuspis* packets, one to two bulbs each, to 38 requestors.

We are continuing to provide *A. sativum* material to the NCGRP for cryopreservation for a long term security back-up. Our short term back-up location for the garlic collection is the NPGS station in Parlier, CA.

We are working on analyzing the data from our study assessing the genetic diversity patterns of *A. acuminatum* in the Great Basin. To continue this work related to the Great Basin Native Plant Selection and Increase Project, we have applied for and received grant money to look at seed production parameters for *A. acuminatum*.

We still have questions regarding the taxonomic identification of some of our accessions of *A. cepa*- relatives. We are planning to use microsatellite and TRAP markers to help verify the species identity of these accessions.

The information gathered in evaluating the garlic collection for virus infection has been summarized and accepted for publication in Plant Health Progress : Pappu, H.R., B.C. Hellier, and F. Dugan. 2008. Evaluation of the National Plant Germplasm System's Garlic Collection for Seven Viruses.Plant Health Progress. In press. Accepted for publication June 26, 2008. Infection data for each evaluated accession will be downloaded into GRIN. The form of the data has not been decided on.

The garlic descriptor list has been up-dated in GRIN. There are now three sets of descriptors for *Allium* accessions: "Allium" for onions, "Allium-garlic" for *A. sativum* and *A. longicuspis*, and "Allium-wild" for all other species of *Allium*.

Dr. Jinguo Hu started as research leader for WRPIS in March 2008. He is a molecular geneticist with experience working on a wide range of crops.

Please contact me if you have comments or questions. Thank you.

Barbara Hellier 509-335-3763, bhellier@wsu.edu

National Germplasm Resources Laboratory
USDA-ARS
Beltsville, Maryland

Report to PGOC, RTACs and CGCs
2008

The National Germplasm Resources Laboratory (NGRL), Beltsville, MD, supports the acquisition, introduction, documentation, evaluation, and distribution of germplasm by the National Plant Germplasm System (NPGS) and other components of the U.S. National Genetic Resources Program (NGRP). The Laboratory is comprised of the Plant Exchange Office (PEO), the Germplasm Resources Information Network/Database Management Unit (GRIN/DBMU), and the Plant Disease Research Unit (PDRU), whose functions and procedures are provided below. The Laboratory also facilitates the activities of the Crop Germplasm Committees that advise components of the NPGS on a variety of matters.

The Plant Exchange Office

Plant Exploration and Exchange Program

The PEO supports the collection of germplasm for the NPGS through the management of a Plant Exploration and Exchange Grant Program. Plant explorations involve field collection of germplasm not available in any germplasm collections, while plant exchanges are expeditions to arrange exchange of germplasm already conserved in foreign genebanks. Annual guidelines for developing plant exploration and exchange proposals are prepared by the PEO and distributed to researchers.

An extensive review procedure is used to assess the relevance of the proposals to the NPGS needs and the likelihood that the proposed explorations or exchanges will accomplish their stated objectives. Before submission, proposals are reviewed by the appropriate CGC or other crop experts. After submission to the PEO, proposals are reviewed by a subcommittee of the NPGS Plant Germplasm Operations Committee (PGOC). The PEO then evaluates the proposals and the PGOC reviews and makes recommendations on funding to the ARS National Program Staff (NPS).

All foreign explorations supported by PEO comply with the provisions of the Convention on Biological Diversity on access and benefit sharing related to genetic resources. Prior informed consent to collect genetic resources is obtained from the appropriate host country authorities before the exploration takes place. The permission includes agreement on the benefits to the host country associated with access to genetic resources. The PEO is involved in most requests to foreign governments for permission for collecting and negotiates the terms of agreements when necessary. Foreign explorations are always conducted in cooperation with scientists from the host country and cooperation with the national genetic resources programs is strongly encouraged. Germplasm obtained on explorations is shared by the NPGS and the host country.

Facilitation of Germplasm Exchange

The PEO assists NPGS personnel and other scientists with acquiring germplasm from scientists, foreign national and international genebanks, domestic and foreign explorations, and special projects and agreements. The PEO also helps to expedite the distribution of germplasm from the NPGS to foreign scientists and other genebanks.

In FY 07, PEO assisted with the distribution of 707 shipments with a total of 57,008 NPGS accessions to scientists in 66 different countries. PEO also assisted with importing 69 shipments containing 841 items from 21 different countries.

Mary Ann Loftus, who was in charge of this activity, retired effective December 31, 2006. PEO is continuing to handle these activities with the assistance of Jason Lebo, a student working part-time for NGRL. The position is scheduled to be filled within early 2008.

