United States Department of Agriculture
Agricultural Research Service

Germplasm Enhancement of Maize

2009 GEM Field Day Handout

September 17th 2009

The information in this report is shared cooperatively.
The data are not published, but are presented with the understanding
that they will not be used in publications without specific consent of the public cooperator.
The mission of the GEM (Germplasm Enhancement of Maize) Project is to effectively increase the diversity of U.S. maize germplasm utilized by producers, global end-users and consumers. The mission will be achieved through a collaborative effort between USDA-ARS, and both public and private research scientists by utilizing exotic, public, and proprietary maize germplasm. The resulting germplasm and associated knowledge, derived via the identification and incorporation of favorable alleles for prioritized traits from exotic sources, is utilized in private and public breeding programs and ultimately contributes to increased genetic diversity of maize grown by producers and improved product performance. In addition, the GEM project provides opportunities for training plant scientists in the enhancement and utilization of un-adapted germplasm. This contributes to the global sustainability of agricultural production, economic stability and the nutrition and well being of society.
Germplasm Enhancement of Maize (GEM) Project  
Field Day September 17\textsuperscript{th} 2009

**Table of Contents**

Breeding History & GEM Protocol……………………………………… Entries 1-29

GEM Recommended Lines (Ames & NC)……………………………… Entries 30-64
Top Crosses (GEM Recommended Lines)…………………………… Entries 100-121

ISU Lines…………………………………………………………………… Entries 66-69; 82
Top Crosses (ISU Lines)…………………………………………………………………… Entries 65; 83-86

Drought Tolerant Lines (Texas A&M U.)………………………… Entry 70-74
Top Crosses-Drought Tolerant (Texas A&M U.)………………… Entry 77-81

Top Crosses (GEM x GEM)……………………………………………… Entry 87-97

Top Crosses (Waxy GEM Lines)………………………………………… Entries 98-99
Top Crosses (2\textsuperscript{nd} year Retests)………………………………………. Entries 125-135
Allelic Diversity Model…………………………………………………… Entries 136-140
Amylomaize GEMS-0067 line (Truman State U.)……………… Entry 141
Top Crosses (Amylomaize VII) (Truman State U.)…………… Entry 142-144

Top Crosses-Anthracnose resistant (Cornell U.)……………… Entry 145-147

Top Crosses- Silage (U. of Wisconsin)………………………………… Entries 148-150

Check Hybrid (HC33 x LH287)……………………………………….. Entries 22, 29, 75, 124
Check Hybrid (LH200 x LH262)……………………………………….. Entries 76, 122
Check Hybrid (MBS3644 x MBS5411)………………………………….. Entry 123

**Field Information**

Planted: May 4, 2009  
Fertilizer: 150 lbs N, 50 lbs P, 50 lbs K/acre (168 kg N, 56 kg P, 56 kg K/hectare)  
Herbicide: PPI: Harness 2 pints/acre (2.33 liters/hectare)  
Plant Population: 29,040 plants/acre (71,742 plants/hectare)

**Legend**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAI</td>
<td>Amino Acid Index (MET, LYS, TRP)</td>
</tr>
<tr>
<td>GDU</td>
<td>Growing Degree Units (Fahrenheit, base 50)</td>
</tr>
<tr>
<td>GLS</td>
<td>Gray Leaf Spot</td>
</tr>
<tr>
<td>NLB</td>
<td>Northern Corn Leaf Blight</td>
</tr>
<tr>
<td>SLB</td>
<td>Southern Corn Leaf Blight</td>
</tr>
</tbody>
</table>
Entry 001

Stiff Stalk Synthetic (SSS)

- Derived from 16 line synthetic
- Developed in 1930's by Sprague
- 70% of lines trace to Reid germplasm
- 1271 GDU's (77 days) to 50% anthesis

Entry 002

BSSS(HT)C5

- Ames 28168
- Synthetic population cycle 5 that B73 was derived from
- 1288 GDU's (78 days) to 50% anthesis

Entry 003

B14

- Public inbred derived from SSS C0
- Released in 1953
- 1350 GDU's (81 days) to 50% anthesis

Entry 004

A632

- Public inbred derived from (Mt42 x B14) B14
- Released in 1964
- 1254 GDU's (76 days) to 50% anthesis

Entry 005

LH74

- Related to inbreds B14 and B73
- Expired PVP certificate # 8200063
- 1215 GDU's (73 days) to 50% anthesis

Entry 006

B37

- Public inbred derived from SSS C0
- Released in 1958
- 1370 GDU's (62 days) to 50% anthesis
Entry 007
LH132
- Related to B73 and B37
- Expired PVP certificate # 8300148
- 1254 GDU's (76 days) to 50% anthesis

Entry 008
B73
- Public inbred derived from SSS C5
- Released in 1972
- 1350 GDU's (81 days) to 50% anthesis

Entry 009
Lancaster Sure Crop
- Recommended for Eastern states in 1936 Yearbook of Ag
- Developed 1860 – 1920 by Hershey Family
- 1095 GDU's (67 days) to 50% anthesis

Entry 010
C103
- Parent of Mo17
- Released in 1949
- Derived from Lancaster Sure Crop
- 1271 GDU's (77 days) to 50% anthesis

Entry 011
Mo17
- Public inbred derived from C103 x 187-2
- Released in 1964
- 1254 GDU's (76 days) to 50% anthesis

