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Regional Corn Planting Date Recommendations for Iowa

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Abstract
Corn is planted earlier every year and thisis one important component in maximizing grain yield. In 2009, 47% of the statewide corn crop was planted by approximately April 26. This was four days earlier than the previous 5-year average (USDA NASS, 2009). Earlier planting dates are attributed to several causes: larger acreage per producer, less spring tillage, advancements in hybrids, increased tile drainage, and improved seed treatments. The start of corn planting is generally related to the date when the soil temperature reaches 50°F (10°C) or greater.

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Introduction

Corn is planted earlier every year and this is one important component in maximizing grain yield. In 2009, 47% of the statewide corn crop was planted by approximately April 26. This was four days earlier than the previous 5-year average (USDA NASS, 2009). Earlier planting dates are attributed to several causes: larger acreage per producer, less spring tillage, advancements in hybrids, increased tile drainage, and improved seed treatments. The start of corn planting is generally related to the date when the soil temperature reaches 50°F (10°C) or greater.

Previous Iowa State University (ISU) recommendations for 99% maximum yield, relative to planting date, were identified as April 20 to May 19 statewide. We believe that this planting window can and should be earlier to achieve high yields.

Research has been conducted at seven sites in Iowa since 2006. This report compiles the data and statistical results observed during this multi-year and multi-location study aiming to provide more precise planting date recommendations by region.

Materials and Methods

Multi-year (2006, 2007, and 2009) and multi-location [seven Iowa State University research and demonstration farms (ISU R&D)] field research was conducted for a total of 21 site-years. Data from 2008 were removed from the study due to atypical conditions (excessive moisture and flooding) throughout the planting and growing season. Five planting dates were evaluated with 3 to 4 replications at each site-year. Target planting dates were between April 1 and June 1 in 15-day increments with adjustments made for weather. Iowa State University farm superintendents planted as early as possible and then adjusted the intervals between remaining planting dates so that the final date would be close to June 1. See Table 1 for information specific to each site-year.

Individual plot dimensions varied, yet the majority of sites were 20-ft (8 rows wide) by 50-ft plots. Rows were on 30-in. spacing and the previous crop was soybean. Hybrids varied across sites although most contained three resistant traits (i.e., triple stack hybrids).

Fertilizer applied and integrated pest management practices were employed throughout the season in accordance with university recommendations. Seeding rates varied from 30,000 to 36,000 seeds/acre (spa) based on location and local farming practices.

Final plant populations–plants per acre (ppa)–were taken, and plots at 25% above or below the median population were discarded from the analysis. Grain yield was collected from the center rows and adjusted to 15.0% moisture basis. SAS PROC MIXED was the statistical program used in analyzing the data, with a significance level of $P \leq 0.05$.

Results and Discussion

Based on yield response to planting date, three regions exist across the state: Southern (Armstrong, McNay, and Southeast R&D farms), Central (Northwest and Ames R&D

farms), and Northern (Northern and Northeast R&D farms) (Figure 1).

Recommendations use a quadratic curve for each region with calendar date (day of year) on the x-axis and yield (bushel/acre) on the y-axis (Figure 2). The planting window per region was developed by determining two windows: 95%+ and 98%+ yield. The window for 95% to 100% yield is calculated by finding the date corresponding to a 5% reduction on each side of the curve's peak; the same is done for the 98% to 100% window except the dates corresponding to a 2% reduction from the curve's peak are calculated.

Therefore, the planting window for the southern region is April 17 to May 8 (107 to 128 day of year) to obtain 98% or greater yield. To obtain 95% or greater yield, April 11 to May 13 (101 to 133 day of year) is recommended.

For the central region the planting window is April 15 to May 9 (105 to 129 day of year) for 98% or greater yield potential. For 95% or greater yield can be realized from April 15 to May 18 (105 to 138 day of year).

In the northern region, April 12 to April 30 (102 to 119 day of year) results in 98% or greater yield potential. April 12 to May 2 (102 to 121 day of year) produces 95% or greater yield.

The planting windows (95% and 98%) provide a different length of recommended time for the producer to plant. As the producer moves further away from the curve's peak, grain yields are expected to decline.

Both of these planting windows in the different regions vary significantly from past research and recommendations. We believe these new recommendations should take into account the variable weather patterns across the state and account for growing season limitations, specifically growing degree days (GDD). The northern region has the narrowest planting window due to a shorter growing season and the need to plant the crop early to maximize GDDs. The southern region has a start date later than the other regions particularly because this part of the state is not limited in GDDs but instead the yield response is likely related to moisture received throughout the season.

