Plant breeding and agronomy have increased yields.
## Corn in Texas

<table>
<thead>
<tr>
<th>2009 Region</th>
<th>Acreage Planted</th>
<th>Average Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Plains</td>
<td>1,027,600 acres</td>
<td>184.3 bu/acre</td>
</tr>
<tr>
<td></td>
<td>(932,100 harvested)</td>
<td></td>
</tr>
<tr>
<td>Central / East</td>
<td>1,219,700 acres</td>
<td>70.8 bu/acre</td>
</tr>
<tr>
<td></td>
<td>(969,300 harvested)</td>
<td></td>
</tr>
</tbody>
</table>

- Texas 2010 – 300 million bu = $1.5 billion (12th in Country)
- Texas 2011 – 179 million bushels – heat and drought

### Three Mega-Environments

- **High Plains**
- **Winter Garden and Coastal Bend**
- **Low Yield Counties**

Data from USDA- NASS

Ivan Barrero et al. submitted
Texas corn production

Data from USDA-NASS

Ivan Barrero et al. submitted
Meta-analysis - No genetic yield gain in commercial corn varieties grown in Texas over the last 11 years

Best linear unbiased estimators (yield)

Data from Texas Extension Corn Performance Trials

\[ y = 0.1115x - 221.6 \]
\[ R^2 = 0.0019 \]

<table>
<thead>
<tr>
<th>Hybrid</th>
<th>BLUP</th>
<th>SE</th>
<th>Year</th>
<th>Locs</th>
</tr>
</thead>
<tbody>
<tr>
<td>TG895W</td>
<td>-37.38</td>
<td>7.088</td>
<td>2007</td>
<td>1</td>
</tr>
<tr>
<td>TRX01601X</td>
<td>-25.03</td>
<td>6.892</td>
<td>2010</td>
<td>2</td>
</tr>
<tr>
<td>F3025</td>
<td>-19.52</td>
<td>7.002</td>
<td>2001</td>
<td>3</td>
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<tr>
<td>DKC6469GENVT3P</td>
<td>19.35</td>
<td>8.548</td>
<td>2010</td>
<td>1</td>
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<tr>
<td>6361RB</td>
<td>20.3</td>
<td>3.928</td>
<td>2006</td>
<td>10</td>
</tr>
<tr>
<td>5202B</td>
<td>20.99</td>
<td>7.037</td>
<td>2002</td>
<td>3</td>
</tr>
</tbody>
</table>

Ivan Barrero et al. submitted
Why do we need a public breeding program on corn? Aren’t the companies doing this?

• Not targeting Texas or the south at all - a unique adaptation (aflatoxin, heat, drought, etc.)

• Unique traits / exotic introgression – colored corn, QPM, perennial corn, high biomass corn

• Graduate student training
  – Primarily for industry

• New breeding methods

• Long-term high risk research
  – perennials
How do we breed corn? – 3000ft. view

1. Develop inbred lines
   A. Cross desirable parents
   B. Self towards homozygosity

2. Make hybrid seed with a tester inbred from another heterotic group

3. Yield trials

4. Only advance best yielding lines/hybrids - or other beneficial traits
What is a heterotic group?


What is a heterotic group?

Bi-parental populations: combining alleles through recombination

Cross two parents different at trait(s) of interest

\[ F_2 \]'s

Self to homozygosity

\[ F_1 \]

RIL's

Raven, 1999.

