W1408

Short Corn Hybrids Selection and Production

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Figure 1. The difference in corn hybrids height, (left) traditional and (right) short corn hybrids

Introduction

Recently, short or short-statured corn hybrids are receiving renewed commercial attention in the U.S. While agricultural benefits of short phenotypes in many species have been well documented particularly in small grain crops, the study of this trait and its utility warrants attention and investigation in corn. Newly commercialized short corn hybrids have a final height of approximately 2 feet shorter than other traditional corn hybrids (Figure 1). This shorter final plant height allows for ground-based spray systems to apply fungicide or biological products at critical corn growth stages throughout the later part of the growing season. Furthermore, corn ear placement is between 2 and 3 feet above ground level.

In this article we primarily want to validate the response of short corn hybrids to water management regimes, seeding rate recommendations and nitrogen management for adoption in our production systems.

Production and Performance of Short Corn Hybrids in the U.S.

Overall, short corn hybrids are changing the landscape of agriculture and are less prone to lodging and green snap due to straight-line windstorms commonly experienced throughout the Midwestern U.S. corn belt. They are the result of natural or "classical" breeding processes, and gene expression has not been genetically engineered (i.e. is not a GMO trait). And previous data indicate that hybrids have potential benefits with spray equipment for mid-season application of crop protection and enhancement products.

Furthermore, they may require less water and nutrients due to their shorter structure. Research and commercial field data from the Midwest—where short corn is more widely grown—have demonstrated similar yield potential with these hybrids as compared to standard stature hybrids.

Currently, Bayer is not recommending any of their Preceon hybrids for production in the Mid-southern and Southeastern United States, as well-adapted hybrids for these regions have not been produced at this time.

Experiment Set-up and Findings

For our water management study, four hybrids including one traditional corn (P15784AM) and three Bayer Preceon short corn (RV6210TVXZ, RV6205TVXZ, and RT6203TVXZ) were planted under two water regimes (sensor-based irrigation and rainfed) in two locations: UT AgResearch and Education Centers at Milan (MREC) and Jackson (WTREC), Tennessee. Plots were four rows wide and replicated four times. In each location, the trial was planted on April 25, 2024. Irrigation using a center pivot system equipped with variable rate technology was initiated when the soil matric potential sensors actual values were around -65 to -70 kPa. In addition to the 2024 seasonal rainfall, irrigated plots received 3.4 inches and 3.5 inches of water at Milan and Jackson locations, respectively.

Overall, the traditional corn hybrid yielded 232 bu/a under irrigated conditions. The yield was significantly higher than the rainfed scenarios (215 bu/a) (Figure 2). At Milan, the overall yield for irrigated short corn hybrids (152 bu/a) was significantly higher than rainfed plots (134 bu/a). The pattern was very similar at Jackson; irrigated short corn plots yielded (175 bu/a) higher than rainfed (152 bu/a) (Figure 2).

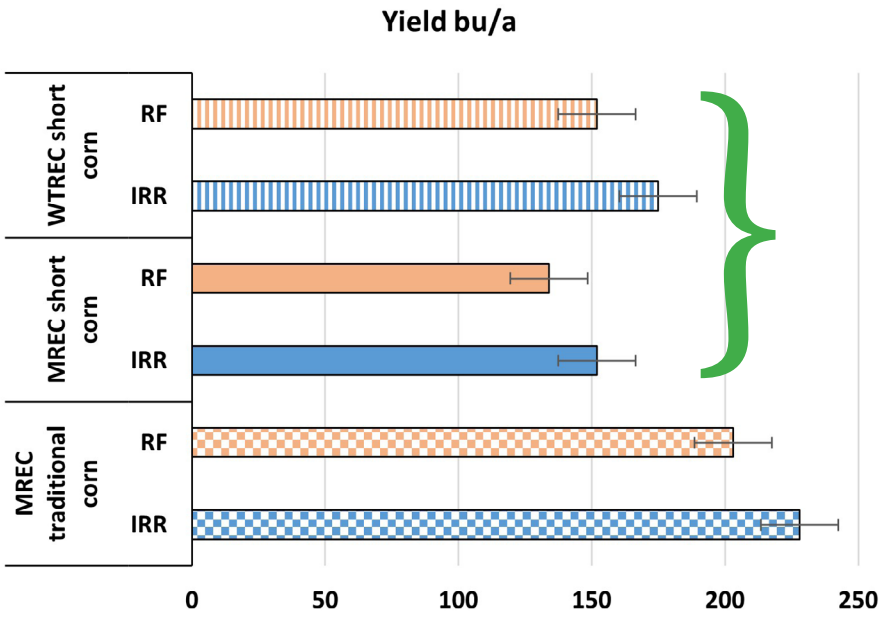

Figure 2. Mean yield date for short and traditional corn hybrids for Jackson (WTREC) and Milan (MREC) under two water regimes (top). The bottom image illustrates the size separation between short corn ears under rainfed (RF) and irrigation (IRR) scenarios.

RV6210TVXZ (158 bu/a) and RV6205TVXZ (166 bu/a) hybrids yielded significantly higher than RT6203TVXZ (150 bu/a).

And when the hybrids grain's chemical quality (after harvest) was analyzed, RV6210TVXZ (3.30) had significantly higher oil percentage only compared to RV6205TVXZ (3.06).

We also noticed that the RT6203TVXZ hybrid had significantly lower internode numbers than the other short corn hybrids.

