

Use of GEM Germplasm for Improving Drought Tolerance, Corn Earworm Resistance and Aflatoxin Resistance

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Objectives:

This report serves to document research conducted under a specific cooperative agreement between ARS and the Texas A&M University. It covers the progress from October 1, 2007 to September 30, 2008. Specific objectives of this project includes: (1) to conduct field trials for drought tolerance, CEW resistance, grain mold, grain yield, and silage yield and quality of the topcrosses of GEM lines with public and Holden's lines; (2) to develop inbred lines from GEM populations and characterize inbred lines for stress tolerance and agronomic traits; (3) to assay aflatoxin of 14 hybrids of the GEM lines for a second year; and (4) to evaluate 18 new GEM breeding crosses for drought tolerance, CEW resistance and agronomic performance.

1. Testcrosses of GEM Lines: about 170 top crosses of GEM lines were tested for yield and stress tolerance, and at three locations in the Texas High Plains (Lubbock, Halfway and Etter), and a subset of the topcrosses at four south Texas sites (College Station, Ganado, Gardwood, and Wharton). Lubbock and Halfway tests have both full-irrigation and drought treatments. Most of them are tested for the second year. These top crosses were made with LH195Bt1RR2-1, LH200, LH287Bt1RR2-1, LH310, GEM lines, and/or public lines. At the time of preparing this report, I only finished data analysis at Etter and hence this report contains results primarily from the Etter location. Testcrosses of the inbred lines derived from AR03056:N0902, BR52051:N04, CH05012:N12, CUBA164:S20, CUBA117:S15, FS8A(T):N11a, SCROGP3:N2017, SCROPG3:N1411a, FS8A(T):N1801, DK888:N11 performed well and yielded comparable to commercial checks (Table 1 to Table 5).

In a 20 hybrid silage study, the average silage yield of Tx205 x B110, DK888:N11-7 x B110 and DK888:N11-5 x B110 -7 was 25.78, 26.24, and 28.04 tones per acre as compared to 27.01 tones per acre. 2008 summer nursery, we made crosses of GEM lines with LH287Bt1RR2-1 and LH310.

2. Inbred line development and characterization: We are advancing lines from ANTIGO01:N16. Inbred lines from AR03056:N0902, BR52051:N04, CH05012:N12, CUBA164:S20, CUBA117:S15, FS8A(T):N11a, SCROGP3:N2017, SCROPG3:N1411a, FS8A(T):N1801, DK888:N11 are being characterized for agronomic characters and stress tolerance under well watered and drought conditions in Lubbock and Halfway for a second year. Theses lines were also being grown at Halfway and infested with mites to screen for mite resistance, but we did not get good mite infestation to screen the mite resistance.

3. Aflatoxin analysis: For the third objective, 14 top crosses of GEM lines developed from CUBA117:S15, DK888:N11, BR52051:N04, and SCROGP3:N1411a as well as Tx205 are being grown along with 11 hybrids in Lubbock, Halfway, Corpus Christi and Beeville in Texas and Mississippi for aflatoxin assays where the test plots were inoculated with *A. flavus* (Table 6). The 2008 samples are being analyzed.

4. Breeding crosses of BR105 and BR106: 18 breeding crosses of BR105 and BR106 and two commercial checks (DKC 66-23 and Pioneer hybrid 34F96) were planted on April 16 in Lubbock under well watered and drought stressed conditions. Plants under drought treatment experienced severe drought stress 10 days from flowering to three week after flowering. A hail storm hit the field on June 19 (two weeks before flowering), which caused the lost of 8-10 leaves and 40% yield reduction. Frequent windy weather from planting to the end of May and the hail storm contributed to a high common smut incidence in most of the entries. Among the 18 breeding crosses, only BR106:S99e shed pollens much later than

others. All 18 breeding crosses are moderately tolerant to corn earworm. BR105:S15, BR105:N16 and BR106:T33a99a had higher yield and overall better agronomic performance (Tables 7-8).

Germplasm distribution: We have distributed seeds of Tx204, Tx205, and four inbred lines (to be released) to 14 seed companies. Breeders, agronomists, and sales reps toured yield trial plots involving GEM top crosses and lines on June 23 (a breeder from B-H Genetics), July 22 (11 breeders people from Pioneer), and July 28-30 (5 breeders from Dow AgroScience).

Communications on GEM project:

Corn breeding field day (a section was dedicated to GEM germplasm) was held on August 7, 2008 at Etter, TX. The expected participants include corn producers, seed company representatives, university and UDA scientists, Ag consultants, and policy makers.

Xinzhi Ni, Wenwei Xu, Matthew D. Krakowsky, G. David Buntin, Steve L. Brown, R. Dewey Lee, and Anton E. Coy. 2007. Field screening of experimental corn hybrids and inbred lines for multiple ear-feeding insect resistance. *Journal of Economic Entomology*. 100: 1704-1713.

Wenwei Xu, Gary Odvody, and W. Paul Williams. 2007. Progress in breeding aflatoxin-resistant corn. Page 86 in *Proceedings of the 2007 Annual Multi-Crop Aflatoxin/Fumonisin Elimination & Fungal Genomics Workshop*, Oct.22-24, 2007. Atlanta, GA.

Mayfield, K., T. Isakeit, W. Xu, D. White, W.B. Henry, G. L. Windham, B. Guo, H. Abbas, S. Moore, Q.J. Rabb, D.P. Gorman, J.M. Perkins, R.D. Lee, and M.D. Krakowsky. 2007. SERATS: the Southern Region Aflatoxin Trial. Page 97 in *Proceedings of the 2007 Annual Multi-Crop Aflatoxin/Fumonisin Elimination & Fungal Genomics Workshop*, Oct.22-24, 2007. Atlanta, GA.

Xu, W. Annual report of GEM project. 2007. Pages 1-18 in *USDA-ARS Germplasm Enhancement of maize 2007 Public Data Summary*, Ames, IA.

Table 1. Grain yield (bu/a adjusted to 15.5% moisture) of 26 TAES experimental hybrids and 4 commercial hybrids at Etter, Halfway (HF), Lubbock (LB), College Station, (CS) Holand (HOL), Ganado, and Wharton, Texas in 2008. The Etter location had two irrigation treatments (100% ET and 75% ET) throughout the season. The Halfway and Lubbock locations had well watered (WW) and severe drought stress (DRT) treatments. College Station had limited irrigation. All other locations were rain fed and experienced moderate to severe late season drought. Days to pollen shed were from the Etter-100% ET. Due to space limitation, data on nine hybrids (entries 3, 4, 6, 9, 10, 11, 12, 13, 14, 16, 22, and 25) were not shown. Entries 1, 7, 19, 20, 21 and 26 are the test crosses of GEM lines.

