**2021 Sugarcane Crop Germplasm Committee Meeting**

**Virtual Meeting via Zoom**

**July 20, 2021**

**Chaired By Dr. Anna Hale, USDA-ARS, Houma, LA**

**AGENDA**

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| 9:00-9:10 | Introductions and welcome | **Zoom:**  Meeting ID: [160 665 3292](https://www.zoomgov.com/j/1606653292?pwd=eVh4NjFJWVlPeWdpTFliZU1UMktUZz09)  Access Code: 623813 |
| 9:10-9:15 | Approval of previous meeting’s minutes (previously sent to committee) | Collins Kimbeng – LSU Ag Center, Baton Rouge, LA |
| 9:15-9:25 | National Germplasm Resources Laboratory’s 2017 Report to PGOC, RTACs and CGCs | Gary Kinard, USDA-ARS-NGRL, Beltsville, MD |
| 9:25-9:40 | Report on the Status of the World Collection at SHRS, Miami | G. Shad Ali |
| 9:40-9:50 | NPL Report | Peter Bretting, Beltsville, MD |
| 9:50-10:10 | Discussion of importation of non-stalk material from foreign sources. | Charley Richard, C. Richard and Associates, LLC., New Orleans, LA and Chris Laborde, U.S. Sugar Corp., |
| 10:10-10:25 | BREAK |  |
| 10:25-10:35 | Nomination of Committee Members and Officers |  |
| 10:35-11:20 | New Topics and Open Discussion (GRIN system, tissue culture, databases, etc.) | Open Discussion |
| 11:20 | Adjourn |  |

In attendance:

|  |  |
| --- | --- |
| Anna Hale (USDA, Houma)  Collins Kimbeng (LSU AgCenter)  James Todd (USDA, Houma)  Aliya Momotaz (USDA, Canal Point)  Orlando Coto (USDA, Canal Point)  Jack Comstock (USDA, Canal Point, Rtd & Representing Rio Farms, TX)  Ricardo Goenaga (USDA, Miami)  Gul Shad Ali (USDA, Miami)  Duli Zhao (USDA, Canal Point)  Charley Richard (C. Richard & Assoc. Rep. a Couple of growers, New Orleans)  Jim Shine (SCGC, Belle Glade) | Jeff Hoy (LSU AgCenter, St Gabriel)  James Shine (SCGC, Belle Glade)  Bishwo Adhikari (USDA, APHIS, Beltsville)  Tim Rinehart (USDA, Spec. Crops, Beltsville)  Peter Bretting (USDA, CPP, Beltsville)  Christopher LaBorde (US Sugar, Clewiston)  Herman Waguespack (ASCL, Thibodeaux)  Niranjan Baisakh (LSU AgCenter, Baton Rouge)  Kenneth Gravois (LSU AgCenter, St. Gabriel)  Gary Kinard (USDA, NGRL, Beltsville)  …………………………………………………..  Present but did not self-identify  Claudia Kaye  Keo Corak  Amanda Hulse-Kemp  Phillip Rott |

Meeting was called to order by Chair Dr. Anna Hale at 9:00 AM.

**\*\*Approval of previous meeting’s minutes, Collins Kimbeng – LSU Ag Center, Baton Rouge, LA.**

* Chair Anna Hale tabled the minutes for approval.
* Gravois motion to approve minutes.
  + Herman 2nd

**National Germplasm Resources Laboratory’s 2017 Report to PGOC, RTACs and CGCs; presented by Gary Kinard, USDA-ARS-NGRL, Beltsville, MD**

* Plant explorations disrupted by Covid. Only a few took place last year, and a couple planned for this year.
* Local and regional, hope for recovery of activity in FY 22.
* Exchange office: new scientist, Dr. Anne Frances, coming from conservation NGO, experience with field botany, will be working with Karen Williams to learn the ropes, before Karen retires.
* Vacancy: Dimitre’s position empty, he remained with ARS, will still collaborate.
* Hope we can fill position with someone good, will collaborate with Dimitre maybe not on sugarcane pathology but small fruit project.
* GRIN and GRIN mobile have remained active during pandemic, made a lot of progress last year, new versions and updated version of the public website now available.

**New Tropical Fruits Curator; presented by Ricardo Goenaga, USDA SHRS, Miami, FL**

* Introduced Dr. Gul Shad Ali.
* Likes to be called “Shad”.
* Will continue to collaborate with Dr. Zhang.
* Was assistant professor at UF.
* From Pakistan.
* Also attended Cornell Univ.
* Worked in Colorado State University.
* Has previously worked on Papaya, Blue berries, and several other crops …on germplasm for stress tolerance using genomics approaches.
* Experience in gene editing, tissue culture.
* 3 patent applications.
* Left (Ricardo) after Shad’s presentation.

