2011 Agronomy Update Meetings

Arlington, Wausau, Eau Claire, Sparta, Kimberly, Fond du Lac, Janesville and Belmont

Joe Lauer
University of Wisconsin

Cooperating with Columbia, Marathon, Eau Claire, Monroe, Outagamie, Fond du Lac, Rock and Grant Counties

January 4 - 7, 2011
Overview

- 2010 growing season review
- Performance of corn biotech traits in the UW trials during 2010
- Tropical corn - Is there a place for it in Wisconsin?
- Seed treatments - Do they make a difference?
Highlights for corn production during 2010

• Growing Season
  ✓ Season was nearly ideal
    □ Rainfall tended to be high in NE
  ✓ Early planting
  ✓ Rainfall adequately distributed
  ✓ Dry fall

• New in the Hybrid Trials
  ✓ Improved readability
    □ Portrait layout of results
    □ Font size
  ✓ New map

• Records
  ✓ Value of crop: high, dry yield AND high price
  ✓ Silage: South Central Zone
    □ 11.7 T/A by G2 Genetics 5H-516RRHX
    □ Previous best: 1998= 11.3 T/A by Pioneer 3527
  ✓ Grain: All Time Zone and Location:
    □ Southern= 271 bu/A by G2 Genetics 5X-909RRHXT
      Arlington= 290 bu/A by G2 Genetics 5X-909RRHXT
    □ Previous best:
      Southern 2009= 266 bu/A by Dairyland ST9009
      Janesville 2009= 288 bu/A by Dekalb DKC59-64(VT3) and AgriGold A6309VT3
Growing degree unit accumulation and precipitation deviations during 2010 compared to the 30-yr normal (± Standard Deviation of warm/cool and wet/dry seasons)

Growing Degree Unit deviations (max = 86 °F, base = 50 °F)

Precipitation deviations (inches)

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Lauer unpublished for UW-ARS Arlington
Growing degree unit accumulation and precipitation deviations during 2010 compared to the 30-yr normal
(± Standard Deviation of warm/cool and wet/dry seasons)

- Growing Degree Unit deviations (max = 86 °F, base = 50 °F)
- Precipitation deviations (inches)

Lauer © 1994-2011
http://corn.agronomy.wisc.edu

Lauer unpublished for UW-ARS Marshfield
Corn Agronomy Program 2010
Rationale and Situation

- Corn is grown on ~4 million acres in WI. A one bushel increase by farmers increases farm income $8 to $20 million dollars annually.
- In 2010, 475 corn hybrids were tested at 13 locations.
- Objective: To provide unbiased performance comparisons of hybrid seed corn available in Wisconsin.
## 2010 Wisconsin Corn Performance Trials
### Grain Summary

<table>
<thead>
<tr>
<th>Location</th>
<th>2000-2009</th>
<th>2010</th>
<th>Percent change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N Yield</td>
<td>N Yield</td>
<td></td>
</tr>
<tr>
<td>Arlington</td>
<td>2003 213</td>
<td>163 243</td>
<td>14</td>
</tr>
<tr>
<td>Janesville</td>
<td>1900 221</td>
<td>163 232</td>
<td>5</td>
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<tr>
<td>Lancaster</td>
<td>1768 210</td>
<td>163 214</td>
<td>2</td>
</tr>
<tr>
<td>Fond du Lac</td>
<td>1486 185</td>
<td>156 198</td>
<td>7</td>
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<td>Galesville</td>
<td>1580 205</td>
<td>156 209</td>
<td>2</td>
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<tr>
<td>Hancock</td>
<td>1609 218</td>
<td>156 181</td>
<td>-17</td>
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<tr>
<td>Chippewa Falls</td>
<td>1195 158</td>
<td>138 211</td>
<td>34</td>
</tr>
<tr>
<td>Marshfield</td>
<td>1600 163</td>
<td>171 175</td>
<td>7</td>
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<tr>
<td>Seymour</td>
<td>1318 170</td>
<td>138 137</td>
<td>-20</td>
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<tr>
<td>Valders</td>
<td>1551 165</td>
<td>138 137</td>
<td>-17</td>
</tr>
<tr>
<td>Coleman/Rhinelander</td>
<td>209 183</td>
<td>59 152</td>
<td>-17</td>
</tr>
<tr>
<td>Spooner</td>
<td>1361 130</td>
<td>177 190</td>
<td>46</td>
</tr>
</tbody>
</table>
## 2010 Wisconsin Corn Performance Trials

