USDA COMMERCIAL SUGARCANE BREEDING

Dr. James Todd

INTRODUCTION

- Established in 1919 to overcome disease
- P.O.J. varieties brought to Southdown in 1922
- Three-way agreement signed in 1926
  - USDA
  - Louisiana Ag Experiment Station
  - American Sugar Cane League

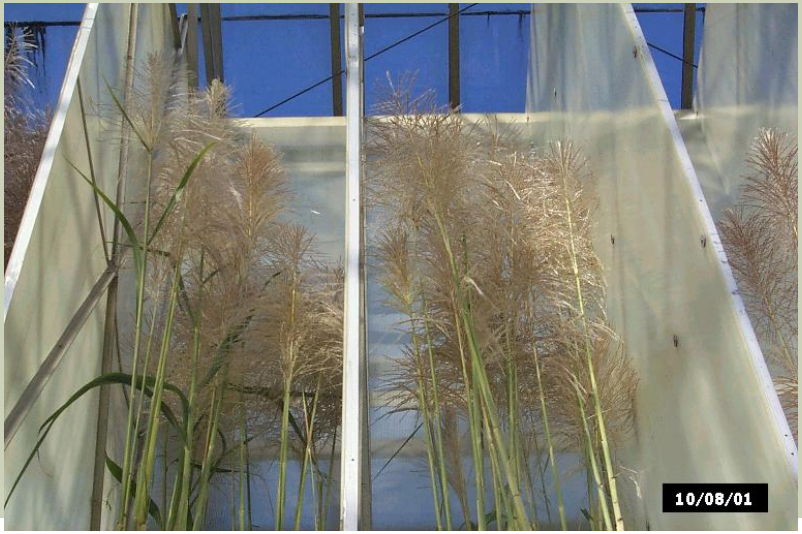
USDA SUGARCANE BREEDING

- Hybridization
- Fuzz planting
- Selection
  - Seedlings 60,000 - 80,000
  - First line 6,000 - 8,000
  - Second line 600 - 800
  - Nurseries 60 - 100
  - Off-station 20 - 40
  - Infield 10 - 15
  - Outfield 5 - 10

12 Year process

CROSSING

HYBRIDIZATION



SEEDLINGS

- Large number of (60,000 - 100,000) clones from seed
- Transplanted to field and visually rated

FIELD BRIXING

- Visually select 2 stalks in stubble
- Brix on headland

First Line

- ~6000 - 8,000 accessions
- Two rows, 6 foot plots
- Non replicated plot
- Compare checks
- ~10% selection rate

SECOND LINE

- Immediately following selection of 1st line trials
  - 6-stalk samples planted in 2nd line trial.
- Evaluated in both Plant cane and 1st and 2nd stubble
  - Assignments in 1st stubble
- Visual Evaluation
- Mill Samples with pre-breaker for fiber analysis

PRE-BREAKER

NURSERIES

- First planted in 3 locations (research farms) with 2 reps
- Evaluated in plant cane and 1st and 2nd stubble
- 10 stalk sample evaluated in the lab (roller mill)
- Replanted the next year in 3 more locations (grower farms)

ROLLER MILL TO COLLECT JUICE

INFIELD

- top ~ 30 from USDA LSU nurseries
  - 3 locations and 2 reps for 3 crops
- 10 stalks samples (pre-breaker)
- Weigh each plot using chopper harvester and weigh wagon
- Compare to commercial checks

HARVEST

OUTFIELD

- Top 10 - 15 from the infield tests from both LSU and USDA
- Planted in 12 locations
  - 3 replications
  - 3 - 4 crops
- Plots harvested with chopper harvester and weighed with weigh wagon
- Juice quality assessed using hand harvested whole stalks

