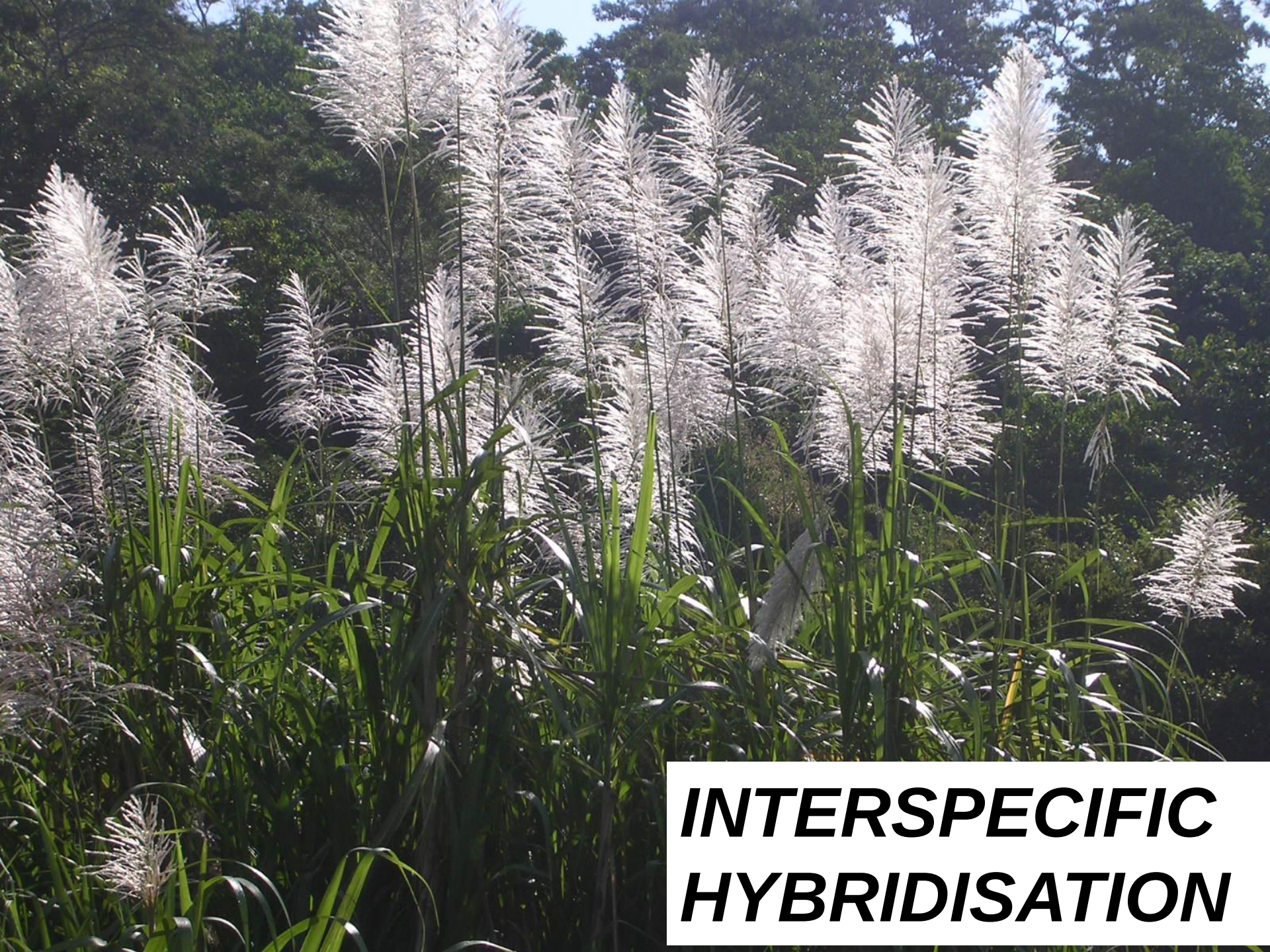
MANAGEMENT OF SYSTEMIC DISEASES OF SUGARCANE IN TEXAS AND LOUISIANA

Jeff L. Flynn
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Texas A&M University Research and Extension Center
Weslaco, Texas