GRIN Taxonomy for Plants

GRIN Taxonomy provides current and accurate scientific names and other taxonomic data on the internet for the ARS National Plant Germplasm System and other worldwide users. This standard set of plant names is essential for effective management of ARS plant germplasm collections, which now represent over 12,400 taxa. GRIN taxonomic data now include scientific names for 26,403 genera (14,097 accepted) and 1,105 infragenera and 86,878 species or infraspecies (52,729 accepted) with nearly 40,000 common names, geographical distributions for 45,000 taxa, 275,000 literature references, and 21,000 economic impacts. A broad range of economically important plants are treated by GRIN nomenclature, including food or spice, timber, fiber, drug, forage, soil-building or erosion-control, genetic resource, poisonous, weedy, and ornamental plants. Most or all species of important agricultural crop genera are represented. Information about the systematic relationships of species is provided, which is critical for optimally determining the disposition or use of individual germplasm samples. Included in GRIN Taxonomy are federal- and state-regulated noxious weeds and federally and internationally listed threatened and endangered plants, with links to information on noxious weed and conservation regulations to ensure unimpeded interstate and international exchange of plant genetic resources. The scientific names are verified, in accordance with the international rules of botanical nomenclature, by taxonomists of the National Germplasm Resources Laboratory using all available taxonomic literature and consultations with taxonomic specialists. Generally recognized taxonomic database standards have been adopted in GRIN Taxonomy.

The current focus of GRIN taxonomic work is to ensure that scientific plant names in GRIN continue to reflect recent plant taxonomic and nomenclatural literature, and that new data on classification, synonymy, native and naturalized distribution, economic impacts, and common names for plants and economic use categories currently treated in GRIN are incorporated. We also seek to expand the nomenclatural, classificatory, and ecogeographical information for specialty or new crop taxa, especially horticultural or

medicinal plants. The breadth of coverage and quality of GRIN taxonomic data has encouraged usage of GRIN-Taxonomy data among genetic resource managers and other agricultural workers worldwide, such that taxonomic data are the most requested item on public GRIN.

PI Documentation

Since 1898, Plant Introduction (PI) numbers have been used as unique identifiers for accessions incorporated into the NPGS. In earlier times, PI numbers were automatically assigned to all material received by the Plant Introduction Office, a predecessor of the PEO. Currently, before PI numbers are assigned, NPGS curators first evaluate the passport data, and grow and observe new accessions to verify uniqueness and rationale for preservation in the NPGS. For this reason, curators usually assign a local identifying number to an accession until a decision is made to assign a PI number. When a decision is reached to assign a PI number to an accession, the curators are now requested to contact Mark Bohning for assignment of the next sequential number(s).

International Collaboration to support conservation and exchange of plant genetic resources

PEO works with other US and international programs to support plant germplasm conservation and exchange worldwide.

During the past year, PEO continued to collaborate with the National Department of Genetic Resources and Biotechnology (DENAREF) of the National Institute of Agricultural Research (INIAP) in Ecuador, the Organization of Farmers and Indigenous Peoples of Cotacachi (UNORCAC), Bioversity International, and the USDA/FAS on a P.L. 480 – funded project to support complementary (*ex situ* and on-farm) conservation and increased utilization of agrobiodiversity in native farming communities in Cotacachi, Ecuador.

The PEO also collaborated with USDA/FAS and USDA/ARS/OIRP to develop joint germplasm collection, conservation and maintenance programs in Jordan, Morocco, Tunisia, Bangladesh, Sri Lanka, Uzbekistan, Pakistan, Kazakhstan, Guyana, Georgia and Azerbaijan using US Food for Peace and other programs.

Since 2002, PEO has been collaborating with the plant genetic resources programs of the eight Central Asia and the Caucasus countries: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, Georgia and Azerbaijan. This program is organized by ICARDA (International Center for Research in the Dry Areas) and the focus is on development of national plant inventories, staff training, and plant exploration.