**Status of the World Collection at SHRS, Miami; Presented by G. Shad Ali, USDA SHRS, Miami, FL**

* 4 support technicians.
* Works also on Mangos, Avocados, and other tropical and subtropical fruits.
* Sugarcane: objectives of curation are 1. Maintenance/increase 2. Acquisition/distribution 3. Evaluation/characterization.
* In GRIN Global
  + 974 sugarcane accessions, more than half not available (in Miami I suppose).
  + Only 442 available, majority *Saccharum species*.
* At SHRS
  + 609 accessions of *Saccharum.*
  + 298 unknowns.
    - 82 labelled as “unknown” and 216 on concrete slab.
  + 232 other accessions including *Trapsacum sp (178), Miscanthus (12), Chrysopogon (12), Tripidium Bengalense (6), T. kanashiroi (1), T. procerum (1), T. ravennae (1)*
* Resources: Sugarcane and related grasses
  + 5-acre block plus 5-acre rotation block.
  + Rotation with soybean.
  + 20 feet between rows, 15 feet between plots.
  + Have sprinkler system for cold protection.
  + Have drip irrigation system.
    - 15 yrs life span, Subsurface drip irrigation installed with self-flushing and root intrusion resistant emitters, better water, fertilizer, and pesticide management.
  + Working on ventura system for fertilizer and precision pesticide application.
* Re-planted 2014.
* Now ready to replant in field that had soybean.
* Can handle 1134 accessions.
* *Saccharum spontaneum:* maintained in pots on trellised rows on concrete.
  + Aphis permit renewed in 2019.
  + Many accessions repotted recently.
* Mislabeling and identity issues
  + About 300 no labels/ mislabeled or duplicate.
  + Genotyping to determine identity.
  + Need better tracking system.
  + Currently using paper labels.
  + Moving to 20-yr shelf life, UV-resistant, Laser-engraved metallic labels.
  + With two QR code system to ID both, GRIN-Global and Local data collection.
  + Bar codes to take you directly to GRIN Global.
* Modernizing curation
  + Fieldbook data collection of germplasm (Breeding Insight).
  + Will plant replicated field plots of collection, so can perform statistical analysis of data, gene-trait association panel, phylogenomic.
  + Plan future use of molecular phenotype and multispectral #D scanning phenotyping.
* Phenotypic traits eval
  + 56 traits in Grin Global.
    - Stalk ht
    - Diameter
    - Internode length
    - Number of internodes
    - Brix
    - 10 stalk sample
  + Might add
    - Flowering date
    - Disease Resistance
    - Biomass weight per plot
  + Want to characterize & select core collection
    - Will give us …Max diversity/fewest accessions
    - Issues to overcome include:
      * heterozygosity & ploidy a problem, 4x-16x
      * large genome size, 3.36-12.64Gb
* Status of sugarcane genotyping.
  + SSR data failed to conclusively assign individual to specific taxa …. collaborator Wang.
  + 716 sugarcane accessions in SHRS missing from microsatellite data.
* Population genetics structure of 64 *S. spont*. world collection accessions.
  + Done using SNPs
  + 64 sponts, gave 3 major groups.
  + Can trace underutilized genes/alleles of spont in modern sugarcane cultivars.
* Genetic characterization of collection using SNP genotyping.
  + 192 accessions selected based on SSR data and phenotype.
  + 3 sets of 2000 single-dose SNPs.
  + SeqSNP (tGBS targeted genotype by sequencing) …collaborator Dapeng Zhang.
  + Phase 1: Seq SNP (completed).
  + Phase 2 SeqSNP optimized 10K, SNPs, ca 1000 accessions.
  + Phase 3: SeqSNP high resolution, 20K SNP, 300 ccessions.
  + Expect to finish phase 3 by Dec 22
  + Will upload SNP data to GRIN.
* **Distribution**
* In 2022, distributed a total of 33 coming from 13 accessions.
* In 2021 6 coming from 3 accessions
* **Acquisition**
* Covid imposed travel restrictions of exploration travel plans.
* Acquisition through germplasm exchange/ collaboration.
* Will first genotype, then seek to acquire if genetically diverse from our collection.
* **Hawaiian collection** …..collaboration Noa Lincoln.
* Will request indigenous Hawaiian varieties (developed prior to 1778).
  + - 11 sites, 4 Hawaiian Islands (6 ethnobotanical gardens, 2 research collections, 3 private collections).
* Will plant core collection in Miami.
* **Other matters**
* Congress appropriated funds for hurricane damaged facility, work to commence Aug 2021.
* Vacancies: project now fully staffed.
  + **Mislabeling issues:** Plans to invite external Sugarcane expert for ID assistance (Postponed due to COVID).
    - Collaboration with CIRAD, France in fingerprinting.
    - Materials being sent to Angélique D'Hont. (Some progress. Pandemic affected work; Fund transfer made August 2020 to Dr. Dapeng Zhang to initiate collaboration on SNP’s. Collaboration will continue 2021-22.
* **Recovery of lost germplasm:** Instituto Agronômicode Campinas, Sao Paulo, Brazil (Host: Luciana Pinto).
  + - Willing to send germplasm collected at SHRS in the past.
    - Will be quarantined in Maryland. (Pandemic affected trip to Brazil).
* Regeneration of cryopreserved back-up germplasm at USDA-AGRPR, Ft. Collins, CO
  + - Material backed-up in liquid N2:27, 40-90% viability, some need to be retested, ready for field planting.

