

## Coffee and Cacao Crop Germplasm Committee

### 17 November 2022 Meeting Minutes

8:00 – 9:30 PM (Germany – CET); 3:00-4:30 PM (PR); 2-3:30 PM (Eastern); 1-2:30 PM (Central & Costa Rica); 12-1:30 PM (Mountain); 11 AM-12:30 PM (Pacific); 9-10:30 AM (Hawaii)

#### **Attendees:**

Dominique Dessauw, Kimo Falconer, Mark Gultinan, Sarada Krishnan, Vern Long, Ray Schnell, Suzanne Shriner

Ex-officio: Peter Bretting, Ricardo Goenaga, Osman Gutierrez. Gary Kinard, Tracie Matsumoto

#### **Absent:**

Eduardo Cortes, Rolando Cerda Bustillo, Path Umaharan, Juan Medrano, Chifumi Nagai, Ed Seguíne

Ex-officio: Tomas Ayala Silva, Stephanie Greene, Lyndel Meinhardt, Tim Rinehart, Gayle Volk, Christina Walters, Dapeng Zhang

- **Welcome & roll call**

Sarada Krishnan, chair of the committee welcomed everyone and did a roll call to capture attendance. A few members had notified ahead of the meeting regarding their absence.

- **Approval of November 11, 2021 meeting minutes**

Vern Long moved and Ricardo Goenaga seconded the approval of the minutes, and they were approved.

- **Introduction of Dr. Qingyi Yu, new Research Geneticist at the DKI PBARC Tropical Plant Genetic Resources and Disease Research Unit in Hilo, HI**

The hiring process took a while, and they are thrilled to have Dr. Qingyi Yu on board. Dr. Qingyi Yu received her Ph.D. in Molecular Biosciences from the University of Hawaii at Manoa in 2003. From 2004-2009, she worked at the Hawaii Agriculture Research Center as a principal investigator. She joined the faculty of Texas A&M University as an Assistant Professor in 2009, Associate Professor in 2015 and full professor in 2022.. Dr. Yu's research uses genomics approaches to study agronomically important traits of tropical crops and translates and integrates genomics discoveries into breeding practice. She played a key role in development of genomics resources for tropical crops, including coffee, which significantly expand capacity to apply genomics-enabled technologies into tropical crop improvement. She has hit the ground running.

- **Cacao and coffee germplasm updates; HARC NIFA grant – Tracie Matsumoto**

Hilo repository is fully staffed now. Lost two of their long-time technicians. Claire Arakawa, tissue culture technician retired May 2021 and is now replaced by Donna Ota. Russel Kai who had been with the repository since establishment also retired in May 2022 and is replaced by Elton Mao. Tracie also introduced all the other staff.

Coffee leaf rust situation update: since discovery in Maui in 2020, the disease has moved to all islands. Samples were sent for molecular analysis to Dr. Aime's lab at Purdue. They have confirmed that the strain found in Hawaii to be the same as that found in Central America and Caribbean. Looks like a single introduction into the island. In addition, race identification was done

by Dr. Victor Varzea and Dr. Maria do Ceu Silva at the University of Lisbon, Portugal, confirming the presence of Race XXIV; V 2,4,5. Samples were sent from Maui, Lanai and Hawaii islands and they all came as the same strain. Working with Dapeng Zhang to do SNP characterization of collections at CATIE as well as some from HARC. Once unique accessions are identified, a core collection will be developed both at Hilo and Mayaguez. Dr. Chris Walters' group is looking at long-term cryopreservation of some of the material as well. Because of regulations on bringing in materials, they are starting with materials at HARC. Based on Dapeng's study, accessions identified for transfer are now being bagged and selfed. HARC variety trial is being conducted in Kunia and Hilo. Other ongoing projects include:

- Propagation of lines from the World Coffee Research IMLVT project
- Project with HARC – breeding Catimor and Obata (elite Hawaiian lines) to incorporate disease resistance
- Fungicide and Beauveria trials with HDOA Specialty Block Grant
- Identification of CLR resistant lines in Hawaii
- Working on agreement for the WCR breeding network
- Working with ARS Fort Detrick and Nestle to screen populations for resistance to different CLR races
- APHIS is completing inspection of their facility and should be getting their controlled import permit soon
- Cocoa - Screening for Cocoa Mild Mosaic Virus

