USDA/ARS/SHRS World Sugarcane Collection

TOMAS AYALA-SILVA and DAVID KUHN

USDA, ARS, National Germplasm Repository Subtropical Horticulture Research Station



USDA "Project Plan"

- National Program 301 (100%)
  - Plant, Microbial, and Insect Genetic Resources, Genomics and Genetic improvement.
- Title:
  - Characterization and Utilization of Subtropical/Tropical Fruit Crops, Sugarcane, *Miscanthus*, and Tripsacum genetic resources.

Duration and Investigators

- 2013-2018 (60 months)
- Investigators

Investigator	Title	Percent Time
Tomas Ayala-Silva	Curator/Horticulturalist	70%
David Kuhn	Biochemist, Molecular Biologist	20%
Cecile Tondo		10%

Maintenance of the World Collection of Sugarcane and Related Grasses.



June 2014

- ~1400 total accessions
  - 10 acre block
  - Drip Irrigation and sprinklers (cold protection)
  - 20 feet between rows
  - 15 feet between plots
- Replanted May 2014

Saccharum Spontaneum

- **450 Accessions (~35%)**
- **Maintained on trellis rows and concrete**
- **Collection was repotted**
- **APHIS permit for noxious weeds renewed June 2014**



Saccharum species



S. arundinaceum



S. barberi



S. hybrid



Mischantus spp



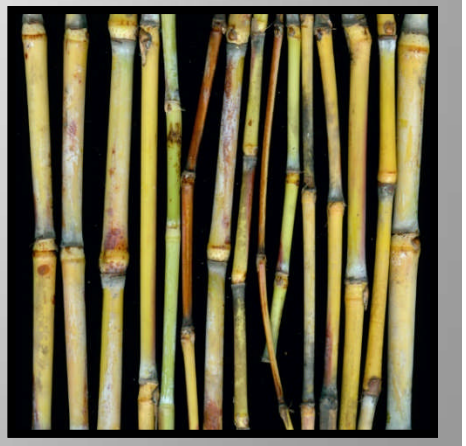
S. officinarum



S. robustum



S. sinense



S. spontaneum

Backup Collection

- On-site backup
  - Full sun nursery
  - Greenhouse
- National Seed Storage Laboratory (Fort Collins, CO)
  - 150 clones in tissue culture
  - 35 clones in cryopreservation (work in progress)

Attrition in the Collection

- Some clones previously lost to cold weather and hurricanes
  - Many have been replaced.
  - ~160 clones recently released from quarantine
    - 100% germination on last shipment.
    - Last shipment well established
- Request to Sugar Research Institute for 125 clones submitted in March 2013.
  - No response to date.

SCYLV and Orange Rust

- Screening for SCYLV
  - July 2013
- Screening for Orange Rust (Puccinia kuehnii)
  - Repository clones and *Miscanthus* and *Narenga*
  - 2012
  - Results negative

Distributions of Sugarcane between January 2014 and May 2015

Species	Number Distributed
S. spontaneum	400
S. officinarum	318
S. robustum	90
S. barberi	80
S. sinensis	86
Miscanthus	85

Distributed to 16 states and five foreign countries

Distributions of *S. barberi* between January 2013 and May 2015

Institute	Number Distributed
CHACRA EXPERIMENTAL AGRICOLA, Argentina	14
Miami-Dade College	10
Fort Collins, CO (USDA-ARS)	14
West Virginia State University	6
University of Florida	25
LSU	22
Brazil	44
US Capitol	4

Distributions of *S. sinense* between January 2013 and May 2015

	Number Distributed
CHACRA EXPERIMENTAL AGRICOLA, Argentina	12
Japan	10
Fort Collins, CO (USDA-ARS)	20
University of Florida	40
LSU	22
Brazil	56
US Capitol	4

Distributions of *S. officinarum* between January 2013 and May 2015

Institute	Number Distributed
CHACRA EXPERIMENTAL AGRICOLA, Argentina	6
Japan	15
Fort Collins, CO (USDA-ARS)	55
University of Florida	250
LSU	225
Brazil	900
US Capitol	6
University of Illinois	40
West Virginia State University	4
Hawaii Agricultural Research Center	8
Ecuador	15

Distributions of *S. spontaneum* between January 2013 and May 2015

Institute	Number Distributed
Monsanto (USA)	30
Japan	10
University of Florida	300
LSU	300
Brazil	725
Texas A&M University	40
University of Illinois	10
Argentina	5
Ecuador	10

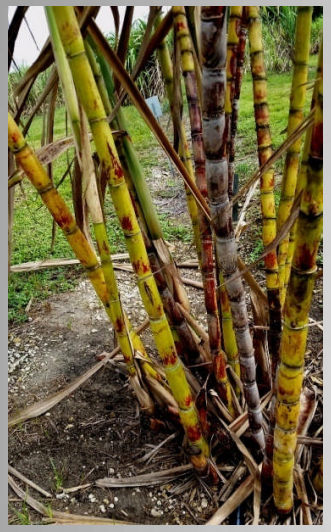
Distributions of *S. robustum* between January 2013 and May 2015

Institute	Number Distributed
Research Institute at Virginia Mason	27
Fort Collins, USDA-ARS	30
West Virginia State University	4
Texas A&M University	13
University of Florida	50
Japan	8
CHACARA EXP. AGRICOLA, Argentina	4
LSU	20
US Capitol	4
Ecuador	6

Top Miscanthus Accessions Requested between January 2013 and May 2015

PI	Name	Species
230189	US 56-0022-03 6 6	*floridulus*
295764	M. sinensis cv gracillimus, 20 4 4 3	Sinensis
294602	US 64-0004-02 3 3 4	sinensis
294605	US 64-0007-01 3 3 5	sinensis
295762	M. floridulus 2x 3 3 6	floridulus
423566	M 75-062 2 3 7	Miscantus sp.
CANE 9233	US 47-0011 1 1 8	sinensis
302423	US 64-0016-03 1 2 9	Miscanthus sp.
417947	NG 77-022 1 2	Miscanthus sp.