FY 2007 NPGS Plant Explorations/Exchanges

Target Crop	Country	Principal Contacts
Ash	China	K. Wang
Cotton	Paraguay	J.M. Stewart, S. Bertoni
Fruits and nuts	Azerbaijan	M. Aradhya, D. Parfitt, Z. Ibrahimov
Garlic, onion, and carrot	Tunisia	P. Simon, M. Neffati, B. Bouzbida
Grape (exchange)	United States	B. Prins
Grasses	Russia	D. Johnson, V. Chapurin, S. Shuvalov
Legumes	Georgia	A. Gulbani, M. Mosulishvili
Medicinal plants	Georgia	J. McCoy, B. Hellier, M. Mosulishvili, A. Gulbani
Peanut	Paraguay	C. Simpson, K. Williams, P.J. Caballero, E. Robledo
Small fruits	United States (many states)	K. Hummer, C. Finn, M. Dossett
Soybean	Vietnam	Nguyen T. C., Tran T.T.
Sunflower	Australia	T. Gulya, G. Seiler, G. Kong
Sunflower	United States (AZ, NM, OK, TX)	L. Marek, G. Seiler
Walnut	Dominican Republic	D. Stone, P. Manos
Potato	United States (TX, NM)	J. Bamberg, A del Rio

The Germplasm Resources Information Network (GRIN)

The mission of the GRIN Database Management Unit (DBMU) is to develop and maintain information systems for the National Genetics Resources Program comprised of plants, animals, microbes, and invertebrates. We have completed the development of a new interface for the plant database and will continue to enhance that system when specific needs arise. The first version of the National Animal Germplasm Program system has been completed and is currently being used in a production mode. Recent statistics for data in the plant database include:

Over 80,000 taxonomic names (including synonyms)
504,807 accessions representing 12,496 species and 2,022 genera
1,685,391 inventory records
1,406,915 germination records
6,630,869 characteristic/evaluation records
Over 140,000 images

Germplasm accessions acquired by the National Plant Germplasm System (NPGS) since the effective date of the Convention on Biological Diversity continue to be flagged in the database with appropriate disclaimers and MTAs. The new SMTA issued under the International Treaty will also be flagged and tracked through the system. These agreements are displayed with accession passport data and automatically printed on

GRIN generated packing slips when accessions are distributed. During the past year, the DBMU continued to provide support to NPGS site personnel and assisted NPGS sites in loading passport data, evaluation data, distribution information and images into the database

GRIN was demonstrated at several Crop Germplasm Committees and commodity meetings, as well as to scientists visiting NGRL throughout the year. The Directory of NPGS Personnel and Crop Germplasm Committees continues to be maintained on the GRIN Web page in a PDF format.

GRIN has now been enhanced to handle molecular data. New tables have been added to the database to store this data and software has been developed to display it. SSR data on pears and apples generated by Ft. Collins has also been loaded into production.

A new project has been started to develop a new version of GRIN which is named GRIN-Global. The project is a cooperative effort between the Global Crop Diversity Trust, USDA-ARS and Bioversity. The system will be freely available for any country to use. It will replace the current GRIN system with all new site maintenance and public retrieval software. A technical steering group has also been identified to guide the project and its first meeting will be in August 2008.

GRIN has also joined the Global Biodiversity Information Facility (GBIF) which allows many databases around the world to be queried at the same time on basic data such as taxonomy. The DBMU continues to work with the international community to make the GRIN data available through a plant germplasm specific portal which will allow users to search on more specific fields with respect to plant genetic resources including characteristic/evaluation descriptors.

The GRIN system was available 98% of the time on a 24 hour a day and 7 day a week schedule. Access to the database through the web pages continues at a brisk pace. Over the last year, there were 226,546 unique host computers that accessed the GRIN database. We always encourage users to send any comments on the public interface by email to dbmu@ars-grin.gov .

Security for the computer and databases are always being reviewed and monitored for intrusion by those who may attempt to corrupt web pages or to destroy data. The system is protected by a firewall and all data are backed up at onsite and offsite locations. We keep backups at several local offsite locations and one at Ft. Collins, CO, for long term storage. The computer system has an Uninterruptible Power Supply for short term power outages and a diesel generator for long term power outages. The building is now locked with access permitted by either a building security person or a card key. The computers are in a locked room that is monitored for temperature on a 24 hour, 7 days a week schedule.

Crop Germplasm Committees

Since June 1, 2007, over twenty-five of the 40 Crop Germplasm Committees (CGC) have met. An NGRL representative was present at most of the meetings to help facilitate their activities. Summaries of each meeting are prepared and distributed to appropriate National Program Leaders, NGRL staff and other NPGS personnel. The committees continue to provide advice on all aspects of the NPGS including identifying gaps and duplications in the collections, germplasm maintenance and evaluation, quarantine issues and maintaining updated versions of the crop vulnerability reports. The 12th biennial meeting of the CGC Chairs was held in Fort Collins, CO June 2-3, 2008, in conjunction with the Plant Germplasm Operations Committee. This meeting provided an opportunity for the Chairs to hear presentations on the status of NPGS sites, plant germplasm exchange, international issues, preservation and utilization, the molecular characterization of accessions, interactions between curators and CGCs and plant quarantine issues. It also allows the Chairs to meet and interact with each other, NPGS managers and curators, and invited guests from ARS, other government agencies, and non-government organizations.

