Root and Bulb Vegetable Crop Germplasm Committee Meeting
Monday, August 2, 2010, 8:00 - 10:00 AM
Springs D & E, Desert Springs JW Marriott Resort & Spa
Palm Desert, CA

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. 2010 National Germplasm Resources Laboratory Report (Mark Bohning)

7. 2010 National Program Staff Report (Gail Wisler)

8. 2009-2010 Short-day onion accession regeneration activities at New Mexico State University (Cramer)

9. Status of 2008 germplasm evaluation proposal (Cramer)

10. Status of 2009 germplasm evaluation proposal (Cramer)

11. Status of 2010 germplasm evaluation proposal (Havey)

12. CGC Chairs meeting in Geneva, NY (Cramer)

13. Collection trips report (Simon)

14. Updating vulnerability report and priority list.

15. Upcoming RBV conferences and activities

16. Other items.

Attendees:
Cramer, Chris – New Mexico State Univ., Las Cruces, NM (cscramer@nmsu.edu)
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Havey, Michael - USDA, ARS, Univ. of Wisconsin, Madison, WI (mjhavey@wisc.edu)
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Kisha, Ted – WRPIS, Pullman, WA (tkisha@wsu.edu)
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Wisler, Gail – USDA, ARS Beltsville, MD (gail.wisler@ars.usda.gov)

1. Current membership list **(See attached list in Appendices)**

A. Dr. Al Burkett, Monsanto, Woodland, CA retired and will not be replaced.
B. Irwin Goldman is stepping down from administration duties and will be returning to his research on root and bulb vegetables, and would like to become active in CGC again.
C. Peter Boches was hired to work as an onion and carrot pre-breeder for Nunhems. He was then reassigned to work only with onions and Dr. Paul Heuvelmans, Nunhems, Holland is taking over the carrot pre-breeding program. Both are potentially new CGC members.

2. Sub-committee reports (Cramer, Simon)

A. Onion/garlic subcommittee has not met so there is not report from Cramer.
B. Carrot subcommittee report by Phil Simon. Some discussions with Mary Ruth McDonald and Roger Freeman regarding how to evaluate traits and two major carrot diseases, carrot fly and cavity spot. Neither disease has established evaluation protocols - need to systematize the process. Mary Ruth hopes to do carrot fly pre-evaluation work on the Tunisian Daucus.

3. Update of RBV germplasm at Geneva, NY (Larry Robertson) **(See "Allium Collection of the PGRU at Geneva, New York" in Appendices)**

A Approximately 400 low germ, no germ accessions for which Larry needs to try to identify new seed sources or inactivate the accessions.
B. The Station's Area Director sees the importance of the short-day onion regeneration work with Chris Cramer, and is committed to continue funding the project with end of the year funds.
C. Peter Boches, Nunhems (Brooks, Oregon), is in the process of doing some regenerations. He is interested in evaluating short-day onions as part of his pre-breeding program (approximately 140 lines with 4 or 5 for regeneration). Hope to get data for GRIN.
D. Distributions for the Alliums about the same level as 2009.

4. Update of RBV germplasm at Ames, IA (Kathy Reitsma) **(See "North Central Regional Plant Introduction Station Root and Bulb Vegetable CGC Report" in Appendices)**

A. Need to check on the status of EU Daucus collection – really only other working collection. P. Simon said they are operating on a 40% budget cut. Need to assess collection diversity. Evaluation work being done in France, Germany, Poland, etc. – approximately 100 lines being evaluated at each site and analysis of data for comparison.
B. Peter Boches, Nunhems (Brooks, OR), was hired as pre-breeder for carrot and onion. Early this spring, he was redirected to work only on onion. Paul Heuvelmans (Nunhems, The Netherlands) was assigned to be new carrot pre-breeder. Paul visited the Ames station on 23 July 2010.

5. Update of RBV germplasm at Pullman, WA (Barbara Hellier) **(See "Status Report on Allium Collection at the Western Regional Plant Introduction Station" in Appendices)**

A. Barbara reported that a large part of the collection is identified as Allium sp. Because the species are unknown, regeneration protocols are not known. She would like assistance in identifying someone who could help her determine taxonomy of these accessions. It was suggested that Barbara contact the Uzbekistan botanist who helped with the collection trip to help determine taxonomy of Allium sp. germplasm. There is also a taxonomist in Germany who may be able to assist with the project. It was suggested that maybe this taxonomist could come to the US as a visiting scientist and look at Barbara's plots.

B. Barbara would like to build a ramp collection. Currently only 1 accession which was collected by Mark Widrlechner (NCRPIS Horticulturist) and Jeff Carstens (NCRPIS Hort. Tech.) She has other people watching out for ramps while on collection trips. P. Simon said there may be possible contacts in eastern US and possibly with the Tunisian program?

C. Barbara would also like input regarding which accessions should be included in cryo backup that has not already been included. **(See spreadsheet in Appendices: Table 2: NPGS garlic and A. longicuspis accessions with cryo back-up" which lists accessions currently backed up and the reason why each was chosen for backup.)**

D. The Pullman Station's entomologist is retiring and the position will not be rehired. The technician assigned to the entomology project will be retained. Barbara would like to make use of her good skills to address the virus issues in the collection. There is a small subset of the collection that appears to be "visually" virus free – not able to do ELISA testing of everything to confirm virus status due to cost, resources, etc. It was suggested by Gail Wisler that maybe the National Clean Plant Network (NCPN) could provide assistance with cleaning up viral and fungal contamination. Phil Simon suggested that maybe this work could be in conjunction with Seed Savers Exchange. Maria Jenderek said that NCGRP could provide meristem tissue for testing (use real=time PCR, etc.?) Barbara, Gail Wisler, Ted Kisha, and Maria will meet to discuss potential collaborations – look at stakeholder interest and invovlment.

E. Pullman currently has 176 accessions either evaluated or identified in the passport data as table beet in the Beta collection. There are 139 accessions available with good quantity of seed and germination rate of 50% or above. Of these 122 accessions are backed-up at NCGRP, Fort Collins. There are 37 table beet accessions that are not available and only 9 of these have no NCGRP back-up sample. We have been focusing on the Beta vulgaris ssp maritima accessions in our increase and regeneration program so there are currently no table beets being grown.

6. 2010 National Germplasm Resources Laboratory Report (Mark Bohning) **(See "National Germplasm Resources Laboratory, USDA-ARS, Beltsville, Maryland 22010 Report to PGOC, RTACs and CGCs" in Appendices)**

A. The joint CGC Chairs meeting was much more interactive this year. Discussions included whether CGCs needed to meet as frequently. It was agreed that needed to meet at least every two years to keep up to date. They hope to do a better job of interacting

between meetings through emails - send updates possibly every 4 months to update Chairs on national and international issues.
B. Two new CGCs. The Specialty Nut CGC has already met twice. The Medicinal Plants and Oils CGC is new and now has a list of members and is looking to meet soon.
C. Update on GRIN Global. GRIN Global is a system for international use – international phase wraps up in 2010. Next phase will be working in old GRIN interface with the new GRIN Global. The public side of GRIN Global will also change and hopefully be significantly improved. Home gardener requests – a subcommittee chaired by Susan Stieve of the OPGC (Ohio) are concerned that the new public side of GRIN Global will make it too easy for home gardeners and hobbyists to order germplasm. Work is underway to try to deal with this issue.
D. Ned Garvey and Karen Williams are working on identifying key people/ministries in other countries to help develop successful collection proposals/trips.

7. 2010 National Program Staff Report (Gail Wisler) **(See "National Germplasm Resources Laboratory, USDA-ARS, Beltsville, Maryland 22010 Report to PGOC, RTACs and CGCs" in Appendices)**

A. Personnel: Phil Forsline has retired from Geneva, NY and search is underway for his replacement. The curator at Palmer, Alaska has left and Kim Hummer is heading up the search for the new curator. Interviews have occurred and they believe they have a very good candidate.
B. The New York Station has developed a core of apple trees from the Asian material to be distributed as seeds. This will free up land for use for new germplasm.
C. Budget: FY09 reallocations and money received from the stimulus package partially covered personnel costs.

8. 2009-2010 Short-day onion accession regeneration activities at New Mexico State University (Cramer) **(See "2009-2010 Short-day onion accession regeneration activities at New Mexico State University" in Appendices)**

9. Status of 2008 germplasm evaluation proposal (Cramer) **(See "Determining redundancy of short-day, onion accessions in the current collection" in Appendices)**

10. Status of 2009 germplasm evaluation proposal (Cramer) **(See "Evaluation of onion accessions for Iris yellow spot virus and onion thrips resistance/tolerance" in Appendices)**

11. Status of 2010 germplasm evaluation proposal (Havey) Received funding for evaluation of *Allium* for thrip tolerance/resistance. He has done the scoring and found some promising accessions. Wax helps thrips attach to plants. Thrips have hard time attaching to semi-glossy types – they wash off. Color also seems to play a part in the resistance (leaf blue).

