

USDA SOYBEAN GERMPLASM COLLECTION REPORT -- 2001

February 2002

In 2001, we distributed 16,584 seed lots from the USDA Soybean Germplasm Collection in response to 400 requests from 214 individuals. There were 338 domestic requests (85% of the total) with a total of 10,871 seed packets representing 7,301 accessions sent to 172 researchers from 32 states and Puerto Rico. Domestically, public scientists made 243 requests and scientists with commercial companies made 95 requests. There were 5,713 seed packets of 5,187 accessions in 62 orders sent to 42 scientists in 20 countries. We also sent seeds of 836 accessions to the National Seed Storage Laboratory for backup.

We planted 1,540 four-row plots of *G. max* for seed replacement in the Collection. These plots were planted at two locations: 1,194 at Urbana and 346 at Stoneville. We added approximately 439 new pure line accessions from China, North Korea, Poland, and Vietnam to the Collection.

We received 100 new accessions from Vietnam, two from Myanmar, 170 accessions from Brazil, and one from South Korea. We also received seeds of 15 domestic cultivars and 5 germplasm releases.

The second year of evaluation of 1,061 accessions in maturity group V with introductions up to PI 408.345 and the first year of the remaining 503 accessions in maturity groups V to VIII were planted at Stoneville. The second year of 850 maturity group V accessions from PI 416.758 to PI 597.389 and the 503 accessions in maturity groups V to VIII will be planted at Stoneville in 2002. The first year of the remaining 1,190 maturity group I to IV accessions was planted at Urbana and 496 accessions in maturity groups 000 to I were planted in Rosemount, MN. The second year of the Urbana and Rosemount evaluations will be planted in 2002. With the 2002 data, all accessions added to the collection prior to 2000 will have been evaluated. This will complete a 12 year project to complete the evaluation of all of the accessions in the Collection.

We grow sub-tropical and tropical accessions in Costa Rica. We had significant germination problems with seeds grown there in the summer of 2000. Production was good and seed appearance was excellent, and the cause of the problem is unknown. No plots were grown this summer. Seed production with late maturing lines has been poor at Stoneville for the past few years so nearly 100 group VIII accessions are being increased in Costa Rica this winter along with more than 100 group IX and X accessions. We are also growing over 150 plots of new introductions or purelines from China and Vietnam.

The Technical Bulletin No. 1894 "Evaluation of the USDA Soybean Germplasm Collection: Maturity Groups VI - VIII (FC 03.659 - PI 567.235B)" containing agronomic and descriptive data for 1625 accessions was published, and the data uploaded into GRIN. Agronomic and descriptive evaluation data for 1353 accessions in Maturity Groups 000 - IV (PI 507.670 - PI 574.486) and 479 accessions in Maturity Groups IX - X (PI 163.308 - PI 567.238) are in the final editing stage before publication.

The following disease data were added to GRIN:

- Reaction to Brown Stem Rot for 625 accessions screened by M. Kirsch and Brian Diers.
- Reaction to races 1, 3, 7, and 25 of Phytophthora rot for 2,456 accessions from China screened by R. Smith and Brian Diers.
- Reaction to races 3, 5, or 14 of soybean cyst nematode for 2,479 accessions screened by L. Young.
- Reaction to races 3, 4, or 5 of soybean cyst nematode for 9,916 accessions screened by S. Anand.

- Reaction to stem canker for 1,356 accessions from David Weaver.

The current perennial *Glycine* inventory is 919 accessions in 13 species, plus one unclassified accession. We presently have no accessions for *G. albicans*, *G. hirticaulis*, and *G. lactovirens*. In 1999, we began to increase the perennial collection starting with the Australian core collection established by Tony Brown of CSIRO in Australia. These are being grown in pots in the greenhouse during the winter and moved outside during the summer months. Most plants produced seed within a year, but a few still have not flowered. 85% of the core collection and 53% of all perennial *Glycine* accessions now have sufficient seed to distribute. Digital images of leaves, pods and seeds, and flowers are being taken as the perennials are grown. These images are on GRIN. Eighteen seed requests were made for 264 seed packets of 164 accessions in 2001 and 152 of those accessions had sufficient seed to distribute. Dr. Tony Brown generously agreed to fill requests for the perennial *Glycine* that we did not have.