### Silage Summary

<table>
<thead>
<tr>
<th></th>
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</tr>
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<tbody>
<tr>
<td>Arlington</td>
<td>639</td>
<td>9.6</td>
<td>69</td>
<td>9.2</td>
<td>-4</td>
</tr>
<tr>
<td>Lancaster</td>
<td>639</td>
<td>8.9</td>
<td>69</td>
<td>8.7</td>
<td>-3</td>
</tr>
<tr>
<td>Fond du Lac</td>
<td>665</td>
<td>8.3</td>
<td>76</td>
<td>6.9</td>
<td>-16</td>
</tr>
<tr>
<td>Galesville</td>
<td>670</td>
<td>9.3</td>
<td>76</td>
<td>9.1</td>
<td>-2</td>
</tr>
<tr>
<td>Chippewa Falls</td>
<td>392</td>
<td>7.3</td>
<td>66</td>
<td>7.6</td>
<td>4</td>
</tr>
<tr>
<td>Marshfield</td>
<td>595</td>
<td>7.3</td>
<td>66</td>
<td>7.0</td>
<td>-5</td>
</tr>
<tr>
<td>Valders</td>
<td>576</td>
<td>7.3</td>
<td>66</td>
<td>7.1</td>
<td>-3</td>
</tr>
<tr>
<td>Coleman/Rhinelander</td>
<td>176</td>
<td>7.4</td>
<td>26</td>
<td>6.2</td>
<td>-16</td>
</tr>
<tr>
<td>Spooner</td>
<td>390</td>
<td>6.7</td>
<td>50</td>
<td>8.1</td>
<td>21</td>
</tr>
</tbody>
</table>
Hybrid Selection Principles

1. Use multi-location averages to compare hybrid performance
2. Evaluate consistency of performance
3. Pay attention to seed costs
   - http://corn.agronomy.wisc.edu/Season/DSS.aspx
4. Every hybrid must stand on its own for performance
5. Buy the traits you need
Materials and Methods

- UW hybrid performance trials (1990 to 2010)
- Comparison methods
  - Isoline v. All hybrids
  - Test genetics v. systems
  - All hybrids v. Top 20% group
  - State v. Zone v. Location
- Cohorts
  - Trait
  - Event by itself
  - Event by itself AND stacked
- Technology
- Measures
  - Actual yield
  - Relative performance
    - Frequency
    - Percent
  - Trial average

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Relative performance of conventional corn hybrids

Grain yield difference (bu/A) = hybrid average - trial average

Grain yield (bu/A)

- • All hybrids
- • Top 20%

Trial Average

STATEWIDE FALL SURVEY AVERAGES 1957-2007
Average ECB Larvae per Plant

Transgenic hybrids first introduced
Tissue cultured hybrids first introduced

Last major fall count of European corn borer

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Lauer unpublished
Relative performance of hybrids with Mon810
Grain yield difference (bu/A) = hybrid average - trial average

Grain yield (bu/A)

Number of comparisons (GxEs):
27 39 118 175 183 318 832 849 535 250 91 35 16

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Lauer unpublished
Relative performance of hybrids with Mon810

Grain yield difference (bu/ A) = hybrid average - trial average

Lauer © 1994-2011
http://corn.agronomy.wisc.edu

Lauer unpublished
## Performance of selected corn transgenic events in Wisconsin during 2010 (All hybrids)

<table>
<thead>
<tr>
<th>Technology</th>
<th>Traits: Events</th>
<th>GxE</th>
<th>Diff.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional: None</td>
<td></td>
<td>N</td>
<td>Bu/A</td>
</tr>
<tr>
<td>CB, CR, RR: Mon810+Mon88017+Nk603</td>
<td>499</td>
<td>-3.1</td>
<td></td>
</tr>
<tr>
<td>CB, CR, RR: Mon89034+Mon88017+Nk603</td>
<td>53</td>
<td>2.4</td>
<td></td>
</tr>
<tr>
<td>CB, LL, RR: Bt11+T25+GA21</td>
<td>104</td>
<td>5.0</td>
<td></td>
</tr>
<tr>
<td>CB, LL, RR: TC1507+T25+Nk603</td>
<td>209</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td>CB, CR, LL, RR: Bt11+MIR604+T25+GA21</td>
<td>248</td>
<td>-1.7</td>
<td></td>
</tr>
<tr>
<td>CB, CR, LL, RR: TC1507+DAS591227+T25+GA21</td>
<td>20</td>
<td>-6.8</td>
<td></td>
</tr>
<tr>
<td>CB, CR, LL, RR: TC1507+DAS591227+T25+Nk603</td>
<td>115</td>
<td>2.4</td>
<td></td>
</tr>
<tr>
<td>CB, CR, LL, RR: TC1507+Mon89034+DAS591227+Mon88017+T25+Nk603</td>
<td>105</td>
<td>-2.2</td>
<td></td>
</tr>
<tr>
<td>LSD (0.10)</td>
<td></td>
<td>6.8</td>
<td></td>
</tr>
</tbody>
</table>