Suzanne gave an update on the 6.1 mil grant NIFA grant. Completed first year of grant. 5 objectives:

1. Variety testing in Hawaii and PR to test most adaptable to microclimates. Difficult to get permits. Materials tied up for two years. A little behind schedule. Micropropagation of some of the materials. In one of the fields, three trees not infected by rust. Sent to Dapeng for identification - mix of Sarchimor and Burboun (maybe mix of three varieties). Propagating those. Also testing for nematode resistance.
2. Second year of field survey for environmental monitoring to see how fungicides and agronomic practices are working against CLR. In Kona having a very hard time – yields down by 50% and in well managed farms by 20% due to CLR. Going to be a very hard time for coffee farmers in Hawaii. Trying to dial in IPM to get over this period before new varieties can be released. Between low yields, high cost of labor and fertilizer, the economic impact is going to continue into next year.
3. Fungicide efficacy and biocontrol trials. Optimize field health through soil management.
4. Fourth objective – genetics – understanding resistance. Genetic markers at Aime lab, project out of PR. Comparison between Caturra and CLR resistant varieties.
5. Economics – Michigan State – cost of replacement with resistant varieties vs. management with current situation.

Penn State starting a program in Cacao to test if tissue culture will clean out latent virus. Possibly through somatic embryos based on a recent paper. Will also try meristem culture with thermotherapy if this does not work.

- **Cacao and coffee germplasm updates – Ricardo Goenega**

Ricardo gave an update on the Mayaguez cacao collection. Quarantine greenhouse was approved by APHIS and they are now free to introduce materials. Hurricane Fiona impact – lots of rain, 30”

over 72 hours. Cacao collection did not suffer damage. NPRDS funding – Tomas has been characterizing clones from Ecuador, which has been completed. Criollo clones (41) are being evaluated. Passport data entered into GRIN-Global. Samples of all accessions in the collection, including back-up collection in shade house have been sent for CaMMV testing to Judy Brown. Awaiting results. Constructing a map of positive and negative trees. 30 samples have been submitted to Ed Seguire for organoleptic characterization. After discovery of CaMMV, experimenting with in vitro culture from flowers from virus free plants. With Maria Jenderek in Ft. Collins, assisting by propagating using budwood instead of flowers in tissue culture.

Compatibility test done in 96% of the accessions selected for this study. To be considered compatible, flowers need to remain on the tree for twenty one days after artificial pollination and 30% of all pollinations meeting this requirement. Out of 20 pollinations, at least 6 flowers should remain and develop into fruit to be considered compatible. Maintenance practices are performed regularly. Priority now is full recovery from hurricane Fiona, which is now completed and grafting of CaMMV negative trees and establishment in tissue culture. Hurricane Maria in 2017 caused severe damage to the trees, with severe defoliation and exposure to sun causing sun scalding. Since then, they have kept a good stock of anti-transpirants, fungicides and water-based white paint. This came in useful after Hurricane Fiona, where they were able to respond quickly. The trees responded extremely well. Defoliation was prevented.

Plant Pathology work - IR4 Syngenta grant – Ridomil treatment was not very effective in controlling cacao pod rot. 233 accessions were evaluated for cacao disease survey. 30% were infected with *Diaporthe* spp., 23% with *Botryosphaeriaceae* spp. and 21% with *Colletotrichum* spp. and were largely responsible for cacao pod rot. *Phytophthora* was not the only culprit.

Field research – at Corozal location the Ecuadorian clone experiment had to be terminated due to loss of trees after Hurricane Maria, compromising experimental design. A new experiment has been established. Decided to delete 3 clones from former experiment. RCBD with 6 replicates, 4 trees per treatment per replication. Temporary shade (sorghum) was installed. Another experiment to cross high yielding clones from TARS with Ecuadorian clones selected by Ray and Ricardo. Crosses were made and resulted in 6 populations. Promising materials from this will be tested in Colombia and QTL discovery for resistance to black pod as part of Osman's five-year project plan.

Miami – Plant Science/Entomology Quarantine Complex – Cacao quarantine greenhouse will have two independent areas to grow quarantine cacao plants. This will give the opportunity to introduce and release accessions at two different dates. Project 70% completed and expected to be completed in December 2022.