RSD
SYSTEMIC DISEASES
Yellow leaf virus
Mosaic virus



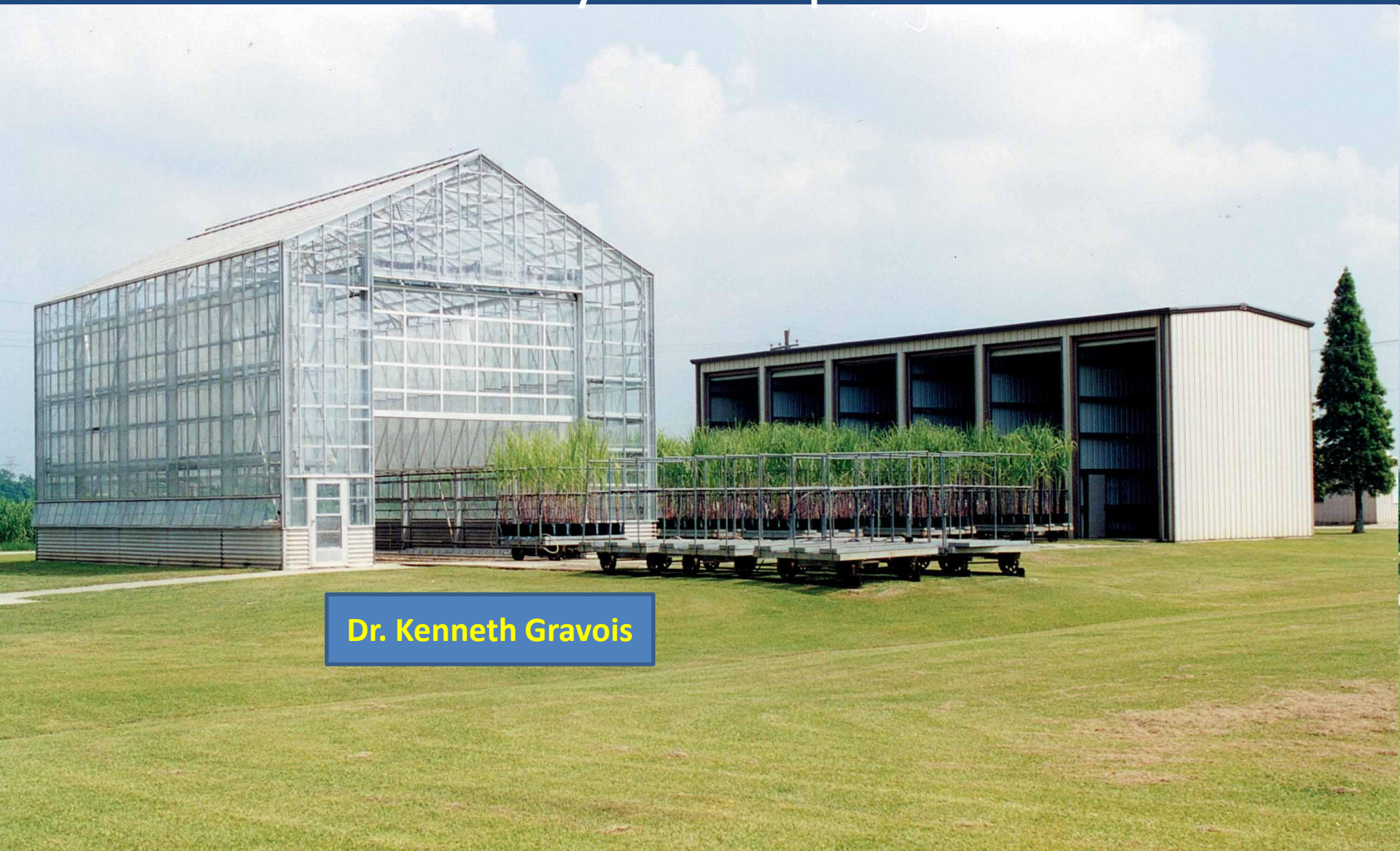
INTERSPECIFIC HYBRIDISATION


AgriLIFE RESEARCH
& EXTENSION
Texas A&M System
WESLACO
CENTER
Dr. Jorge da Silva




Dr. Jorge da Silva
1
2
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L.S.U. St. Gabriel Field Station, Sugarcane variety development



Dr. Kenneth Gravois

USDA/ARS SUGARCANE RESEARCH UNIT
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USDA
U.S. Sugar Cane Field Station
U.S. Department of Agriculture
Agricultural Research Service
Dr. Jack Comstock