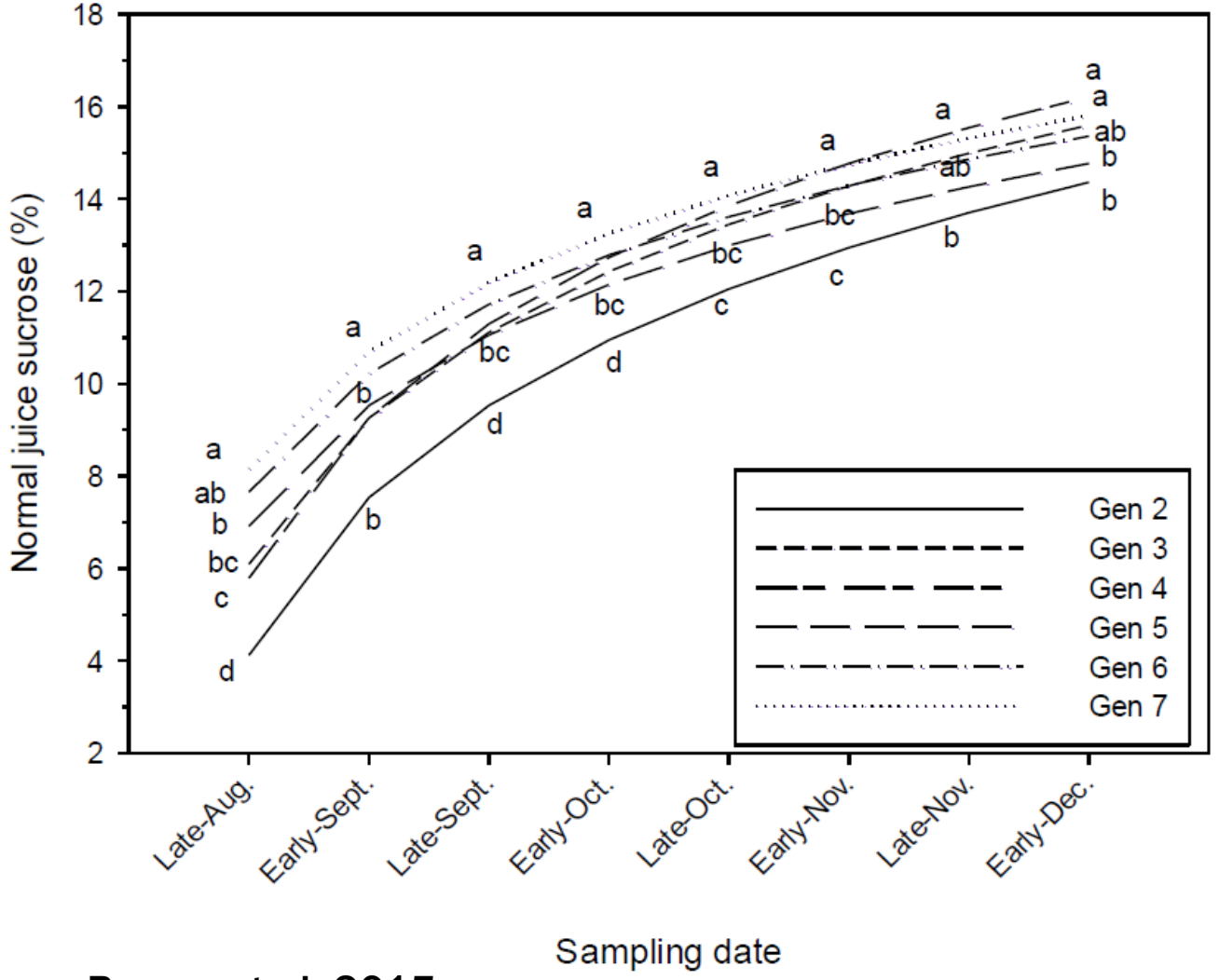
RELEASE

- Three-way agreement
- Committee meeting in May
- Release if equal or better than checks or with disease resistance
- ~12 years from cross to release

CURRENT BREEDING GOALS

- Increase yield
  - Early ripening and high sucrose
  - Increased tonnage
  - Disease resistance
  - Increase stubbling
  - Cold Tolerance