Agro 643 – QTL Mapping – Fine mapping
| STOCK | PEDIGREE | ADJUST TOT. | Breed1 AREA | GA1 | GA2 | GAS | Ring | Siler | CS 3.1 | CS 2.2 | CS 2.1 | CS 2.2 | CS 2.2 | CS 2.2 |
|-------|----------|-------------|-------------|-----|-----|----|------|------|-------|-------|-------|-------|-------|-------|-------|
| CS12-B73I-29-W-02 | LAMAB2C2-23-3-B-B-B-REM-44-1-1-1-B-1-REM12-12 | 306 | 47 | 37 | 47 | 88 | 50 | 01 | 01 | 62 | | | | |
| CS12-M171-14-X-02 | B-B-B-B-B-B-B-B-B-B-B-B-B-B-B-B-B-B | 251 | 42 | 26 | 42 | 66 | 31 | 62 | 31 | 62 | 31 | 62 | 31 | 62 | 31 | 62 |
| CS12-M171-14-X-21 | LAMAB2C2-23-3-B-B-B-REM-44-1-1-1-B-1-REM12-12 | 306 | 47 | 37 | 47 | 88 | 50 | 01 | 01 | 62 | | | | | |
| CS12-M171-14-X-21 | LAMAB2C2-23-3-B-B-B-REM-44-1-1-1-B-1-REM12-12 | 306 | 47 | 37 | 47 | 88 | 50 | 01 | 01 | 62 | | | | | |
| CS12-M171-14-X-21 | LAMAB2C2-23-3-B-B-B-REM-44-1-1-1-B-1-REM12-12 | 306 | 47 | 37 | 47 | 88 | 50 | 01 | 01 | 62 | | | | | | | |
| CS12-M171-14-X-21 | LAMAB2C2-23-3-B-B-B-REM-44-1-1-1-B-1-REM12-12 | 306 | 47 | 37 | 47 | 88 | 50 | 01 | 01 | 62 | | | | | | | |
Delay planting to spread out labor
How do we breed corn? – 3000ft. view
## Corn breeding program timeline

<table>
<thead>
<tr>
<th>Activity</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepare Nursery</td>
<td>CS</td>
<td>CS</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Plant Nursery</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>WE</td>
</tr>
<tr>
<td>Harvest</td>
<td></td>
<td></td>
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<td></td>
<td>CS</td>
<td></td>
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<td></td>
<td></td>
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<td>WE</td>
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<tr>
<td>Process Seed</td>
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<tr>
<td>Prepare Yield Trials</td>
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<td>Agronomics</td>
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<td>CS</td>
<td>CS</td>
<td>CS</td>
<td>CS</td>
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<td>Notes</td>
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<tr>
<td>Inoculate AF</td>
<td>CS</td>
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<td>WE</td>
<td>CS</td>
<td></td>
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<tr>
<td>Grind, NIRS, Aflatest</td>
<td></td>
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<td>CS</td>
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<tr>
<td>Analyze Data</td>
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<td></td>
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</tr>
</tbody>
</table>

**CS** = College Station, TX  
**WE** = Weslaco, TX  

*Downtime!*
Information management

• In 2012 –
  – Over 4679 Summer yield trial plots:
    • Yield
    • Stand count
    • Flowering time
    • Height
    • Other traits
    • Some with subsampled grain

  – Summer nursery >6007 seed stocks

  – Weslaco winter nursery (2011) 3584 seed stocks

  – Genotyping results >2000 plants

• Multiplied by 5-10 years of seed in cooler
• Still no single data format we are really happy with
Lots of laborious work

- Undergraduates & high school students

- In addition to graduate students and technical support
Where do we / where should we target breeding activities?

Data from USDA - NASS
Quick aside

Code for visualizing county level data in R – freely available from:

http://maizeandgenetics.tamu.edu/Rcode.html
## Finished germplasm for release

<table>
<thead>
<tr>
<th>Traits</th>
<th>Color</th>
<th>Number (unique)</th>
<th>Background Exotic/Temp</th>
<th>Heterotic Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield, adaptation</td>
<td>Y</td>
<td>13</td>
<td>T x E</td>
<td>3 NSS, 10 SS</td>
</tr>
<tr>
<td>Yield, adaptation</td>
<td>Y</td>
<td>7</td>
<td>T</td>
<td>7 SS</td>
</tr>
<tr>
<td>Yield, aflatoxin resistance, flint</td>
<td>Y</td>
<td>4 (3)</td>
<td>(E) Argentine</td>
<td>4 NSS</td>
</tr>
<tr>
<td>Yield, aflatoxin resistance, disease res.</td>
<td>Y</td>
<td>5</td>
<td>(E) LAMA</td>
<td>NSS &amp; SS</td>
</tr>
<tr>
<td>QPM, aflatoxin resistance</td>
<td>Y</td>
<td>5</td>
<td>4 E, 1 T</td>
<td>4 NSS, 1 SS</td>
</tr>
<tr>
<td>QPM</td>
<td>Y</td>
<td>12 (4)</td>
<td>T</td>
<td>2 NSS, 10 SS</td>
</tr>
<tr>
<td>Food, adaptation</td>
<td>W</td>
<td>3</td>
<td>E</td>
<td>2 NSS, 1 SS</td>
</tr>
<tr>
<td>Food, adaptation</td>
<td>W</td>
<td>16 (9)</td>
<td>E</td>
<td>5 NSS, 12 SS</td>
</tr>
<tr>
<td>Food, adaptation</td>
<td>B</td>
<td>7 (4)</td>
<td>E</td>
<td>?</td>
</tr>
<tr>
<td>Food, adaptation</td>
<td>R</td>
<td>27 (2)</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>