Entry 012
LH51
- Related to Mo17
- Expired PVP certificate # 8200062
- 1306 GDU's (79 days) to 50% anthesis
<table>
<thead>
<tr>
<th>Entry</th>
<th>Variety</th>
<th>Source</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>013</td>
<td>Oh43</td>
<td>Public inbred derived from Oh40B x W8</td>
<td>Released in 1949, 1116 GDU's (68 days) to 50% anthesis</td>
</tr>
<tr>
<td>014</td>
<td>A619</td>
<td>Public inbred derived from (A171 x Oh43) Oh43</td>
<td>Released in 1961, 1156 GDU's (70 days) to 50% anthesis</td>
</tr>
<tr>
<td>015</td>
<td>LH39</td>
<td>Related to Oh43</td>
<td>Expired PVP certificate # 8000067, 1201 GDU's (72 days) to 50% anthesis</td>
</tr>
<tr>
<td>016</td>
<td>B73 x OH43</td>
<td>Public hybrid of 1970's</td>
<td>1180 GDU's (71 days) to 50% anthesis</td>
</tr>
<tr>
<td>017</td>
<td>A632 x A619</td>
<td>Public hybrid of 1960's – 1970's</td>
<td>1116 GDU's (68 days) to 50% anthesis</td>
</tr>
<tr>
<td>018</td>
<td>B73 x LH39</td>
<td>Public x Ex PVP</td>
<td>Hybrid of 1970's – 1980's, 1135 GDU's (69 days) to 50% anthesis</td>
</tr>
</tbody>
</table>
Entry 019
B73 x Mo17
- Popular hybrid from mid-1970's – 1980's
- First tested in 1973
- 1254 GDU's (76 days) to 50% anthesis

Entry 020
LH132 x LH51
- Ex PVP x Ex PVP
- Hybrid of 1980's – 1990's
- 1254 GDU's (76 days) to 50% anthesis

Entry 021
LH74 x LH51
- Ex PVP x Ex PVP
- Hybrid of 1980's – 1990's
- 1215 GDU's (73 days) to 50% anthesis

Entry 022
HC33 x LH287
- Check Hybrid-Medium Maturity (109 days)
- Modern hybrid
- 1215 GDU's (73 days) to 50% anthesis

Entry 023
Jarvis Golden Prolific
- Southern US OPV
- Related to Caribbean flint and Creole races
- 1447 GDU's (86 days) to 50% anthesis

Entry 024
CUBA 164
- Tropical GEM accession
- Source of drought stress
- Source of high protein and oil content
- Source of unique starch thermal properties
- Race: Mixed (Creole)
- 1688 GDU's (98 days) to 50% anthesis
<table>
<thead>
<tr>
<th>Entry 025</th>
<th>CUBA164:S20</th>
</tr>
</thead>
<tbody>
<tr>
<td>50% Tropical Breeding Cross</td>
<td></td>
</tr>
<tr>
<td>CUBA164 x SS 20</td>
<td></td>
</tr>
<tr>
<td>1412 GDU's (84 days) to 50% anthesis</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Entry 026</th>
<th>CUBA164:S2008c</th>
</tr>
</thead>
<tbody>
<tr>
<td>25% Tropical Breeding Cross</td>
<td></td>
</tr>
<tr>
<td>(CUBA164 x SS 20) x SS 08c</td>
<td></td>
</tr>
<tr>
<td>1350 GDU's (81 days) to 50% anthesis</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Entry 027</th>
<th>CUBA164:S2008c-289-001-B-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>S4 line from CUBA164:S2008c</td>
<td></td>
</tr>
<tr>
<td>1390 GDU's (83 days) to 50% anthesis</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Entry 028</th>
<th>CUBA164:S2008c-289-001/LH287</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top cross of entry 27</td>
<td></td>
</tr>
<tr>
<td>1215 GDU's (73 days) to 50% anthesis</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Entry 029</th>
<th>HC33 x LH287</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check Hybrid-Medium Maturity (109 days)</td>
<td></td>
</tr>
<tr>
<td>1215 GDU's (73 days) to 50% anthesis</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Entry 030</th>
<th>GEMN-0187</th>
</tr>
</thead>
<tbody>
<tr>
<td>(25% tropical exotic; NS heterotic group)</td>
<td></td>
</tr>
<tr>
<td>Deriv. ANTIG03:N1218-056-001 (S4)</td>
<td></td>
</tr>
<tr>
<td>2009 Recommended Line</td>
<td></td>
</tr>
<tr>
<td>12.2% protein, 3.9% oil, 70.5% starch</td>
<td></td>
</tr>
<tr>
<td>Origin: Antigua Race: Criollo</td>
<td></td>
</tr>
<tr>
<td>1350 GDU's (81 days) to 50% anthesis</td>
<td></td>
</tr>
</tbody>
</table>
Entry 031

GEMS-0188
(25% tropical exotic; SS heterotic group)

- Deriv. DKXL212:S0912-012-001 (S4)
- 2009 Recommended Line
- 13.8% protein, 4.2% oil, 68.9% starch
- Origin: Brazil  Race: Tropical Hybrid
- 1306 GDU's (79 days) to 50% anthesis

Entry 032

GEMS-0189
(25% tropical exotic; SS heterotic group)

- Deriv. DKXL212:S0912-117-001 (S4)
- 2009 Recommended Line
- 14.1% protein, 4.2% oil, 68.9% starch
- Origin: Brazil  Race: Tropical Hybrid
- 1350 GDU's (81 days) to 50% anthesis

Entry 033

GEMN-0190
(25% tropical exotic; NS heterotic group)

- Deriv. PASCO14:N0424-078-001 (S4)
- 2009 Recommended Line
- 11.8% protein, 3.8% oil, 70.8% starch
- Origin: Peru  Race: Cuban Yellow
- 1370 GDU's (82 days) to 50% anthesis

Entry 034

GEMN-0191
(25% tropical exotic; NS heterotic group)

- Deriv. SCROGP3:N2017-003-001 (S4)
- 2009 Recommended Line
- 11.9% protein, 3.4% oil, 70.9% starch
- Origin: St. Croix  Race: Tusón
- 1432 GDU's (85 days) to 50% anthesis

Entry 035

GEMN-0192
(25% temperate exotic; NS heterotic group)

- Deriv. SCROGP3:N2017-172-001 (S4)
- 2009 Recommended Line
- 12.2% protein, 4.5% oil, 70.0% starch (Starch Properties)
- Origin: St. Croix  Race: Tusón
- 1201 GDU's (72 days) to 50% anthesis

Entry 036

GEMN-0193
(25% temperate exotic; NS heterotic group)