Plant Disease Research Unit

Effective October 1, 2005, the responsibilities for the quarantine indexing and distribution of prohibited genera germplasm that were performed by the USDA-ARS, Plant Germplasm Quarantine Office (PGQO) in Beltsville MD were transferred to the USDA Animal and Plant Health Inspection Service-Plant Health Programs (APHIS-PHP). Three scientists from PGQO and their support staff have established the Plant Disease Research Unit within NGRL (NGRL-PDRU). The mission of NGRL-PDRU is to investigate pathogens and diseases of quarantine significance that occur in clonal plant germplasm that must enter the US through federal quarantine programs. The objectives are focused on determining the causal agents responsible for diseases that prevent germplasm from entering the country, and developing tools to effectively detect and eliminate them. These research efforts provide support to the APHIS quarantine program and help facilitate the safe introduction and international exchange of valuable plant germplasm.

NGRL-PDRU is glad to discuss potential collaborations with pathologists and stakeholders who have interest in clonally propagated, prohibited genera crops that are handled by the USDA quarantine program.

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2008 OFFICE OF NATIONAL PROGRAMS REPORT

FOR THE U. S. NATIONAL PLANT GERMPLASM SYSTEM
OFFICE OF NATIONAL PROGRAMS, NATIONAL PROGRAM 301: PLANT GENETIC RESOURCES, GENOMICS, AND GENETIC IMPROVEMENT

(PETER BRETTING, EVERT BYINGTON, ERIC ROSENQUIST, SALLY SCHNEIDER, ROY SCOTT, KAY SIMMONS, GAIL WISLER, DA JUDY ST. JOHN)

1 Personnel changes:

1.1 Farewell and best wishes to Graves Gillaspie (Griffin), Jim Mowder (DBMU, Beltsville), Dwayne Buxton (Area Director, PWA), Phyllis Johnson (Area Director, BA) and Wilda Martinez (Area Director, NAA) on their retirements.

1.2 Welcome to Roy Scott, new NPL for Oilseeds and Bioscience. Congratulations to Phil Forsline on becoming Research Leader, NERPIS, Geneva; Jinguo Hu on becoming Research Leader, WRPIS, Pullman; Richard Percy on becoming Research Leader, Crop Germplasm Research Unit, College Station; Chuck Simon on assuming responsibilities as Grape Curator, Geneva; and to Harold Bockelman (Aberdeen), John Erpelding (Mayagüez), Kim Hummer (Corvallis), and Ed Stover (Davis; but see below) on their promotions.

1.3 John Wiersema moved across BARC from the Systematic Botany and Mycology Laboratory to the National Germplasm Resources Laboratory; his duties remain the same. Ed Stover moved from Davis to assume the RL position at the Horticulture and Breeding Research Unit in the U. S. Horticultural Research Laboratory at Ft. Pierce, FL. Allan Brown is acting in the curator's position at Parlier. NGRL and NCGRP Research Leader positions are being recruited.

2 Site developments and changes:

2.1 The NCGRP coordinated the shipment of about 10,000 accessions of NPGS germplasm to the Svalbard Seed Vault, a long-term storage facility in the Arctic operated by the Norwegian government and the Global Crop Diversity Trust.

2.2 Corvallis and other sites distributed record amounts of germplasm in 2007.

2.3 Staff at Griffin (sorghum) and Corvallis (strawberry) participated in developing Global Conservation Strategies, sponsored by the Global Crop Diversity Trust (GCDT).

2.4 The USDA/ARS-NPGS is partnering with Bioversity and the GCDT on a three-year, $1.4 million project to transform GRIN into GRIN-Global, a powerful but easy-to-use, Internet-based, plant genetic information management system that will link world's plant genebanks. The nucleus of the system will be ARS's existing GRIN, which already houses information about the 500,000 accessions of more than 10,000 plant species in the NPGS. Software upgrades will enable GRIN be used by genebanks of all sizes from many countries, making more information about more plants available to researchers.