### Populations

| QPM, aflatoxin res., population              | Y     | Pop.            | E x T                  | na                |
| Argentine hybrid composite, aflatoxin resistance | Y     | Pop.            | E                      | na                |
Important origins of germplasm to the TAMU Maize Breeding Program
Midwest (IA) Unadapted Germplasm

Still green!
Temperate high yield corn

Tropical corn with good traits: Aflatoxin resistance, stress tolerance, etc.

Identify parents and make crosses (one to two years)

Cross AgriLife inbred to two older commercial tester lines (one to two years)

Self pollinate and select (three to five years)

AgriLife inbred corn: ears look good but does it yield and have resistance?

Discard trash

Stiff stalk tester inbred
Non-stiff stalk tester inbred

Test hybrid aflatoxin resistance
Ok yield (~two years)

FINISHED GERMPLASM RELEASE!
(BLACK BOX)

Along the way we:
1) Trained students
2) Increased knowledge and wrote papers
3) Assisted growers, students and researchers with corn research

Assisting Texas Growers Increase Profit

previous phase of public corn breeding at Texas A&M (the last seven to eleven years) – Corn breeding at A&M started in 1927
**Today’s corn seed chain**

<table>
<thead>
<tr>
<th>TRAIT SUPPLIERS</th>
<th>INBRED BREEDING</th>
<th>INBRED SALES</th>
<th>HYBRID SEED PRODUCTION</th>
<th>HYBRID SALES</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIONEER</td>
<td>MAKE INBREDS</td>
<td>HYBRID TESTING</td>
<td>HYBRID TESTING</td>
<td>HYBRID TESTING</td>
</tr>
<tr>
<td>MONSANTO</td>
<td></td>
<td>SELL INBREDS</td>
<td></td>
<td>MARKETING</td>
</tr>
</tbody>
</table>

Monsanto

- A few

- AgriLife Research
  - Texas A&M System

- IFSI

- Thurston Genetics

- Golden Acres

- B-H Genetics

**Assisting Texas Growers Increase Profit**

- $$$

**Might not continue**
New model (2011) of public corn breeding at Texas A&M

“Use what we have and get it commercialized in the next few years”

Cross AgriLife inbreds to commercially RELEVANT testers

~100 AgriLife inbred corn: Proven In past

Commerci al Stiff stalk Tester inbred “A”
Commerci al Stiff stalk Tester inbred “B”
Commerci al Stiff stalk Tester inbred “C”
Commerci al Stiff stalk Tester inbred “D”
Commerci al Stiff stalk Tester inbred “E”

Assisting Texas Growers Increase Profit

Test specific hybrids in partnership find winning combinations

Seed Production

Use what we have and get it commercialized in the next few years
Argentine Composite Population

- 9 hybrids from Argentina were intermated for 8 generations
- Good yield potential (240 bu/ac in irrigated high plains)
- Could be grown as an OP variety
- Have selfed numerous lines from population
- Poor aflatoxin resistance
Two crops:
- Maize
- Sorghum

Multiple traits (genetics and/or breeding):
- Yield
- Aflatoxin
- Drought
- Grain color (antioxidants)
- Perennialism
- Biomass (cellulosic bio-products)
- Composition (starch, oil, protein, phosphorus)
- Stem sugar

Multiple techniques for identification and improvement:
- Bi-parental linkage QTL mapping
- Association QTL mapping
- Selection QTL mapping
- Breeding theory and simulation (recombination)
- Inheritance studies (e.g. diallel)
- Near infrared spectroscopy (NIRS)
- Meta-analyses of data
Aflatoxin contamination