- Deriv. UR11002:N0308b-086-001 (S4)
- 2009 Recommended Line
- 12.0% protein, 4.2% oil, 70.3% starch
- Origin: Uruguay  Race: Dente Branco
- 1370 GDU's (82 days) to 50% anthesis
Entry 037

GEMN-0194
(50% tropical exotic; NS heterotic group)

- Deriv. DK888:N11(95)-B-027-001-011 (S5)
- 2009 Recommended Line – NC State/USDA-ARS
- Origin: Thailand Race: Tropical Hybrid
- 1642 GDU's (96 days) to 50% anthesis

Entry 038

GEMN-0195
(50% tropical exotic; NS heterotic group)

- Deriv. DK888:N11(95)-B-027-001-015 (S5)
- 2009 Recommended Line – NC State/USDA-ARS
- Origin: Thailand Race: Tropical Hybrid
- 1642 GDU's (96 days) to 50% anthesis

Entry 039

GEMN-0196
(50% tropical exotic; NS heterotic group)

- Deriv. DK888:N11(95)-B-003-001-001 (S5)
- 2009 Recommended Line – NC State/USDA-ARS
- Origin: Thailand Race: Tropical Hybrid
- 1736 GDU's (100 days) to 50% anthesis

Entry 040

GEMN-0198
(50% tropical exotic; NS heterotic group)

- Deriv. DK212T:N11-040-001-007 (S4)
- 2009 Recommended Line – NC State/USDA-ARS
- Origin: Argentina Race: Cristalino Colorado
- 1306 GDU's (79 days) to 50% anthesis

Entry 041

GEMN-0174
(25% temperate exotic; NS heterotic group)

- Deriv. AR17056:N2025-574-001 (S7)
- 2008 GEM Release
- 16.3% protein, 3.1% oil, 67.2% starch (Starch Properties)
- Origin: Argentina Race: Cristalino Colorado
- 1306 GDU's (79 days) to 50% anthesis

Entry 042

GEMS-0175
(25% tropical exotic; SS heterotic group)

- Deriv. BVIR155:S2012-029-001 (S4)
- 2008 Recommended Line
- 13.9% protein, 4.4% oil, 66.8% starch
- Upright leaf phenotype
- Origin: British Virgin Islands Race: Tusón
- 1306 GDU's (79 days) to 50% anthesis
Entry 043  
GEMS-0176  
(25% tropical exotic; SS heterotic group)  
Deriv. CUBA164:S2008c-289-001 (S4)  
2008 Recommended Line  
13.2% protein, 4.1% oil, 68.3% starch  
Origin: Cuba  Race: Mixed (Creole)  
1390 GDU's (83 days) to 50% anthesis

Entry 044  
GEMN-0177  
(25% tropical exotic; NS heterotic group)  
Deriv. DK888:N11a08a-395-001 (S4)  
2008 Recommended Line  
11.3% protein, 3.9% oil, 70.8% starch  
Resistant to NLB & SLB  
Origin: Thailand  Race: Tropical Hybrid  
1370 GDU's (82 days) to 50% anthesis

Entry 045  
GEMN-0178  
(25% tropical exotic; NS heterotic group)  
Deriv. DK888:N11a08a-440-001 (S4)  
2008 Recommended Line  
11.4% protein, 4.0% oil, 70.5% starch  
Origin: Thailand  Race: Tropical Hybrid  
1432 GDU's (85 days) to 50% anthesis

Entry 046  
GEMN-0179  
(25% temperate exotic; NS heterotic group)  
Deriv. FS8B(T):N11a08c-030-002 (S4)  
2008 Recommended Line  
12.8% protein, 5.2% oil, 67.7% starch  
Resistant to NLB; Upright leaf phenotype  
Origin: USA (Florida)  Race: Mixed  
1306 GDU's (79 days) to 50% anthesis

Entry 047  
GEMS-0180  
(25% tropical exotic; SS heterotic group)  
Deriv. GUAT209:S1308a-047-001 (S4)  
2008 Recommended Line  
10.9% protein, 3.6% oil, 71.6% starch  
(Starch Properties)  
Resistant to NLB & SLB  
Origin: Guatemala  Race: Tusón  
1447 GDU's (86 days) to 50% anthesis

