

Yield Performance of Clearfield Corn Hybrids

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INTRODUCTION

Many herbicide-resistant crops are being introduced for commercial use in the United States. The first herbicide-resistant technology developed through nonclassical breeding methods was imidazolinone-resistance (IR) (Greaves et al. 1993). Considerable research has focused on weed control evaluation, crop injury, and systems using imidazolinone herbicides on imidazolinone-resistant corn (Monks et al. 1996; Krausz and Kapusta 1998). Several studies (File et al. 1998; Hooks et al. 1998; Walker et al. 1998) indicate Lightning[®] herbicide (imazethapyr + imazaquin), an imidazolinone product of American Cyanamid Company, is capable of controlling many problem southern weed species when used on imidazolinone-resistant corn.

American Cyanamid Company, a producer of imidazolinone herbicides, has introduced a global brand name encompassing imidazolinone-resistant (IR)

and imidazolinone-tolerant (IT) seed products from all companies. All IR and IT seed products will be identified by the "CLEARFIELD" name and symbol beginning in 2000.

The profitability of the CLEARFIELD corn production system compared to a conventional production system (conventional hybrids and weed control) will also depend upon hybrid yield performance and several economic inputs, including seed, herbicide, and application expenses. There is a lack of research performance data of herbicide-resistant corn hybrids. Our objective was to evaluate hybrid yield performance and agronomic characteristics of several CLEARFIELD corn hybrids in Mississippi environments where corn is commonly produced. A well-adapted conventional hybrid, which is an isolate of one of the CLEARFIELD hybrids, was grown for comparison.

MATERIALS AND METHODS

Eight CLEARFIELD corn hybrids and one conventional corn hybrid were grown in field studies at four MAFES branch locations during 1999. Seed companies donated their respective CLEARFIELD hybrids: AgriPro AP 9829IMI; DEKALB DK642IMI; Garst 8300GLS/IT; Garst 8222IT; Pioneer 3395; Pioneer 32Z18; Pioneer 35A19; and Terra TR1167IT. A well-

adapted conventional hybrid, Pioneer 32K61, which is a closely related isolate of Pioneer 32Z18, was evaluated as a conventional treatment in this study. The studies were conducted at the Black Belt Branch Experiment Station (Brooksville) on a Brooksville silty clay, Delta Research and Extension Center (Stoneville) on a Bosket very fine sandy loam, North Mississippi

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Research and Extension Center (Verona) on a Leeper silty clay loam, and Prairie Research Unit (Prairie) on a Houston clay. The study at Stoneville was furrow irrigated, while all other studies were dryland culture.

Hybrids were grown in a randomized complete block design with four replications, except at Verona (three replications). The conventional hybrid was replicated twice per block. Each CLEARFIELD hybrid was planted in a four-row plot that varied in length (40-100 feet) depending upon location. The conventional hybrid was planted in an eight-row plot to minimize potential crop injury resulting from imidazolinone herbicide drift from adjacent CLEARFIELD plots. Corn was planted in 30-inch-wide rows at all locations except Stoneville, where rows were 40 inches wide. Hybrids at all loca-

tions were planted at a seeding rate of 28,000 seeds per acre. An imidazolinone herbicide (Lightning 70DG at 1.28 ounces per acre, plus 0.25% v/v nonionic surfactant) was applied on CLEARFIELD hybrids. Conventional herbicides were used on the conventional hybrid and at any location where supplemental weed control was necessary on CLEARFIELD hybrids.

The middle two rows of each plot were harvested with a Kincaid MF-8 XP two-row experimental plot combine. Shelled grain weight and moisture were measured and adjusted to 15.5% moisture. Data were analyzed using Statistical Analysis System (SAS) procedures for analysis of variance. Treatment means were compared using least significant difference with a significance level of $P \leq 0.05$.

RESULTS

Effective weed control negated weed competition with corn hybrid treatments at all locations. Herbicide treatments caused no apparent crop injury at any location.

Abundant rainfall and cool temperatures after planting hampered stand establishment at Prairie. The resulting low and variable stands were inadequate to evaluate hybrid yield performance. Thus, yield results are not reported from the study at Prairie.

Other than a short period of drought stress during mid-May, the dryland study at Brooksville received timely and abundant rainfall until the crop was nearly mature. These excellent growing conditions resulted in

an average corn grain yield of 173 bushels per acre at Brooksville.