RR561




CURRENTLY, THE USE OF TISSUE-CULTURED PLANTS DERIVED **FROM MERISTEMATIC TISSUES EXTRACTED FROM DISEASE INDEXED SOURCE PLANTS HAS GAINED WIDE ACCEPTANCE BY THE INDUSTRY AS THE BEST APPROACH TO ESTABLISH A SOURCE OF DISEASE FREE SEED STOCK IN RELATIVELY LARGE NURSERIES**
APR 18 2012

Sugarcane industries with active tissue culture programs

- **Louisiana**
- Florida
- Guatemala
- El Salvador
- Costa Rica
- Columbia
- Brazil
- Argentina
- India
- Mauritius
- Guadalupe
- China
- Thailand
- Australia
- **Texas**

Why Tissue Culture?

VARIETY INTRODUCTION

DISEASE MANAGEMENT PROGRAM

The power of T.C. – rapid expansion (new variety, healthy plant, etc.)





PROS AND CONS OF TISSUE CULTURE VS TRADITIONAL VEGETATIVE CUTTINGS

- **Pros:**

➢ **Transport efficiency; program time gain**

➢ **Superior insect and disease control**

Cons:

❖ **Much more fragile, 1st few months**

❖ **Some potential for genetic change (mutation)**



TISSUE CULTURE ASSISTANCE

- Lab design, equipment recommendations
- Supplylists, ordering
- Basic training in the various TC methods:
  - Meristem
  - Therapeutic meristem
  - Shoot tip
  - Callus, shoot tip callus

DR. Q. J. XIE - KLEENTEK
tissue culture lab manager with over 20 years of TC experience (15 with KT); over 100 varieties successfully cultured; considered top in his field.

- **Hands on demonstration and troubleshooting**
- **Training of personnel from private industry wishing to establish their own tissue culture operation.**





Greenhouse – note screened panels for air exchange (exhaust fans located in rear)

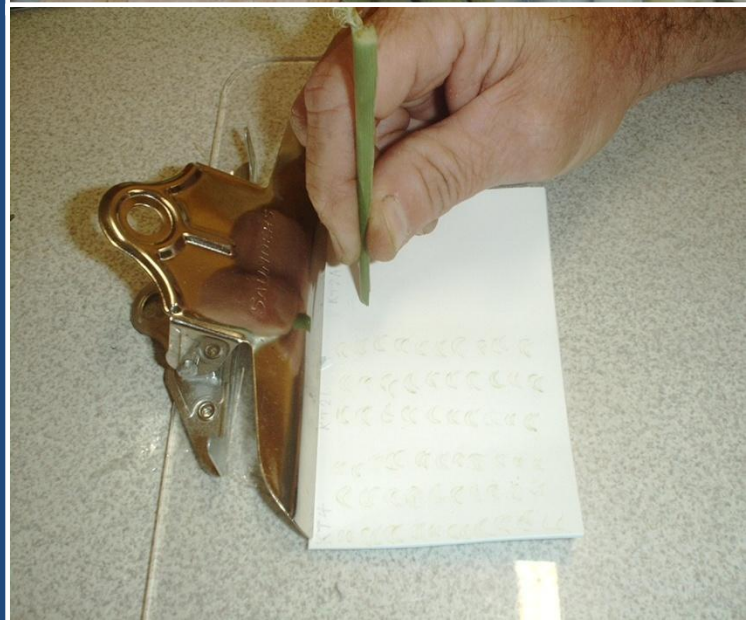
Foundation stock plants used as donor tissue for lab

Important to maintain stable and warm temperature



Foundation stock undergoes LHWT and "routine" disease testing to insure healthy meristems used for t.c.; "therapeutic tissue culturing" can be used to remove pathogens like sugarcane yellow leaf