Entry 048  
GEMS-0181  
(25% tropical exotic; SS heterotic group)  
Deriv. GUAT209:S1308a-068-001 (S4)  
2008 Recommended Line  
12.6% protein, 4.3% oil, 69.1% starch  
Resistant to GLS  
Origin: Guatemala  Race: Tusón  
1370 GDU's (82 days) to 50% anthesis
| Entry 049 | GEMS-0182  
(25% tropical exotic; SS heterotic group)  
- Deriv. GUAT209:S1308a-084-001 (S4)  
- 2008 Recommended Line  
- 11.1% protein, 4.0% oil, 70.6% starch  
- Resistant to SLB & GLS  
- Origin: Guatemala Race: Tusón  
- 1370 GDU's (82 days) to 50% anthesis |
| Entry 050 | GEMS-0183  
(25% tropical exotic; SS heterotic group)  
- Deriv. GUAT209:S1308a-104-001 (S4)  
- 2008 Recommended Line  
- 12.4% protein, 3.7% oil, 69.9% starch  
- Origin: Guatemala Race: Tusón  
- 1350 GDU's (81 days) to 50% anthesis |
| Entry 051 | GEMS-0184  
(25% tropical exotic; SS heterotic group)  
- Deriv. GUAT209:S1308a-120-001 (S4)  
- 2008 Recommended Line  
- 11.8% protein, 4.6% oil, 69.4% starch  
- Origin: Guatemala Race: Tusón  
- 1390 GDU's (83 days) to 50% anthesis |
| Entry 052 | GEMS-0185  
(25% tropical exotic; SS heterotic group)  
- Deriv. CUBA164:S2012-966-001-B  
- 2008 Recommended line – Waxy  
- Origin: Cuba Race: Mixed (Creole)  
- 1254 GDU's (76 days) to 50% anthesis |
| Entry 053 | GEMN-0186  
(25% tropical exotic; NS heterotic group)  
- Deriv. DKXL370:N11a20-036-002-B wx  
- 2008 Recommended line – Waxy  
- Origin: Brazil Race: Tropical Hybrid  
- 1271 GDU's (77 days) to 50% anthesis |
| Entry 054 | GEMS-0061  
(50% temperate exotic; SS heterotic group)  
- Deriv. AR16026:S17-010-001 (S5)  
- 12.6% protein, 4.4% oil, 67.7% starch  
- Low aflatoxin and fumonisin  
- Origin: Argentina Race: Cristalino Colorado  
- 1254 GDU's (76 days) to 50% anthesis |
<table>
<thead>
<tr>
<th>Entry</th>
<th>(see TC entry)</th>
<th>Registration and Description</th>
</tr>
</thead>
</table>
| **Entry 055** | GEMN-0140 (25% tropical exotic; NS heterotic group) | Deriv. BR51675:N0620-033-001 (S5)  
- 11.4% protein, 3.6% oil, 70.4% starch; Good YM  
- Resistant to GLS; low fumonisin  
- Origin: Brazil  
- Race: Dente Amarelo  
- 1327 GDU's (80 days) to 50% anthesis |
| **Entry 056** | CUBA117:S15-101-001-B-B-B-B-B (50% tropical exotic; SS heterotic group) |  
- 12.6% protein, 4.7% oil, 67.4% starch  
- Low aflatoxin  
- Origin: Cuba  
- Race: Argentino  
- 1432 GDU's (85 days) to 50% anthesis |
| **Entry 057** | GEMN-0130 (50% tropical exotic; NS heterotic group) | Deriv. DKXL370A:N11-B-005-010 (S6)  
- 13.3% protein, 4.0% oil, 68.9% starch  
- Low aflatoxin/fumonisin  
- Origin: Brazil  
- Race: Tropical Hybrid  
- 1589 GDU's (94 days) to 50% anthesis |
| **Entry 058** | GEMS-0162 (25% tropical exotic; SS heterotic group) | Deriv. CUBA117:S1542-057-002 (S4)  
- 15.7% protein, 5.0% oil, 65.0% starch  
- Origin: Cuba  
- Race: Argentino  
- 1306 GDU's (79 days) to 50% anthesis |
| **Entry 059** | GEMS-0163 (25% tropical exotic; SS heterotic group) | Deriv. CUBA164:S2012-456-001 (S4)  
- 12.5% protein, 4.4% oil, 68.2% starch  
- Upright leaf phenotype  
- Origin: Cuba  
- Race: Mixed (Creole)  
- 1390 GDU's (83 days) to 50% anthesis |
| **Entry 060** | GEMN-0111 (25% temperate exotic; NS heterotic group) | Deriv. CH05015:N1204-057-001 (S5)  
- 14.0% protein, 4.7% oil, 63.0% starch, Good AAI  
- Fusarium ear rot resistant  
- Origin: Chile  
- Race: Camelia  
- 1288 GDU's (78 days) to 50% anthesis |
Entry 061
(see TC entry 90)

MDI022:N2120-253-001-B-B-B-B
(25% tropical exotic; NS heterotic group)

- 11.4% protein, 3.3% oil, 70.9% starch
- Good AAI
- Origin: Peru Race: Cuban Yellow
- 1479 GDU's (88 days) to 50% anthesis

Entry 062
(see TC entry 89)

GEMS-0116
(25% tropical exotic; SS heterotic group)

- Deriv. DKB844:S1601-003-002 (S7)
- 2005 Recommended line
- Excellent combining ability; Biomass research
- 14.8% protein, 3.8% oil, 68.6% starch (Starch Properties)
- Origin: Mexico Race: Tropical Hybrid
- 1511 GDU's (90 days) to 50% anthesis

Entry 063
(see TC entry 88)

GEMN-0145
(25% tropical exotic; NS heterotic group)

- Deriv. MDI022:N2120-333-001 (S5)
- 2007 Recommended Line; Biomass research
- 13.3% protein, 3.7% oil, 68.4% starch; Good AAI
- Origin: Peru Race: Cuban Yellow
- 1390 GDU's (83 days) to 50% anthesis

Entry 064
(see TC entry 87)

GEMN-0132
(50% tropical exotic; NS heterotic group)

- Deriv. DKXL370A:N11-B-005-021 (S6)
- 2005 Recommended line – NC State/USDA-ARS
- Biomass research
- 13.9% protein, 3.3% oil, 68.8% starch; Good AAI
- Origin: Brazil Race: Tropical Hybrid
- 1511 GDU's (90 days) to 50% anthesis

Entry 065
(see TC entry 86)

[B73/B89)-013-1/2/B84/B89)-037-1]02)-05-03-01-01-01-B-B-B/3/LH287

- Iowa State University
- Derived from B73/B89
- 1288 GDU's (78 days) to 50% anthesis

Entry 066
(see TC entry 85)

BS31(R)C1-112-01-02-01-02-01-B-B-B

- Iowa State University
- Derived from FS8A(T) C4
- 1479 GDU's (88 Days) to 50% Anthesis
Entry 067
(see TC entry 84)

B116

- Iowa State University
- Derived from B97 x B99
- Good combining ability with SS
- 1327 GDU's (80 Days) to 50% Anthesis

Entry 068
(see TC entry 83)

BSKRL1(HI)C2-141-01-03-03-02-01-B-B

- Iowa State University
- Derived from narrow based synthetic (B73, B84, B89, B94)
- 1370 GDU's (82 days) to 50% anthesis

Entry 069
(see TC entry 82)

B125

- Iowa State University
- Derived from BSKRL2
- BSKRL2 is narrow based synthetic (B90, B91, B95, B97, B99)
- Good combing ability with SS; Excellent root and stalks
- 1215 GDU's (73 days) to 50% anthesis

Entry 070
(see TC entry 81)

AR03056:N0902)-1
(25% temperate exotic; NS heterotic group)