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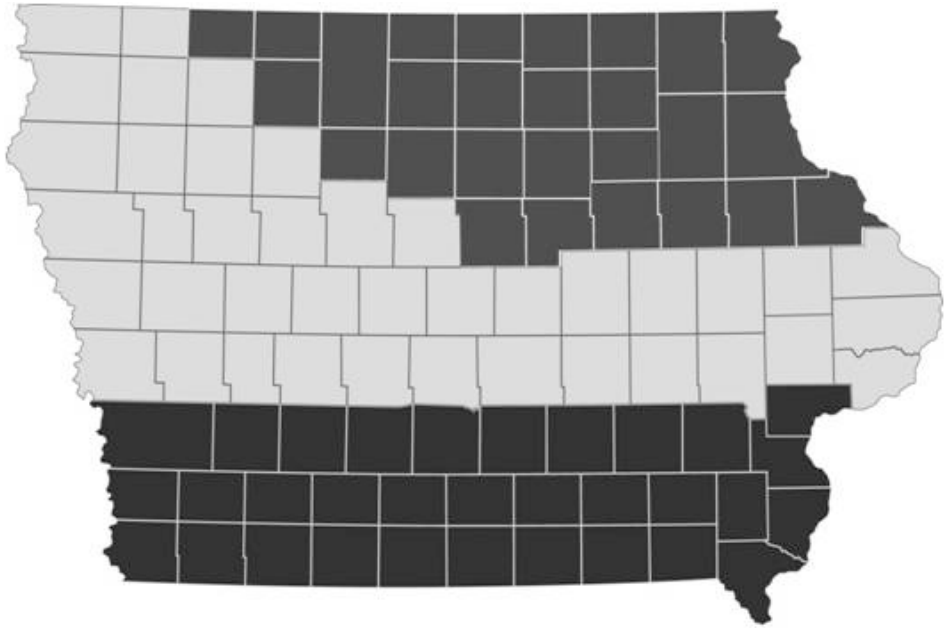

Figure 1. Planting date recommendations for Iowa based on three regions: Southern (black), Central (light gray), and Northern (dark gray).

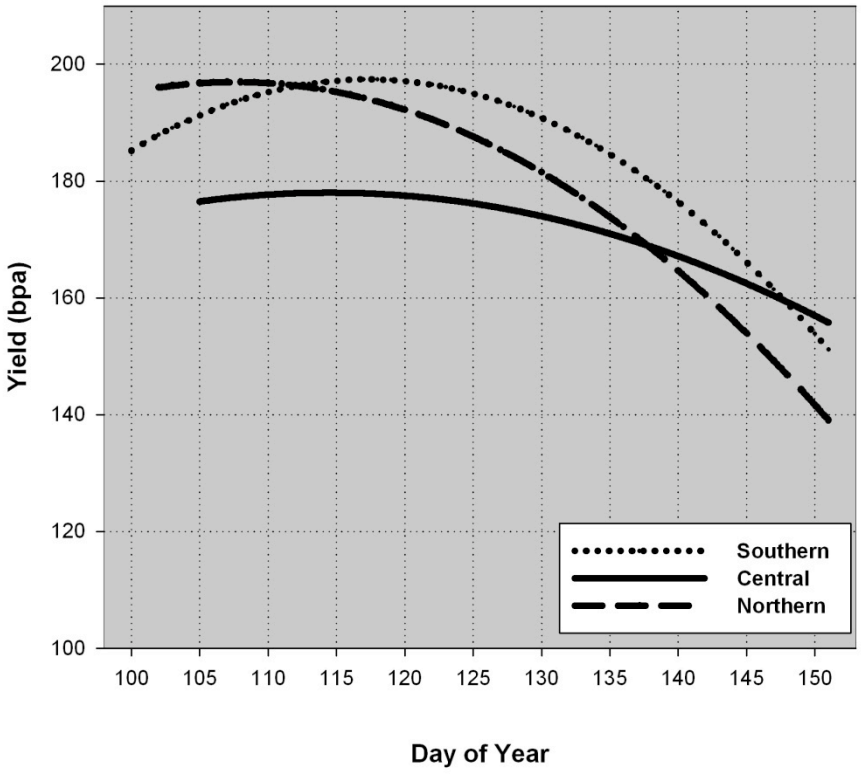

Figure 2. Planting date response based on calendar date (day of year) for each region.