The study at Stoneville likely sustained slight yield reduction from an infestation of second-generation southwestern corn borers. An insecticide application was not made since the corn borer infestation did not exceed the treatment threshold before the crop reached maturity. The average corn grain yield at Stoneville was 149 bushels per acre.

The dryland study at Verona struggled through an early-season infestation of chinch bugs. Chinch bugs reduced hybrid plant populations to an average of 21,000 plants per acre, but their numbers were not

Table 1. Corn hybrids' grain yield production at three Mississippi location in 1999.¹

| Company | Hybrid | Type | Location | | |
|---------|-------------|--------------|---------------|----------------|---------------|
| | | | Brooksville | Stoneville | Verona |
| | | | <i>bu/A</i> | <i>bu/A</i> | <i>bu/A</i> |
| AgriPro | AP 9829 IMI | CLEARFIELD | 159 c | 159 ab | 110 b |
| DEKALB | DK642IMI | CLEARFIELD | 189 ab | 140 bc | 99 c |
| Garst | 8222 IT | CLEARFIELD | 193 a | 156 ab | 97 c |
| Garst | 8300 GLS/IT | CLEARFIELD | 159 c | 144 abc | 66 d |
| Pioneer | 32K61 | Conventional | 177 ab | 147 abc | 115 ab |
| Pioneer | 32Z18 | CLEARFIELD | 159 c | 128 c | 97 c |
| Pioneer | 3395 | CLEARFIELD | 175 bc | 154 ab | 122 a |
| Pioneer | 35A19 | CLEARFIELD | 160 c | 155 ab | 113 ab |
| Terra | TR 1167 IT | CLEARFIELD | 177 ab | 161 a | 112 ab |
| | | Mean | 173 | 149 | 103 |
| | | LSD | 16.1 | 20.7 | 10.8 |

¹Values within a column followed by the same letter are not significantly different at $p = 0.05$.

significantly different among hybrids. An insecticide (Karate at 0.065 pound of active ingredient per acre) was applied once during the last week of May and again the first week of June to reduce chinch bug populations during the remainder of the season. Favorable rainfall during pollination and early grain fill allowed the corn to yield a respectable average of 103 bushels per acre.

Data indicate the CLEARFIELD hybrids differed in their ability to produce grain yields comparable to a well-adapted conventional hybrid/herbicide system. The conventional hybrid/herbicide system, Pioneer 32K61, produced high grain yields at all three locations (Table 1). Terra TR1167IT produced high grain yields similar to the conventional hybrid at all three locations. Garst 8222, Pioneer 3395, and Pioneer 35A19

produced high grain yields at two of the three locations. AgriPro 9829 IMI, DEKALB DK-642, and Garst 8300 GLS/IT produced high grain yields at only one of the three locations.

The CLEARFIELD hybrid Pioneer 32Z18 produced grain yields significantly lower than its conventional isoline (Pioneer 32K61) at all three locations (Table 1). These results demonstrate that the CLEARFIELD hybrid Pioneer 32Z18 exhibits less yield potential than its conventional isoline. Pioneer 32Z18 also produced shorter plants, lower ears, and less canopy development than Pioneer 32K61 (Table 2). This suggests need for additional evaluation of other CLEARFIELD hybrids and their conventional isolines to discover if a consistent trend of yield lag and plant growth characteristics exists.

Table 2. Plant characteristics of hybrids grown.

| Company | Hybrid | Plant height | Ear height | Canopy development ¹ | Days to tassel | Relative maturity ² |
|---------|-------------|--------------|------------|---------------------------------|----------------|--------------------------------|
| | | | <i>in</i> | | | <i>days</i> |
| AgriPro | AP 9829 IMI | Tall | 66 | 4 | 58 | 118 |
| DEKALB | DK642IMI | Tall | 51 | 4 | 54 | 114 |
| Garst | 8222 IT | Very Tall | 61 | 4 | 54 | 118 |
| Garst | 8300 GLS/IT | Short | 53 | 3 | 52 | 116 |
| Pioneer | 3395 | Medium | 55 | 2 | 53 | 110 |
| Pioneer | 32K61 | Tall | 55 | 4 | 55 | 114 |
| Pioneer | 32Z18 | Medium | 53 | 3 | 55 | 114 |
| Pioneer | 35A19 | Medium-Tall | 49 | 1 | 51 | 103 |
| Terra | TR 1167 IT | Medium-Tall | 64 | 4 | 56 | 116 |

¹Measured after tassel stage. Ranked from 1 (sparse) to 5 (dense).
²As designated by the respective seed companies.

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