12. CGC Chairs meeting in Geneva, NY (Cramer) covered by Mark Bohning's report.
13. Collection trips report (Simon)

A. (See "Trip Report Summary, *Daucus* and *Allium* Germplasm Exploration in Tunisia, August 7 - 21, 2009 P.W. Simon, D. Spooner, S. Rouz, et al." in Appendices)

B. Western and Southern US Daucus collection trip by P. Simon and D. Spooner, Univ. of Wisc., Madison, WI. To collect representatives of 3 different tribes within family, would like to get approximately 200 accessions. (Chris will try to get name of BLM contact for Phil.)

14. Updating vulnerability report and priority list. (See "Crop Vulnerability Statement, Root and Bulb Vegetable Crop Germplasm Committee, July 2005" in Appendices)
Kathy Reitsma will look for most recent report and send PDF to Chris Cramer. Chris needs input from committee – need to develop priority lists.

15. Upcoming RBV conferences and activities
Allium Conference, Reno, NV December 8-10, 2010
International Carrot Conference in 18 mos. to 2 years in South Africa. If South African not able to host, probably be in Madison, WI.

16. Other items.
Do not know where next CGC will be meeting, but will possibly with ASHS in Hawaii, but also possibly via virtual meeting. Mark Bohining said Gary Kinard is actively researching possibilities.

Root and Bulb Vegetable Crop Germplasm Committee Membership List, 2010

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Allium Collection of the PGRU at Geneva, New York

August, 2010

Palm Desert, CA

Status of Collections

Currently there are 1124 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.

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

Taxa	G*	PI	Total	Number accessions backed up NCGRP
Allium cepa var. *cepa*	221	775	996	504
Allium fistulosum	33	80	113	38
Allium total	258	866	1124	561

*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 the past three seasons. In 2009 seed was received for 27 short day onion accessions and another 48 regenerations of short day onion accessions will be received in 2010. Since June, 2009 approximately $60,000 was added to this SCA and it was extended for three years through May 2012 to meet needs for routine regeneration of short day onions. Funding for this support of the short day onion regenerations was received from the North Atlantic Area Office.

In 2009 a total of 81 accessions were sent for screening of thrips and IYSV resistance at New Mexico State University and Colorado State University by Dr. Christopher Cramer and Dr. Harold Schwartz. These accessions were selected for screening because they have been found to have less leaf wax.

Digital images of bulbs (840) and foliage (834) were added to GRIN. This is now done as an ongoing activity after each year of regeneration is completed.

Germplasm Distribution

Between January 1, 2009 and July 1, 2010 (Fiscal Year 2009 and Fiscal Year 2010 to date) a total of 905 samples of 412 accessions were distributed in 82 domestic and 19 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
Seed 2009	38	3	41
Seed 2010	58	16	74
Bulbs/Plants 2006	70	5	75
Bulbs/Plants 2007	85	11	96
Bulbs/Plants 2008	49	3	52
Bulbs/Plants 2009	70	16	86
Bulbs/Plants 2010	67	1	68
Cooperators/NPGS Sites			
Seed 2006	45	0	45
Seed 2007	42	0	42
Seed 2008	8	0	8
Seed 2009	39	1	40
Seed 2010	45	0	45
Bulbs 2006	30	0	30
Bulbs 2007	0	0	0
Bulbs 2008	52	0	52
Bulbs 2009	48	0	48
Bulbs 2010	10	0	10
Total Seed Production			
Seed 2006	100	7	107
Seed 2007	106	5	111
Seed 2008	70	8	78
Seed 2009	77	4	81
Seed 2010	103	16	119

Table 3. Distribution of the Geneva *Allium* collection (2009, 2010*)

Type/Statistic	*Allium cepa* var. *cepa*			*Allium fistulosum*			*Allium* total		
Domestic	**2009**	**2010**	**Total**	**2009**	**2010**	**Total**	**2009**	**2010**	**Total**
Orders	52	24	76	8	3	11	56	26	82
Accessions	310	142	348	15	3	17	325	145	365
Samples	554	162	716	20	4	24	574	166	740
Foreign	**2009**	**2010**	**Total**	**2009**	**2010**	**Total**	**2009**	**2010**	**Total**
Orders	11	7	18	5	3	8	12	7	19
Accessions	28	71	92	11	24	28	40	96	121
Samples	46	77	123	18	24	42	64	101	165
Total	**2009**	**2010**	**Total**	**2009**	**2010**	**Total**	**2009**	**2008**	**Total**
Orders	63	31	94	13	6	19	68	33	101
Accessions	314	191	373	22	27	38	337	219	412
Samples	600	239	839	38	28	66	638	267	905

***Through July 1, 2010**

North Central Regional Plant Introduction Station
Root and Bulb Vegetable CGC Report
August 2, 2010
Palm Desert, CA
Submitted by K. R. Reitsma

DAUCUS

Statistics for the NCRPIS collection are found in the table below. Collection availability is at 80% with 82% of the collection backed up at the National Center for Genetic Resources Preservation (NCGRP) in Ft. Collins, CO. Dr. Philipp Simon and Dr. David Spooner donated 94 new *Daucus* accessions acquired during an NPGS-sponsored collection trip in Tunisia in 2009.

Taxon	New Accessions	PI Numbers	Ames Numbers	Total Accessions	Available	Backed up at NCGRP
D. aureus	2	7	5	12	4	4
D. broteri		10	9	19	15	15
D. capillifolius		1		1	1	1
D. carota	84	691	145	836 (865[a])	706 (716)	747
D. carota subsp. *carota*		41	11	52	41	42
D. carota subsp. *commutatus*		3	1	4	4	3
D. carota subsp. *drepanensis*		2		2		1
D. carota subsp. *fontinesii*			4	4		
D. carota subsp. *gummifer*		2		2	1	2
D. carota subsp. *hispanicus*		2		2	2	2
D. carota subsp. *major*		2	3	5	5	5
D. carota subsp. *maritimus*		2	16	18	2	2
D. carota subsp. *maximus*		9	9	18	9	9
D. carota subsp. *sativus*		2		2	2	2
D. carota var. *atrorubens*[b]		2		2	1	2
D. carota var. *sativus*		92	7	99	99	97
D. crinitus		5	7	12	3	3
D. durieua			1	1		
D. glochidiatus		1		1		
D. guttatus		17	8	25	24	20
D. involucratus		3		3	3	2
D. littoralis		2		2	1	2
D. muricatus	2	1	14	15	3	3
D. pusillus		6	1	7	6	6
D. sahariensis	4		7	7	3	
D. syrticus			10	10	6	3
D. unidentified species	2		31	31	26	26
Total	**94**	**903**	**289**	**1221**	**977**	**999**

[a] The total number of *Daucus carota* accessions is 865 when including 29 NSSL-numbered accessions sent to Ames by NCGRP in 2006 for regeneration due to low viability. Ten of the 29 are currently available and will be assigned PI numbers.
[b] Nomenclature change: *D. carota* var. *atrorubens* was formerly known as *D. carota* var. *boissieri*.

Regeneration:
Accessions regenerated at Ames in 2009 will be viability tested before the seed lots will be inventoried and stored for distribution. Thirty-one *Daucus* accessions were planted in the greenhouse in October 2009 for the 2010 regeneration cycle. Two accessions failed to germinate, one accession was annual, and the remaining accessions were biennial in nature. The biennial plants were vernalized and transplanted to field cages in May 2010. Fifteen annual accessions from the new Tunisian *Daucus* collections were started in

May and transplanted to field cages. Thirteen of fifteen of these accessions have bolted and begun to flower. Several of the accessions have yellow flowers. A preliminary taxonomic review indicates these could be *D. capillifolius* or *D. capillifolius - D. carota* hybrids. All field cages are being controlled pollinated with blue bottle flies, house flies, alfalfa leaf cutter bees, and/or honey bees.

Approximately 30 accessions will be started in the greenhouse this fall for regeneration in 2011.

Six accessions of *Daucus* were sent to Rob Maxwell (Seminis/Monsanto) for regeneration during the 2010 growing season, and another 6 were sent for regeneration in 2011. Rob has left Seminis for Bejo Seeds, which is setting up a station in Idaho to breed carrots and onions. He said he hopes that his replacement at Seminis will be able to continue to regenerate germplasm for us, and also hopes that he will be able to continue to help at Bejo Seeds sometime in the future. Seeds of some wild-type *Daucus* were also sent to Peter Boches at Nunhems for evaluation and pre-breeding work. Nunhems has since reassigned Peter to work strictly with onions, and the carrot pre-breeding program has been transferred to Paul Heuvelmans in Holland. Paul was able to visit our station in Ames on 23 July on his way to the carrot conference in Washington. Roger Freeman said he plans to continue regenerating a few accessions for us each year, and he and Peter were looking at the material in the evaluation plot as potential candidates for regenerations from this season's planting.

Distribution:
Since the last report in July 2009, we have fulfilled 44 *Daucus* requests, resulting in the distribution of 482 packets (359 accessions) for 39 domestic orders and 133 packets (127 accessions) for 5 foreign requests. Over 66% of the domestic requests were for one-time distributions to meet "Non-Research Requests" (home gardener orders). The intended use for other orders included molecular analyses, DNA sequencing, adaptation studies, morphological and germination studies on Apiaceae, and breeding for virus resistance, disease tolerance, heat/drought tolerance, and organic production.