| ENO | Hybrid | Days to pollen | Yield (bu/a) | | | | | | | | | | Entry mean | % CK mean |
|-----|---|----------------|---------------|-------------|-------|--------|--------|--------|-----|-----|--------|---------|------------|-----------|
| | | | Etter-100% TE | Etter-75%ET | HF-WW | HF-DRT | LBB-WW | LB-DRT | CS | HOL | Ganado | Wharton | | |
| 1 | AR03056:N0902-1 x LH195Bt1RR2-1 | 73 | 239 | 226 | 144 | 48 | 156 | 61 | 149 | 72 | 71 | 91 | 126 | 89 |
| 2 | B5C2x LH287BT1RR2-1 | 75 | 258 | 276 | 163 | 39 | 139 | 67 | 199 | 72 | 89 | 96 | 140 | 100 |
| 5 | B1C3S1MP-2 x LH287BT1RR2-1 | 73 | 248 | 244 | 146 | 47 | 96 | 28 | 173 | 73 | 92 | 110 | 126 | 89 |
| 7 | BR52051:N04)-1x LH195Bt1RR2-1 | 75 | 254 | 247 | 165 | 46 | 128 | 55 | 154 | 73 | 82 | 95 | 130 | 93 |
| 8 | C2A-2 x LH195Bt1RR2-1 | 76 | 245 | 237 | 156 | 65 | 129 | 60 | 163 | 78 | 75 | 90 | 130 | 93 |
| 15 | C3SB-3-2 x LH287BT1RR2-1 | 73 | 224 | 251 | 125 | 80 | 99 | 62 | 173 | 61 | 82 | 117 | 127 | 91 |
| 17 | C73A-1a x LH287BT1RR2-1 | 73 | 267 | 262 | 153 | 47 | 111 | 68 | 150 | 37 | 101 | 108 | 131 | 93 |
| 18 | CB4 x LH287BT1RR2-1 | 71 | 247 | 216 | 129 | 57 | 88 | 73 | 161 | 70 | 80 | 87 | 121 | 86 |
| 19 | CUBA117:S15)-1x LH287BT1RR2-1 | 73 | 277 | 276 | 158 | 68 | 124 | 50 | 154 | 74 | 99 | 106 | 139 | 99 |
| 20 | DK888:N11)-5 x LH195Bt1RR2-1 | 74 | 262 | 269 | 158 | 56 | 145 | 60 | 174 | 69 | 85 | 105 | 138 | 98 |
| 21 | DK888:N11)-7 x LH195Bt1RR2-1 | 77 | 229 | 247 | 156 | 50 | 140 | 37 | 164 | 57 | 96 | 110 | 128 | 91 |
| 23 | S2B73 x LH287BT1RR2-1 | 73 | 235 | 242 | 150 | 62 | 128 | 63 | 124 | 69 | 93 | 100 | 127 | 90 |
| 24 | S2B73BC x LH287BT1RR2-1 | 73 | 250 | 243 | 154 | 48 | 139 | 61 | 128 | 54 | 87 | 98 | 126 | 90 |
| 26 | SCROGP3:N2017)-1 x (SCROGP3:N14111a)-1]-1 x LH195Bt1RR2-1 | 73 | 289 | 272 | 168 | 52 | 146 | 55 | 163 | 85 | 85 | 86 | 140 | 100 |
| 27 | BH8913RR/YGCB (CK1, RM 118) | 77 | 267 | 258 | 170 | 73 | 144 | 53 | 164 | 64 | 92 | 103 | 139 | 99 |
| 28 | DKC66-23 (CK2, RM 116) | 72 | 262 | 265 | 163 | 44 | 129 | 59 | 151 | 70 | 97 | 105 | 134 | 96 |
| 29 | DKC67-87 (CK3, RM 117) | 74 | 266 | 294 | 186 | 74 | 139 | 57 | 182 | 68 | 112 | 115 | 149 | 106 |
| 30 | P31G96 (CK4, RM 117) | 77 | 301 | 285 | 137 | 48 | 142 | 52 | 174 | 51 | 95 | 106 | 139 | 99 |
| | CK mean | 75 | 274 | 276 | 164 | 60 | 139 | 55 | 168 | 63 | 99 | 107 | 140 | 100 |
| | Test mean | 73 | 239 | 246 | 145 | 50 | 122 | 56 | 153 | 54 | 84 | 97 | 125 | |
| | CV% | 1 | 7 | 6 | 8 | 24 | 11 | 14 | 10 | 19 | 14 | 12 | | |
| | LSD0.05 | 2 | 58 | 30 | 24 | 25 | 27 | 16 | 33 | 24 | 12 | 14 | | |

Table 2. Days to pollen shed (DTP), plant height (PHT), ear height (EHT), Stalk lodging (STALKL), stay green rating on Sept 3 (SG903), grain moist at harvest, grain yield (bu/a adjusted to 15.5% moisture) of 30 testcrosses from the lines of ANTIG01, DK888, and DKXL370 at Etter, Texas in 2008. The field was watered at 100% ET level throughout the season.