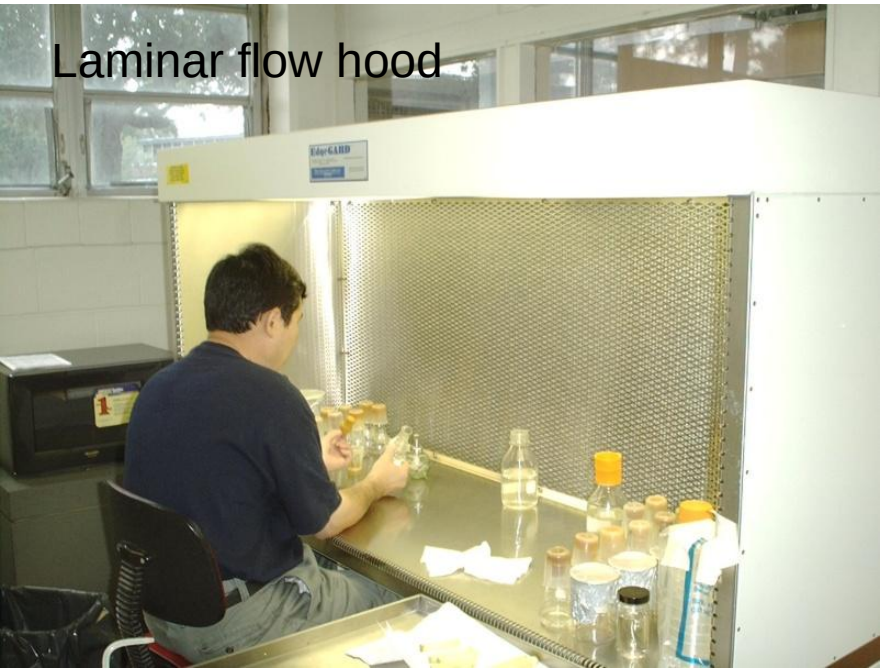






Aseptic harvest and labeling of cane tops to be used for tissue culture propagation in lab
It is imperative that the healthiest source stock plants are used for micropropagation

