

USDA SOYBEAN GERMPLASM COLLECTION REPORT -- 2009

February 2010

In 2009, we distributed 59,384 seed lots from 20,062 accessions from the USDA Soybean Germplasm Collection in response to 766 requests from 382 individuals. There were 661 domestic requests (86% of the total) with a total of 33,922 seed packets representing 17,776 accessions sent to 320 researchers from 38 states and the U.S. Virgin Islands. Domestically, public scientists made 414 requests and scientists with commercial companies made 195 requests. There were 25,462 seed packets of 17,651 accessions in 105 orders sent to 62 scientists in 18 countries. Thirty requests were made for 695 seed packets of 506 perennial *Glycine* accessions. We also sent backup seeds of 733 accessions to the National Center for Genetic Resources Preservation and 2,805 accessions for storage in the Svalbard Arctic Seed Vault. We have now sent 6,691 accessions to Svalbard. A sample for Svalbard is packaged each time a new seeds are added to the Collection so over a period of 10 years all annual accessions will have been sent.

All of the available accessions have now been sent to Embrapa in Brazil, and Tropical Melhoramento e Genética (TMG), a private Brazilian plant breeding company, with 9,317 accessions sent this year. All available annual accessions have been sent to Perry Cregan and David Hyten as part of a joint project funded by the United Soybean Board to characterize each accession for 50,000 single nucleotide polymorphisms (SNPs) with 15,618 sent this year. This project has helped to fund a temporary germplasm assistant, Ron Beatty, which has allowed us to meet the demand in 2009. Since the soybean collections were consolidated in 1990, the previous record for seed distribution was 29,992 in 1995. In 1993, the average number of seed lots distributed over the previous 4 years was 9179 from 249 requests. That 4 year average reached 15395 in 1995 with 340 requests, 20562 in 2001 with 390 requests, 25881 in 2005 with 477 requests and 322234 in 2009 with 641 requests. Since 1993 the 4 year rolling average for seed lot distribution has increased 251% and the number of requests has increased 65% while the size of the Collection has grown by 27%. Although the Collection continues to grow, the number of requestors and the size of the requests are growing much faster.

We planted 2,596 plots of *G. max* for seed replacement in the Collection. These plots were planted at three locations: 1,387 plots at Urbana, 1,086 plots at Stoneville, and 123 plots in Costa Rica. Plots for pure lining new accessions were planted in Urbana, Stoneville, and Costa Rica. 77 new *Glycine max* pure line accessions from Burundi(4), China(1), Columbia(3), Ghana(1), Japan(3), the Philippines(10), Russia(17), the Seychelles(2), and Vietnam(35); and 61 *G. soja* from Russia(60) and Taiwan(1) were added to the Collection.

We received seeds of 1 *G. max* accession from Japan, 2 domestic cultivars, 2 germplasm releases, and 2 genetic types.

As part five year project with Nick Bajjalieh and Jim Orf funded by the United Soybean Board, 5,530 accessions were analyzed for amino acid and sugar content. This data has been uploaded into GRIN. Although the USB will no longer be funding the work, Jim Orf has agreed to continue analyzing more samples. Old seed is sent to him as new samples are processed.

Under USDA, ARS ARIS Project # 5348-21000-022-02-S, the International Rice Research Institute (IRRI) agreed to georeference all of the locality data in the USDA GRIN database for **collected** accessions ~~that had more collection information than just the country and state.~~ They used Biogeomancer and searched the Internet to provide latitude and longitude coordinates and to verify that records with latitude/longitude values were located in the correct countries. A total of 150,000 accessions were verified as correct. There were 85,297 accessions lacking latitude/longitude data or were incorrect, including 2,190 *G. max*, 514 *G. soja*, and 409 perennial *Glycine* accessions. Corrections

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and clarifications were also made to passport data to standardize the format and arrangement of geographic data. The data from IRRI is being used to update the GRIN records. Currently, there are 45 *G. max*, 890 *G. soja*, and 902 perennial *Glycine* that have latitude/longitude data in GRIN.

A manuscript describing the selection procedure for establishing a core collection for *Glycine max* was submitted to TAG. Using a combination of descriptive, quantitative, and origin data, a core consisting of 1,696 accessions is proposed. The manuscript was accepted pending revisions, but after keeping the revised manuscript in review for 4 months, it was rejected.

During the World Soybean Research Conference VIII in Beijing in August, Roy Scott, ARS National Program Leader for Oilseeds & Bioscience, convened a meeting to discuss germplasm exchange between China and the U.S. No definitive plans were established. We have ongoing discussions with both South Korea and Japan concerning germplasm exchanges.