Special projects:

The NCRPIS has provided 371 accessions of *Daucus* for backup in Svalbard Global Seed Vault in Norway.

The *Daucus* 2010 observation field includes 102 accessions of *Daucus* planted so that we may collect plant, root, and flower characterization notes and images. Accessions in the planting were selected to represent the diversity of *Daucus* species currently available in the collection and will be used in a collaborative project with David Spooner and Phil Simon to develop a monograph for *Daucus* and related genera. Spooner and Simon have also been approved to write the treatment of *Daucus* for the Flora of North America. Thus far, almost all of the accessions have had leaf samples imaged and characterized. We are currently recording plant and flower data. Dr. Spooner and two visiting scientists (one from India, the other from Tunisia) will be coming to Ames in early August to begin collecting their own characterization data. These data and images will be loaded to GRIN. We will continue with these annual observation plantings until we are able to work our way through the collection and characterize all available *Daucus* accessions.

PASTINACA

No new accessions of *Pastinaca* have been received, and no accessions are being regenerated in 2010. Of the 70 accessions in the collection, 51 are currently available for distribution and 47 accessions are backed up at the NCGRP. Twenty-eight packets (21 accessions) were distributed for two domestic orders and one foreign order since the last CGC report – all were basically for unspecified breeding work or home gardener requests.

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) Aug. 2010

There are currently 1119 accessions in 115 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 791 accessions of true seeded species, 395 are available for distribution. Table 1 lists the status of the cultivated species and wild relatives of cultivated species. The accessions of the remaining 98 true seeded species (456 accessions) are mostly wild collected, wild species. The largest group is the material not identified to species (191 accessions). Of these, only 65 accessions (34%) are available. These accessions are difficult to germinate and propagate.

There are 328 vegetatively maintained accessions in the collection. We maintain all the *A. sativum* (292) and *A. longicuspis*(16) accessions clonally. We also maintain accessions of *A. aflatunense, A. stipitatum, A. canadense, A. moly, A. roseum,* and *A. melanantherum* as clones because either they do not produce true seed (eg. varieties of *A. canadense*) or don't produce seed in Pullman, WA (eg. *A. moly*). These accessions are regenerated each year (30-40 cloves/accession) with availability determined after harvest and cleaning in September.

From Aug. 1, 2009 to July 31, 2010, we distributed 560 seed/bulb packets of 310 accessions in 102 orders to 93 requestors. The majority (326 packets) were of garlic and *A. longicuspis*. For all *Allium*, the number of seed/bulb packets distributed decreased by 75 packets from last year but the number of requestors increase by 23. During the same time period we added one new accession to the collection: a wild US species, A. burdickii (formerly a subspecies of A. tricoccum -ramps) collected by collaborators from the Ames Station. Also, 11 *Allium* accessions were viability tested by the WRPIS germination program.

We are continuing to provide *A. sativum* and *A. longicuspis* material to the NCGRP for cryopreservation for a long term security back-up. There are currently 80 accessions successfully cryopreserved. We currently have 5 accessions planted to send for long term back-up in the fall. Table 2 the lists of accessions cryopreserved and to be cryopreserved. We are continuing to send a duplicate planting of 10 cloves/ accession to the NPGS station in Parlier, CA for short term back-up. We have already received this year's harvest. Facilities for storing the short-term back-up material is currently lacking. We are borrowing cold room space from the WSU Postharvest Physiology program. Additional WRPIS garlic cold storage will need to be addressed in the future.

Dr. Frank Dugan, WRPIS plant pathologist, is finishing a study on resistance to *Penicillium hirsutm* in garlic and other *Allium* species. This work has been submitted for publication. Dr. RC Johnson, WRPIS agronomist, and I are collecting data on the second year of a trial looking at seed production parameters for *A. acuminatum,* a restoration species for

Western sage grouse habitat. This work was funded by the BLM Great Basin Native Plant Selection and Increase Project . We will be harvesting bulbs from a replicated trial looking at optimizing the fertilizer application rate we apply to the increase nursery. This has not been done for growing garlic in the Palouse region of eastern Washington.

The Horticulture Crops Program had one change in personnel this past year. John Connett, Hort Crops technician, transferred to a different program within the unit. He has been replaced by Corey Wahl, a WSU graduate with a BS in Horticulture.

Table 1. Status of the cultivated and wild relatives of cultivated species accessions

	No. of accessions				
TAXON	total	backed-up	available	% available	common name/use
Allium altaicum	24	15	20	83.3	A. fistulosum wild relative
Allium ampeloprasum	207	60	104	50.2	leek
Allium angulosum	6	5	5	83.3	mouse garlic
Allium galanthum	10	9	7	70.0	A. cepa wild relative
Allium oschaninii	6	1	3	50.0	A. cepa wild relative
Allium praemixtum	2		2	100.0	A. cepa wild relative
Allium pskemense	5	4	5	100.0	A. cepa wild relative
Allium ramosum	22	6	15	68.2	fragrant garlic
Allium roylei	1		1	100.0	A. cepa wild relative
Allium schoenoprasum	31	19	28	90.3	chives
Allium tuberosum	11	10	10	90.9	Chinese chives
Allium vavilovii	10	6	9	90.0	A. cepa wild relative

Please contact me if you have comments or questions. Thank you. Barbara Hellier 509-335-3763, bhellier@wsu.edu

Table 2. NPGS garlic and A. longicuspis accessions with cryo back-up.

List of accessions that are first priority for cryopreservastion/long term back-up.
The remaining accessions in the collection may be added to back-up as time and resources allow.
Lines sent to NCGRP but not successfully preserved will be resent after virus clean-up.