Meristem Extraction

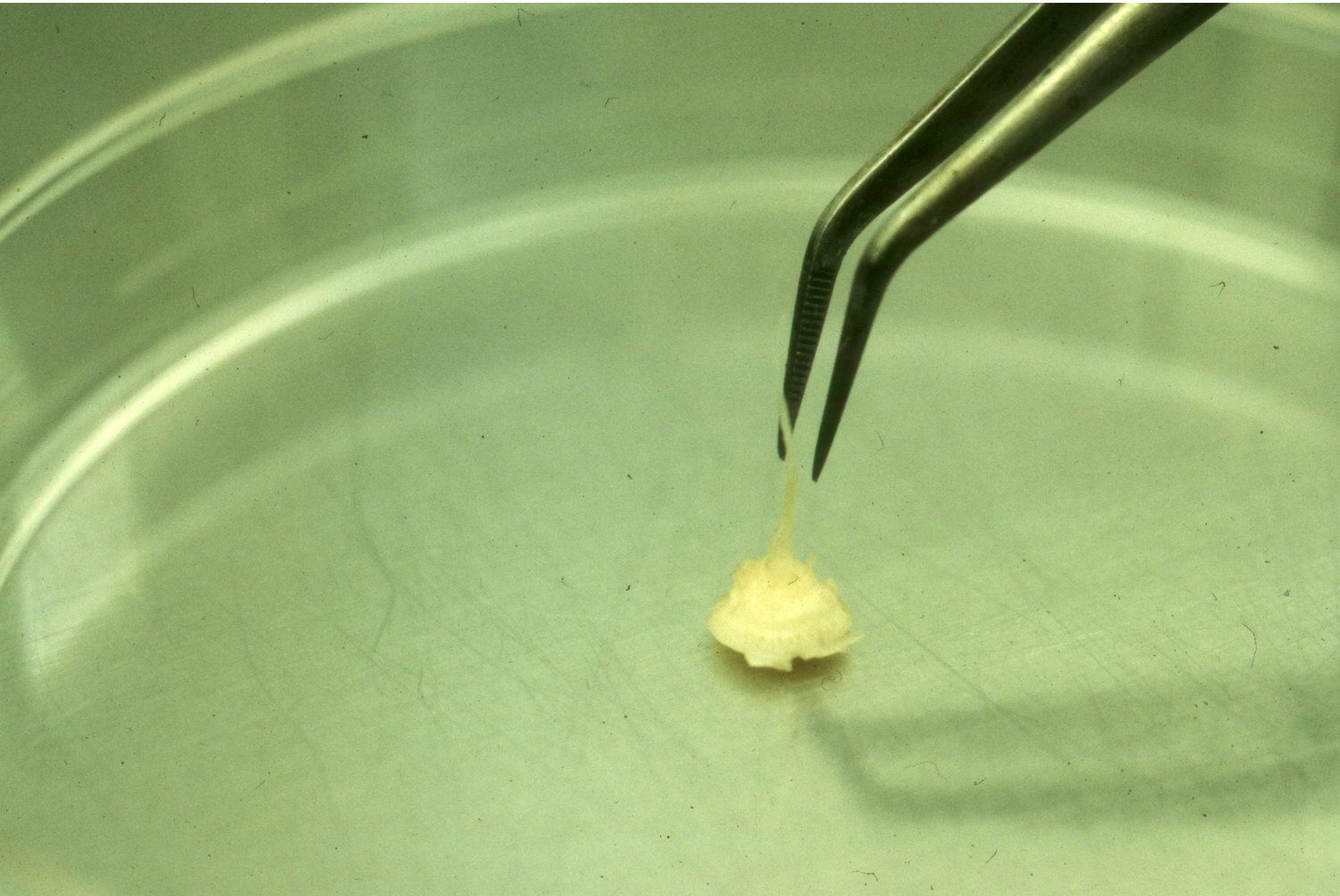






Aseptic extraction of apical meristem and immediate placement into liquid media on orbit shaker; depending on variety, 3 to 6 weeks required for this initiation with frequent media exchange.

Shoot tip (meristem) with primordial leaf extracted from sugarcane top.







Continuous process of multiplication under laminar flow hoods over several months until target number of plants achieved.





Constant monitoring for problems and culture characteristics to determine optimum media formulation and changes; typically 3 to 5 months of multiplication.





After several weeks (approx. 6 to 8 weeks) in rooting media, plants have sufficient roots for transplant to greenhouse.





All plants from cultures of a single variety mericlone are packaged together in clean zip lock plastic bags, labeled, sealed and placed in cooler. These must be kept cool (< 60F) until removed for planting.



Many thousands of plants can be shipped in a single cooler (6,000 to 12,000). Overtime, these plants will continue to lose vigor so must be retrieved and planted within 4 to 6 days to ensure survival.


One group of workers separate the clumps into single plants, one mericlone at a time, then pass on to the planters
AQUAFINA
AQUAFINA


The other workers then take the separated plants and place into the moist potting soil


DAY 0
DAY 7
DAY 17
DAY 27



Additional plants can be separated after several weeks of development in the greenhouse





After approx. 6 to 8 weeks of growth, firm root development should be noted. Plants can be pulled from tray and examined. These plants are ready for field transplant.





Same style used in El Salvador. Extreme care needed to insure that no variety or mericlone mix-ups occur.





In the U. S., this is accomplished using various types of mechanical vegetable transplanters.



In California, a multi-row transplanter is used; requires labor on planter and on ground to straighten up transplants.





Plants will need immediate watering to preserve roots and encourage establishment.