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As of December 31, 2008, the Collection contained the following entries:

USDA Soybean Germplasm Collection Inventory

Annual subcollection	Entries	Perennial species	Entries	Core
Introduced <i>G. max</i>	16960	<i>G. arenaria</i>	5	3
<i>G. soja</i>	1178	<i>G. argyrea</i>	14	3
Germplasm releases	179	<i>G. canescens</i>	122	18
Modern cultivars	522	<i>G. clandestina</i>	88	16
Old cultivars	208	<i>G. curvata</i>	9	4
Private cultivars	75	<i>G. cyrtoloba</i>	48	5
All isolines	593	<i>G. dolichocarpa</i>	3	0
Color	47	<i>G. falcata</i>	29	5
Genetic types	197	<i>G. latifolia</i>	44	8
Annual sub-total	19959	<i>G. latrobeana</i>	7	5
		<i>G. microphylla</i>	32	10
		<i>G. peratosa</i>	7	0
		<i>G. pescadrensis</i>	68	2
		<i>G. pindanica</i>	4	0
		<i>G. rubiginosa</i>	37	2
		<i>G. stenophita</i>	27	0
		<i>G. syndetika</i>	5	1
		<i>G. tabacina</i>	142	14
		<i>G. tomentella</i>	310	20
		<i>G. sp.</i>	1	0
		Perennial subtotal	1002	116
Collection total	20961			

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Number of accessions screened for pests and diseases for which data is entered in GRIN:

<i>Perennial Glycine</i>			
Type	Descriptor	Qualifier	Accessions screened
CHEMICAL	Bowman-Birk Inhibitor		552
DISEASE	Sclerotinia stem rot		777
DISEASE	SDS		758
NEMATODE	Cyst nematode	Race 3	493

<i>Glycine soja</i>			
Type	Descriptor	Qualifier	Accessions screened
CHEMICAL	human allergen P34		1118
DISEASE	Bean Pod Mottle Virus		117
DISEASE	Phytophthora Rot	Race 3	452
DISEASE	Soybean mosaic virus		182
INSECT	Beet armyworm		425
INSECT	Soybean Looper		379
INSECT	Velvetbean caterpillar		408
NEMATODE	Cyst nematode	Race 1	1078
NEMATODE	Cyst nematode	Race 3	545
NEMATODE	Cyst nematode	Race 4	1
NEMATODE	Cyst nematode	Race 5	547
STRESS	Chlorosis score		21

<i>Glycine max</i>			
Type	Descriptor	Qualifier	Accessions screened
CHEMICAL	Arginine		5530
CHEMICAL	Cysteine		5530
CHEMICAL	Isoleucine		5530
CHEMICAL	Leucine		5530
CHEMICAL	Lysine		5530
CHEMICAL	Methionine		5530
CHEMICAL	Stachyose		5522
CHEMICAL	Sucrose		5483
CHEMICAL	Threonine		5530
CHEMICAL	Tryptophan		5530
CHEMICAL	Valine		5530
CHEMICAL	human allergen P34		13305
CHEMICAL	Petiole Ureide		2499
DISEASE	Bacterial pustule		3438
DISEASE	Bean Pod Mottle Virus		427
DISEASE	Brown stem rot		4033
DISEASE	Frogeye C-32 Isolate		1688
DISEASE	Frogeye race 2		2665
DISEASE	Frogeye, unspecified race		115
DISEASE	Peanut Mottle Virus		2150
DISEASE	Phytophthora Rot	Race 1	9988
DISEASE	Phytophthora Rot	Race 2	433
DISEASE	Phytophthora Rot	Race 3	2823
DISEASE	Phytophthora Rot	Race 4	1479
DISEASE	Phytophthora Rot	Race 5	798
DISEASE	Phytophthora Rot	Race 6	139
DISEASE	Phytophthora Rot	Race 7	3002
DISEASE	Phytophthora Rot	Race 8	149

DISEASE	Phytophthora Rot	Race 9	96
DISEASE	Phytophthora Rot	Race 10	629
DISEASE	Phytophthora Rot	Race 12	646
DISEASE	Phytophthora Rot	Race 17	2235
DISEASE	Phytophthora Rot	Race 20	659
DISEASE	Phytophthora Rot	Race 25	2844
DISEASE	Phytophthora Rot	Race 30	115
DISEASE	Phytophthora Rot	Race 30T	263
DISEASE	Phytophthora Rot	Race 31	145
DISEASE	Phytophthora Rot	Race 33	113
DISEASE	Phytophthora Rot	Race 38	65
DISEASE	Pythium ultimum		1290
DISEASE	Soybean mosaic virus		15
DISEASE	Soybean Rust	Mixed	437
DISEASE	Soybean Rust	Red-Brown	103
DISEASE	Soybean Rust	Tan	3099
DISEASE	Soybean Sudden Death Syndrome		6868
DISEASE	Northern Stem Canker		1489
DISEASE	Southern Stem Canker		120
INSECT	Beet armyworm		5
INSECT	Corn Ear Worm		27
INSECT	Leaf hopper injury		784
INSECT	Mexican Bean Beetle damage		5056
INSECT	Soybean Aphid Resistance		2125
INSECT	Soybean Looper		2335
INSECT	Velvetbean caterpillar		133
NEMATODE	Cyst nematode	Race 1	119
NEMATODE	Cyst nematode	Race 14	2532
NEMATODE	Cyst nematode	Race 2	117
NEMATODE	Cyst nematode	Race 3	12366
NEMATODE	Cyst nematode	Race 4	7379
NEMATODE	Cyst nematode	Race 5	11481
ROOT	Root Fluorescence		796
STRESS	Chlorosis score		4617
STRESS	Salt reaction		564
STRESS	High temperature germinability		520

Photos stored in GRIN:

	Number of Photos	Number of Accessions
<i>G. max</i>	2,755	1,737
<i>G. soja</i>	2,047	1,079
Perennial <i>glycine</i>	2,943	955