- Texas A&M University
- Origin: Argentina Race: Dentado Blanco
- 1370 GDU's (82 Days) to 50% Anthesis

Entry 071
(see TC entry 80)

BR52051:N04)-1
(50% tropical exotic; NS heterotic group)

- Texas A&M University
- Origin: Brazil Race: Dente Amarelo
- 1493 GDU's (89 Days) to 50% Anthesis

Entry 072
(see TC entry 79)

CUBA117:S15)-1A-1
(50% tropical exotic; SS heterotic group)

- Texas A&M University
- Origin: Cuba Race: Argentino
- 1479 GDU's (88 Days) to 50% Anthesis
<table>
<thead>
<tr>
<th>Entry</th>
<th>(see TC entry)</th>
<th>Variety/Parentage</th>
<th>Description</th>
<th>Morphological Details</th>
</tr>
</thead>
</table>
| **Entry 073** | | **Tx204** | (25% temperate exotic; NS heterotic group) | - Deriv. AR01150:N0406  
- Public Texas A&M Release  
- Drought and heat tolerant  
- Origin: Argentina  
- Race: Dente Blanco Rugoso  
- 1463 GDU's (87 days) to 50% anthesis |
| **Entry 074** | | **Tx205** | (25% temperate exotic; NS heterotic group) | - Deriv. AR01150:N0406  
- Public Texas A&M Release  
- Drought and heat tolerant  
- Origin: Argentina  
- Race: Dente Blanco Rugoso  
- 1589 GDU's (94 days) to 50% anthesis |
| **Entry 075** | | **HC33 x LH287** | Check Hybrid-Medium Maturity (109 days) | 1215 GDU's (73 days) to 50% anthesis |
| **Entry 076** | | **LH200 x LH262** | Check Hybrid-Late Maturity (117 days) | 1370 GDU's (82 days) to 50% anthesis |
| **Entry 077** | (see entry 74) | **LH200 x Tx205** | (25% temperate exotic; NS heterotic group) | - Tx205 (Deriv. AR01150:N0406)  
- Texas A&M University  
- Drought and heat tolerant  
- Origin: Argentina  
- Race: Dente Blanco Rugoso  
- 1390 GDU's (83 days) to 50% anthesis |
| **Entry 078** | (see entry 73) | **LH200 x Tx204** | (25% temperate exotic; NS heterotic group) | - Tx204 (Deriv. AR01150:N0406)  
- Texas A&M University  
- Drought and heat tolerant  
- Origin: Argentina  
- Race: Dente Blanco Rugoso  
- 1390 GDU's (83 days) to 50% anthesis |
Entry 079

CUBA117:S15)-1A-1 x BR52051:N04)-1

- GEM x GEM Cross
- Texas A&M University
- 1447 GDU's (86 days) to 50% anthesis

Entry 080

BR52051:N04)-1 x LH200

(50% tropical exotic; NS heterotic Group)

- Texas A&M University
- Origin: Brazil Race: Dente Amarelo
- 1412 GDU's (84 days) to 50% anthesis

Entry 081

AR03056:N0902)-1 x CUBA117:S15)-1A-1

- GEM x GEM Cross
- Texas A&M University
- 1306 GDU's (79 days) to 50% anthesis

Entry 082

[B73/B89)-013-1/2/B84/B89)-037-1]02)-05-03-01-01-01-B-B-B

- Iowa State University
- Derived from B73/B89
- (No data for GDU – water stress)

Entry 083

BS31(R)C1-112-01-02-01-02-01-B-B/TR7322

- Iowa State University
- Derived from FS88A(T) C4
- 1350 GDU's (81 Days) to 50% Anthesis

Entry 084

LH332 x B116

- Iowa State University
- B116 Derived from (B97x B99)
- 1271 GDU's (77 days) to 50% anthesis
<table>
<thead>
<tr>
<th>Entry 085</th>
<th>BSKRL1(HI)C2-141-01-03-02-01-B-B/B114</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa State University</td>
<td></td>
</tr>
<tr>
<td>Derived from narrow based synthetic (B73, B84, B89, B94)</td>
<td></td>
</tr>
<tr>
<td>1254 GDU’s (76 Days) to 50% anthesis</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Entry 086</th>
<th>SGI890 x B125</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa State University</td>
<td></td>
</tr>
<tr>
<td>Derived from BSKRL2</td>
<td></td>
</tr>
<tr>
<td>BSKRL2 is narrow based synthetic (B90, B91, B95, B97, B99)</td>
<td></td>
</tr>
<tr>
<td>Good combing ability with SS; Excellent root and stalks</td>
<td></td>
</tr>
<tr>
<td>1271 GDU’s (77 days) to 50% anthesis</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Entry 087</th>
<th>(see entry 64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEMS-0182 x GEMN-0132</td>
<td></td>
</tr>
<tr>
<td>Deriv. GUAT209:S1308a-084-001-B-B/DKXL370:N11-B-005-021-B-B-B</td>
<td></td>
</tr>
<tr>
<td>GEM x GEM Cross</td>
<td></td>
</tr>
<tr>
<td>Biomass research</td>
<td></td>
</tr>
<tr>
<td>1254 GDU's (76 days) to 50% anthesis</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Entry 088</th>
<th>(see entry 63)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEMS-0162 x GEMN-0145</td>
<td></td>
</tr>
<tr>
<td>Deriv. CUBA117:S1542-057-002-B-B-SIB/MDI022:N2120-333-001-B-B-B</td>
<td></td>
</tr>
<tr>
<td>GEM x GEM Cross</td>
<td></td>
</tr>
<tr>
<td>Biomass research</td>
<td></td>
</tr>
<tr>
<td>1271 GDU’s (77 days) to 50% anthesis</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Entry 089</th>
<th>(see entry 62)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEMS-0116 x GEMN-0132</td>
<td></td>
</tr>
<tr>
<td>Deriv. DK8844:S1601-003-002-B-B-B-B/DKXL370:N11-B-005-021-B-B</td>
<td></td>
</tr>
<tr>
<td>GEM x GEM Cross</td>
<td></td>
</tr>
<tr>
<td>Biomass research</td>
<td></td>
</tr>
<tr>
<td>1412 GDU's (84 days) to 50% anthesis</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Entry 090</th>
<th>(see entry 61)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEMS-0091 x MDI022:N2120-253-001-B-B</td>
<td></td>
</tr>
<tr>
<td>Deriv. CHIS740:S1411a-783-002-B-B-Sib/MDI022:N2120-253-001-B-B-B</td>
<td></td>
</tr>
<tr>
<td>GEM x GEM Cross</td>
<td></td>
</tr>
<tr>
<td>Good AAI</td>
<td></td>
</tr>
<tr>
<td>1306 GDU's (79 days) to 50% anthesis</td>
<td></td>
</tr>
<tr>
<td>Entry</td>
<td>Cross Details</td>
</tr>
<tr>
<td>-------</td>
<td>---------------</td>
</tr>
<tr>
<td>Entry 091</td>
<td>GEMS-0091 x GEMN-0111</td>
</tr>
<tr>
<td>Entry 092</td>
<td>GEMS-0163 x GEMN-0179</td>
</tr>
<tr>
<td>Entry 093</td>
<td>GEMS-0162 x GEMN-0179</td>
</tr>
<tr>
<td>Entry 094</td>
<td>CUBA117:S15-101-001-B-B-B-B-GEMN-0130</td>
</tr>
<tr>
<td>Entry 095</td>
<td>CUBA117:S15-101-001-B-B-B-B-GEMN-0140</td>
</tr>
</tbody>
</table>
Entry 097