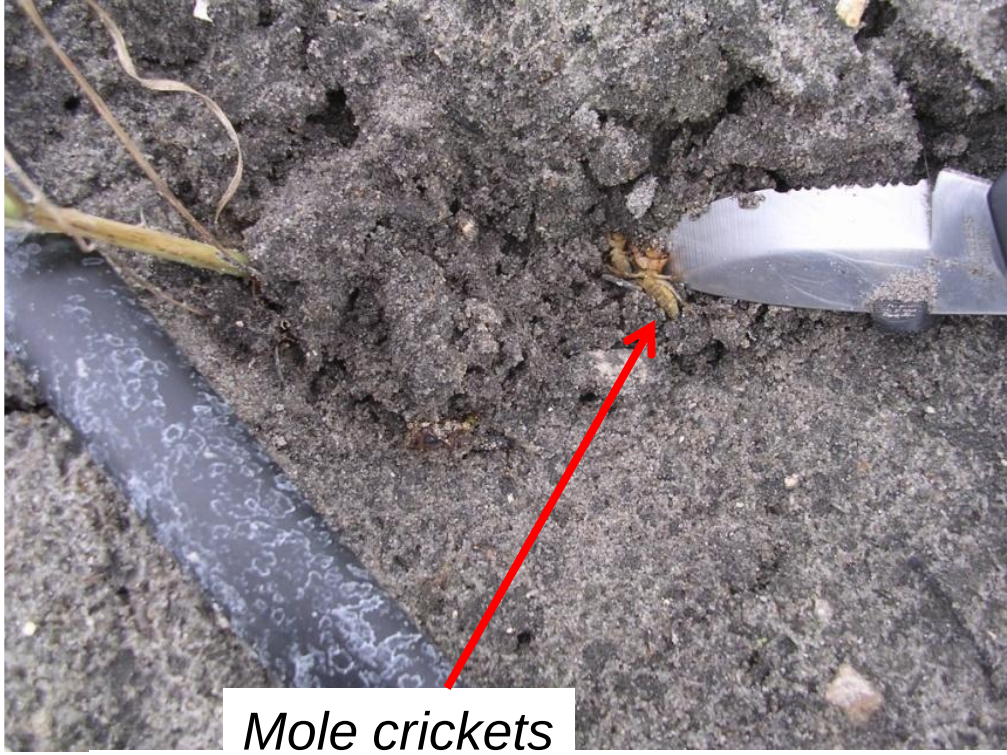
Drip Irrigation



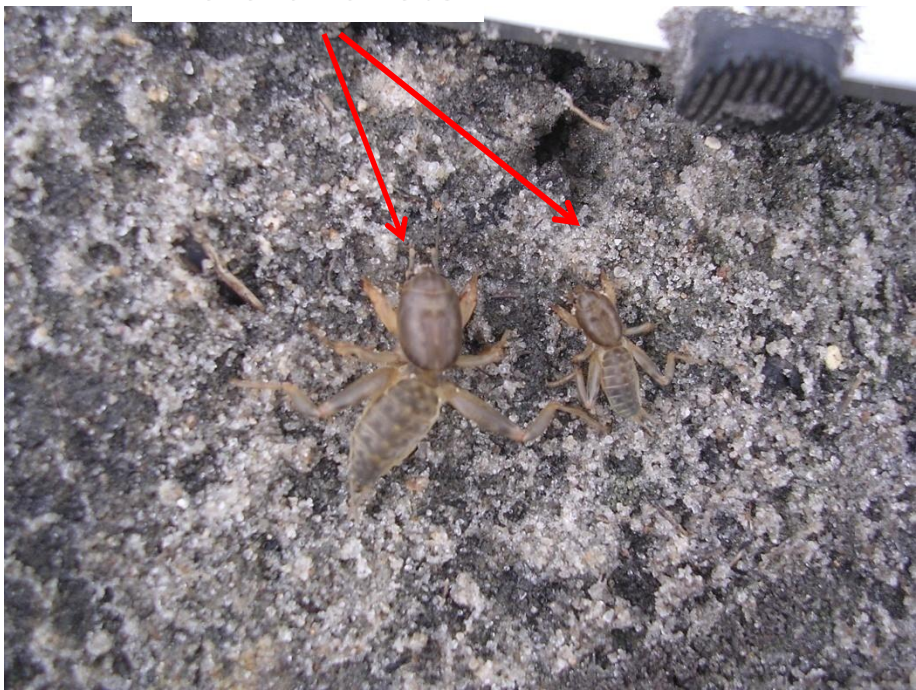
Sprinkler irrigation used for
plantlets in the Imperial Valley, CA







Mole crickets



Closely and constantly monitor plants and be vigilant of potential pests such as these mole crickets shown here. Plants are extremely vulnerable for the first few weeks.



These plants are well established after 5 – 7 weeks.







Various forms of somoclonal mutations.







Another type of mutation characteristic of some varieties; the same variety depicted in both photos





Monitoring and removal of mutations.

In Louisiana, plantlets after 5 months of growth.







Seedcane harvest in Louisiana, U.S.A. with Cameco 2 row harvester; loading from pile row to transport wagon.