† GxE: Number of replicated hybrid means used to calculate Diff.
‡ Diff.: Grain yield difference = hybrid average – trial average
Tropical Corn (Low starch) - Is there a place for it in Wisconsin?
Joe Lauer, Pat Hoffman, Mike Bertram, and Zen Miller

- **Rationale:**
  - Feed for growing heifers is different than for a high performing dairy cow.
  - An ideal forage should have:
    - High yield
    - High energy (high digestibility)
    - High intake potential (low fiber)
    - High protein
    - Proper moisture at harvest for storage
  - Adapted corn silage may have too much energy

- **Objective:** To measure yield, adaptation and quality of tropical corn hybrids
Materials and Methods

• Mix of on-farm and research station trials

✓ 2006
  □ Everett Farm
  □ Luedtke Farm
  □ Pethke Farm
  □ Schuessler Farm

✓ 2007
  □ Arlington, WI
  □ De Pere, WI
  □ Malone Farm
  □ Marshfield, WI
  □ Stratford, WI

✓ 2008 and 2009
  □ Arlington, WI
  □ Marshfield, WI (2009: Planting date)
  □ Stratford, WI

<table>
<thead>
<tr>
<th>Adapted corn</th>
<th>Tropical corn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dahlco 4013RRBTRW</td>
<td>Agroceres AG1051</td>
</tr>
<tr>
<td>Dairyland DST11725</td>
<td>Agroceres AG2060</td>
</tr>
<tr>
<td>Dairyland DST11907</td>
<td>DeKalb AG8060</td>
</tr>
<tr>
<td>DeKalb DKC50-44</td>
<td>DeKalb AG9010</td>
</tr>
<tr>
<td>DeKalb DKC54-46</td>
<td>DeKalb AG9020</td>
</tr>
<tr>
<td>Garst 8922YG</td>
<td>DeKalb DKB215</td>
</tr>
<tr>
<td>NK Brand N78-D6</td>
<td>DeKalb DKB290</td>
</tr>
<tr>
<td>Pioneer 34N44</td>
<td>DeKalb DKB390</td>
</tr>
<tr>
<td>Pioneer 38B83</td>
<td>DeKalb DKB393</td>
</tr>
<tr>
<td>Spangler 324G</td>
<td>DeKalb DKB499</td>
</tr>
<tr>
<td>Kaltenberg K8105LF</td>
<td>DeKalb DKB789</td>
</tr>
<tr>
<td>MARS EX2 (Leafy)</td>
<td>Hytest HT92-90W</td>
</tr>
<tr>
<td>Kaltenberg Male-Sterile</td>
<td>Hytest HT94-99W</td>
</tr>
<tr>
<td>Jung HDS04</td>
<td>Jung HDS04</td>
</tr>
<tr>
<td>MARS EX1(Blend)</td>
<td>Pioneer 30F34</td>
</tr>
</tbody>
</table>
# Tropical Corn Results

<table>
<thead>
<tr>
<th>Year</th>
<th>Trait</th>
<th>Yield T/A</th>
<th>Moisture %</th>
<th>NDF %</th>
<th>NDFD %</th>
<th>Starch %</th>
<th>Milk per Ton</th>
<th>Milk per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average † Hybrid</td>
<td>8.0</td>
<td>64</td>
<td>47</td>
<td>59</td>
<td>30</td>
<td>3040</td>
<td>24900</td>
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<tr>
<td>2006</td>
<td>Adapted</td>
<td>6.0</td>
<td>65</td>
<td>42</td>
<td>59</td>
<td>30</td>
<td>2980</td>
<td>17700</td>
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<tr>
<td></td>
<td>Tropical</td>
<td>6.0</td>
<td>73</td>
<td>54</td>
<td>58</td>
<td>14</td>
<td>2520</td>
<td>14900</td>
</tr>
<tr>
<td></td>
<td>LSD(0.10)</td>
<td>NS</td>
<td>3</td>
<td>4</td>
<td>NS</td>
<td>5</td>
<td>170</td>
<td>2360</td>
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<tr>
<td>2007</td>
<td>Adapted</td>
<td>6.7</td>
<td>55</td>
<td>42</td>
<td>55</td>
<td>32</td>
<td>3170</td>
<td>21300</td>
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<tr>
<td></td>
<td>Tropical</td>
<td>5.5</td>
<td>73</td>
<td>67</td>
<td>54</td>
<td>2</td>
<td>2020</td>
<td>11000</td>
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<tr>
<td></td>
<td>LSD(0.10)</td>
<td>0.8</td>
<td>3</td>
<td>3</td>
<td>NS</td>
<td>1</td>
<td>90</td>
<td>1750</td>
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<tr>
<td>2008</td>
<td>Adapted</td>
<td>7.2</td>
<td>54</td>
<td>39</td>
<td>59</td>
<td>37</td>
<td>3140</td>
<td>22600</td>
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<td></td>
<td>Tropical</td>
<td>5.6</td>
<td>76</td>
<td>60</td>
<td>59</td>
<td>5</td>
<td>2370</td>
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<td></td>
<td>LSD(0.10)</td>
<td>0.6</td>
<td>2</td>
<td>2</td>
<td>NS</td>
<td>3</td>
<td>90</td>
<td>1770</td>
</tr>
</tbody>
</table>