• Produced by fungus *Aspergillus flavus* L.
  • US federally regulated at 20ppb
    – Above 500ppb corn must be destroyed!
• Can lead to acute death
  – *Kenya 2004*: 125 people died, 192 poisoned (levels to 2,000ppb)
  – *US 1998*: 25 dogs died eating levels of 100-200ppb for 3 months
• Potent chronic carcinogen, leads to stunting, and other health problems in humans and animals
  – 1.7cm decrease in height for highly exposed children in Benin
  – Higher rates of liver cancer in China
  – Varying sensitivities among species

*Clean feed*  
*Aflatoxin contaminated feed*  

Courtesy of Velazquez, Bailey, Deng, and Dixon; Texas AgriLife (2010 - unpublished data)
Pre-harvest aflatoxin contamination

- Texas 2008 corn farm gate value = $1billion (12th in Country)
- $14 - $250 million loss liability from mycotoxins in 2008
- Most elite US germplasm is highly susceptible in Texas
- Breeding is one of the least expensive and least intensive methods for reducing aflatoxin contamination
- No identified sources of complete resistance to Aspergillus / aflatoxin

2008 Texas Maize Acreage and 2009 Testing Locations

Percent (%) Acreage with Aflatoxin Claims 2008
Four lines have now been released by Texas AgriLife research for improved aflatoxin control.

“REduced aflatoxin between 30% and 73% reduction…”

Mayfield et al. 2012
Journal of Plant Registrations
6:88–94
Challenges in developing lines with good aflatoxin resistance and yield under stress

- Husk Coverage
  - Long, cover tips
  - Tight and thick
- Maturity
  - Flowering time
  - Days to maturity
- Kernel hardness
- Ear nod (ear droop)
- Earworm resistance
- Drought tolerance

How do we separate these various correlated traits?

How do we make gains from selection on this many traits?

**YIELD**

- Row number
- Ear length
- Stress Resistance
- Stay Green
- Kernel size
- Lodging
- Kernel density
QTL co-localization in RIL hybrids

Mayfield et al. 2011
Crop Sci. 51:2489–2498
Effect of atoxigenic treatment on aflatoxin (ppb) – 2011 trials

AF 36: 134 k / 10 LB

Afla-Guard: 116 k / 10 LB
Effect of atoxigenic treatment on aflatoxin (ppb) – 2011 trials
Suggests different GxEExM needed

<table>
<thead>
<tr>
<th>TREATMENT &amp; YIELD</th>
<th>Hill County (30 BU/A)</th>
<th>Colorado County (89 BU/A)</th>
<th>Nueces County (45 BU/A)</th>
<th>Ellis County (40 BU/A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None (Control)</td>
<td>161 a</td>
<td>4 a</td>
<td>31 a</td>
<td>340 a</td>
</tr>
<tr>
<td>Atoxigenic@ 10 lb/Ac</td>
<td>56 a</td>
<td>0 a</td>
<td>2 b</td>
<td>126 b</td>
</tr>
<tr>
<td>DOLLAR BENEFIT PER ACRE**</td>
<td>$9.00</td>
<td>$0.00</td>
<td>$13.50</td>
<td>$24.00</td>
</tr>
</tbody>
</table>

*MEAN OF 4 REPS.
**BASED ON DISCOUNT / BU: $0.30 FOR >20 & <100 PPB; $0.60 FOR >100 & <200 PPB; $0.90 FOR >200 & <300 PPB; $1.20 FOR >300 & <350 PPB.
Texas corn producers survey at 2011 extension session

- Percent stating main reason for acreage reduction from 2010 to 2011 due to aflatoxin: 74%
- Percent of respondents that received price reductions due to aflatoxin levels in corn in 2010: 76%
- Total income reduced due to aflatoxin in 2010: $946,912
- Mean income reduced due to aflatoxin in 2010: $28,694

• Intent to Adopt
  - 35% – A competitive yielding corn variety if it provided lower aflatoxin levels
  - 25% – A voluntary one sample strategy for monitoring aflatoxin
  - 25% – An integrated management approach for aflatoxin control (i.e. use two or more methods)