	year sent to NCGRP	successfully preserved	PRE	NUM	GENUS	SPECIES	SIDID	ORIGIN	reason/ importance	info source
1	2005	yes	PI	383817	Allium	sativum	Domasen	Yugoslavia	genetically unique	GV JASHS article
2	2008	yes	PI	383820	Allium	sativum	Prizrenski	Yugoslavia	group B	GV JASHS article
3	2007	yes	PI	383821	Allium	sativum	Lokalen	Yugoslavia	group E	GV JASHS article
4	2004	yes	PI	383823	Allium	sativum	Ivankoski	Yugoslavia	group C	GV JASHS article
5	2005	yes	PI	383824	Allium	sativum	Lokalen	Yugoslavia	group P	GV JASHS article
6	2007	yes	PI	383831	Allium	sativum	Klisurski	Yugoslavia	group E	GV JASHS article
7	2009	yes	PI	493098	Allium	sativum		Moldova	good pollen production	PU data
8	2009	yes	PI	493106	Allium	sativum		Austria	unique country of origin	PU data
9	2009	yes	PI	493107	Allium	sativum		Poland	high SS	PU data
10	2005	yes	PI	493116	Allium	sativum		Czechoslovakia	genetically unique	GV JASHS article
11	2005	yes	PI	497942	Allium	sativum		Poland	genetically unique	GV JASHS article
12	2008	yes	PI	497951	Allium	sativum	Kisswani	Syria	short storing	PU data
13	2004	yes	PI	515972	Allium	sativum	Music	US, WA	genetically unique	GV JASHS article
14	2004	yes	PI	515973	Allium	sativum	French Red	US, WA	popular	PU data
15	2009	yes	PI	515974	Allium	sativum	Oswego White	US, NY	used in cancer research	Bastyr U and WSU
16	2005	yes	PI	540314	Allium	longicuspis	R81	Russian Federation	group Q	GV JASHS article
17	2006	yes	PI	540316	Allium	sativum		F. S. U.	good seed producer	PU data
18	2008	yes	PI	540318	Allium	sativum	Peshawar White	Pakistan	short storing	PU data
19	2006	yes	PI	540319	Allium	sativum	R81	Poland	good seed producer	PU data
20	2006	yes	PI	540321	Allium	sativum	Yabroudi	Syria	short storing	PU data
21	2006	yes	PI	540327	Allium	sativum	Mexicano-B	Brazil	group O	GV JASHS article
22	2009	yes	PI	540328	Allium	sativum	Morano Arequipeno-B	Brazil	short storing, difficult to maintain	PU data
23	2008	yes	PI	540331	Allium	sativum	Horsky	Czechoslovakia	group A	GV JASHS article
24	2009	yes	PI	540335	Allium	sativum	Americky Maly	Czechoslovakia	good pollen production	PU data
25	2005	yes	PI	540336	Allium	sativum	Seversky Palicak	Czechoslovakia	group L/ good seed producer	GV JASHS article/ PU data
26	2005	yes	PI	540337	Allium	sativum	Adizanskij	Czechoslovakia	group L/ good seed producer	GV JASHS article/ PU data
27	2008	yes	PI	540338	Allium	sativum	Starobelskij Belyj	Czechoslovakia	group L	GV JASHS article
28	2007	yes	PI	540340	Allium	sativum	Jampol Skij	Czechoslovakia	group I	GV JASHS article
29	2006	yes	PI	540343	Allium	sativum		Germany	group F	GV JASHS article
30	2006	yes	PI	540346	Allium	sativum		Germany	genetically unique	GV JASHS article
31	2006	yes	PI	540349	Allium	sativum		Germany		
32	2007	yes	PI	540352	Allium	sativum		Czechoslovakia	group G	GV JASHS article
33	2006	yes	PI	540355	Allium	sativum		Belarus	popular	PU data
34	2005	yes	PI	540356	Allium	sativum		Georgia	group L/ good seed producer	GV JASHS article/ PU data
35	2005	yes	PI	540357	Allium	longicuspis	850904-32	Russian Federation	group L	GV JASHS article
36	2006	yes	PI	540359	Allium	sativum	Rocambole	US, VT	genetically unique	GV JASHS article
37	2004	yes	PI	540360	Allium	sativum	Spanish Red	US, WA	group F	GV JASHS article
38	2004	yes	PI	540369	Allium	sativum	Creole	US	group B	GV JASHS article
39	2008	yes	PI	540371	Allium	sativum	Village Market	US, IL	short storing	PU data
40	2009	yes	PI	540377	Allium	sativum		Switzerland	unique country of origin	PU data
41	2009	yes	PI	540379	Allium	sativum		Chile	unique country of origin	PU data
42	2008	yes	PI	540380	Allium	sativum		US, AR	short storing	PU data
43	2006	yes	PI	543049	Allium	sativum	WKP 88-19	Pakistan	genetically unique	GV JASHS article
44	2009	yes	PI	576914	Allium	longicuspis	W6-1896 (U 085)	Uzbekistan	group K	GV JASHS article
45	2008	yes	PI	615415	Allium	sativum	W6-1860	Turkmenistan	short storing	PU data
46	2004	yes	PI	615417	Allium	sativum	W6-2557, #36	Former Soviet Union	group E	GV JASHS article
47	2004	yes	PI	615419	Allium	sativum	W6-4264	Russian Federation	group J	GV JASHS article
48	2006	yes	PI	615420	Allium	sativum	W6-4285	Russian Federation	good seed producer	PU data
49	2008	yes	PI	615421	Allium	sativum	W6-4462, PRC-4	China	short storing, difficult to maintain	PU data
50	2008	yes	PI	615423	Allium	sativum	W6-8408, Blanco de Huelma Zamora-2	Spain	group E	GV JASHS article
51	2008	yes	PI	615429	Allium	sativum	W6-17260, Cang Shang	China	short storing	PU data
52	2007	yes	PI	615430	Allium	sativum	W6-1962	France	genetically unique	GV mini survey
53		no	PI	615431	Allium	sativum	W6-12911, Asian Tempest	Korea via US,OR	unique country of origin	PU data
54	2009	yes	PI	615432	Allium	sativum	W6-16275	Viet Nam	high Thiosulfinates	UCD eval
55	2009	yes	PI	615433	Allium	sativum	W6-18618	Albania	high dry weight	UCD eval
56	2009	yes	W6	50	Allium	sativum	31	Morocco	unique country of origin	PU data
57	2007	yes	W6	670	Allium	sativum	160689-01	Turkey	genetically unique	GV mini survey
58	2008	yes	W6	671	Allium	sativum		Turkey	short storing	PU data
59	2006	yes	W6	1861	Allium	sativum	U 037	Uzbekistan	genetically unique	GV JASHS article
60	2008	yes	W6	1862	Allium	sativum	U 038	Uzbekistan	group H	GV JASHS article
61	2005	yes	W6	1880	Allium	longicuspis	U 069	Uzbekistan	genetically unique	GV JASHS article
62	2009	yes	W6	1883	Allium	sativum	U 072	Uzbekistan	good pollen production	PU data
63	2006	yes	W6	1884	Allium	sativum	U 073	Uzbekistan	genetically unique	GV mini survey
64	2005	yes	W6	1903	Allium	longicuspis	U 094	Uzbekistan	genetically unique	GV JASHS article
65	2006	yes	W6	1961	Allium	sativum		Spain	genetically unique	GV mini survey
66	2008	yes	W6	2308	Allium	sativum		Nepal	genetically unique	GV mini-survey
67	2010		W6	2560	Allium	sativum		Greece	unique country of origin	PU data
68	2004	yes	W6	8415	Allium	sativum	Morado de Pedronera	Spain	group A	GV JASHS article
69	2009	yes	W6	8417	Allium	sativum	Rojo de Castro	Spain	good pollen production	PU data
70	2007	yes	W6	8418	Allium	sativum	Rojo de las Infantas	Spain	genetically unique	GV mini survey
71	2007	yes	W6	10472	Allium	sativum	S92-5	Syria	genetically unique	GV mini survey
72	2010		W6	10473	Allium	sativum	E92-16	Egypt	low Alliin	UCD eval
73	2009	yes	W6	10717	Allium	sativum	BE 4215	Honduras	short storing	PU data
74	2004	yes	W6	10734	Allium	sativum	B 92-21	Bulgaria	group D	GV JASHS article
75	2004	yes	W6	10737	Allium	sativum	B 92-24	Bulgaria	group D	GV JASHS article
76		no	W6	11052	Allium	sativum	Red German	US, WI	high Alliin	UCD eval
77	2009	yes	W6	12820	Allium	longicuspis	850904-42	US-IL	genetically unique	GV mini survey
78	2008	yes	W6	12821	Allium	sativum	Arkansas Red	US, AR	genetically unique	GV mini-survey
79	2009	yes	W6	12829	Allium	sativum	851004-1	US	high Alliin	UCD eval
80	2010		W6	12832	Allium	sativum	870825		good pollen production	PU data
81		no	W6	12834	Allium	sativum	890616	Turkey	high SS	PU data
82	2006	yes	W6	12839	Allium	sativum	Gourmet Red	US, OR	group J	GV JASHS article
83	2005	yes	W6	12842	Allium	sativum	Poodles	US, WA	group N	GV JASHS article
84	2008	yes	W6	12844	Allium	sativum	890609	Turkey	short storing	PU data
85	2007	yes	W6	14858	Allium	longicuspis	Kaz 39-06	Kazakstan	genetically unique	GV mini survey
86	2010		W6	17074	Allium	sativum		Jordan	short storing	PU data
87	2008	yes	W6	17281	Allium	sativum		Turkministan	group H	GV JASHS article
88	2005	yes	W6	18723	Allium	sativum		Czechoslovakia	group N	GV JASHS article
89	2008	yes	W6	18724	Allium	sativum		Czechoslovakia	group D	GV JASHS article
90	2009	yes	W6	18726	Allium	sativum		Hungary	unique country of origin	PU data
91	2009	yes	W6	18729	Allium	sativum		Slovenia	unique country of origin	PU data
92	2008	yes	W6	35655	Allium	sativum	Ajo Rojo	US-WA	group R	GV JASHS article
93	2007	yes	W6	35656	Allium	sativum	Carpathian	Filaree Farm	genetically unique	GV JASHS article
94	2008	yes	W6	35658	Allium	sativum	Japanese	US-WA	group K	GV JASHS article
95	2007	yes	W6	35661	Allium	sativum	Pskem	Filaree Farm	genetically unique	GV JASHS article
96	2007	yes	W6	35665	Allium	sativum	Brown Rose	US-WA	genetically unique	GV JASHS article
97	2007	yes	W6	35666	Allium	sativum	Chamiskuri	US-WA	genetically unique	GV JASHS article
98	2007	yes	W6	35668	Allium	sativum	Darcheli	US-WA	genetically unique	GV JASHS article
99	2010		W6	35674	Allium	sativum	Jerome's French Rose	US-WA	genetically unique	GV mini-survey
100	2007	yes	W6	35676	Allium	sativum	Machashi	US-WA	group R	GV JASHS article
101	2009	yes	W6	35680	Allium	sativum	Red Grain	US-WA	good pollen production	PU data
102	2009	yes	W6	35689	Allium	sativum	Orting	US-WA	genetically unique	GV JASHS article
103	2007	yes	W6	35694	Allium	sativum	DX-127	Italy	genetically unique	GV JASHS article
104	2006	yes	W6	26171	Allium	sativum	K431	Kazakstan	good seed producer	PU data

National Germplasm Resources Laboratory
USDA-ARS
Beltsville, Maryland
2010 Report to PGOC, RTACs and CGCs

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 permanent NGRL Research Leader position has been filled with the hiring of Dr. Gary Kinard in January 2009.

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 2008, PEO assisted with the distribution of 803 shipments with a total of 27,156 NPGS accessions to scientists in 69 different countries. PEO also assisted with importing 71 shipments containing 707 items from 21 different countries for the NPGS and ARS.

In FY 2009, PEO assisted with the distribution of 754 shipments with a total of 60,323 NPGS accessions to scientists in 67 different countries. PEO also assisted with importing 17 shipments containing 447 items from different 17 countries for the NPGS and ARS.

In the first 8 months of FY 2010 PEO assisted with the distribution of 607 shipments with a total of 30,997 NPGS accessions to scientists in 67 different countries. It is anticipated that for FY 2011 PEO will assist with the distribution of 911 shipments with a total of 46,493 NPGS accessions to scientists in 67 different countries. In FY 2010 between October 1, 2009 and June 1, 2010 PEO also assisted with importing 19 shipments containing 654 items from 19 different countries for the NPGS and ARS.