| ENO | Hybrids | DTP | PHT | EHT | STALKL | SG903 | Moist | Yield | % CK Mean | Y-rank |
|-----|--|------|-------|-------|--------|-------|-------|-------|-----------|--------|
| 1 | ANTIG01:N16-B1-5-1-1 x B110 | 81.0 | 304.0 | 145.0 | 16.2 | 2.5 | 20.4 | 217.7 | 82.4 | 13 |
| 2 | ANTIG01:N16-B1-B-1-1 x B110 | 77.0 | 312.0 | 165.0 | 18.6 | 2.5 | 17.3 | 268.5 | 101.6 | 3 |
| 3 | ANTIG01:N16-B1-B-1-2 x B110 | 80.0 | 297.0 | 152.0 | 25.9 | 1.5 | 17.3 | 196.1 | 74.2 | 21 |
| 4 | ANTIG01:N16-B1-B-2-1 x B110 | 79.0 | 298.0 | 150.0 | 25.5 | 3.0 | 17.6 | 194.2 | 73.4 | 23 |
| 5 | ANTIG01:N16-B1-B-2-2 x B110 | 79.0 | 289.0 | 152.0 | 17.9 | 2.8 | 16.9 | 195.1 | 73.8 | 22 |
| 6 | ANTIG01:N16-B1-B-2-3 x B110 | 79.0 | 295.0 | 151.0 | 23.0 | 2.5 | 17.7 | 205.6 | 77.8 | 19 |
| 7 | ANTIG01:N16-B1-B-2-4 x B110 | 80.0 | 309.0 | 162.0 | 34.4 | 2.5 | 18.6 | 226.5 | 85.7 | 10 |
| 8 | ANTIG01:N16-B3-1-1-1 x B110 | 80.0 | 302.0 | 158.0 | 27.0 | 2.3 | 19.6 | 192.9 | 72.9 | 26 |
| 9 | ANTIG01:N16-B3-1-1-2 x B110 | 77.0 | 296.0 | 126.0 | 22.6 | 2.0 | 17.2 | 223.8 | 84.6 | 11 |
| 10 | ANTIG01:N16-B3-1-1-3 x B110 | 80.0 | 312.0 | 148.0 | 9.5 | 1.5 | 18.4 | 247.4 | 93.6 | 6 |
| 11 | ANTIG01:N16-B3-1-1-4 x B110 | 80.0 | 306.0 | 151.0 | 26.8 | 2.5 | 17.6 | 238.3 | 90.1 | 8 |
| 12 | ANTIG01:N16-B3-1-2-1 x B110 | 79.0 | 289.0 | 130.0 | 16.4 | 2.5 | 18.3 | 202.6 | 76.6 | 20 |
| 13 | DK888:N11a08f-1-B-B-1-1-1-1-1 x B110 DK888:N11a08f-1-B-B-1-1-1-1-1-B x LH200 | 76.0 | 284.0 | 123.0 | 10.9 | 2.3 | 17.6 | 182.0 | 68.9 | 30 |
| 14 | | 79.0 | 273.0 | 129.0 | 15.3 | 2.0 | 17.6 | 193.3 | 73.1 | 25 |
| 15 | DK888:N11a08f-1-B-B-1-1-1-1-2 x B110 | 77.0 | 281.0 | 139.0 | 1.6 | 1.8 | 17.1 | 239.9 | 90.7 | 7 |
| 16 | DK888:N11a08f-1-B-B-B-1-1-1-1 x B110 DK888:N11a08f-1-B-B-B-1-1-1-1 x LH195Bt1RR2-1 | 75.0 | 278.0 | 130.0 | 21.5 | 3.0 | 18.6 | 205.7 | 77.8 | 18 |
| 17 | | 75.0 | 253.0 | 96.0 | 6.5 | 2.3 | 16.5 | 212.8 | 80.5 | 17 |
| 18 | DK888:N11a08f-1-B-B-B-1-1-1-1-1 x LH200 | 77.0 | 261.0 | 125.0 | 10.2 | 2.0 | 16.8 | 189.2 | 71.6 | 27 |
| 19 | DK888:N11a08f-1-B-B-B-1-1-1-2 x B110 DK888:N11a08f-1-B-B-B-1-1-1-2-1 x LH200 | 76.0 | 258.0 | 118.0 | 20.6 | 2.8 | 20.8 | 193.7 | 73.3 | 24 |
| 20 | | 77.0 | 259.0 | 118.0 | 31.9 | 3.0 | 18.1 | 171.8 | 65.0 | 34 |
| 21 | DK888:N11a08f-1-B-B-B-1-1-2-1 x B110 DK888:N11a08f-1-B-B-B-1-1-2-1-1 x LH200 | 75.0 | 271.0 | 136.0 | 17.5 | 2.5 | 17.1 | 218.5 | 82.6 | 12 |
| 22 | | 77.0 | 270.0 | 117.0 | 8.2 | 2.5 | 17.3 | 215.3 | 81.4 | 16 |
| 23 | DK888:N11a08f-1-B-B-B-1-1-2-2 x B110 DKXL370:N11a20-199-1-B-B-2-B-1-1-1-1 x B110 | 75.0 | 275.0 | 117.0 | 16.8 | 2.8 | 17.8 | 185.2 | 70.0 | 28 |
| 24 | | 75.0 | 275.0 | 117.0 | 16.8 | 2.8 | 17.8 | 185.2 | 70.0 | 28 |
| 25 | DKXL370:N11a20-199-1-B-B-2-B-1-1-1-2-1 x LH200 | 74.0 | 271.0 | 110.0 | 13.0 | 2.5 | 17.0 | 177.8 | 67.3 | 32 |
| 26 | DKXL370:N11a20-2-1-B-B-B-1-2-1-1-1-1-1 x B110 | 74.0 | 285.0 | 114.0 | 10.5 | 2.3 | 21.5 | 215.4 | 81.5 | 15 |
| 27 | DKXL370:N11a20-76-2-B-B-1-1-1-2-1 x B110 | 77.0 | 292.0 | 136.0 | 26.6 | 2.0 | 17.0 | 217.0 | 82.1 | 14 |
| 28 | DKXL370:N11a20-76-2-B-B-1-1-2-1-1 x B110 | 79.0 | 272.0 | 135.0 | 21.0 | 1.8 | 20.0 | 177.5 | 67.1 | 33 |
| 29 | DKXL370:N11a20-76-2-B-B-1-1-2-1-1 x LH195Bt1RR2-1 | 74.0 | 265.0 | 98.0 | 8.2 | 2.3 | 17.2 | 249.6 | 94.4 | 5 |
| 30 | DKXL370:N11a20-76-2-B-B-1-1-2-2-1 x B110 | 73.0 | 273.0 | 122.0 | 11.3 | 2.0 | 19.6 | 178.4 | 67.5 | 31 |
| 31 | DKC66-23 (RM116) | 72.0 | 272.0 | 93.0 | 4.8 | 2.0 | 16.8 | 260.7 | 98.6 | 4 |
| 32 | DKC67-87 (RM117) | 76.0 | 287.0 | 131.0 | 8.8 | 1.8 | 17.4 | 274.3 | 103.7 | 2 |
| 33 | 82H80GT/CB/LL | 73.0 | 294.0 | 121.0 | 4.9 | 2.0 | 17.7 | 235.1 | 88.9 | 9 |
| 34 | Pioneer 34F96 (RM110) | 73.0 | 262.0 | 88.0 | 8.6 | 2.0 | 16.9 | 287.6 | 108.8 | 1 |
| | CK Mean | 73.5 | 278.8 | 108.3 | 6.8 | 1.9 | 17.2 | 264.4 | 100.0 | |
| | Test mean | 76.7 | 282.6 | 129.4 | 16.2 | 2.3 | 17.9 | 213.9 | 80.9 | |
| | CV% | 1.2 | 3.5 | 7.5 | 68.3 | 23.7 | 7.7 | 12.9 | 4.9 | |
| | LSD 0.05 | 1.9 | 19.9 | 19.5 | ns | ns | ns | 55.8 | 21.1 | |

Table 3. Days to pollen shed (DTP), Stalk lodging, grain moist at harvest, yield (bu/a) of 36 testcrosses from the lines of BR51039, CH5015, CUBA164, FS8(A)S, and UR13085 at Etter, Texas in 2008. The field was watered at 75% ET level throughout the season (mild drought stress).