† Average hybrid from UW Silage Performance trials (N=7339 GxEs, 1989-2010)
Corn Seed Treatments - Do they make a difference?

• Growers must do ALL of the right things to minimize early season STRESS

• Rain a grower’s best friend or worst enemy

  ✓ Rainfall - soon after planting that results in saturated or nearly saturated soils - is as important a factor on yield as is date of planting or tillage type

  ✓ Grower’s today plant large numbers of acres of corn each day-increasing the at risk acres when a major weather front comes through

• Objective: To evaluate efficacy of corn seed treatments
## Efficacy of Corn Seed Treatments

<table>
<thead>
<tr>
<th>Disease</th>
<th>Favorable Environment</th>
<th>Captan</th>
<th>Maxim</th>
<th>Apron</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rhizoctonia</td>
<td>Rainfall followed by cool and then warm weather</td>
<td>Good</td>
<td>Good</td>
<td>Poor</td>
</tr>
<tr>
<td>Fusarium</td>
<td>Warm, wet soil</td>
<td>Good</td>
<td>Excellent</td>
<td>Poor</td>
</tr>
<tr>
<td>Pythium</td>
<td>Likes cold and wet</td>
<td>Poor</td>
<td>Poor</td>
<td>Excellent</td>
</tr>
<tr>
<td>Helminthosporium</td>
<td>??</td>
<td>Good</td>
<td>Good</td>
<td>Poor</td>
</tr>
<tr>
<td>Penicillium</td>
<td>??</td>
<td>Good</td>
<td>Good</td>
<td>Poor</td>
</tr>
<tr>
<td>Aspergillus</td>
<td>??</td>
<td>Good</td>
<td>Good</td>
<td>Poor</td>
</tr>
</tbody>
</table>
Assumption: Corn seed treatments are applied randomly to hybrids in the UW trials.

- Number of tests is important

Cohorts

- Trait
- Event by itself
- Event by itself AND stacked
- Technology

Measures

- Actual yield
- Relative performance
  - Frequency
  - Percent
  - Trial average

Corn Production Zones

- Northern
- North Central
- South Central
- Southern
Corn Seed Treatments
Common Names : Chemical Names

- **Fungicides**
  - Captan
  - Maxim: Fludioxonil
  - Apron FL, Allegiance: Metalaxyl
  - Apron XL: Mefenoxam (Metalaxyl-M)
  - Maxim XL: Fludioxonil+ Mefenoxam
  - Dynasty, Protégé, Quadris, Trilex: Strobilurins

- **Insecticides**
  - Lorsban: Chlorpyrifos
  - Poncho250, Poncho1250: Clothianidin
  - Gaucho, Admire, Condifor, Premier, Premise, Provado, and Marathon: Imidacloprid
  - Assult, Baracuda: Permethrin
  - Actellic, Nu-Gro: Pirimiphos-methyl
  - Cruiser: Thiamethoxam
Relative performance of corn seed treatments

Grain yield difference (bu/ A) = hybrid average - trial average

Source: Lauer
Conclusions

- **Hybrid Selection Principles**
  1. Use multi-location averages to compare hybrid performance
  2. Evaluate consistency of performance
  3. Pay attention to seed costs
     - http://corn.agronomy.wisc.edu/Season/DSS.aspx
  4. Every hybrid must stand on its own for performance
  5. Buy the traits you need

- **Seed treatments:**
  - Performance difference exist for seed treatments
  - “Stay tuned”

- Even though Tropical corn hybrids are 2-3 feet taller than adapted hybrids, they are lower yielding primarily due to grain yield
  - Lower starch content
  - NDFD is similar
  - Higher moisture content, so frost will need to kill the plant.
  - Milk per Ton and Milk per acre is lower than adapted hybrids

- **Consider other options to produce heifer feed**
  - Cut corn silage with
    - Straw
    - Grasses - Which species would work best?
Thanks for your attention!
Questions?

Website: [http://corn.agronomy.wisc.edu](http://corn.agronomy.wisc.edu)

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