**NPL Report; presented by Peter Bretting, USDA CPP, Beltsville, MD**

* New accessions coming in.
* Filling genetic gaps.
* Usually distribute ≈250,000 accessions/year.
  + Down 20% in 2020 due to COVID.
* Genebanks range from fully to 50% operational.
* Budget 2020 $47.2M.
* Budget up but purchasing power down.
* Key challenges
  + Retirements.
  + Develop and applying cryopreservation & in-vitro conversation.
* BMPs for managing accessions.
* Have been able to hire.
* Started training program for curators (Gayle Volk & P. Byrne).
* Budget increases were targeted to specific crops (small grains, blueberry, hemp).
* NPGS system is not for your home garden.
  + Short video recorded about this to dissuade homeowners from ordering stuff.

**Sugarcane importation & Quarantine; Presented by Bishwo Adhikari, USDA APHIS, Beltsville, MD**

* + Plant Pathology, Viral Genomics, Pathogen Detection, Quarantine
  + Background in bioinformatics & genomics.
  + In charge of the Poaceae Program.
* Sugarcane quarantine longest for Poaceae.
* It takes 2 years – goes to 2nd grow out.
* Test for disease & do high throughput sequencing.
* Side-by-side testing standard diagnostic tests vs. HS
* Reproducibility at different time of the year.
* Currently 40 clones in quarantine.
* Report sent to group.
* **Question? Shad: imports from Hawaii, where do they go?**
* Bishwo: it has to go through Beltsville even when from Hawaii.
* Clones from South Africa are ready to release (Collins: Question by text).

**Break Break Break Break Break Break**

**Modernizing ARS Breeding using Breeding Insight; Presented by Timothy Rinehart, USDA CPP (Specialty Crops), Beltsville, MD**

* 60 or so species of crops under ARS.
* The big ones, cattle, dairy, corn etc have good support and technology, help with management needs.
* Other species Ltd level of support, ARS funded Breeding Insight, Cornell Univ.
* Dozen people working on it.
* Insight group learns about breeding program and develops data tools to support them.
* Designed to support breeders.
  + There is also a scientific support team aside from the developers.
* Software development team, scientific team to work with breeders and germplasm curators.
* 13 species supported so far – started with 6.
* Confirmed that **sugarcane not selected**, not currently supported, hopefully in the future.
* Will like to include sugarcane (Amanda has been meeting with sugarcane breeders).
* Tim mentioned Shad and that curator should be included.
* Want trait ontologies in genebank and programs to match.
* Seamless data management process, want alignment with trait ontology with genebank information, grant access to breeders through use of the same platforms.
* Asked Amanda to chime in.
  + Amanda: Keo Corak hired.
* Keo working with breeders and is a key contact person for sugarcane
* Questions?
* James asked about incorporating GRIN traits into ontology.
* Amanda: Definity the goal, in future wants software to work seamlessly without you knowing.
* Gary – a programmer with GRIN working w/ API so that breeding insights will be able to pull data from GRIN there is a working prototype.

ANNA asked Amanda: are you developing a database?

Amanda: yes developing Bred Base database which can be integrated with field book.

Collins: is this open or only for USDA?

Amanda: Now with USDA but eventually for everyone. Will reach out outside ARS once it is done. Best to get on the contact list.

* Amanda: we are working w/ “Breed Base” with Amanda so database will be developed regardless of our (sugarcane that is) selection for Breeding Insight.