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 13,100 taxa. GRIN taxonomic data now include scientific names for 26,500 genera (14,150 accepted) and 1,230 infra-genera and 91,250 species or infra-species (54,900 accepted) with nearly 42,000 common names, geographical distributions for 49,000 taxa, 314,000 literature references, and 21,800 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. A project accomplishing this for medicinal plants was concluded in 2008. In late 2008 another project to provide thorough coverage in GRIN-Taxonomy to wild relatives of all major and minor crops was initiated. We have now completed work on 13 major crops, including alfalfa, cotton, lettuce, maize, potato, rice, sorghum, soybean, strawberry, sugarbeet, tobacco, tomato, and wheat, and an interface to query these data in various ways has been developed (http://www.ars-grin.gov/~sbmljw/cgi-bin/taxcrop.pl). 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. GRIN taxonomic data are the most requested item on public GRIN, with ca. 800,000 of these reports retrieved monthly.

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 plant 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 if possible 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 the decision is reached to assign a PI number to an accession, the curators contact Mark Bohning in DBMU for assignment of the next sequential number(s).

PEO has implemented two new projects to make the PI Books more accessible: 1) PEO, DBMU and the National Agricultural Library (NAL) are collaborating to digitize the older volumes of the PI books and make them available for downloading from the NGRL and the NAL websites; 2) The PI books for the years 1997 – 1979 will be formatted for downloading using Adobe Acrobat and made available through the PEO website so that the PI Books for years 1979 to the current completed year will be available. Beginning in 1979, all new Plant Introductions (PIs) were entered directly into the Germplasm Resources Information Network (GRIN).

International Collaboration to support conservation and exchange of plant genetic resources

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

The PEO continued to collaborate with USDA/FAS and USDA/ARS/OIRP to develop joint germplasm collection, conservation and maintenance programs in Guyana, Jordan, Morocco, Tunisia, 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 2009 NPGS Plant Explorations/Exchanges

Target Crop	Country	Principal Contacts
Forage legumes	Armenia	K. Tamanyan, G. Fayvush
Lettuce	Armenia	K. Tamanyan, G. Fayvush
Ash	China	W. Kang
Fruits, and nuts	Azerbaijan, Kyrgyzstan	M. Aradhya, Z. Akparov, Z. Ibrahimov, A. Orozumbekov
Forage legumes	Georgia	M. Mosulishvili, G. Arabuli
Lettuce	Georgia	M. Mosulishvili, G. Arabuli
Fruits, nuts, specialty crops	Japan	K. Hummer, J. Postman, H. Imanishi, H. Iketani
Carrot, onion, and garlic	Tunisia	P. Simon, D. Spooner
Ash	United States (MO, IL)	M. Widrlechner, J. Carstens
Herbaceous ornamentals	United States (MD, VA, WV, NC, SC, GA, FL, AL)	S. Stieve, E. Renze
Pecan	United States (FL)	L.J. Grauke
Potato	United States (AZ)	J. Bamberg, A. del Rio, C. Fernandez
Spinach relatives	United States (Nebraska)	D. Brenner, G. Kostel
Sunflower	United States (NC, SC, TN, GA)	L. Marek, G. Seiler
Switchgrass	United States (FL)	M. Harrison-Dunn, G. Pederson, M.A. Gonter

FY 2010 NPGS Planned Plant Explorations

Target Crop	Country	Principal Contacts
Wild beet	Morocco	B. Hellier, L. Panella, Y. Bahloul, N. Qariouh
Small grains	Armenia	K. Tamanian, G. Fayvush
Lettuce	Georgia	M. Mosulishvili, G. Arabuli
Small grains	Georgia	M. Eristave, L. Kobakhidze
Lettuce	Russia	S. Litvinskaya, R. Murtazaliev
Ash	China	W. Kang
Fruits and nuts	Georgia	M. Aradhya, D. Maghradze, Z. Bobokashvili
Cool-season grasses	Russia	D. Johnson, P. Johnson, N. Dzyubenko, E. Dzyubenko
Spanish lime	United States (PR, USVI), Trinidad and Tobago	B. Irish, I. Reyes, C. Bermudez, E. Chichester, E. Johnson, L. Roberts-Nkrumah, P. Perez
Sunflower	United States (MO, KS, OK. AR)	L. Marek, G. Seiler
Ash	United States (OH)	M. Widrlechner, J. Carstens
Carrot relatives	United States (many states)	P. Simon, D. Spooner
Ash	United States (WI, MN)	M. Widrlechner, A. David, E. Humenberger
Ash	United States (KS, MO, AR, OK)	J. Carstens, J. Griffin
Grain amaranths and bedding plants	United States (AZ)	D. Brenner, S. Stieve
Kentucky coffeetree	United States (MO, AR, TN, KY, IL, IA)	J. Carstens, A. Schmitz
Lesquerella	United States (NM, TX, AZ)	D. Dierig, M. Cruz
Ornamentals	United States (TX)	P. Jordan, S. Stieve

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 95,800 taxonomic names (including synonyms)
535,769 accessions representing 13,426 species and 2,200 genera
1,832,629 inventory records
1,577,869 germination records
7,166,524 characteristic/evaluation records
Over 188,700 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 is also 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 membership lists and related reports for the Crop Germplasm Committees continue to be maintained on the GRIN Web page.

GRIN has 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 generated on apple, cacao, grape, hazelnut, hops, pear and blueberry, along with AFLP data on Rhubarb, has been loaded into the system.

The GRIN-Global project continues to move forward at a rapid pace. The project is a cooperative effort between the Global Crop Diversity Trust, USDA-ARS and Bioversity International. 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 (TSG) has also been convened to guide the project and provide recommendations. Several posters describing the GRIN-Global project were presented at the 2009 American Society of Horticultural Science (ASHS), the American Phytopathological Society (APS) and the Agronomy Society of America/Crop Science Society of America meetings along with a poster and computer demo of the system at the

Plant & Animal Genome XVIII meeting in January 2010. A training session for GRIN-Global international trainers (Train the Trainers) was held April 12-23, 2010 in Beltsville, Maryland. Eighteen international participants learned how to use the GRIN-Global application and offered their comments and suggestions. Later this year and in early 2011, these individuals will be responsible for deploying the system to the international community. A demonstration of the new public software is planned for the biennial CGC Chair, Regional Technical Advisory Committees and Plant Germplasm Operations Committee joint meetings in Geneva, NY July 27-29, 2010. Comments, ideas and suggestions are always welcome.

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. In 2009, there were 1,892,505 visits to 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. New security patches are implemented as soon as they become available. 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 housing NGRL is locked with access permitted only by proximity card. The GRIN server room is locked with further limited proximity card access and is monitored for temperature fluctuations 24/7/365.

Crop Germplasm Committees

Since June 1, 2009, over twenty-five of the 42 Crop Germplasm Committees (CGC) have met. An NGRL representative was present at most of the meetings or via a teleconference 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 13^{th} biennial meeting of the CGC Chairs will be held in Geneva, NY July 27-28, 2010 in conjunction with the Plant Germplasm Operations Committee and the Regional Technical Advisory Committees. This meeting provides 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.

The Plant Disease Research Unit

Since October 1, 2005, the responsibilities for the quarantine indexing and distribution of prohibited genera germplasm that were performed by the ARS, Plant Germplasm Quarantine Office (PGQO) in Beltsville MD were transferred to APHIS-Plant Health Programs (APHIS-PHP). The quarantine program manager for APHIS-PHP is Dr. Joseph Foster. Three SYs (Gary Kinard, Ruhui Li, and Ray Mock) and nine support staff now make up the Plant Disease Research Unit within National Germplasm Resources Lab (NGRL-PDRU). The mission of NGRL-PDRU is to conduct research to understand the biology of pathogens that infect economically important prohibited genera plant germplasm, including their etiology, detection, and elimination by therapeutic procedures. These projects provide support to the USDA quarantine programs and help facilitate the safe introduction and international exchange of valuable plant germplasm.

Personnel

The permanent NGRL Research Leader position has been filled with the hiring of Dr. Gary Kinard in January 2009. Gary has been with the PDRU and quarantine based research for almost 10 years and primarily focuses on work with the pome fruits. Ray Mock works with the sugarcane, stone fruits, and small fruits, and Dr. Ruhui Li provides molecular support for all unit projects and works more intensively on sugarcane, sweet potato, grasses, and stone fruits. Whitney Hymes, who was a student employee in PDRU for several years, began working in a permanent position in May 2010 and provides molecular lab support primarily for Dr. Li but for all other lab research to some extent. Sam Grinstead, a biological research technician, provides greenhouse support for the unit. Dr. Eun Ju Cheong, a post-doctoral research horticulturist who joined NGRL-PDRU in May 2006 has a primary focus on *Saccharum* and stone fruits. Dr. Cheong is focusing on developing methods for the *in vitro* cultivation of a broad range of *Saccharum* sp., and elimination of quarantine pathogens from this prohibited genus crop. Four International Visiting Research Scholars have joined the lab since February 2008: Dr. Liming Lin, working on viroid detection in stone and pome fruits; Donglin Xu, working on characterization and detection of sugarcane viruses; Ae Rin Jeon, focusing on developing methods for the *in vitro* cultivation of a broad range of small fruit species, and elimination of quarantine pathogens from these ‘prohibited’ category crops; and Dr. Fan Li working on viruses of potatoes and sweet potatoes.