We were asked by those establishing the new system for soybean cyst nematode classification to be the sole supplier of seeds for typing. We agreed to do this at least temporarily. This year we grew large increase blocks of nine lines. Eight are currently being used as differentials and the ninth may be added in the near future. Have approximately 300,000 seeds of each line.

We were successful in obtaining plant exploration funds to continue collecting primitive soybean varieties in Vietnam. We are cooperating with Dr. Luu Ngoc Trinh, Director of National Plant Genetic Resources Center, Vietnam Agriculture and Science Institute (VASI) and Mr. Truong Trong Ngon of Can Tho University. Both of these men visited Urbana last year and plans for collecting were made at that time. We have identified priority areas for collecting in northern, central and southern provinces of Vietnam. This grant is a departure from usual USDA policy as there will not be a U.S. representative on the collecting team. This will also be a major test as to how this will work. Both of these men are highly competent to complete this work and by not having to pay travel costs from the U.S. the funds available for collecting are significantly increased. The arrangements are still being made for this work to begin in 2002.

Yiwu Chen recently completed his Ph.D degree research on *Glycine soja* evaluation using all of the accessions in the Collection. This included a extensive study of leaf shape and the geographical distribution of those phenotypes. Pictures of leaflets for all accessions were collected and added to GRIN. Preliminary genetic results indicate that two additional loci are conditioning leaf shape in *G. soja* that have not been identified in *G. max*. He also found that *G. soja* lines vary greatly in early season growth. Thirty days after planting accessions with similar maturity can differ by over 80 cm in plant height. Oil, protein, fatty acid, and isoflavone concentration data are being collected but not completed. These data will be published in a USDA technical bulletin and entered into GRIN. His research also included a comparison of accessions of *G. soja*, *G. max*, and semi-wild types. Analyses based on either phenotypic data or SSR markers separated all three types into three discrete groups. Although the semi-wild types are most likely products of *G. max* by *G. soja* hybridization, these data indicate that they could be a distinct gene pool that should be considered in establishing a core collection.

Greenhouse planning for a new ARS greenhouse to built on the University of Illinois campus are nearly complete. This new facility will provide us with 4 bays which will give us with more flexibility in controlling photoperiod. Two bays are designed for growing the perennial species and two for annual species. Occupancy by next winter is not likely.

For the past year we have had a full-time, temporary person working with the Collection primarily processing seeds. We plan on making this a full-time permanent ARS position in 2002 and will be conducting a national search for this technical support position.

As of December 31, 2001, the Collection contained the following entries:

Annual subcollection	Entries	Available		
Introduced <i>G. max</i>	16413	16268		
<i>G. soja</i>	1114	1113		
Germplasm releases	138	138		
Modern cultivars	474	471		
Old cultivars	207	202		
Private cultivars	31	30		
All isolines	593	592		
<u>Genetic types</u>	<u>178</u>	<u>173</u>		
Annual sub-total	19148	18,987		
Perennial species	Entries	Available	Core	Core Available
<i>G. arenaria</i>	3	0	3	0
<i>G. argyrea</i>	12	3	3	3
<i>G. canescens</i>	119	49	20	20
<i>G. clandestina</i>	116	50	18	14
<i>G. curvata</i>	6	4	4	3
<i>G. cyrtoloba</i>	44	16	5	5
<i>G. falcata</i>	26	9	5	4
<i>G. latifolia</i>	43	24	8	8
<i>G. latrobeana</i>	6	2	6	2
<i>G. microphylla</i>	34	28	9	9
<i>G. pindanica</i>	1	1	0	0
<i>G. tabacina</i>	229	121	15	15
<i>G. tomentella</i>	279	176	21	17
<u><i>G. sp.</i></u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>
Perennial subtotal	919	483	117	100
Collection total	20067	19470		

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