| ENO | Hybrid | DTP | Stalk lodge | Moist | Yield | % Ck Mean | Y-rank |
|-----|--|------|----------------|-------|-------|--------------|--------|
| 1 | BR51039:N15-B-B-B-2-1 x B110 | 77.5 | 16.9 | 25.3 | 205.7 | 79.8 | 32 |
| 2 | CH05015:N12-147-1-B-B-3-1-1-1-1-1-1 x B110 | 70.0 | 7.8 | 17.8 | 207.8 | 80.6 | 31 |
| 3 | CH05015:N12-36-1-B-B-SIB-1-1-1-2-1-2-1 x B110 | 72.5 | 15.2 | 16.0 | 217.1 | 84.2 | 26 |
| 4 | CH05015:N15-82-1-B-B-1-1-2-1-2-1-1-1 x LH247 | 68.0 | 0.9 | 15.4 | 201.1 | 78.0 | 34 |
| 5 | CH05015:N15-82-1-B-B-1-1-2-1-2-1-1-1 x B110 | 73.0 | 3.3 | 17.0 | 218.8 | 84.9 | 24 |
| 6 | CH05015:N15-87-1-B-B-2-1-1-2-1-1 x B110 | 73.0 | 4.4 | 17.3 | 228.7 | 88.8 | 18 |
| 7 | CH05015:N15-87-1-B-B-2-1-1-2-1-1 x B113 | 73.0 | 7.8 | 16.8 | 192.7 | 74.8 | 37 |
| 8 | CH05015:N15-87-1-B-B-2-1-1-2-1-1 x LH195Bt1RR2-1 CH05015:N15-87-1-B-B-2-1-1-2-1-1-1 x CML254xB105)F5-BMxCM105-B-B3-1-2-1-1-3-1 | 73.0 | 1.6 | 16.4 | 220.9 | 85.7 | 23 |
| 9 | CH05015:N15-87-1-B-B-2-1-1-3-1-1-1 x B110 | 66.0 | 4.5 | 12.8 | 159.0 | 61.7 | 39 |
| 10 | CH05015:N15-87-1-B-B-2-1-1-3-1-1-1 x B110 | 73.0 | 8.1 | 19.6 | 253.7 | 98.4 | 4 |
| 11 | CH05015:N15-87-1-B-B-2-1-1-3-1-2 x B110 | 73.0 | 6.5 | 17.0 | 224.5 | 87.1 | 20 |
| 12 | CH05015:N15-87-1-B-B-2-1-1-3-1-2 x B113 | 70.0 | 4.5 | 16.7 | 231.1 | 89.7 | 15 |
| 13 | CH05015:N15-87-1-B-B-2-1-1-3-1-2 x LH200 | 71.5 | 0.9 | 16.2 | 230.5 | 89.4 | 16 |
| 14 | CUBA117:S15)-1 x DK888:N11a08f-1-B-B-1-1-1-1-2 | 75.0 | 1.2 | 17.1 | 178.4 | 69.2 | 38 |
| 15 | CUBA164:S20)-1A-B-1-1-1-2-1 x LH200 | 75.0 | 5.1 | 16.8 | 257.6 | 99.9 | 3 |
| 16 | CUBA164:S20)-1A-B-1-1-1-2-1 x LH310 | 75.0 | 4.0 | 17.8 | 244.8 | 95.0 | 7 |
| 17 | CUBA164:S20)-1C-3-1-B-1-1-B x Tx205 | 73.0 | 3.7 | 19.1 | 231.4 | 89.8 | 14 |
| 18 | CUBA164:S20-1-2B-1-2-2-1-1-1-1-B x Tx205 | 73.0 | 6.6 | 16.9 | 243.4 | 94.5 | 9 |
| 19 | FS8(A)S:S09-309-1-B-B-1-1-1-1-1 x Tx205 | 73.0 | 3.4 | 14.6 | 194.1 | 75.3 | 35 |
| 20 | FS8(A)S:S09-309-1-B-B-1-1-1-2-1 x Tx205 | 71.5 | 8.8 | 15.0 | 214.4 | 83.2 | 29 |
| 21 | FS8(A)S:S09-309-1-B-B-1-1-2-1-1 x Tx205 | 73.0 | 9.6 | 11.5 | 215.6 | 83.7 | 28 |
| 22 | FS8(A)S:S09-309-1-B-B-1-2-1-1-1 x LH287BT1RR2-1 | 70.0 | 1.4 | 16.8 | 203.0 | 78.8 | 33 |
| 23 | FS8(A)S:S09-309-1-B-B-1-2-1-1-1 x Tx205 | 73.0 | 8.8 | 16.0 | 224.0 | 86.9 | 21 |
| 24 | FS8(A)S:S09-309-1-B-B-2-1-1-1-1 x Tx205 | 73.0 | 13.5 | 14.9 | 193.0 | 74.9 | 36 |
| 25 | FS8A(T):N1801)F8-2-1-B-2-B-B x Tx205 FS8B(S):S0316-1099-1-B-B-2-2-2-1-1-1-1-B x LH287BT1RR2-1 | 76.5 | 3.5 | 17.1 | 153.8 | 59.7 | 40 |
| 26 | FS8B(S):S0316-1099-1-B-B-2-2-2-1-1-1-2-B x LH287BT1RR2-1 | 73.0 | 6.4 | 16.0 | 218.6 | 84.8 | 25 |
| 27 | FS8B(T):N11a)F8-1-4-1-1-1-1 x B105 | 73.0 | 9.0 | 16.0 | 242.5 | 94.1 | 11 |
| 28 | FS8B(T):N11a)F8-1-4-1-1-1-1 x B105 | 74.0 | 12.5 | 16.0 | 210.6 | 81.7 | 30 |
| 29 | FS8B(T):N11a)F8-1-4-1-1-1-1 x LH200 | 73.0 | 5.5 | 15.8 | 227.6 | 88.3 | 19 |
| 30 | FS8B(T):N11a)F8-1-4-1-1-1-2-B x B110 | 76.0 | 13.3 | 16.9 | 221.2 | 85.8 | 22 |
| 31 | UR13085:N0215-14-1-B-B-1-1-1-1 x B110 | 75.0 | 11.8 | 16.6 | 239.5 | 92.9 | 12 |
| 32 | UR13085:N0215-14-1-B-B-1-2-1-1 x B110 | 74.0 | 29.0 | 17.9 | 229.4 | 89.0 | 17 |
| 33 | UR13085:N0215-14-1-B-B-1-2-1-1 x LH200 | 75.0 | 13.6 | 16.0 | 239.3 | 92.9 | 13 |
| 34 | UR13085:N0215-14-1-B-B-3-2-1-B x B110 | 74.0 | 21.4 | 18.7 | 246.1 | 95.5 | 5 |
| 35 | UR13085:N0215-14-1-B-B-4-1-1-1 x B110 | 75.0 | 18.0 | 20.1 | 216.8 | 84.1 | 27 |
| 36 | UR13085:N0215-14-1-B-B-4-1-1-2 x LH195Bt1RR2-1 | 76.0 | 3.7 | 18.1 | 243.1 | 94.3 | 10 |
| 37 | DKC66-23 (RM116) | 71.5 | 0.0 | 16.3 | 244.1 | 94.7 | 8 |
| 38 | DKC67-87 (RM117) | 74.0 | 0.8 | 17.1 | 286.3 | 111.1 | 1 |
| 39 | Garst 82H80GT/CB/LL | 73.0 | 0.0 | 17.6 | 245.0 | 95.1 | 6 |
| 40 | Pioneer 34F96 (RM110) | 73.0 | 0.0 | 16.6 | 270.1 | 104.8 | 2 |
| | CK Mean | 73.5 | 0.9 | 17.1 | 257.7 | 100.0 | |
| | Mean | 73.1 | 7.4 | 16.8 | 223.1 | 86.6 | |
| | CV% | 1.8 | 72.8 | 7.3 | 9.1 | | |
| | LSD 0.05 | 2.6 | 11.0 | 2.5 | 40.7 | | |