Research Objectives and Progress

The NGRL-PDRU performs research on viral pathogens of quarantine significance infecting clonally propagated prohibited crop genera, with an emphasis on deciduous tree and small fruits, sugarcane, grasses, and sweet potatoes. Our mission is to characterize and investigate the etiology of poorly described diseases and pathogens of quarantine significance, and to develop more reliable detection and elimination methods. Once complete, these protocols will be submitted to the USDA, APHIS quarantine for validation and inclusion in the quarantine testing program. PDRU provides regular updates about its research projects to the CGCs that deal with prohibited genera crops. The staff regularly confers and collaborates with APHIS scientists on matters pertaining to the quarantine of plant germplasm. NGRL-PDRU personnel are glad to discuss potential collaborations with colleagues and stakeholders in the NPGS.

NGRL Contact Information

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2009-2010 Short-day onion accession regeneration activities at New Mexico State University

On September 14, 2009, seed of 27 accessions and collected germplasm from a 2006 collection trip was sent from the onion breeding program at NMSU to the onion curator at the PGRU in Geneva, NY (Table 1). On September 25, 2009, bulbs of 46 onion accessions and collected germplasm were placed in a cage field for future seed production in the following year (Table 2). Those bulbs broke dormancy and began resprouting. In April of 2010, seedstalks from those bulbs emerged and the plants were covered with a frame structure and netting. Honeybees and blue bottle flies were introduced into the cage structures once flowers started to open. The pollination vectors were allowed to pollinate the flowers for six weeks. After the pollinators were removed, the plants remained in the cages for seed set. Once open capsules were visible, umbels were harvested from each cage and were kept separate by accession. The umbels will be allowed to dry for four weeks. Once the umbels are completely dry, they will be crushed and the seed will be extracted and cleaned. The cleaned seed will be delivered to the onion curator at PGRU during September of 2010.

On September 25, 2009, seed of 12 accessions and collected germplasm from a 2006 collection trip was sown in a field at the Fabian Garcia Science Center in Las Cruces, NM for bulb production (Table 3). Plants of these accessions had not produced enough seed in a previous regeneration attempt and so another attempt was made to produce a sufficient amount of seed. Beginning in June of 2010, bulbs of these accessions were harvested and placed into storage until Sept. 2010. Seed will be produced from these bulbs in the following year as described above. Instead of producing bulbs, some plants of several accessions produced seedstalks. These plants were covered with a frame structure and netting. Blue bottle flies were introduced to the cage structure once flowers started to open. The pollination vectors were allowed to pollinate the flowers for 6 weeks. Once open capsules were visible, umbels were harvested from each cage and were kept separate by accession. The umbels will be allowed to dry for 4 weeks. Once the umbels are completely dry, they will be crushed and the seed will be extracted and cleaned. The cleaned seed will be delivered to the onion curator at PGRU during September of 2010.

Table 1. Seed of the following onion accessions and collected germplasm was sent to PGRU on September 14, 2009.

Eclipse from ESC	PI 546271 New Mexico White Grano PRR
Extra Early White Grano from MD	Red Creole from ESC
Italian Red Torpedo from LS	Red Creole C-5 from ESC
Jarit JTO-308	Red Torpedo from IVS
Jarit JTO-520	Rio Verde
PI 164349	Siohu N-53
PI 249898	Texas Early Grano 502 from MD
PI 261764	White Creole from CSC
PI 288227	White Creole from ESC
PI 343048	White Creole PRR from SDF
PI 546091	White Grano from ESC
PI 546094 Early White Grano	White Mexican from ESC
PI 546127 Texas Early Grano 502	White Mexican from IVS
PI 546178	

Table 2. Plant introductions and collected germplasm lines currently being regenerated for seed production.

Ben Shemen	PI 264631	PI 639914
Blanco Duro	PI 269306	PI 639915
Early Red Burger	PI 271039	PI 639916
Jarit JTO-91	PI 273211	Red Flat Italian
Jarit Sunshine	PI 287540	Rio Blanco Grande
G 32590	PI 293756	Rio Jefe
G 32787	PI 318886	Rio Plata
PI 142790	PI 321385	Samson
PI 164361	PI 342943	Siohu PBR-2
PI 179164	PI 343049	Stockton Early Red
PI 183660	PI 430371	Stockton Early Yellow
PI 239633-1	PI 546152 New Mexico	Stockton Red
PI 239633-2	White Grano S-1	Temprana
PI 256048	PI 639911	White Tampico
PI 256049	PI 639912	
PI 264321	PI 639913	

Table 3. Accessions and collected germplasm lines currently being regenerated for bulb production.

AC 595	PI 175036	Rio Jefe
Ben Shemen	PI 478675	Rio Plata
Dawn	PI 546164 Yellow Grano	Siohu PBR-2
Jarit JTO-91	PI 546272 New Mexico	
Jarit Sunshine	White Grano PRR	

Trip Report Summary

Daucus and *Allium* Germplasm Exploration in Tunisia

August 7 - 21, 2009 P.W. Simon, D. Spooner, S. Rouz, et al.

Trip Summary: P.W. Simon and D. Spooner traveled ~ 4300 km through Tunisia with S. Rouz, B. Bouzbida, C. Hannachi, and Z. Ghrabi from Djerba to Tataouine to Tabarka and back to Djerba over 13 days collecting 141 seed or bulb samples including native, wild *Allium ampeloprasum* and *Daucus* (4 species), as well as local land races of carrot, onion, elephant garlic, and other umbels. Several other wild Apiaceae were also collected. Germplasm collections of particular interest for the USDA collection were: 1) first extensive collection of wild yellow-flowered *Daucus carota*, prevalent in southern Tunisia, 2) first collection of widespread distinctive wild *Daucus carota* subspecies prevalent in northern Tunisia, and 3) additional collections of *Daucus sahariensis, D. aureus,* and *D. muricatus*. Additional critical observations were made of diversity and geographic partitioning in wild *Daucus carota*, noting a range of plant types beyond those that are observed in Central Asia, Anatolia, Middle East, Europe, or the Americas. Plans were discussed for future evaluation, utilization, and collections of germplasm for collaborative research characterizing phenotypic and molecular diversity in *Allium* and *Daucus*, and evaluating variation in *Daucus*, hopefully involving exchange of students and staff.

Determining redundancy of short-day, onion accessions in the current collection

All field data has been collected and the data analysis has been completed. Based upon the morphological data collected, recommendations have been made to keep accessions in the collection, to discard accessions from the collection, to incorporate newly-collected germplasm into the collection, or to abandon newly-collected germplasm (Table 1). The recommendations to discard accessions from the collection are because these accessions are very similar to other accessions already in the collection. The accessions kept in the collection have some unique characteristics that warrant their retention. The recommendation to include newly-collected germplasm into the collection is because this material has some unique qualities not already represented in the collection. Several newly-collected cultivars were recommended to be abandon because they are duplicates of cultivars already in the collection or do not possess any unique characteristics not already represented in the collection.

For several groups, we were unable to evaluate the same characters over two years due to a high percentage of bolting in the second evaluation year. For this reason, we could not make any recommendations for these accessions and cultivars. We recommend that the ‘Eclipse’, ‘Red Creole’, ‘White Creole’, and ‘White Mexican’ cultivars be tested in another location that is better suited for their production.

Soon after seed was received at NMSU in Sept. 2007, seed of each entry was sent to Ted Kisha to perform the molecular analysis on the entries. Marker data has been acquired for 10 microsatellite loci and 2 sets of Targeted Region Amplification Polymorphism (TRAP) primers. Along with the field data, both primer types indicate differences among some of the accessions with the same name. Because TRAP markers acquire data at multiple loci with a single primer set, these differences were evident after analysis with only one primer set, while differences using microsatellite markers became evident only after analysis with the first six loci. TRAP markers provide a desirable, cost efficient alternative when analyzing multiple loci in species with large genomes, such as *Allium cepa*, in which Amplified Fragment Length Polymorphism (AFLP) analysis is cumbersome as a result of the large number of fragments amplified.

Table 1. Recommendations for onion accessions and collected short-day onion germplasm evaluated.