Characterization/evaluation/Post quarantine

















Characterization of *Saccharum spontaneum* seedlings from cryopreserved polycrosses

Phenotypic Measurements

- 10 stalk sample
  - Stalk height
  - Stalk diameter
  - Internode length
  - Number of internodes
  - Brix
- Flowering date
- Disease
- Biomass (weight per pot)

- September – November 2012
- July – August 2013

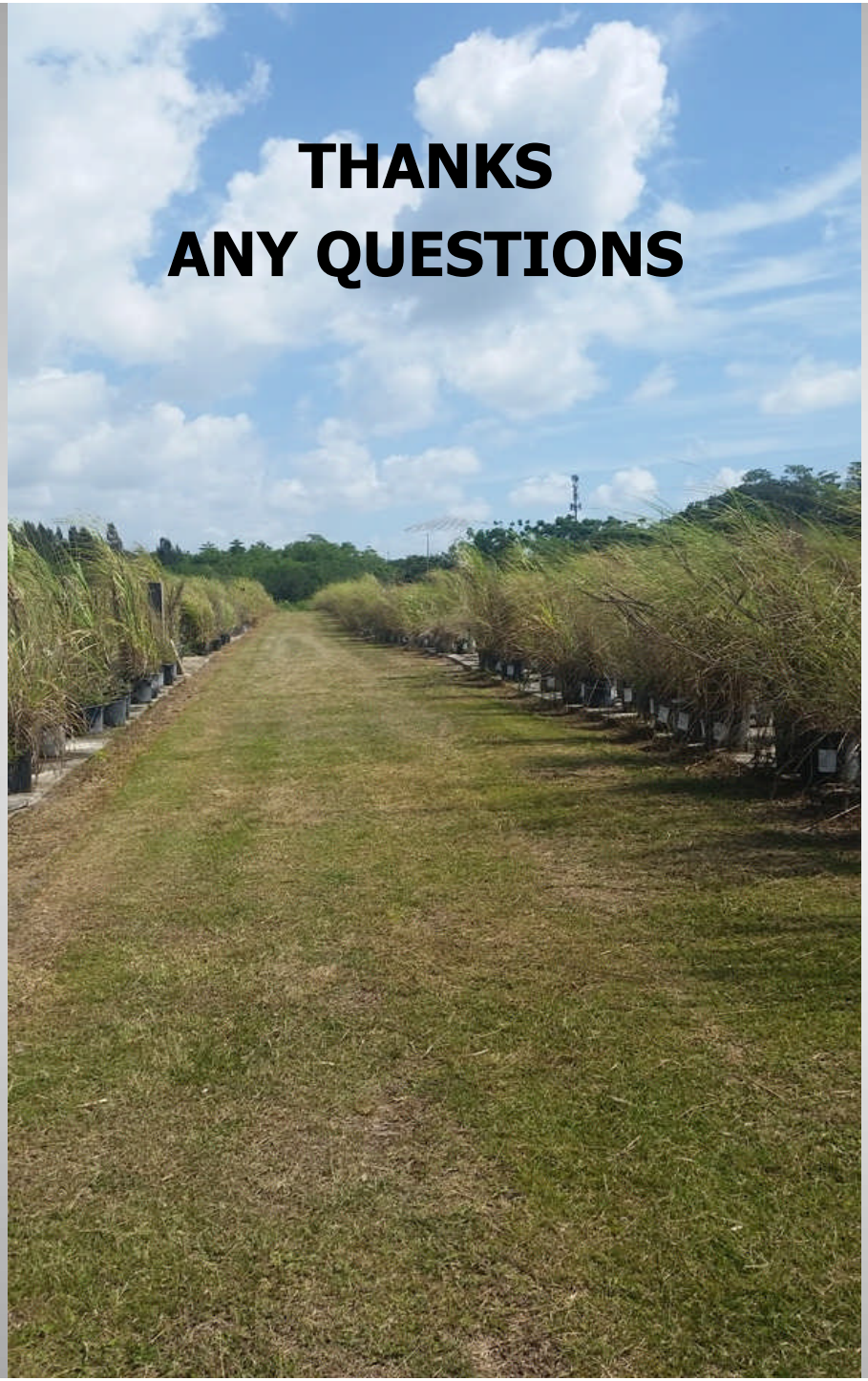
Results:

- **30 accessions were ID as possible energy canes and added to the collection.**

- **Disease rating:** out of 67 families only 8 accessions showed minor symptoms of DEAD SPOT, LEAF SPOT, and rust. Only one accession showed lots of LEAFSPOTS and three of rust.

- Flowering dates ranged from mid-September to Mid December, 2012/2013.

- Brix values ranged from 6.4 to 19.50
- Clones added to the collection, will be input in GRIN


THANKS
ANY QUESTIONS