**Nomination of Committee Members and Officers**

* Duli Zhao – Nominated Orlando Coto.
  + Gave brief background as follows:
  + New team member at USDA-ARS CP.
  + Joined late Sept last year.
  + Previously worked at UF on sand-land soil research/sugarcane.
* Jim Shine – 2nd
* Collins Kimbeng nominated Shad Ali to replace Tomas – Kenneth 2nd
* Collins Kimbeng nominated Bishwo to replace M. Wright
  + Herman 2nd

**Open Discussion**

* Collins asked about Charley’s proposal from last year.
* Charley said it was tabled.
* Collins: Delayed or shelved? Charley: Dead.
* Kenneth: what’s being discussed?
* Charley: moving in material via tissue culture, I was a third party to it.
* Anna: do we need to put it on a to do list?
* Not certain about the response to Anna’s question.
* Kenneth: are they finding any projects? Anna: no, we were not funded.
* Collins asked Gary if someone was going to follow up on Dimitri’s work on the discovery of the new virus that was discovered? (Bad audio no further discussion).
* Jack Comstock: clones coming into quarantine were sequenced. Still happening?
* Bishwo: yes
* Jack: can these it?? be used.
* Bishwo: we try to identify known viruses and we are happy to share data
  + We do total RNA metagenomics (30M-40M reads).
* Bad audio…..
* Niranjan: it would be good to know how they are doing the sequencing.
* Bishwo: total RNA metagenomics.
* Unknown voice: what kind? Illumina Reads.
* Bishwo: 75bp, we can identify DNA & RNA viruses.
* Niranjan: how many % of total reads?
* Bishwo: Less than 10%. We can ID both RNA and DNA viruses.
* Collins restated Question: last year Dimitre identified a new virus and our routine test failed to identify this. Is anybody following up on that work? Can these sequences be included in the routine test?
* Jim: the more you look the more wild stuff you will find running loose in sugarcane. Are we going to restrict imports by locking ourselves down so tight we can’t move? We don’t know if these are pathogenic.
* Phillipe Rott: through metagenomic we can identify viruses that we don’t know if they are pathogenic, it’s up to the regulators to decide.
* Gary: new Misc. virus paper was published towards end of last year. The information is out. It is for others to do the risk assessments of newly identified viruses. Not heard of anything to restrict current regulation.
* Phillipe Rott: we can also detect viruses that we are not testing for (e.g., sugarcane streak mosaic) virus detected by high-throughput sequencing in Louisiana clones. Fortunately, the vector does not exist in Louisiana. The same thing happened in Ivory Coast & in that situation the virus causes 70% damage. 2 different situations. So high throughput sequencing brings something to the table.
* Jim Shine: use technology as long as it is going to help us.
* Gary: no follow up has yet been done to see if it (the newly discovered virus) infects sugarcane, it’s a question being asked a lot in quarantine programs.
  + Viruses are generally bad – better to be safe than sorry.

Phillip: no the virus has not been found?? in sugarcane. I suspect he meant found to be pathogenic????

* Bishwo: In rice new virus found by HTP and it turned out to be bad.
* Charley who decides if material should be released. Is it the sole discretion of the Q program?
* Gary: it’s an APHIS decision. They usually consult the industry and get input as to what balances the risk and need to protect production and ecosystems and prevent the unwanted movement of pathogen. Some crops allow release of known infected material, e.g., fruit trees.
* Bishwo: doing survey to see how much these viruses are important, example with the rice virus that turned out to be pathogenic.
* Gary: we need to work on crop vulnerability statement for sugarcane. The sugarcane group has not taken on that task. Be good to do this now especially with all the new people onboard.
* Anna: how is it initiated.
* Gary: Depends on how the group wants to tackle it. There is a recommended format. 10-15 pages. Some committees have submitted it as a peer reviewed submission. Usually done by subcommittee. Genetic Resources Advisory Council wants these reports …they use them to argue/make a case for more resources. Helps them better advocate for increased resources.
* Anna asked if anybody would like to volunteer. Shad said he would take the lead. He found it in the five-year plan. He has downloaded the template from another CGC group. Shad wants it to be a committee effort …. wants other folks from academia to be involved. Jeff Hoy agreed to assist but not take lead.
* Kenneth says we have an old one to go off of. I think Freddie Martin wrote one.
* Collins: Seen one by Freddie Martin. With all the new diseases since that one was written, it’s about time for another one and there is a lot of fertile ground to plow.
* James: asked about the status of accessions from Brazil?
* Shad: trip planned by Dr. Bretting & Goenaga interrupted by Covid. Had planned to visit with Luciano Pento at the Institute Agronômica de Campinas, São Paulo.

Kenneth motion to adjourn. 2nd by Charley.

Chair Dr. Anna Hale adjourned meeting at 11:09 AM.

Respectfully Submitted by,

Collins Kimbeng