

Corn Breeding (Field 1)

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Objective: The objectives are to develop multiple stress tolerant corn germplasm (lines and hybrids) by transferring desirable genes from tropical corn into temperate lines and to determine the genetic and physiological mechanisms of stress tolerance.

Methodology: Helms Farm is one of our primary test sites for field evaluation of drought tolerance, heat tolerance, insect resistance, yield and other agronomic traits. With the subsurface drip irrigation system, we can impose uniform soil moisture treatments across the field and control the timing, intensity, and duration of drought stress. The planting date was April 24. In 2003, a total of 434 experimental hybrids and breeding lines were grown under 100% ET, 50% ET and post-tassel drought stress conditions. The 100% ET, 50% ET and post-tassel drought water treatments received 23.6, 13.4 and 6.1 acre-inch water respectively. The plants under 100% ET and 50% ET were watered throughout the growing season. For post-tassel drought stress, irrigation was withheld on July 9 with a 0.48 acre-inch pause on July 29. Data were collected for early vigor, flowering date, plant height, stay green, earworm feeding to ears, grain mold and yield.

Results: The experiments at Helms Farm and other locations have lead to the following major findings:

- Three inbred lines show improved drought and heat tolerance, corn earworm resistance, and grain mold resistance. We are preparing to release these lines.
- Three yellow hybrids and two white hybrids with equivalent or higher grain yields but significantly lower aflatoxin contamination in comparison to commercial checks.
- The hybrids made with these three lines as parent yielded 252 bu/a under 100% ET and 159 bu/a under 50% ET at Helms Farm. Their average yields over five environments at Helms Farm, Lubbock, and Etter was 10-14% higher than the average yield of four commercial check hybrids. These hybrids have improved resistance to drought, heat, insect, and molds.
- One white hybrid S1WC3, as shown in the picture, produced 228 bu/a under 100% ET and 125 bu/a under 50% ET at Helms Farm. S1WC3 is a non-transgenic hybrid with a relative maturity of 119 days. It is resistant to corn earworm and gain mold. Under inoculated field at Corpus Christi, it had significantly lower aflatoxin than the commercial check.

Expectations: Corn breeding is a continuous process that involves hybridization of selected germplasm, evaluation and selection. We will continue to use this field facility as one of our primary test sites. The multiple stress tolerant lines and hybrids developed from our program can be used for commercial production and for further breeding by the seed industry. They are well adapted to Texas and can help corn producers to save water and reduce the risk of mycotoxin contamination.