For our seeding rate plus nitrogen management study, two Bayer Preceon short-corn hybrids (116-20SSC VT2PSFC and 118-50 SSCRIB), three seeding rates (36,000; 42,000; 50,000), and two nitrogen management programs (V6 & V6 + V12) were evaluated for comparison. For both nitrogen application programs, 70# was applied at planting, while the remaining 150# was either applied entirely at V6 or split applied at V6 and again at V12. This trial was planted at the in Jackson on May 20, 2024.

In Figure 3, the average yield for each factor is presented. While the apparent differences are not statistically significant, certain trends are apparent. Referencing only numerical differences, the 188-day Relative maturity (RM) hybrid outperformed the 116-day RM by 13 bushels per acre, a seeding rate of 42,000 outperformed 36,000 and 50,000 by at least 7.7 bushels, and the split nitrogen application program was 10 bushels greater than V6.

Conclusion

We observed that short corn hybrids were more stable and resistant to lodging in our trials. These hybrids also appear to be sensitive to seeding rate (i.e., 42K), indicating that there are further opportunities to explore planting densities and row spacing under both irrigated and rainfed scenarios in the future. Furthermore, grain quality (physical and chemical) of these short corn hybrids must be evaluated under water limitation and nitrogen management to better understand their responses to nutrient management when facing any water limitation or drought scenarios.

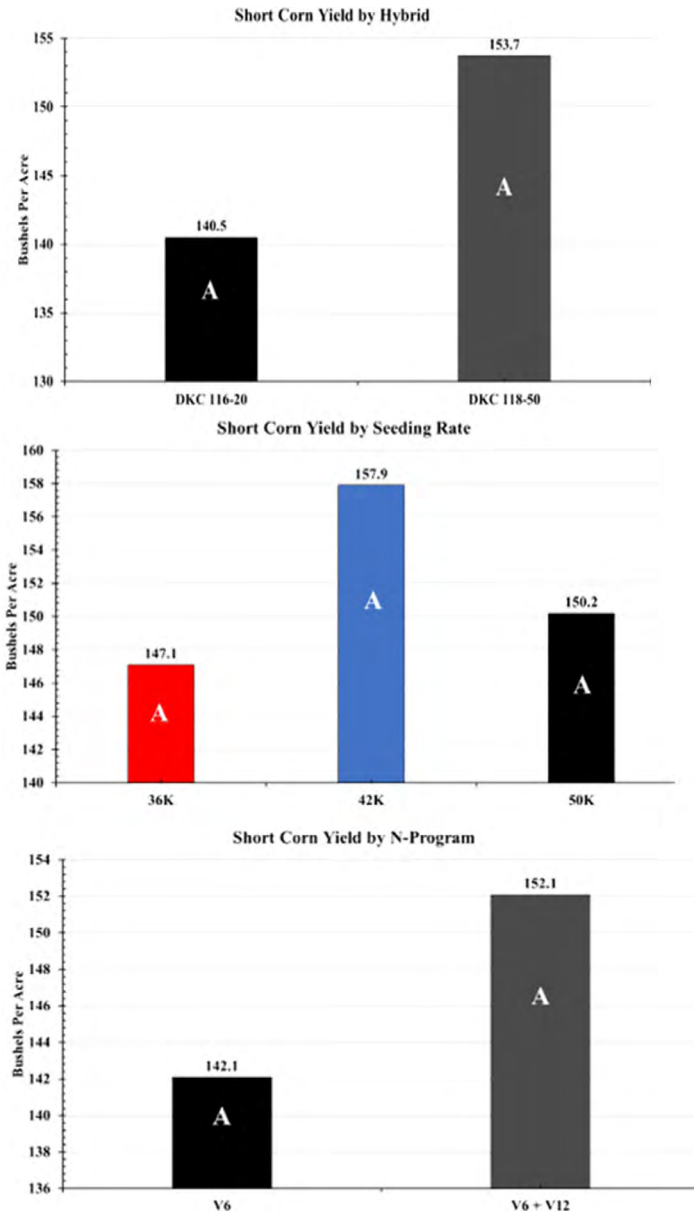

Figure 3. Mean yield data for short corn hybrids (top), yield by seeding rate (middle), and yield by nitrogen management (bottom).

Overall, our data show that these corn hybrids have ability to yield well under both rainfed and irrigated conditions. Since most of our corn hybrids in Tennessee are grown under rainfed conditions, many physiological and management scenarios that must be investigated through research projects to inform optimal hybrid selection for our region.

An important observation to be noted here regarding short corn hybrids, as reported by our field technical support, was concern about ear height at harvest. As stated previously, the observed ear placement was between 2 to 3 feet above ground level. However, a placement of ~3 feet proved to be optimal for harvest operations. As ear placement decreased, we observed issues with harvest or were required to lower the header and proceed at a reduced speed, increasing harvest time.

This project aims to generate robust physiological, management and agronomic datasets to inform and strengthen marketing strategies for short corn hybrids throughout the Mid-Southern and Southeastern U.S.

Acknowledgements

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Online Resources

Purdue University: Short-Stature Corn Hybrids: Next Evolution in U.S. Corn Production?: ag.purdue.edu/news/department/agry/kernel-news/2024/02/short-stature-corn-hybrids-next-evolution-us-corn-production.html

https://agriculture.auburn.edu/feature/new-short-corn-not-as-high-as-an-elephants-eye/

UT Crops blog: Why Irrigation: news.utcrops.com/2020/06/why-irrigation/

UT Extension publication W1164 Economic Analysis of Efficient Irrigation for Maximizing Corn Yield: tiny.utk.edu/W1164

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