SUCROSE CURVE

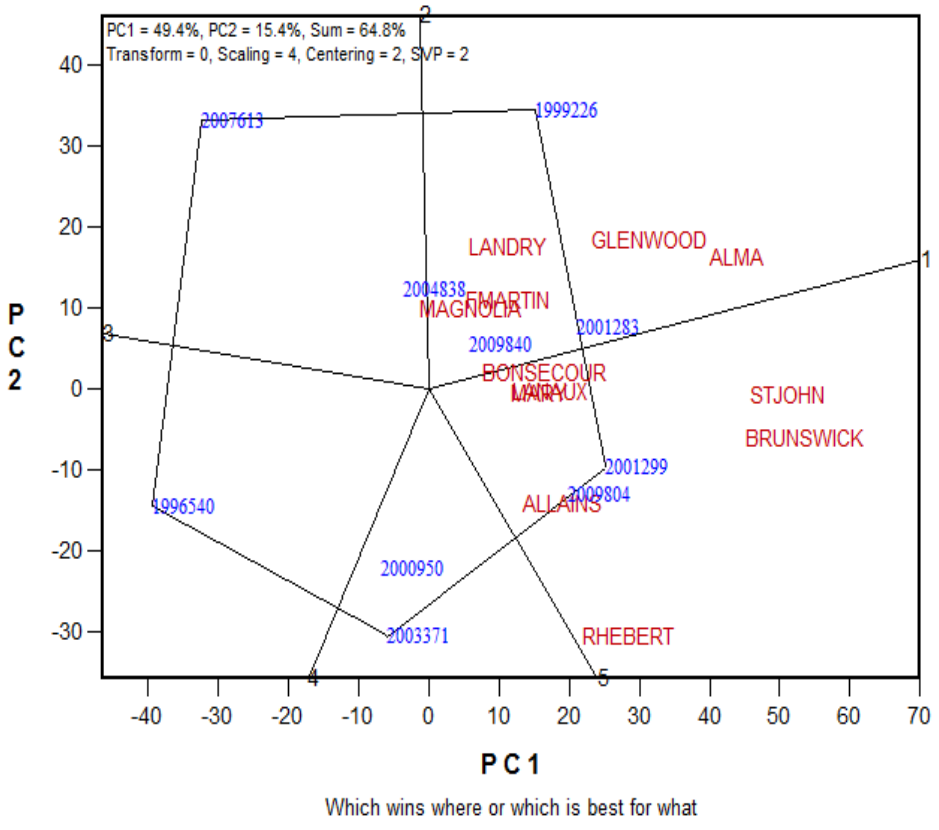


Burner et al. 2015

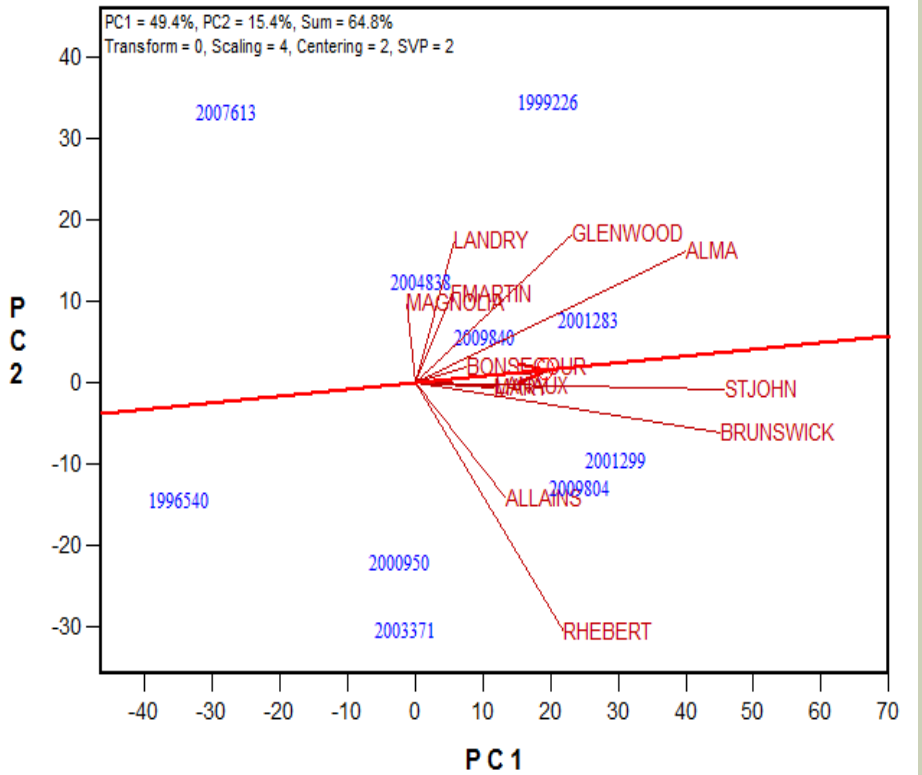
RESEARCH

- Examine historical outfield and nursery data
  - Genotype by Environment interaction
- Collaborate with other scientists
  - Look at using drone reflectance data in selection fields

GGE BIPLOT ANALYSIS



Which wins where or which is best for what



Average Tester Coordination for Teseter Evaluation

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