GEMS-0061 x GEMN-0130

- Deriv. AR16026:S17-010-001-B-B-B/DKXL370:N11-B-005-010-B-B-B
- Low aflatoxin/fumonisin x low aflatoxin/fumonisin
- 1412 GDU's (84 days) to 50% anthesis

Entry 098

AR16035:S02-615-001-B wx x GEMN-0186

- Deriv. AR16035:S02-615-001-B wx x DKXL370:N11a20-036-002-B wx
- GEM x GEM Cross
- Waxy converted GEM lines
- 1306 GDU's (79 days) to 50% anthesis

Entry 099

GEMS-0185 x GEMN-0186

- GEM x GEM Cross
- Waxy converted GEM lines
- 1224 GDU's (74 days) to 50% anthesis

Entry 100

GEMS-0184 x MBS5411

(25% tropical exotic; SS heterotic group)

- Deriv. GUAT209:S1308a-120-001
- 2008 Recommended Line
- Inbred traits: 11.8% protein, 4.6% oil, 69.4% starch
- Origin: Guatemala Race: Tusón
- 1254 GDU's (76 days) to 50% anthesis

Entry 101

GEMS-0183 x LH287

(25% tropical exotic; SS heterotic group)

- Deriv. GUAT209:S1308a-104-001
- 2008 Recommended Line
- Inbred traits: 12.4% protein, 3.7% oil, 69.9% starch
- Origin: Guatemala Race: Tusón
- 1215 GDU's (73 days) to 50% anthesis

Entry 102

GEMS-0182 x LH287

(25% tropical exotic; SS heterotic group)

- Deriv. GUAT209:S1308a-084-001
- 2008 Recommended Line
- Inbred traits: 11.1% protein, 4.0% oil, 70.6% starch
- Resistant to SLB & GLS
- Origin: Guatemala Race: Tusón
- 1215 GDU's (73 days) to 50% anthesis
Entry 103

GEMS-0181 x MBS5411
(25% tropical exotic; SS heterotic group)

- Deriv. GUAT209:S1308a-068-001
- 2008 Recommended Line
- Inbred traits: 12.6% protein, 4.3% oil, 69.1% starch
- Inbred traits: Resistant to GLS
- Origin: Guatemala Race: Tusón
- 1271 GDU's (77 days) to 50% anthesis

Entry 104

GEMS-0180 x MBS5411
(25% tropical exotic; SS heterotic group)

- Deriv. GUAT209:S1308a-047-001
- 2008 Recommended Line
- Inbred traits: 10.9% protein, 3.6% oil, **71.6% starch**
- Resistant to NLB & SLB
- Origin: Guatemala Race: Tusón
- 1271 GDU's (77 days) to 50% anthesis

Entry 105

GEMN-0179 x HC33
(25% temperate exotic; NS heterotic group)

- Deriv. FS88(T):N11a08c-030-002
- 2008 Recommended Line
- Inbred traits: 12.8% protein, **5.2% oil**, 67.7% starch
- Origin: USA (Florida) Race: Mixed
- 1224 GDU's (74 days) to 50% anthesis

Entry 106

GEMN-0178 x HC33
(25% tropical exotic; NS heterotic group)

- Deriv. DK888:N11a08a-440-001
- 2008 Recommended Line
- Inbred traits: 11.4% protein, 4.0% oil, 70.5% starch
- Origin: Thailand Race: Tropical Hybrid
- 1271 GDU's (77 days) to 50% anthesis

Entry 107

GEMN-0177 x HC33
(25% tropical exotic; NS heterotic group)

- Deriv. DK888:N11a08a-395-001
- 2008 Recommended Line
- Inbred traits: 11.3% protein, 3.9% oil, 70.8% starch
- Inbred traits: Resistant to NLB & SLB
- Origin: Thailand Race: Tropical Hybrid
- 1288 GDU's (78 days) to 50% anthesis

Entry 108

GEMS-0176 x LH287
(25% tropical exotic; SS heterotic group)

- Deriv. CUBA164:S2008c-289-001
- 2008 Recommended Line
- Inbred traits: **13.2% protein**, 4.1% oil, 68.3% starch
- Origin: Cuba Race: Mixed (Creole)
- 1224 GDU's (74 days) to 50% anthesis
Entry 109  (see entry 42)
GEMS-0175 x LH287
(25% tropical exotic; SS heterotic group)
- Deriv. BVIR155:S2012-029-001
- 2008 Recommended Line
- Inbred traits: 13.9% protein, 4.4% oil, 66.8% starch
- Origin: British Virgin Islands  Race: Criollo
- 1224 GDU's (74 days) to 50% anthesis