<u>Keep</u>
PI 385949 White Creole
PI 546128 White Creole
PI 546153 New Mexico Yellow Grano
PI 546168 Long Red Italian
PI 546110 Early Texas Yellow Grano
PI 546170 White Grano
PI 546261 Texas Grano 502 PRR
PI 546271 New Mexico White Grano PRR

<u>Discard</u>
G 32071 Texas Early Grano 502 PRR
G 32072 Texas Early Grano 502
PI 546094 Early White Grano
PI 546111 Early Yellow Grano Tex 502
PI 546127 Texas Early Grano 502
PI 546161 S-1 White Grano

<u>Incorporate</u>
Italian Red Torpedo from LS
White Creole PRR from SDF
White Grano Improved from MD

<u>Abandon</u>
Extra Early White Grano from MD
Red Creole from CSP
Red Torpedo from IVS
White Grano from CSP
White Grano from ESC
Yellow Grano from ESC

<u>Inconclusive</u>
PI 546119 Eclipse L 303
PI 546180 Red Creole C-5
PI 546234 Red Grano
Eclipse from CSP
Eclipse from ESC
Red Creole from ESC
Red Creole C-5 from ESC
Red Grano from ESC
Red Grano from IVS
White Creole from CSP
White Creole from ESC
White Mexican from ESC
White Mexican from IVS

CSP = Condor Seed Production, ESC = Emerald Seed Company, IVS = Imperial Vegetable Seed, LS = Lockhart Seeds, MD = Mark Dessert, SDF = Sensient Dehydrated Flavors

Evaluation of onion accessions for *Iris yellow spot virus* and onion thrips resistance/tolerance

In February 2009, seeds of 78 onion (*Allium cepa* L.) accessions (Table 1) were sent by the onion curator in Geneva, NY to the onion breeding program at New Mexico State University (NMSU) in Las Cruces, NM. Half of the seed from each accession was sent to Howard Schwartz at Colorado State University (CSU) while the other half remained at NMSU. At NMSU, seeds were sown in black plastic trays that contained Metro Mix 510 on 18-19 Feb. Plants were later transplanted to a field at the Leyendecker Plant Science Research Center (LPSRC) in Las Cruces, NM on 30 Apr. At CSU, seeds were sown in peat pellets in early February, and plants/pellets were later transplanted to the field on 1 May. Plants were raised in this fashion due to the low amount of seed that possessed variable germination percentages. Entries were split into two groups based upon the number of plants produced. At NMSU, individual plots were one bed wide by 3 m in length with a uniform plant population (5 cm between plants in each line) in a randomized complete block design with 3 replications. For those accessions with a limited number of plants, the plot length was only 1.5 m. Plants were spaced 7.5 cm apart within the row and two rows were planted per plot.

On the first and last bed of the study and at the front and back borders of the study, IYSV-infected bulbs, from the previous year IYSV evaluation study, were placed in the field in January 2009 to ensure that IYSV inoculum was in the field. On each third bed, IYSV-susceptible breeding lines were transplanted in February 2009 to act as disease spreader rows. The field was designed such that onion thrips would acquire IYSV from the infected bulbs, live on these bulbs until scape formation, then move to the transplanted IYSV-susceptible breeding line plants, and once these plants matured then move to the test plants. At each move, thrips would transfer IYSV to those new plants. Onion plants were grown using standard cultural practices for growing onions in southern New Mexico except that chemical sprays were not applied for controlling onion thrips levels.

At 12, 14, 16, and 20 weeks post planting or transplanting, entries were evaluated for the number of thrips per plant when the thrips number was counted from ten plants per plot. At 16 weeks, entries were evaluated for leaf color (on a scale of 1 to 4 where 1 = light green color and 4 = blue) and leaf waxiness (on a scale of 1 to 4, where 1 = glossy and 4 = waxy). At 16, 20, and 24 weeks, entries were evaluated for leaf axil pattern on a scale of 1 to 4, where 1 = very open and 4 = tight. At 16, 20, and 24 weeks, entries were evaluated for Iris yellow spot (IYS) disease severity by rating all plants of a plot on a scale of 0 to 4, where 0 = no symptoms, 1 = 1 to 2 small lesions per leaf, 2 = > 2 medium-sized lesions per leaf, 3 = lesions coalescing on more than 25% of the leaf, and 4 = more than 50% leaf death. When more 80% of the plants had matured, visible through the lodging of the plant tops, all bulbs from the plot were harvested. From within a plot, plants that exhibited few IYS foliar disease symptoms were selected and kept separate from other bulbs harvested from the plot. Leaves and roots from the harvested bulbs were removed and bulbs were stored. Bulbs were graded for market class (colossal, jumbo, medium, and smaller) and the bulb number and weight were recorded for each market class. In addition, the total bulb number and weight was recorded for each plot. The Colorado study did not measure total yield. Some accessions produced plants that developed bulbs, but failed to mature before the study ended. Some accessions produced plants, that did not develop bulbs, and plants from these accessions were not harvested.

In general, thrips number per plant increased from 12 to 14 weeks post transplanting while the number decreased afterwards up to 20 weeks. At this time, there were fewer thrips per plant than at 12 weeks. At 14 weeks, PI 248753, PI 248754, PI 274780, and PI 288272 averaged less than three thrips per plant that was less than most entries tested and less than the average number of thrips per plant for all entries, 21. These accessions produced dark green leaves that had a moderate amount of waxy coating. Seventeen accessions were rated as having light to dark green leaf color, three were rated as having semi-glossy to glossy leaves, and one possessed an open leaf axil pattern. PI 239633 and PI 289689 possessed glossy foliage that was dark green in color. PI 258956, PI 546188, and PI 546192 possessed semi-glossy foliage that was dark green in color. At 20 weeks, PI 239633, PI 264320, PI 321385, PI 546100, PI 546115, PI 546188, and PI 546192 exhibited less severe IYS symptoms than other accessions. Four weeks later, IYS symptoms became more severe on plants of these accessions, however; plants of PI 546115 and PI 546192 exhibited less severe symptoms than most other accessions that had not matured by this time. PI 239633, PI 258956, PI 264320, PI 321385, and PI 546100 exhibited a jumbo market class yield that was greater than the yield of other entries. Individual plants, that exhibited few IYS disease symptoms, were selected at bulb maturity from 14 different accessions (Table 2). These bulbs are being self-pollinated and testcrossed to male-sterile lines in the hopes of finding individual progeny that possess a higher level of IYS tolerance. The Colorado site experienced unusually cool, moist conditions throughout much of the growing season, and IYSV was delayed until very late in the season resulting in only trace incidence. Therefore, we are relying primarily upon the New Mexico data for preliminary selections of accessions that performed well there as listed in Table 2. Bulbs of those accessions that also performed well agronomically in Colorado and did not exhibit high populations of thrips during the seasonal counts, will also be self-pollinated to produce seed for further evaluation.

For the second year of evaluation, IYSV-infected bulbs, from the previous year IYSV evaluation study, were placed on the first and last bed of the study and at the front and back borders of the evaluation field in October 2009 to ensure that IYSV inoculum was in the field. At the same time, late-maturing, autumn-sown, IYSV-susceptible breeding lines were sown directly on each third bed to act as disease spreader rows as was done in the previous evaluation year. In November 2009, seeds of 57 onion accessions were sent by the onion curator in Geneva, NY to the onion breeding program at NMSU in Las Cruces, NM. The number of accessions was reduced as compared to the previous year due to the lack of viable seeds for some accessions. Half of the seed from each accession was sent to Howard Schwartz at CSU while the other half remained at NMSU. At NMSU, seeds were sown in black plastic trays that contained Metro Mix 510 on January 6, 2010. Based upon the number of plants germinated, accessions were split into two groups. Plants were later transplanted to a field at the LPSRC in Las Cruces, NM on April 5, 2010. As with the previous year evaluation, individual plots were one bed wide by 3 m in length with a uniform plant population (5 cm between plants in each line) in a randomized complete block design with 3 replications. For those accessions with a limited number of plants, the plot length was only 1.5 m. Plants were spaced 7.5 cm apart within the row and two rows were planted per plot. On March 4, 2010, seeds of 15 additional accessions were sent to NMSU by the onion curator in Geneva, NY. Half of the seed from each accession was sent to Howard Schwartz at CSU while the other half remained at NMSU. At NMSU, seeds were sown in black plastic trays that contained Metro Mix 510 on March 13, 2010. Plants were later transplanted to a field at the LPSRC in Las Cruces, NM on May 4, 1010. As done in the previous year, accessions will be evaluated for thrips number per plant, leaf color, waxiness, and axil pattern, IYS disease severity, and bulb yield. Individual plant selections will be made from plants that exhibit reduced IYS symptoms.

Table 1. Onion accessions that were evaluated for *Iris yellow spot virus* and onion thrips resistance/tolerance.

G 32590	PI 174024	PI 256049	PI 288903	PI 546100
G 32787	PI 177242	PI 258956	PI 288908	PI 546140
PI 124525	PI 179164	PI 264320	PI 288909	PI 546115
PI 142790	PI 179627	PI 264321	PI 289689	PI 546162
PI 164361	PI 182138	PI 264631	PI 289690	PI 546174
PI 164807	PI 183660	PI 264648	PI 293756	PI 546188
PI 165498	PI 200874	PI 269306	PI 318886	PI 546192
PI 168962	PI 233186	PI 271039	PI 321385	PI 546201
PI 168966	PI 239633-1	PI 273211	PI 342943	PI 639911
PI 171475	PI 239633-2	PI 274780	PI 343049	PI 639912
PI 171477	PI 248753	PI 277349	PI 344392	PI 639913
PI 172701	PI 248754	PI 287540	PI 391509	PI 639914
PI 172702	PI 249899	PI 288073	PI 430371	PI 639915
PI 172703	PI 251325	PI 288270	PI 433330	PI 639916
PI 172704	PI 255557	PI 288272	PI 433332	
PI 174018	PI 256048	PI 288902	PI 546096	

Table 2. Number of bulbs harvested and number of bulbs selected for IYSV resistance from onion accessions grown at NMSU.