Table 4. Days to pollen shed (DTP), Plant height (PHT), ear height (EHT), stalk lodge, root lodging, stay green rating on Sept 3 (SG903), grain moist at harvest, yield (bu/a) of 31 testcrosses from the lines of AR01150, AR13026, and AR16021 at Etter, Texas in 2008. The field was watered at 100% ET level throughout the season.

| Hybrids | DTP | PHT | EHT | STALKL | Moist | Yield | % CK mean |
|---|------|-------|-------|--------|-------|-------|-----------|
| AR01150:N04-046-1-B-B-1-1-1-1-1 x B110 | 74.0 | 276.0 | 114.5 | 29.0 | 16.8 | 158.8 | 59.4 |
| AR01150:N04-046-1-B-B-1-1-2-1-1 x LH200 | 73.0 | 283.0 | 124.5 | 8.9 | 15.2 | 203.6 | 76.1 |
| AR01150:N04-213-1-B-B-2-1-1-1-1-1 x B113 | 75.0 | 262.0 | 113.0 | 8.7 | 16.9 | 170.9 | 63.9 |
| AR01150:N04-213-1-B-B-2-1-1-1-1-1-1 x B110 | 77.0 | 261.0 | 118.5 | 8.0 | 20.1 | 197.3 | 73.7 |
| AR01150:N04-213-1-B-B-2-1-1-1-2-1-1-B x B110 | 76.0 | 276.0 | 110.0 | 21.1 | 18.8 | 204.1 | 76.3 |
| AR01150:N04-617-1-B-B-B-1-1-1-1-1-1 x B110 | 73.0 | 270.0 | 115.0 | 12.8 | 17.0 | 211.4 | 79.0 |
| AR01150:N04-617-1-B-B-B-1-1-1-1-1-1-1 x LH200 | 73.0 | 271.0 | 111.5 | 6.2 | 16.9 | 146.6 | 54.8 |
| AR01150:N04-617-1-B-B-B-1-1-1-1-1-1 x BPR96AS1 | 73.0 | 262.0 | 112.0 | 11.4 | 16.7 | 177.0 | 66.1 |
| AR01150:N04-617-1-B-B-B-1-1-1-1-2-1 x B113 | 72.0 | 279.0 | 120.5 | 16.9 | 16.4 | 190.1 | 71.0 |
| AR01150:N04-617-1-B-B-B-1-1-1-1-2-1 x CUBA117:S15)-1 | 73.0 | 274.0 | 111.0 | 7.2 | 18.6 | 194.2 | 72.6 |
| AR01150:N04-617-1-B-B-B-1-1-1-1-2-1-1 x LH195Bt1RR2-1 | 73.0 | 263.0 | 107.0 | 7.7 | 16.5 | 178.6 | 66.7 |
| AR01150:N04-617-1-B-B-B-1-1-1-1-2-2-2 x LH195Bt1RR2-1 | 73.0 | 277.0 | 103.5 | 3.3 | 16.7 | 218.1 | 81.5 |
| AR01150:N04-617-1-B-B-B-1-1-1-1-2-2 x BPR96AS1 | 72.0 | 292.0 | 107.5 | 9.9 | 16.9 | 232.4 | 86.9 |
| AR01150:N04-617-1-B-B-B-1-1-2-1-1-1-1 x B110 | 74.0 | 285.0 | 114.5 | 1.6 | 17.3 | 179.0 | 66.9 |
| AR01150:N04-617-1-B-B-B-1-1-2-1-1-1-1 x LH195Bt1RR2-1 | 73.0 | 269.0 | 115.0 | 10.7 | 16.7 | 200.9 | 75.1 |
| AR01150:N04-617-1-B-B-B-1-1-2-1-1-2-1 x B110 | 74.0 | 278.0 | 127.0 | 9.5 | 17.9 | 196.7 | 73.5 |
| AR01150:N0406)F7-C x (AR03056:N0902)]1-B-B-1-1-1 x B110 | 75.0 | 268.0 | 115.5 | 9.8 | 19.5 | 236.4 | 88.3 |
| AR01150:N0406)F7-C x (AR03056:N0902)]1-B-B-1-B-1 x B110 | 75.0 | 256.0 | 110.0 | 9.9 | 17.9 | 193.5 | 72.3 |
| AR13026:N08C06x(FS8A(T):N11a19)-1-B-B-B-1-1-1-1-1 x B110 | 73.0 | 285.0 | 124.5 | 11.7 | 20.4 | 272.5 | 101.8 |
| AR13026:N08C06x(FS8A(T):N11a19)-1-B-B-B-1-1-1-3-1 x B110 | 74.0 | 286.0 | 125.0 | 5.1 | 19.2 | 218.2 | 81.6 |
| AR13026:N08C06x(FS8A(T):N11a19)-1-B-B-B-1-3-1-1-1 x B110 | 74.0 | 284.0 | 124.0 | 7.6 | 18.0 | 138.8 | 51.9 |
| AR13026:N08C06x(FS8A(T):N11a19)-1-B-B-B-1-3-1-2-1 x B110 | 72.0 | 259.0 | 109.0 | 6.5 | 18.6 | 222.4 | 83.1 |
| AR13026:N08C06x(FS8A(T):N11a19)-1-B-B-B-1-3-1-2-1 x LH195Bt1RR2-1 | 74.0 | 288.0 | 129.5 | 5.0 | 17.3 | 237.3 | 88.7 |
| AR13026:N08C06x(FS8A(T):N11a19)-1-B-B-B-1-B-1-1-1 x B110 | 75.0 | 288.0 | 130.0 | 7.4 | 20.6 | 245.0 | 91.6 |
| AR13026:N08C06x(FS8A(T):N11a19)-1-B-B-B-1-B-1-1-2 x B110 | 75.0 | 297.0 | 135.5 | 14.1 | 19.7 | 215.0 | 80.4 |
| AR13026:N08C06x(FS8A(T):N11a19)-1-B-B-B-2-1-1-2-1 x B110 | 74.0 | 270.0 | 117.0 | 11.2 | 21.2 | 230.4 | 86.1 |
| AR13026:N08C06x(FS8A(T):N11a19)-1-B-B-B-2-1-1-2-2 x B110 | 74.0 | 287.0 | 53.0 | 14.9 | 18.6 | 265.9 | 99.4 |
| AR16021:S08a01)F7-1-2-B-1-B-B-B x Tx205 | 75.0 | 267.0 | 109.0 | 6.5 | 18.6 | 243.7 | 91.1 |
| AR16021:S08a01)F7-1-2-B-1-B-B-B x LH310 | 77.0 | 263.0 | 116.5 | 10.0 | 16.8 | 193.5 | 72.3 |
| AR16035:S02-443-1-B-B-1-1-2-1-1-1-1-1 x Tx205 | 74.0 | 290.0 | 114.0 | 8.2 | 17.7 | 224.4 | 83.8 |
| AR16035:S02-443-1-B-B-1-1-2-1-1-1-2-1-1 x Tx205 | 73.0 | 275.0 | 114.0 | 14.3 | 19.5 | 231.8 | 86.6 |
| DKC66-23 (RM116) | 73.0 | 274.0 | 98.0 | 2.4 | 17.4 | 291.4 | 108.9 |
| DKC67-87 (RM117) | 75.0 | 291.0 | 127.0 | 2.4 | 17.9 | 281.6 | 105.2 |
| 82H80GT/CB/LL | 73.0 | 288.0 | 108.0 | 1.7 | 19.9 | 265.2 | 99.1 |
| Pioneer 34F96 (RM110) | 72.0 | 265.0 | 95.5 | 3.3 | 17.0 | 268.0 | 100.1 |
| | | | | | | | 0.0 |
| CK mean | 73.2 | 278.6 | 108.5 | 4.8 | 18.3 | 267.6 | 100.0 |
| Mean | 73.7 | 275.7 | 113.7 | 9.3 | 18.0 | 215.3 | 80.5 |
| CV% | 1.3 | 3.6 | 11.9 | 72.0 | 6.8 | 11.1 | |
| LSD 0.05 | 1.9 | 20.1 | 27.6 | ns | 2.4 | 48.6 | |

