

Soybean Germplasm Committee Meeting February 13, 2023

The meeting was called to order by chair Anna Locke.

Members present were:

Anna Locke, Chair and Physiologist (USDA-ARS, Raleigh, NC) (vice-chair 2020-2022, physiologist term 2020-2023)

Roy Scott, *ex officio* Nation Program Staff representative

Adam Mahan, *ex officio* Curator (USDA-ARS, Urbana, IL)

Benjamin Bartlett, Secretary and *ex officio* Assistant Curator (USDA-ARS, Urbana, IL)

Rusty Smith, *ex officio*, Associate Curator (USDA-ARS, Stoneville, MS)

Bob Stupar, Genomicist (University of Minnesota, Minneapolis, MN) (term 2020-2023)

Leon Sun, Pathologist (BASF) (term 2020-2023)

Qijian Song, Molecular geneticist, genomicist (USDA-ARS, Beltsville, MD) (term 2020-2023)

Krystal Navarro, Pathologist (Corteva, Johnston, IA) (term 2020-2023)

Lisa Weaver *ex officio* SmithBucklin/United Soybean Board representative

Aaron Lorenz, Public Breeder North (term 2023-2026)

Benjamin Fallen, Public Breeder South (term 2023-2026)

Innan Cervantes Martinez, Private Breeder South (term 2023-2028)

Pedro Gonzalez, Private Breeder North (2023-2028)

Members not present:

Milad Eskandari, Canadian breeder (term 2021-2024)

Incoming members present:

Jason Gilman, Genomics/Molecular biology (term 2024-2027)

Others present:

Peter Bretting (USDA National Program Leader, Crop Production and Protection)

Anne Gillen (USDA-ARS Research Geneticist and Uniform Soybean Test coordinator)

Katherine Stowe (US Soybean Research Collaborative)

Gary Kinard (USDA-ARS)

Gayle Volk (USDA-ARS)

The meeting began with Anna Locke calling the meeting to order. Everyone attending the meeting introduced themselves to the other members.

Anna Locke displayed the 2023 Committee Members list with their Committee Roles and Term Dates. Several people are rotating off the committee in the upcoming year and will need replacements. The Committee Roles that will need replacement are one Geneticist, two Physiologists, and two Pathologists. Committee Members will soon receive email correspondence with prospective Committee Members and their Committee Roles for a vote. Krystel Navarro has nominated her successor at Corteva to replace her as one of the Pathologists.

Typically, the role of the Chair of the Committee is to organize the meeting at the Soybean Breeder's Workshop. In the past a second, mid-year meeting has sometimes been held. Benjamin Fallen accepted the role for Chair of the Committee and Pedro Gonzalez accepted for Vice-Chair.

The Minutes for the 2022 Soybean Germplasm Committee were approved without dissent.

The Annual Report of the USDA Soybean Germplasm Committee was presented by Adam Mahan. The following items from the Annual Report were discussed:

Jess Fowler was hired in October for the Research Technician position that was vacated by Clint Heiman in January 2022.

David Walker retired as a Geneticist and a post-doc will likely be hired to quickly fill the vacancy at this time. This arrangement does not abolish the position within the USDA, but rather provides flexibility in hiring and potentially allows for the post-doc to transition into a permanent salaried position. Committee Members are encouraged to submit candidates as a post-doc directly to Adam Mahan.

Adam Mahan has been named Acting Research Leader within the USDA Soybean/maize Germplasm, Pathology, and Genetics Research unit.

A Color Sorter machine is operational at the USDA Soybean Germplasm Collection in Urbana, IL. There is a considerable backlog of seed that needs cleaning from 2019 and onwards. This machine has already increased the rate of cleaning seed and is helping eliminate the backlog. The goal is to be within one growing season of seed that needs cleaning. The Color Sorter is intended to work best with yellow seed and can help process seed in a breeding program. However, there are limitations, which include difficulty with identifying hilum color, detecting stink bug damage, and distinguishing between slightly green seed from yellow seed. The Color Sorter can detect purple stain, mold, and other discolorations very well, along with detecting misshapen seed and sorting seed on size and shape. Color Sorter cost in the range of \$70k.

Collection staff are in the process of working with the National Agriculture Library and the UIUC Agriculture Library to digitize decades of hard-copy historical documents. Anna Locke suggested that the USDA Office of Technology Transfer be consulted before any action be taken. Ideally, the Collection will make these documents available from a USDA-ARS or .GOV website.

The Collection needs a cold room that can maintain -18°C temperature and 25% humidity for optimal, long-term seed storage conditions, in addition to a 4°C, 25% humidity cold room. The current cold room cannot reliably maintain the latter conditions. Installing a new -18°C coldroom is not likely to happen in the current site that is more than 45 years old. The future goal is to move the entire collection to a new facility and that would have both long- and short-term cold room capacity. Upgrading to long-term seed storage will reduce error in seed handling due to fewer re-grows, and allow the Collection staff to perform other research objectives. The USDA Soybean/maize Germplasm, Pathology, and Genetics Research unit received funding for deferred maintenance in 2023. Some of these funds will go towards upgrading the current coldroom to maintain the minimum standard of 4°C and 25% humidity.