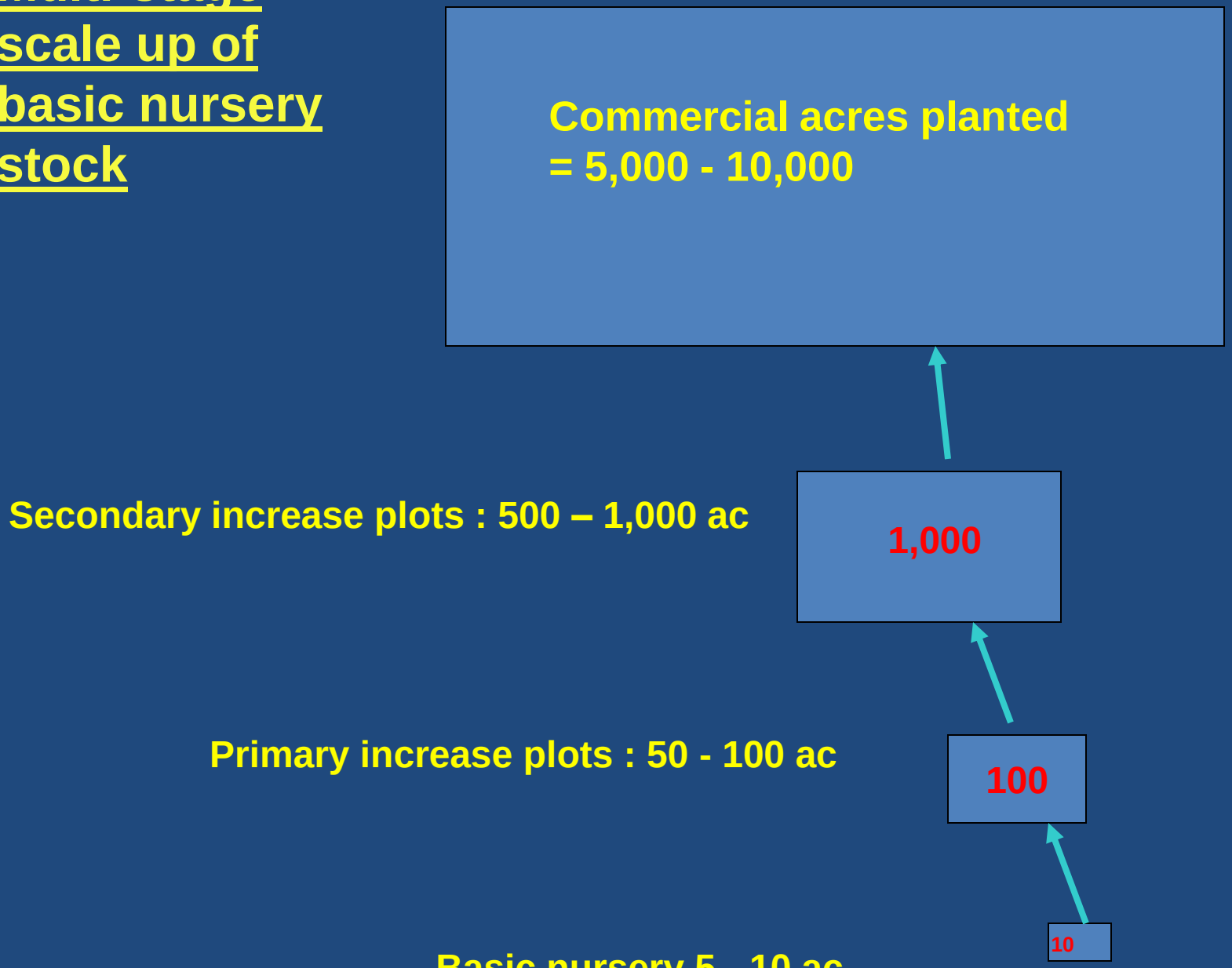
Loading trucks with seed for transport to remote locations; field planting operation in Louisiana using planter's aid wagon.

Equipment sanitation, seedcane harvest best practices





Multi-stage scale up of basic nursery stock



RSD Levels in Louisiana, 1986 -2006

That was then

1986 LSU survey (LAES Annual Rpt)

- 59% of fields tested positive
- 22.4 % of stalks positive

New var. release (CP76-331)

- 57.7% fields positive
- 16.9% of stalks positive

This is now

2006 LSU SDDL results (LAES Annual Rpt)

- **13% of farms positive**
- **0.9% of stalks positive**

ASCL Var. Release Pgm

- **0.0% of farms**
- **0.0% of stalk**





Thus, the two most important diseases of sugarcane in Louisiana, RSD and mosaic, have just about been eliminated.

TRIAL SUMMARY

- **KT STALK POP. ADVANTAGE**
  VS. Heat trt = 6.2%
  VS field run = 10.8%

- **% THEO. SUGAR, KT AND HT NOT SIGNIF. DIFF.**

- **KT SUGAR/AC ADVANTAGE**

VS. HT = 923.4 lbs (2,280/HA)
VS FR = 1366 lbs (3374/HA)

- **KLEENTEK BENEFITS**

➢ **Higher sugar production per acre**

➢ **Higher stalk population = better planting ratios**

➢ **Accelerated variety introduction**


THANKS!