Table 5. Days to pollen shed (DTP), Plant height (PHT), ear height (EHT), stalk lodge, grain moist at harvest, yield (bu/a) of 22 testcrosses from the lines of SCROP1 and SCROP3 at Etter, Texas in 2008. The field was watered at 100% ET level throughout the season.

| ENO | Hybrids | DTP | PHT | EHT | STALKL | Moist | Yield | % CK Mean | Y-rank |
|-----|---|------|-------|-------|--------|-------|-------|-----------|--------|
| 1 | SCRO1:N1310-126-1-B-B-B-1-B-1-1-1-1-B x B110 | 74.0 | 289.0 | 123.0 | 10.2 | 18.1 | 218.5 | 80.3 | 17 |
| 2 | SCRO1:N1310-353-1-B-B-B-1-1-1-1-1-1-1 x B110 | 75.0 | 268.0 | 121.5 | 7.9 | 20.4 | 208.6 | 76.7 | 20 |
| 3 | SCRO1:N1310-353-1-B-B-B-1-1-2-1-1-1-1 x B110 | 73.0 | 274.0 | 106.5 | 3.7 | 19.7 | 205.2 | 75.4 | 21 |
| 4 | SCRO1:N1310-353-1-B-B-B-1-1-2-1-1-1-2 x LH200 | 74.0 | 261.0 | 97.5 | 2.4 | 17.9 | 220.7 | 81.1 | 15 |
| 5 | SCRO1:N1310-353-1-B-B-B-1-1-2-1-2-1-1 x B110 | 74.0 | 277.0 | 111.5 | 8.8 | 20.1 | 222.3 | 81.7 | 13 |
| 6 | SCRO1:N1310-353-1-B-B-B-1-1-2-1-2-1-1 x LH200 | 74.0 | 275.0 | 117.0 | 7.6 | 16.9 | 174.6 | 64.2 | 24 |
| 7 | SCRO1:N1310-398-1-B-B-B-2-B-1-1-1-1-1 x B110 | 75.0 | 266.0 | 108.5 | 7.3 | 21.8 | 189.7 | 69.7 | 23 |
| 8 | SCRO1:N1310-398-1-B-B-B-2-B-1-2-1-1-1 x B110 | 75.0 | 268.0 | 114.0 | 6.6 | 19.5 | 173.8 | 63.9 | 25 |
| 9 | SCRO1:N1310-398-1-B-B-B-2-B-1-2-1-2-1 x B110 | 75.0 | 263.0 | 99.0 | 7.3 | 21.3 | 223.1 | 82.0 | 12 |
| 10 | SCROGP1:N1318)-1-B-1-1 x LH198 | 73.0 | 275.0 | 122.0 | 6.3 | 18.2 | 172.7 | 63.5 | 26 |
| 11 | SCROGP1:N1318)-1-B-1-1-1-B-B x LH195Bt1RR2-1 | 79.0 | 268.0 | 120.0 | 0.0 | 18.3 | 221.5 | 81.4 | 14 |
| 12 | SCROGP1:N1318)-1-B-1-1-1-B-B x LH200 | 78.0 | 295.0 | 128.5 | 6.0 | 17.8 | 238.0 | 87.4 | 6 |
| 13 | SCROGP3:N1411a)-1 x LH198 | 75.0 | 289.0 | 115.5 | 7.1 | 18.1 | 227.7 | 83.6 | 8 |
| 14 | SCROGP3:N1411a)-1 x B104 | 78.0 | 305.0 | 134.0 | 5.8 | 21.8 | 223.7 | 82.2 | 11 |
| 15 | SCROGP3:N2017)-1-1-1-B-B-2-B-B x LH200 | 77.0 | 287.0 | 115.5 | 7.1 | 20.3 | 260.4 | 95.7 | 3 |
| 16 | SCROGP3:N3215-1-B-1-1-1-1 x LH198 (S) | 73.0 | 299.0 | 128.5 | 6.2 | 17.9 | 209.0 | 76.8 | 19 |
| 17 | SCROGP3:N3215-1-B-1-1-1-1 x LH200 (S) | 74.0 | 300.0 | 127.5 | 4.8 | 17.2 | 223.9 | 82.3 | 10 |
| 18 | SCROGP3:N3215-1-B-1-1-1-1-4-1 x LH195Bt1RR2-1 | 75.0 | 276.0 | 106.0 | 3.4 | 20.9 | 205.1 | 75.3 | 22 |
| 19 | SCROGP3:N3215-1-B-1-1-B-1-1-1 x B110 | 77.0 | 310.0 | 132.0 | 7.1 | 19.7 | 213.2 | 78.3 | 18 |
| 20 | SCROGP3:N3215-1-B-1-1-B-1-1-1 x LH195Bt1RR2-1 | 75.0 | 297.0 | 118.5 | 1.7 | 18.3 | 220.3 | 80.9 | 16 |
| 21 | SCROGP3:N3215-1-B-1-1-B-1-2-1 x LH195Bt1RR2-1 | 76.0 | 268.0 | 121.5 | 0.0 | 18.2 | 232.8 | 85.5 | 7 |
| 22 | SCROGP3:N3215-1-B-1-1-B-1-3-1 x LH195Bt1RR2-1 | 75.0 | 285.0 | 52.7 | 3.3 | 18.0 | 225.6 | 82.9 | 9 |
| 23 | DKC66-23 (RM116) | 73.0 | 277.0 | 103.0 | 0.0 | 17.8 | 273.4 | 100.4 | 2 |
| 24 | DKC67-87 (RM117) | 77.0 | 292.0 | 122.0 | 4.1 | 19.4 | 258.0 | 94.8 | 4 |
| 25 | 82H80GT/CB/LL | 74.0 | 276.0 | 94.0 | 1.6 | 20.1 | 250.4 | 92.0 | 5 |
| 26 | Pioneer 34F96 (RM110) | 73.0 | 257.0 | 85.5 | 3.2 | 16.9 | 306.9 | 112.7 | 1 |
| | | | | | | | | 0.0 | |
| | CK Mean | 74.3 | 275.5 | 101.1 | 2.2 | 18.6 | 272.2 | 100.0 | |
| | Mean | 75.1 | 280.4 | 112.5 | 5.0 | 19.0 | 223.0 | 81.9 | |
| | CV% | 1.2 | 4.7 | 14.0 | 69.4 | 6.5 | 12.8 | 4.7 | |
| | LSD 0.05 | 1.8 | 27.1 | 33.3 | ns | 2.5 | 58.3 | 21.4 | |