There are many exPVPs that will be available to be distributed by the collection in the upcoming years. The vast majority of these exPVPs are varieties with genetically engineered traits. Specifically, more than 2,200 exPVPs with GE traits current have PVP registration. Within the next 10 years, more than 900 GE varieties

will be available to be accepted into the collection. The USDA is currently drafting a policy to allow the distribution of these varieties. It was mentioned that these exPVPs should be genotyped once received. Roy Scott remarked that there aren't any restrictions for genotyping these exPVPs before the USDA policy is implemented. However, such a project will require funding.

The main cold room is approaching storage capacity, with approximately 98% of the main cold room storage being occupied. Finding cold room storage space for any new varieties will be a challenge. The Collection has two smaller cold rooms that need upgrades. Adam plans to submit requests for a small cold room to replace the two existing, aging coldrooms to the USDA Midwest Area office.

The Collection has many public and private varieties (exPVPs) that don't contribute much to the genetic diversity of the Collection and are requested infrequently. Adam Mahan is currently drafting a proposal to the Committee to inactivate these varieties after 10 years. These varieties will remain in long-term storage in Fort Collins but will not be available for distribution. This will free up limited storage space and reduce the number of accessions grown for seed increases. Moreover, most breeders will have already requested any varieties within that time and will be maintaining those accessions in their own collection. It should be noted that any varieties that are frequently requested will remain active and the best yielding older conventional varieties will remain active. It is up to the discretion of the Soybean Curator to inactivate any varieties and to replenish seed stored in Fort Collins.

The Collection primarily only accepts improved cultivars that carry a Journal of Plant Registration, PVP certificate, or other varietal release. The Collection does not have the capacity or budgetary resources to accept seed from genetic mapping or mutant populations. Adam Mahan and Anna Locke have initiated a one-pager for developing a companion collection solely for mutant soybean types, similar to the Maize Genetic Stocks Collection. Currently, the Collection can only increase seed on approximately 1,000 accessions in Urbana, IL, 700 accessions in Stoneville, MS, and 200 accessions in Costa Rica.

The Collection is currently able to test germination rate for all newly grown seed. This step prevents poor quality seed from being distributed to Fort Collins and to seed requestors. Last year 2500 accessions were tested for germination.

The Collection distributes seed worldwide. Some countries require import permits before seed can be sent to that country. Some import permits carry restrictions on diseases that are prevalent to our growing locations. In these cases, the requestor must request an exemption. Sometimes exemptions can be made. The Collection does its best to fulfill international orders but does not fulfill orders until an import permit has been obtained.

The Collection maintains wild relative *Glycine soja* and perennial *Glycine*. The Soja were grown inside an in-ground greenhouse room this year. This method replaces the insect-proof screen cage that is assembled in the field. Perennial *Glycine* accessions are grown in a greenhouse room with blackout curtains that manipulate the photoperiod (daylight hours) received by the plants. Reducing the photoperiod is intended to induce flowering. Perennial *Glycine* species flower with anywhere between 10-14 daylight hours.

Bob Stupar asked for clarification on the *G. max* × *G. tomentella* hybrids that had been reported several years previously. Adam Mahan and Jason Gillman filled in that these lines are still undergoing some testing, but so far none of the purported hybrids have been validated as containing *G. tomentella* DNA.

Dr. Jeff Doyle and Dr. Jacob Landis, at Cornell University are conducting genetic analysis on perennial *Glycine* accessions from the Collection. Dr. David Hyten, at the University of Nebraska, has continued a project to re-sequence the Collection. The staff in Urbana, IL grew larger quantities of seed for protein analysis from several accessions to be analyzed by Impossible™ Foods for meat-substitute properties. Through this analysis, Impossible™ Foods will be providing information on carbohydrate composition for each accession which will be uploaded and made publicly available via GRIN-Global. Steve Clough and Matt Hudson are continuing to analyze the genome from perennial *Glycine* crosses. None of the perennial *Glycine* crosses with conventional soybean have been validated.

As time was running low the remaining topics from the Annual Report were briefly discussed (see Annual Report).

Rusty Smith opened a discussion on sharing large quantities of seed from publicly available releases. He described this as casually sharing seed. Many public breeders maintain a large stock of seed that are used in field experiments. This seed is then requested by collaborators and often provided by the breeder. Recently, it was determined that USDA employees do not have the authority to provide seeds in this manner. All seed requests must be submitted to the Curator and be distributed by the Collection. Otherwise, USDA employees must submit an MTA to provide seeds. Roy Scott confirmed this policy and provided an explanation that the USDA wants to maintain identity of the requested seed and keep a record of seed requests for accountability.

The meeting was adjourned.

Submitted by Benjamin Bartlett, Assistant Soybean Curator