	Bulb Number	
PI	Harvested	Selected
172701	100	1
172702	213	3
172703	173	11
179627	113	2
239633-1	91	14
239633-2	161	10
258956	205	37
264320	206	10
288270	90	6
288909	107	12
289689	155	6
343049	194	12
546140	200	54
546188	37	2
639911	51	1

I. **Evaluation of Epicuticular Waxes on Semi-Glossy Foliage of Onion (*Allium cepa* L.)**

Michael J. Havey, USDA-ARS Research Geneticist, Department of Horticulture, University of Wisconsin, Madison, WI 53706

II. **Significance of the proposal to U.S. agriculture:**

Epicuticular waxes accumulate on leaf surfaces of essentially all terrestrial plants, provide protection against water loss and UV damage, and are important in plant-insect communications. Normal waxy onions possess copious amounts of epicuticular waxes (Fig. 1), which build up on leaf surfaces and allow thrips to adhere to the plant and incite damage. Glossy foliage accumulates essentially no epicuticular waxes, appears light green in color, slows the growth of thrips populations, and experiences less damage from thrips feeding (Hilgardia 8:215-232). However these glossy onions suffer from poor field performance due to greater transpiration and spray injury. Importantly, some populations of onion possess "semi-glossy" foliage, which means that the plants accumulate lower amounts of epicuticular waxes relative to wild-type plants and more than true glossies (Fig. 1). Semi-glossy onion foliage is potentially useful in an integrated approach to thrips control by reducing sprays and the incidence of thrips-vectored diseases such as *Iris Yellow Spot Virus* (IYSV). In two independent surveys over the last 5 years, stakeholders rated thrips and IYSV as the most important production constraints for onion (surveys available from http://www.ipmcenters.org/pmsp/pdf/Western ONION%20.pdf and http://haveylab.hort.wisc.edu/cap/AlliumCAP%20Final%20 Report.pdf).

III. **Outline of specific research:**

We propose to evaluate in the field and greenhouse at least 200 long-day (LD) plant introductions (PIs) of onion to identify semi-glossy plants. We will concentrate our efforts on LD onions in order to harvest bulbs that will flower for seed production in Wisconsin. We will also plant genetic stocks of waxy and true-glossy (USDA inbred B9887 and cultivar 'Odorless Greenleaf') types for comparisons. Leaf pieces will be harvested from normal waxy, true-glossy, and the semi-glossy plants and placed into $CHCl_3$. We will harvest leaf tissue from both greenhouse and field grown plants, in case field-grown plants experience losses of specific waxes. Replicated samples will be evaluated by gas chromatography with mass spectrometry (GC-MS) as previously described (Plant Physiol. 116:901-911). GC-MS will provide estimates of the types and quantities of epicuticular waxes associated with waxy, semi-glossy, and glossy foliage types. We will provide GRIN with visual scores of leaf types (waxy, semi-glossy, or glossy as well as any variation for leaf types within a single PI) and the quantities and types of epicuticular waxes for semi-glossy plants within PIs. Over the long term (i.e. outside the tenure of this grant), we will self-pollinate semi-glossy plants to determine if this foliage type breeds true. We will also complete complementation analyses by crossing among independent sources of semi-glossy foliage and scoring of progenies. Information on the types and quantities of

Fig. 1. Onion plants with semi-glossy (left) and normal waxy foliage (right).

epicuticular waxes and the inheritance of the semi-glossy phenotype will be useful in the development of semi-glossy onion cultivars requiring fewer sprays to avoid damage by thrips.

IV. Total funding requested: $15,000

This germplasm evaluation will be completed within one year. Funds will be used as follows:

- $2,000 for travel to field for planting, scoring of leaf types, sampling, and harvest of bulbs.
- $2,000 for greenhouse space for planting of semi-glossy PIs previously identified in the field
- $1,000 for glass vials, chemicals, and student labor to prepare samples for GC-MS
- $10,000 for runs on GC-MS (estimated for at least 100 samples) and data analyses.

IV. **Personnel:**

A. Research will be directed by USDA-ARS Research Geneticist (MJ Havey), assisted by one USDA Agricultural Research Technician (Mark Petrashek), one graduate student in Plant Breeding at the University of Wisconsin (unknown at this time), and student hourly workers. All personnel will work on scoring of foliage types and sampling.

B. Plants will be produced at the Kincaid Farms, Palmyra WI, and greenhouses at the University of Wisconsin.

C. GC-MS will be completed in cooperation with Dr. Cynthia Henson, USDA-ARS, University of Wisconsin, with technical help with the GC-MS.

VI. Approximate resources contributed to the project by the cooperating institution:

USDA-ARS will provide salary support of MJ Havey (scientist) and M Petrashek (technician), as well as technical support to run GC-MS (Henson's lab). The graduate student will be supported by a grant from the USDA Specialty Crops Research Initiative. Undergraduate student labor would be supported by this germplasm evaluation grant. The University of Wisconsin will provide greenhouse space, cold rooms for the vernalization of selected bulbs, and field space for eventual seed production. The Kincaid farm provides field space for bulb production.

Trip Report Summary

Daucus and *Allium* Germplasm Exploration in Tunisia

August 7 - 21, 2009 P.W. Simon, D. Spooner, S. Rouz, et al.

Trip Summary: P.W. Simon and D. Spooner traveled ~ 4300 km through Tunisia with S. Rouz, B. Bouzbida, C. Hannachi, and Z. Ghrabi from Djerba to Tataouine to Tabarka and back to Djerba over 13 days collecting 141 seed or bulb samples including native, wild *Allium ampeloprasum* and *Daucus* (4 species), as well as local land races of carrot, onion, elephant garlic, and other umbels. Several other wild Apiaceae were also collected. Germplasm collections of particular interest for the USDA collection were: 1) first extensive collection of wild yellow-flowered *Daucus carota*, prevalent in southern Tunisia, 2) first collection of widespread distinctive wild *Daucus carota* subspecies prevalent in northern Tunisia, and 3) additional collections of *Daucus sahariensis, D. aureus*, and *D. muricatus*. Additional critical observations were made of diversity and geographic partitioning in wild *Daucus carota*, noting a range of plant types beyond those that are observed in Central Asia, Anatolia, Middle East, Europe, or the Americas. Plans were discussed for future evaluation, utilization, and collections of germplasm for collaborative research characterizing phenotypic and molecular diversity in *Allium* and *Daucus*, and evaluating variation in *Daucus*, hopefully involving exchange of students and staff.

Crop Vulnerability Statement
Root and Bulb Vegetable Crop Germplasm Committee

July, 2005

The Homeland Security Presidential Directive No. 9 (HSPD-9) from January 30, 2004 puts into place a national policy to defend US agriculture and food systems from terrorist attacks, disasters, and other emergencies. One of the aspects of this directive is the establishment of a National Plant Disease Recovery System that insures that tools, infrastructure, and capacity can be met to mitigate the impact of significant plant disease outbreaks.

1) Degree of genetic uniformity of the standing crop

- Carrot has a highly diverse nuclear genome among major cultivars, but wide use of cytoplasm-genic male sterility could make for somewhat more uniformity in the mitochondrial genome. Although two cytoplasms exist for producing hybrids, U.S. carrot seed production and breeding relies almost exclusively on the petaloid type. To the extent that single cytoplasms are a concern for genetic uniformity, carrot would fall into a group that should be carefully watched.

- Garlic has relatively few clones in wide use, and is thus highly vulnerable, as was demonstrated with an outbreak of garlic rust several years ago. Until recently, no sexual crossing was possible and thus all clones existed as vegetatively-propagated germplasm. Among the four major crops covered by this Crop Germplasm Committee, garlic is perhaps the most vulnerable from a genetic uniformity point of view.

- Onion in the U.S. relies on a single cytoplasm for hybrid seed production. Thus, mitochondrial genome uniformity is likely quite high. Nuclear genome variability exists across U.S. onion germplasm. To the extent that single cytoplasms are a concern for genetic uniformity, onion would fall into a group that should be carefully watched.

- Table beet relies on a single cytoplasm for hybrid seed production, and this is the same cytoplasm used for sugar beet. Nuclear genome variation exists, although it is quite limited since very little effort is directed at table beet breeding in the U.S. All the sterile female lines in the U.S. (and worldwide) come from a single public program (Wisconsin) and share a high degree of genetic similarity. Most of the table beet production in the U.S. is handled with a few open pollinated and hybrid cultivars. To the extent that single cytoplasms are a concern for genetic uniformity, table beet would also fall into a group that should be carefully watched, particularly in light of the fact that the same cytoplasm is shared by sugar beet.

2) An identification and rank of the highest impact crop diseases

Carrot

Alternaria leaf blight
Root-knot nematodes (several species)
Pythium/cavity spot

Garlic

White rot
Nematodes
Rust

Onion

White rot
Onion maggot
Thrips
Fusarium
Pinkroot
Nematodes (as a group)
Iris yellow spot virus
Smut
Downy mildew
Botrytis (neck and leaf)
Bacterial rots of the bulb
Purple Blotch
Onion yellow dwarf virus
Rust

Reports of human diseases (E. coli-based) harbored in green onions suggests that fresh (probably not processed) onion could be a vector of human disease

Table beet

Rhizoctonia root rot
Cercospora leaf blight