2.5 Staff at Stuttgart characterized the USDA rice core subset (1794 accessions from 114 nations) with 75 SSR markers covering the entire genome about every 30 cM. Along with 26 phenotypic traits evaluated previously, the molecular data will be used for association mapping analyses and for assessing genetic diversity in the entire NGPS rice collection of 20,000 accessions.

3 Budgets:

3.1 For FY07, the NPGS operated under a continuing resolution, at essentially the FY06 budget level. For FY08, no new or expanded research projects were funded, and an across-the-board reduction of 0.7 percent was levied on all USDA programs and activities. Furthermore, no additional funds were appropriated for increased pay costs during FY08. Consequently, the budgets of some NPGS sites are strained at present. Continual increases in labor and operating costs may further reduce their effective operating budgets in the future.

3.2 The Administration's USDA/ARS FY09 budget proposes a total of $146 million in reductions (7.5%) and redirections (5.5%), comprising 13% of the total ARS budget. This is a result of the Federal government focusing on national priorities such as national deficit reduction, the national economy, international conflicts, homeland security, and domestic entitlement/mandatory spending programs. Importantly, many of the budget increases for NPGS sites that in the past were considered Congressional "add-ons" have now been categorized as part of USDA/ARS's "base budget." This change may generate positive developments in the future.

3.3 If approved by Congress, the effect on ARS of the proposed cuts and redirections would be dramatic. Notably, the Administration's FY09 budget proposes an increase of $3.25 million for "Agricultural Genomics, Germplasm, and Collections", but such an increase would result from redirection of existing funds from current research projects. Congress will "mark-up" the Administration's FY09 budget during the summer of 2008.

3.4 The Research Title of the 2008 Farm Bill contains provisions that have substantially re-organized USDA's total research effort. Some of the important details remain to be clarified and refined, but it appears that CSREES will be transformed into a new National Institute for Food and Agriculture, and a new office for coordinating all of USDA's total research effort will be established.

4 National Programs:

ARS's research portfolio is organized as a series of 22 national programs. Plant and microbial genetic resource management, genetic improvement, genomics, bioinformatics, and genomic database management are incorporated into National Program 301 (see the WWW at: http://www.nps.ars.usda.gov/programs/programs.htm?NPNUMBER=301).

4.1 The retrospective programmatic assessment for NP301's first five-year cycle (2000-2005) occurred in September, 2005. Scientists for the ca. 140 projects associated with NP301 documented the major accomplishments for this period; see the NP301 Accomplishment Report at:

http://www.ars.usda.gov/research/programs/programs.htm?np_code=301&docid=11885 The preceding report served as the basis for a retrospective assessment of NP301 conducted by an anonymous external review panel, composed of distinguished non-ARS experts. The panel found that, on the whole, during 2000-2005 NP301 accomplished what it had planned to do. The panel also identified areas for improvement and added emphasis: their report is summarized at the URL below. Click on "2005 NP301 External Assessment Report". http://www.ars.usda.gov/research/programs/programs.htm?np_code=301&docid=11693

4.2 The 2nd NP301 Customer-Stakeholder Workshop on 31 October -2 November 2005 included more than 60 customer/stakeholders and an approximately equal number of ARS scientists and administrators. The customer/stakeholders furnished much valuable input about future directions for NP301. A team of ARS scientists and National Program Leaders incorporated this input into a Action Plan for NP301 for 2005-2010, which is posted on the web at http://www.ars.usda.gov/research/programs/programs.htm?np_code=301&docid=13280

4.3 On 19-20 September 2006, NP301 scientists for projects which will contribute to attaining the 2005-2010 NP301 Action Plan goals convened for a planning workshop in St. Louis, MO. The workshop facilitated planning individual NP301-associated projects with coordinated, complementary, and mutually supportive research and/or service-infrastructure objectives.

4.4 During 2007-2008, NP301 Project Plans were developed by ARS scientists and then were reviewed by thirteen peer review panels. 88% of the Project Plans were rating passing during the first review, with a median score of Minor Revision, a substantial improvement as compared to the first review cycle five years ago.

5 National Plant Germplasm Coordination Committee (NPGCC):

The NPGCC seeks to promote a stronger, more efficient, more widely-recognized and better utilized NPGS. Its goals are to facilitate the coordination of ARS, CSREES and SAES planning and assessment mechanisms for NPGS policy, organization, operations and support; promote awareness and understanding of the NPGS across ARS, CSREES, and SAES and more broadly to the scientific community; and serve as a vehicle for improving communications and discussions about issues impacting the NPGS with ARS, SAES, and CSREES. It will assess, develop and recommend to the SAES, ARS and CSREES strategies for improved coordination of NPGS activities; develop and recommend a process for improved communication of the value of the NPGS; initiate a strategic planning effort for the NPGS to better define and communicate the vision, mission and short- and long-term goals; and to evaluate the current funding models for the NPGS and report findings to the SAES directors, ARS and CSREES.