Table 6. Aflatoxin levels in 26 TAES experimental and four commercial hybrids at Mississippi State, MS in 2007 (Data from Dr. Dr. Paul Williams, USDA-ARS). Aflatoxin level in Lubbock was very low and not reported. The same hybrids were grown in replicated field trials for aflatoxin assay in south Texas (Corpus Christi and Beeville) and were discarded due to excessive drought stress and insufficient grain samples. Samples from 2008 trials are still being analyzed

| Entry | GEM | Aflatoxin (ppb) | Log(Afla) | Ranking |
|--|------------|-----------------|------------|-----------|
| B5C2 x NC300 | | 263.3 | 5.5 | 15 |
| B5C2 x DK888:N11-5 | Yes | 566.7 | 6.2 | 27 |
| BPR96AS1 x Tx205 | Yes | 290.0 | 5.8 | 17 |
| C2B76 x Tx205 | Yes | 263.3 | 5.5 | 14 |
| CML273xA632)-1a x Tx205 | Yes | 616.7 | 6.2 | 28 |
| CML32xB104)-2 x Tx025 | Yes | 236.0 | 5.1 | 8 |
| LH200 x C3A632-1A-1-1 | | 295.7 | 5.5 | 19 |
| B113 x CUBA117:S15)-1 | Yes | 246.7 | 5.4 | 10 |
| C3CM105-1 x S2B73 | | 330.0 | 6.0 | 21 |
| C3CM105-1 x S2B73BC | | 236.7 | 5.5 | 9 |
| (DK888:N11)-5 x B110 | Yes | 306.7 | 5.7 | 20 |
| DK888:N11)-7 x LH200 | Yes | 253.3 | 5.3 | 11 |
| C3S1B73-3-3-1-1-1-2 x DK888:N11)-7 | Yes | 390.0 | 6.0 | 23 |
| SCROGP3:N1411a)-1 x B110 | Yes | 404.0 | 5.3 | 26 |
| C3S1W | | 200.0 | 5.2 | 6 |
| B5C2 x BR52051:N04)-1 | Yes | 396.7 | 5.7 | 24 |
| BR52051:N04)-1 x BPR96AS1 | Yes | 403.3 | 6.0 | 25 |
| S2B73 x NC300 | | 59.3 | 4.1 | 3 |
| S2B73BC x NC300 | | 36.7 | 2.7 | 1 |
| Tx205 x B110 | Yes | 235.7 | 4.8 | 7 |
| Tx205 x S1W-1 | Yes | 260.0 | 5.7 | 13 |
| BC3MP715-BM-1 x C2A554-4-2-1-B- 1 | | 2173.3 | 7.6 | 29 |
| BC3MP715-1-4-7-2-1-1-B-1 x C2A554-4-2-1-B-1 | | 260.0 | 5.5 | 12 |
| BC3MP715-1-4-7-B-1-1-1-1 x C2A554-4-2-1-B-1 | | 55.5 | 3.3 | 2 |
| BC3MP715-1-4-7-B-1-1-1-2 x C2A554-4-2-1-B-1 | | 89.3 | 4.3 | 4 |
| BC3MP715-1-4-7-B-1-1-2-1 x C2A554-4-2-1-B-1 | | 101.3 | 3.2 | 5 |
| BH8913RRYGCB | | 2400.0 | 7.8 | 30 |
| DKC66-80 | | 293.3 | 5.6 | 18 |
| Garst 8288 | | 390.0 | 5.9 | 22 |
| P31B13 | | 280.0 | 5.4 | 16 |
| CK mean | | 840.8 | 6.2 | |
| Mean | | | 5.3 | |
| CV% | | | 18.6 | |
| LSD 0.05 | | | 1.9 | |

Table 7. Days to pollen shed (DTP) and grain yield of the breeding crosses of BR105 and BR106 under well-watered (WW) and drought stressed (DRT) conditions in Lubbock, Texas in 2008. Grain yield was well below the target level due to a heavy hail storm on June 19 (10 days before flowering).

| ENO | Pedigree | DTP | Yield | % CK | Yield | YBU | % CK | Yield |
|-----|------------------|------|--------------|------------|------------|------|-------------|-------------|
| | | WW | (bu/a) WW | mean WW | rank WW | DRT | mean DRT | rank DRT |
| 1 | BR105:N16a16b | 78.5 | 108.8 | 88.1 | 6 | 61.4 | 68.5 | 7 |
| 2 | BR105:S1640 | 77.5 | 93.4 | 75.7 | 10 | 46.9 | 52.3 | 13 |
| 3 | BR105:S1612 | 76.0 | 90.5 | 73.4 | 12 | 50.5 | 56.4 | 12 |
| 4 | BR106:T33a99a | 78.0 | 125.3 | 101.5 | 2 | 64.3 | 71.8 | 5 |
| 5 | BR106:S99e | 81.0 | 88.4 | 71.6 | 13 | 53.7 | 59.9 | 11 |
| 6 | BR106:T33aN20 | 78.5 | 93.3 | 75.6 | 11 | 62.6 | 69.9 | 6 |
| 7 | BR105:N1641 | 75.5 | 78.0 | 63.2 | 15 | 60.6 | 67.6 | 8 |
| 8 | BR106:S99a99k | 78.5 | 68.1 | 55.2 | 16 | 31.3 | 34.9 | 17 |
| 9 | BR106:S99a99e | 78.5 | 54.8 | 44.4 | 19 | 31.6 | 35.2 | 16 |
| 10 | BR105:S1634 | 78.5 | 107.7 | 87.3 | 7 | 57.2 | 63.9 | 9 |
| 11 | BR105:N1646 | 77.0 | 103.4 | 83.8 | 8 | 42.5 | 47.5 | 14 |
| 12 | BR106:S99a99n | 75.0 | 80.7 | 65.4 | 14 | 32.0 | 35.7 | 15 |
| 13 | BR106:S99e99j | 77.5 | 65.7 | 53.2 | 17 | 29.3 | 32.7 | 18 |
| 14 | BR106:S99n99n | 76.0 | 54.8 | 44.4 | 18 | 24.4 | 27.3 | 19 |
| 15 | BR106:N99v99v | 77.5 | 42.6 | 34.5 | 20 | 18.3 | 20.4 | 20 |
| 16 | BR105:S1643 | 76.0 | 100.5 | 81.4 | 9 | 64.9 | 72.4 | 4 |
| 17 | BR105:S16 | 78.0 | 115.2 | 93.4 | 5 | 54.9 | 61.2 | 10 |
| 18 | BR105:N16 | 78.5 | 117.8 | 95.5 | 3 | 70.3 | 78.5 | 3 |
| 19 | DKC66-23 (RM116) | 71.0 | 129.3 | 104.7 | 1 | 80.5 | 89.8 | 2 |
| 20 | P34F96 (RM110) | 72.0 | 117.6 | 95.3 | 4 | 98.7 | 110.2 | 1 |
| | CK mean | 71.5 | 123.4 | 100.0 | | 89.6 | 100.0 | |
| | Test mean | 77.0 | 91.8 | 74.4 | | 51.8 | 57.8 | |
| | CV% | 1.0 | 14.5 | 11.8 | | 18.2 | 20.3 | |
| | LSD 0.05 | 1.6 | 27.9 | 22.6 | | 19.7 | 22.0 | |