<table>
<thead>
<tr>
<th>Difficulty to breed for</th>
<th>Yield</th>
<th>Drought</th>
<th>Aflatoxin</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hard</td>
<td>Harder</td>
<td>Hardest</td>
</tr>
<tr>
<td>Logical grower alternative</td>
<td>Grow maize</td>
<td>Grow sorghum</td>
<td>Grow sorghum</td>
</tr>
</tbody>
</table>

Reasons why Texas growers prefer maize over sorghum

- **Ease of taking care of**
  - Roundup ready / Bt
  - Ear is protected from birds and molds
- **Crop insurance payments** – generally higher for maize
- **Yield in good years** is higher for maize
- **Market (and market price)** is better than maize

\[\text{A “wicked problem”}\]
Drought is a critical cause of yield loss and associated with aflatoxin

- Time where the amount of moisture in the soil no longer meets the needs of the crop (*Mannocchi et al.*, 2009)
- Many different traits and timepoints
- Unknown (but huge) losses to agriculture

http://www.bae.ncsu.edu/programs/extension/evans/ag452-4.html
Rapid phenotypic screens for “drought” tolerance

<table>
<thead>
<tr>
<th>Trait</th>
<th>Type</th>
<th>$H^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wax weight</td>
<td>Inbred</td>
<td>0.17</td>
</tr>
<tr>
<td>Leaf weight</td>
<td>Hybrid</td>
<td>0.58</td>
</tr>
<tr>
<td>Wax weight</td>
<td>Inbred</td>
<td>0.41</td>
</tr>
<tr>
<td>Leaf area</td>
<td>Hybrid</td>
<td>0.59</td>
</tr>
<tr>
<td>Seedling drought</td>
<td>Inbred</td>
<td>0.32</td>
</tr>
<tr>
<td>recovery</td>
<td>Hybrid</td>
<td>0.37</td>
</tr>
</tbody>
</table>

Meeks et al. (accepted) Measuring maize seedling drought response in search of tolerant germplasm.

Meeks et al. 2012 Genetic variation for maize epicuticular wax response to drought stress at flowering.
**Lipoxygenase gene family**

- Large family of nonheme iron containing fatty acid dioxygenases
- Ubiquitous in plants and animals
- Involved in the susceptibility of plants to fungal invasion

Knock-out hypothesis:
- Reduces aflatoxin contamination
- Reduces drought stress
Crossing scheme for association mapping study

**Tx714** *lox5-3*  
(Nonfunctional gene)

**Pollen w/ *lox5-3***

**Inbred Females**
364 Diverse Lines

**Pollen w/ *lox4-8***

** Tx714 ** *lox4-8*  
(Nonfunctional gene)

**2011, 2012 YIELD TRIALS**

**HYBRIDS** (*lox5-3, lox5*)  
(*lox4, lox4*)

A. *flavus* inoculated  
Test aflatoxin resistance

**Testers used:**
- **Va35** [(C103 X T8) T8] – **NSS** – *Warburton et al. Submitted*
- **TX714** [(K55/3*B73)-B-B-B)/B73]-1-B-B – **SS** – This study

**Limited and full irrigation**  
Test drought tolerance
Genetic diversity in the maize lipoxygenase gene family

Major findings and outcomes

1. For both LOX4 (drought) and LOX5 (aflatoxin):
   - Low genetic diversity
   - Low LD
   - Genotype data available for association mapping

2. For LOX5 (aflatoxin):
   - Genotypes missing LOX5 and with two copies (PAV)
   - Suggests LOXs might not be as conserved as thought
   - Backcrossing alleles into elite material

3. LOX12 has LD pattern that suggests that it is important for temperate material
   - Developing isogenic lines for formal tests

4. Current Next-gen sequencing can not capture polymorphism in high similarity genes
   - Use other methods to test hypotheses
Inoculating yield trials with colonized kernels

Harvesting yield trials

Fourier Transformed Near Infrared Reflectance Spectroscopy (FT-NIRS) (Thermo Antaris II)

Vicam AflaTest immunoaffinity columns
Aflatoxin in lox4/lox4 vs lox5/lox5 hybrids CS11

\[ y = 0.5993x + 578.57 \]
\[ R^2 = 0.2402 \]