Entry 110  (see entry 41)
GEMN-0174 x LH200
(25% temperate exotic; NS heterotic group)
- Deriv. AR17056:N2025-574-001
- Inbred traits: Starch and Protein Research
- Inbred traits: 16.3% protein, 3.1% oil, 67.2% starch
- Origin: Argentina  Race: Cristalino Colorado
- 1254 GDU's (76 days) to 50% anthesis

Entry 111  (see entry 40)
GEMN-0198 x (FR992xFR1064)
(50% tropical exotic; NS heterotic group)
- Deriv. DK212T:N11-040-001-007 (S4)
- 2009 Recommended Line – NC State/USDA-ARS
- Origin: Thailand  Race: Tropical Hybrid
- 1306 GDU's (79 days) to 50% anthesis

Entry 112  (see entry 39)
GEMN-0196 x (FR992xFR1064)
(50% tropical exotic; NS heterotic group)
- Deriv. DK888:N11(95)-B-003-001-001 (S5)
- 2009 Recommended Line – NC State/USDA-ARS
- Origin: Thailand  Race: Tropical Hybrid
- 1350 GDU's (81 days) to 50% anthesis

Entry 113  (see entry 38)
GEMN-0195 x (FR992xFR1064)
(50% tropical exotic; NS heterotic group)
- Deriv. DK888:N11(95)-B-027-001-015 (S5)
- 2009 Recommended Line – NC State/USDA-ARS
- Origin: Thailand  Race: Tropical Hybrid
- 1327 GDU's (80 days) to 50% anthesis

Entry 114  (see entry 37)
GEMN-0194 x (LH244xLH245)
(50% tropical exotic; NS heterotic group)
- Deriv. DK888:N11(95)-B-027-001-011 (S5)
- 2009 Recommended Line – NC State/USDA-ARS
- Origin: Thailand  Race: Tropical Hybrid
- 1432 GDU's (85 days) to 50% anthesis
Entry 115  (see entry 36)

**GEMN-0193 x HC33**  
(25% temperate exotic; NS heterotic group)

- Deriv. UR11002-N0308b-086-001 (S4)
- 2009 Recommended Line
- 12.0% protein, 4.2% oil, 70.3% starch
- Origin: Uruguay  Race: Dente Branco
- 1254 GDU's (76 days) to 50% anthesis

Entry 116  (see entry 35)

**GEMN-0192 x HC33**  
(25% tropical exotic; NS heterotic group)

- Deriv. SCROGP3:N2017-172-001 (S4)
- 2009 Recommended Line
- 12.2% protein, 4.5% oil, 70.0% starch, (Starch Properties)
- Origin: St. Croix  Race: Tusón
- 1254 GDU's (76 days) to 50% anthesis

Entry 117  (see entry 34)

**GEMN-0191 x HC33**  
(25% tropical exotic; NS heterotic group)

- Deriv. SCROGP3:N2017-003-001 (S4)
- 2009 Recommended Line
- 11.9% protein, 3.4% oil, 70.9% starch
- Origin: St. Croix  Race: Tusón
- 1224 GDU's (74 days) to 50% anthesis

Entry 118  (see entry 33)

**GEMN-0190 x HC33**  
(25% tropical exotic; NS heterotic group)

- Deriv. PASCO14:N0424-078-001 (S4)
- 2009 Recommended Line
- 11.8% protein, 3.8% oil, 70.8% starch
- Origin: Peru  Race: Cuban Yellow
- 1224 GDU's (74 days) to 50% anthesis

Entry 119  (see entry 32)

**GEMS-0189 x MBS5411**  
(25% tropical exotic; SS heterotic group)

- Deriv. DKXL212:S0912-117-001 (S4)
- 2009 Recommended Line
- **14.1% protein**, 4.2% oil, 68.9% starch
- Origin: Brazil  Race: Tropical Hybrid
- 1224 GDU's (74 days) to 50% anthesis

Entry 120  (see entry 31)

**GEMS-0188 x MBS5411**  
(25% tropical exotic; SS heterotic group)

- Deriv. DKXL212:S0912-012-001 (S4)
- 2009 Recommended Line
- **13.8% protein**, 4.2% oil, 68.9% starch
- Origin: Brazil  Race: Tropical Hybrid
- 1224 GDU's (74 days) to 50% anthesis
**Entry 121**

**GEMN-0187 x HC33**
(25% tropical exotic; NS heterotic group)

- Deriv. ANTI03:N1218-056-001 (S4)
- 2009 Recommended Line
- 12.2% protein, 3.9% oil, 70.5% starch
- Origin: Antigua Race: Criollo
- 1306 GDU's (79 days) to 50% anthesis

**Entry 122**

**LH200 x LH262**
Check Hybrid-Late Maturity (117 days)
- 1350 GDU's (81 days) to 50% anthesis

**Entry 123**

**MBS3644 x MBS5411**
Check Hybrid-Early Maturity (105 days)
- 1156 GDU's (70 days) to 50% anthesis

**Entry 124**

**HC33 x LH287**
Check Hybrid-Medium Maturity (109 days)
- 1201 GDU's (72 days) to 50% anthesis

**Entry 125**

**BR105:S1640-125-001 x LH287**
(25% tropical exotic; SS heterotic group)

- New experimental line
- Origin: Brazil Race: Composite (Suwan)
- 1224 GDU's (74 days) to 50% anthesis

**Entry 126**

**BR105:S1640-003-001 x LH287**
(25% tropical exotic; SS heterotic group)

- New experimental line
- Origin: Brazil Race: Composite (Suwan)
- 1224 GDU's (74 days) to 50% anthesis
Entry 127
BR105:S1612-132-001 x LH287
(25% tropical exotic; SS heterotic group)

- New experimental line
- Origin: Brazil Race: Composite (Suwan)
- 1224 GDU's (74 days) to 50% anthesis