Site has been identified and prepared for the coffee collection. It's ready to go. Once Hawaii gets the collection and have identified the core collection, they will establish the Mayaguez core collection. First planting will be the IMLVT varieties.

Ed Seguire's report – beans have been received from Mayaguez and Hilo. They have been secured in cool storage (<60F) to protect them from infestation. Expect to start processing following the Thanksgiving holidays.

- **2022 NPGS Briefing – Peter Bretting**

Dr. Bretting gave the 2022 NPGS Briefing. Key points from the presentation:

- Growth of collection slow over the past 5 year – mainly concentrating on filling gaps.
- 600,000 accessions of 16,000 species at end of 2021.
- Demand for germplasm went down in 2020 but going back up now.
- COVID impact - Genebanks finding it very difficult to hire temporary labor, especially student labor.
- Budget, after taking a hit in 2013 has now bounced back. 2021 budget about \$50 million. When inflation is taken into account, purchasing power has declined.
- Challenges – increased operational costs, personnel transitions, cryopreservation of clonal crops, developing BMPs for accessions with GE traits, acquisition and conservation of additional PGR/CWR.
- Training new personnel is a challenge – effort spearheaded by Gayle Volk and CSU have developed an online training program for PGR management, funded by NIFA. Numerous PRG training and educational materials are available at GRIN-University. Infographic posters have also been developed. <https://grin-u.org/>

- **WCR updates – Vern Long**

- IMLVT agreement with USDA signed, through June 2027. 30 varieties sent to Hawaii and Puerto Rico.
- Launched their global breeding network for Arabica – Innovea. Nine countries invited (US, Peru, Mexico, Costa Rica, India, Indonesia, Kenya, Rwanda, Uganda). Agreement pending with USDA/Hilo. Seeds will be sent out in January 2023.
- Ethiopian collaboration – USDA-ARS Hilo and HARC staff conducted an expert assessment of the propagation lab for EIAR. Many countries have been asking for propagation support.
- Breeding program assessment tool – U. of Queensland developed a tool commissioned by the Gates Foundation that helps breeding programs assess their performance against benchmark of high-performing small programs. WCR used this tool to conduct a review of India’s breeding program and will receive the results soon. This will help them orient their resources to improve efficiency of their breeding program. This has been done for Ethiopia and Uganda and will be performed for Indonesia in January. This will give an understanding of operational approaches and provide recommendations for improvement. This will help prioritize capacity building plan for the next few years.
- Michigan State University – economic analysis on impacts of R&D on outcomes of productivity. This will help governments with allocating funds for coffee R&D. White paper will come out in Feb. 2023.
- 2023 plans include global robusta breeding program, developing medium density panel for arabica and robusta, and precommercial trials of WCR hybrids. Four candidate hybrids with moderate cupping scores of 82/84 with good performance in El Salvador and Costa Rica. Contract with CATIE to propagate the material with plantlets ready in Q2 or 3 of 2023.
- IFPRI discussion paper – released in August. Evidence to make a case for increased investment in coffee R&D (<https://www.ifpri.org/publication/revisiting-rates-return-agricultural-rd-investment>).

- **New chair for the CCCGC – someone from the Cacao sector**

It will be good to have a new chair from the Cacao side. Bylaws dictate that chair is rotated between the two industries every 2-3 years. No one came forward. Vern offered to work with Sarada to look at the bylaws and identifying next steps. Until a new chair is identified, Sarada will continue as chair.

- **2023 meetings and other business (5 min)**

Update from Gayle Volk – NLGRP will be starting cryo-exposures of shoot tips for one coffee cultivar. It didn't work on the first try, but that is not uncommon.

Update from Gary Kinard – changes in GRIN-Global, it is in the report that Gary shared. Karen Williams in the Plant Exchange Office who has been with the ARS for close to 40 years will be retiring in December, which will leave a huge gap in the ARS. Dr. Anne Francis was hired about a year ago who will be taking over Karen's duties.

Dominique announce the CIRAD International Symposium of Cacao Research in Montpellier in early December (Dec. 5-7, 2022).

Sarada will work with Tracie and Tomas to identify meeting dates for 2023. We will plan to have one coffee and one cacao meeting followed by a meeting of the full committee. Dates will be communicated in early 2023. Recording of this meeting will be send to everyone.

The meeting adjourned at 3:34 pm ET.