Table 8. Plant height, ear height, stalk lodging, stay green rating, ear length, CEW ear penetrating (CEW), percentage of molded kernels (MOLD), and common smut incidence of the breeding crosses of BR105 and BR106 under well-watered (WW) and drought stressed (DRT) conditions in Lubbock, Texas in 2008.

| Pedigree | Plant ht | | Ear ht | | Stalk lodge % | | Stay green | | Ear length | | CEW | | MOLD % | | Smut % |
|---------------|----------|------|--------|-----|---------------|------|------------|------|------------|------|------|------|--------|------|--------|
| | WW | DRT | WW | DRT | WW | DRT | WW | DRT | WW | DRT | WW | DRT | WW | DRT | WW |
| BR105:N16a16b | 226 | 209 | 96 | 83 | 1.6 | 2.4 | 2.5 | 3.0 | 20.3 | 18.9 | 5.3 | 7.0 | 5.5 | 5.0 | 0.7 |
| BR105:S1640 | 226 | 195 | 96 | 81 | 1.7 | 14.8 | 2.8 | 4.0 | 20.6 | 18.4 | 7.0 | 7.9 | 6.0 | 7.5 | 9.2 |
| BR105:S1612 | 215 | 203 | 84 | 73 | 0.0 | 6.0 | 3.0 | 3.8 | 20.2 | 17.9 | 6.6 | 6.5 | 4.5 | 11.5 | 3.9 |
| BR106:T33a99a | 247 | 205 | 94 | 68 | 3.9 | 2.5 | 2.3 | 3.5 | 21.0 | 17.9 | 5.6 | 6.9 | 4.0 | 6.5 | 10.0 |
| BR106:S99e | 243 | 218 | 98 | 80 | 3.3 | 5.7 | 2.3 | 2.8 | 20.1 | 17.5 | 6.0 | 7.3 | 14.0 | 19.0 | 19.7 |
| BR106:T33aN20 | 246 | 212 | 87 | 62 | 6.3 | 5.8 | 2.5 | 2.5 | 21.9 | 19.1 | 5.8 | 6.8 | 4.5 | 4.0 | 10.9 |
| BR105:N1641 | 222 | 191 | 81 | 79 | 0.0 | 3.1 | 3.5 | 3.3 | 20.1 | 18.6 | 6.0 | 8.3 | 10.0 | 10.0 | 9.4 |
| BR106:S99a99k | 193 | 170 | 75 | 71 | 1.6 | 6.4 | 3.5 | 4.0 | 20.8 | 17.0 | 7.1 | 7.8 | 7.5 | 20.0 | 9.0 |
| BR106:S99a99e | 207 | 190 | 70 | 65 | 0.0 | 2.4 | 2.5 | 3.5 | 19.4 | 17.8 | 5.6 | 7.7 | 7.5 | 20.0 | 11.9 |
| BR105:S1634 | 224 | 173 | 81 | 57 | 0.0 | 5.2 | 2.0 | 2.5 | 20.3 | 18.8 | 6.9 | 8.3 | 7.5 | 12.5 | 7.4 |
| BR105:N1646 | 240 | 228 | 90 | 87 | 0.0 | 1.6 | 3.0 | 3.0 | 22.1 | 18.7 | 6.5 | 6.7 | 5.5 | 4.0 | 11.1 |
| BR106:S99a99n | 217 | 177 | 65 | 57 | 0.0 | 4.0 | 4.0 | 4.3 | 18.3 | 17.3 | 5.2 | 7.5 | 14.0 | 15.0 | 20.6 |
| BR106:S99e99j | 222 | 192 | 95 | 74 | 0.0 | 6.4 | 4.0 | 3.3 | 20.9 | 18.1 | 5.1 | 7.7 | 14.0 | 12.5 | 15.0 |
| BR106:S99n99n | 215 | 177 | 62 | 67 | 0.0 | 5.8 | 3.8 | 3.7 | 18.5 | 17.0 | 5.3 | 6.9 | 14.0 | 6.5 | 11.3 |
| BR106:N99v99v | 215 | 194 | 82 | 56 | 0.0 | 1.7 | 3.5 | 3.0 | 17.5 | 17.0 | 5.3 | 7.2 | 15.0 | 19.0 | 7.9 |
| BR105:S1643 | 215 | 193 | 73 | 86 | 2.5 | 7.0 | 3.5 | 3.9 | 18.9 | 18.0 | 5.8 | 6.1 | 8.0 | 2.5 | 18.5 |
| BR105:S16 | 256 | 221 | 101 | 87 | 1.9 | 5.7 | 2.0 | 3.3 | 21.0 | 17.5 | 6.0 | 6.5 | 5.0 | 6.0 | 10.6 |
| BR105:N16 | 257 | 222 | 118 | 98 | 1.5 | 3.0 | 2.0 | 2.8 | 22.6 | 19.7 | 5.8 | 5.9 | 2.0 | 4.0 | 0.9 |
| DKC66-23 | 196 | 184 | 57 | 46 | 0.0 | 6.4 | 3.3 | 4.3 | 21.7 | 18.8 | 5.5 | 6.2 | 7.0 | 5.0 | 8.9 |
| P34F96 | 191 | 171 | 55 | 52 | 0.0 | 1.6 | 3.3 | 3.3 | 22.4 | 18.7 | 6.1 | 6.7 | 10.0 | 12.5 | 5.6 |
| CK mean | 194 | 178 | 56 | 49 | 0.0 | 4.0 | 3.3 | 3.8 | 22.1 | 18.8 | 5.8 | 6.5 | 8.5 | 8.8 | 7.2 |
| Test mean | 223 | 196 | 83 | 71 | 1.2 | 4.9 | 3.0 | 3.4 | 20.4 | 18.2 | 5.9 | 7.1 | 8.3 | 10.2 | 10.0 |
| CV% | 5 | 8 | 12 | 14 | | 48.5 | 13.5 | 12.6 | 4.7 | 3.1 | 13.8 | 10.6 | 55.3 | 65.8 | 87.7 |
| LSD 0.05 | 21 | 31;6 | 21 | 21 | ns | 4.9 | 0.8 | 2.1 | 2.0 | 1.2 | ns | ns | ns | ns | ns |