The current members of the NPGCC are L. Sommers (Colorado State-SAES), Chair; E. Young (Executive Director, Southern Region); K. Grafton (North Dakota State-SAES), G. Arkin (University of Georgia-SAES), T. Burr (Cornell University-SAES), A. M. Thro

(CSREES), E. Kaleikau (CSREES), B. S. Benepal (CSREES), P. Bretting (ARS-National Program Staff), D. Upchurch (ARS-Southern Plains Area), and C. Gardner (ARS-Ames).

NPGCC members made a joint presentation on the NPGS to the 2006 Experiment Station Section/State Agricultural Experiment Station/Agricultural Research Directors Workshop September 24-27, 2006. That presentation, plus testimonials from key Directors about the NPGS's value, increased the NPGS's visibility to this important group. In May 2007, the NPGCC recommended to the National Research Support Project Review Committee that it recommend restoring off-the-top funds designated for NRSP-5 (the Prosser, WA virus-free pome and stone fruit project) and NRSP-6 (the potato genebank project at Sturgeon Bay, WI) to their FY 06 levels to sustain these valuable efforts. The NPGCC met on June 5, 2008, in conjunction with the annual PGOC and biennial CGC Chairs meetings. It discussed the NPGS's budget levels, funding for NRSP-5 and NRSP-6, the location of crop collections, and mechanisms for publicizing the NPGS.

6 International germplasm items:

Negotiations on the Revision of the International Undertaking on Plant Genetic Resources for Food and Agriculture concluded in November 2001, with 113 nations adopting the text of the International Treaty (IT) for Plant Genetic Resources for Food and Agriculture. Despite its abstention from voting for the IT text, the US on 1 Nov. 2002 signed the IT, joining more than 100 other nations which have already done so. The IT came into force on 29 June 2004. Signing the IT was strongly supported by the US agricultural community, who wanted to enable the US to participate actively in developing the standard material transfer agreement (SMTA) for plant genetic resource exchange. The SMTA was completed immediately prior to the first meeting of the IT Governing Body in Madrid, Spain in mid-June 2006. Beginning in 2007, the SMTA was adopted by Parties to the IT and the CGIAR Centers for use in distributing plant genetic resources for food and agriculture. NPGS staff developed a standard operating procedure (SOP) for handling incoming germplasm accompanied by the SMTA. Early in 2008, the Departments of State and Agriculture transmitted the IT to the White House for its consideration. On 7 July 2008, the White House transmitted the IT to the Senate; ratification would require the advice and consent of a 2/3 majority of the Senate.

Concurrently, the Convention on Biodiversity (CBD) adopted the voluntary, non-binding Bonn Guidelines on Access and Benefit-Sharing during the sixth Conference of Parties (COP-6) of the CBD at The Hague in April 2002. The Ad Hoc Open-Ended Working Group for Access and Benefit Sharing (ABS), which developed the Bonn Guidelines mentioned above, held its second meeting in Montréal on 1-6 December 2003. This meeting followed the World Summit on Sustainable Development, in Johannesburg during the summer of 2002, which endorsed an effort by "biodiversity-rich nations" to establish a separate international regime for benefit-sharing, under the auspices of the CBD. The CBD Conference of the Parties (COP-7), at its meeting in Malaysia in February 2004, authorized the ABS to begin negotiating during its February 2005 meeting in Bangkok elements of an international regime for benefit-sharing associated

with access and sustainable use of genetic resources. The negotiations in Bangkok set the stage for more detailed discussions during the fourth ABS meeting held in Granada, Spain in January 2006. The recommendations from that negotiation were carried to the COP-9 in Brazil in April, 2006. At that COP, it was decided to continue the ABS negotiations, with a deadline for completion of 2010. The ABS met for a fifth time in October 2007 in Montréal, and for a sixth time in Geneva, Switzerland during January 2008.

The preceding developments at FAO and with the CBD will substantially affect international exchange of plant genetic resources, and the NPGS, whether or not the U. S. is ultimately a Party to either or both treaties. Precisely how they will affect U. S. users of germplasm is uncertain at present, but some of the most important questions bearing on the IT and its SMTA are beginning to be resolved.