Entry 128
BR105:S1612-057-001 x LH287
(25% tropical exotic; SS heterotic group)

- New experimental line
- Origin: Brazil Race: Composite (Suwan)
- 1215 GDU's (73 days) to 50% anthesis

Entry 129
AR16021:S0908c-046-001 x LH287
(25% temperate exotic; SS heterotic group)

- New experimental line
- Origin: Argentina Race: Cristalino Colorado
- 1201 GDU's (72 days) to 50% anthesis

Entry 130
AR16021:S0908a-065-001 x LH287
(25% temperate exotic; SS heterotic group)

- New experimental line
- Origin: Argentina Race: Cristalino Colorado
- 1156 GDU's (70 days) to 50% anthesis

Entry 131
CUBA117:S1516-321-001 x LH287
(25% tropical exotic; SS heterotic group)

- New experimental line
- Origin: Cuba Race: Argentino
- 1215 GDU's (73 days) to 50% anthesis

Entry 132
CUBA117:S1516-259-001 x LH287
(25% tropical exotic; SS heterotic group)

- New experimental line
- Origin: Cuba Race: Argentino
- 1215 GDU's (73 days) to 50% anthesis
<table>
<thead>
<tr>
<th>Entry</th>
<th>Variety</th>
<th>Origin</th>
<th>Race</th>
<th>Days to 50% Anthesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>133</td>
<td>ANTIG03:N3215-167-001 x HC33</td>
<td>Antigua</td>
<td>Criollo</td>
<td>74 days</td>
</tr>
<tr>
<td>134</td>
<td>GUAD05:N3215-175-001 x HC33</td>
<td>Guadalupe</td>
<td>Early Caribbean</td>
<td>74 days</td>
</tr>
<tr>
<td>135</td>
<td>GUAD05:N3215-099-001 x HC33</td>
<td>Guadalupe</td>
<td>Early Caribbean</td>
<td>74 days</td>
</tr>
<tr>
<td>136</td>
<td>Cuzco 31</td>
<td>Peru</td>
<td>Confite Puntiagudo</td>
<td>81 days</td>
</tr>
<tr>
<td>137</td>
<td>PHB47/CON PUNT CUZ13</td>
<td>Peru</td>
<td>Confite Puntiagudo</td>
<td>70 days</td>
</tr>
<tr>
<td>138</td>
<td>(PHB47/CON PUNT CUZ13)/PHB47</td>
<td>Peru</td>
<td>Confite Puntiagudo</td>
<td>73 days</td>
</tr>
</tbody>
</table>
Entry 139

((PHB47/CON PUNT CUZ13)/PHB47)-B

- Allelic Diversity BC1F2
- Origin: Peru Race: Confite Puntiagudo
- 1215 GDU's (73 days) to 50% anthesis

Entry 140

((PHB47/CON PUNT CUZ13)/PHB47)-B-B

- Allelic Diversity BC1F3
- Origin: Peru Race: Confite Puntiagudo
- 1271 GDU's (77 days) to 50% anthesis

Entry 141

GEMS-0067

(50% tropical exotic; SS heterotic group)

- Deriv. GUAT209:S13 x (H99ae x OH43 ae)-4-4-2-1
- Truman State University
- Public GEM Release
- Amylomaize VII (70%) S4 line
- Origin: Guatemala Race: Tusón
- 1350 GDU's (81 days) to 50% anthesis

Entry 142

GEMS-0003 x GEMN-0147

- Truman State University
- Amylomaize VII converted GEM lines
- Donor source of ae is GEMS-0067
- 1327 GDU's (80 days) to 50% anthesis

Entry 143

SCR01:N1310-358-1-B-B x DKXL370:N11a20-31-1-B

- Truman State University
- Amylomaize VII converted GEM lines
- Donor source of ae is GEMS-0067
- 1224 GDU's (74 days) to 50% anthesis

Entry 144

SCR01:N1310-358-1-B-B x AR16035:S02-615-1-B-B

- Truman State University
- Amylomaize VII converted GEM lines
- Donor source of ae is GEMS-0067
- 1224 GDU's (74 days) to 50% anthesis
Entry 145

**LH198 x AR01150:N0406-266**  
(25% temperate exotic; NS heterotic group)

- Cornell University  
- Anthracnose resistant line  
- Origin: Argentina  
- Race: Dente Blanco Rugoso  
- 1224 GDU’s (74 days) to 50% anthesis

Entry 146

**LH198 x FS8B(T):N1802-212**  
(25% temperate exotic; NS heterotic group)

- Cornell University  
- Anthracnose resistant line  
- Origin: USA (Florida)  
- Race: Mixed races  
- 1224 GDU’s (74 days) to 50% anthesis

Entry 147

**LH198 x FS8B(T):N1802-215**  
(25% temperate exotic; NS heterotic group)

- Cornell University  
- Anthracnose resistant line  
- Origin: USA (Florida)  
- Race: Mixed races  
- 1224 GDU’s (74 days) to 50% anthesis

Entry 148

**W609S x LH244**  
(50% temperate exotic; NS heterotic group)

- University of Wisconsin  
- Deriv. FS8B(T):N11a-322-1-B-B-19-1-1  
- Silage Top Cross  
- Origin: USA (Florida)  
- Race: Mixed Races  
- 1201 GDU’s (72 days) to 50% anthesis

Entry 149

**W607S x LH244**  
(50% tropical exotic; NS heterotic group)

- University of Wisconsin  
- Deriv. BR52051:N04-76-1-B-B-22-1-1  
- Silage Top Cross  
- Origin: Brazil  
- Race: Dente Amarelo  
- 1215 GDU’s (73 days) to 50% anthesis

Entry 150

**W606S x LH244**  
(25% tropical exotic; NS heterotic group)

- University of Wisconsin  
- Deriv. SCRO1:N1310-398-1-B-21-1-1-B-B-1  
- Silage Top Cross  
- Origin: St. Croix  
- Race: St. Croix  
- 1254 GDU’s (76 days) to 50% anthesis