\( n = 308 \text{ pairs} \)
Color and composition

• Breeding for color (red, blue, purple)

• Breeding quality protein maize (QPM) improves lysine and tryptophan

1 – opaque
3- semi-modified
5- full modification
Overview of Total Phenol Content

Maiz Morado types

Red x blue

Commercial yellow

Commercial white

Test mean: 264
Population designed to measure recombination

\[ \begin{align*}
&\text{B73 Oleie} \\
&\text{Lfy Blue} \\
&\text{TX772} \\
&\text{Ethiopia}
\end{align*} \]

\[ \begin{align*}
&\text{Self} \\
&\text{Self} \\
&\text{Self} \\
&\text{Self}
\end{align*} \]

\[ \begin{align*}
&n = 133 \\
&\text{4 way, 3 self}
\end{align*} \]

\[ \begin{align*}
&n = 158 \\
&\text{2 way, 3 self}
\end{align*} \]

\[ \begin{align*}
&n = 253 \\
&\text{4 way, 1 sib, 3 self}
\end{align*} \]

\[ \begin{align*}
&n = 140 \\
&\text{2 way, 3 self}
\end{align*} \]

\[ \begin{align*}
&n = 575 \\
&\text{4 way, 3 sib, 2 self}
\end{align*} \]

\[ \begin{align*}
&n = 173 \\
&\text{4 way, 2 sib, 3 self}
\end{align*} \]

\[ n = 1432 \text{ total} 
\text{(Goal is 1000)} \]
Z. mays

Commercial Hybrid

Z. diploperennis shattering

Z. Mays
Z. Diploperennis F1

Lines derived from Z. mays
X
Z. diploperennis
X
Shavers populations ~F4
Perennial maize
Perennial Z. mays hybrid
(Weslaco, 2010)
Texas material did surprisingly well in Wisconsin 2012

Appearance of Z. mays x Z. diplo. plant in fall (Madison, WI 2012)

Photos by Dr. Natalia De Leon
Tropical photoperiod sensitive material

1. Biomass feedstock
2. Complement sorghum genomics
3. New sources of aflatoxin resistance
4. Self useful lines out of tropical OP’s?
‘Red Stalker’/ Tx772WRS – This is not a GMO
Southern rust resistance

Commercial hybrids from 100% temperate material

TAMU Hybrids with ½ tropical background
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- Olivia De Hoyos

Most wonderful wife in the world
Andrea Fox
SCSC 421/621: Study Abroad International Agricultural Research Centers in Mexico (3 credits) August 18-24, 2013 (Sunday – Saturday)

Dr. Seth Murray sethmurray@tamu.edu
Dr. Steve Hague shague@ag.tamu.edu
CIMMYT: Wheat and Corn Research
Plant Breeding Internships are designed to introduce plant breeding techniques used in agronomic and horticultural crops of Texas and provide hands on experience in such techniques as pollination, trait measurement, phenotypic selection, cultural practices and molecular genotyping. Primary work will be in the field, but there may also be some laboratory and computer work. Interaction will include other undergraduates, graduate students, research staff and professors. Although this specific internship focuses on corn, there will be opportunities to work with other crops and programs. Additional internships with different foci may also be available. This is a great opportunity to see what Plant Breeding, Texas A&M, and graduate study is about. This may lead to independent research projects and/or a graduate assistantship (A graduate assistantship is a competitive position that pays you, comparable to a job, plus pays for your graduate degree, and health care).

Eligibility: Undergraduate students interested in plant breeding. Preference will be made for students with an overall GPA of 3.0 or greater in their major. Students coming from colleges/universities without plant breeding programs are especially encouraged to apply to gain broader exposure to this growing and important discipline.

Dates: Between May 1, 2013 through August 26, 2013 but dates are flexible

Salary: $8.50/hr or commensurate (A housing allowance for those not at Texas A&M may be available)

Contact: Please visit the project website (http://maizeandgenetics.tamu.edu – it is a little out of date) and contact Seth Murray specifically mentioning your interest in the undergraduate internship. (e-mail: sethmurray@tamu.edu phone: (979)-845-3469).

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