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Late Planting and Replanting Corn—June 2013 (Part 1)

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Abstract
Corn planting progress ground to a halt again in late May with 85 percent of Iowa's corn planted (USDA-NASS). Fifteen percent of our corn acres remain unplanted for the first time, and as water sits in ponds across the state, some of the planted corn may need replanted (see article about flooded corn). Last week Steve Johnson and William Edwards provided ideas on crop insurance concerns relative to delayed and prevented planting, and replanting (ICM News). Their bottom line: talk to your insurance agent and analyze various options using spreadsheets at the Ag Decision Maker website. Planting other crops may be an option. However, either nitrogen or herbicides already applied to some fields may eliminate the possibility of planting of other crop.

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Part 1: Crop Model Output

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When should I change to earlier maturing hybrids?
Agronomic questions need answered in order to generate options. From the corn perspective, two issues come to mind that revolve around a central question: When should I change hybrids? Extension agronomists often counsel farmers not to change hybrids for earlier-season hybrids until late May (see ICM article). Frost potential increases before maturity of full-season hybrids with later planting. It is for that reason that we need to consider planting earlier-season hybrids.

With the rain already received and more in the forecast, we likely won't be in the field for several more days. Should we consider planting shorter-season hybrids then?

Modeling Methods
In a separate article (Part 2) we will address the hybrid-change question using actual 2010 and 2011 data generated from four ISU Research & Demonstration Farms (NW, NE, Central and SE). Here I discuss the question using simulations from the corn model Hybrid-Maize. I used the model to predict maturity dates, yield and frost potential at maturity for the same four Iowa State University Research and Development Farms and the same planting dates we'll talk about in the next article.

The crop model helps us better understand the interaction between management, genetics and weather. Its strength lies in that it allows us to simulate the same management – e.g. planting date, plant population, etc. - and hybrid maturities across several years (Table 1); weather is the only variable that changes across the years. The weather data base used varies at each location but at all locations included here goes back to the mid to late 1980's (Table 2). The model estimates maturity dates, frost potential, and yields given the weather conditions experienced in previous years through 2012. It assumes that there are no other limiting factors like diseases, insects, low N availability, etc.

Table 1 shows the common model input factors across all locations and years. Table 2 displays information on the hybrids and locations where they were modeled. Maturity, frost risk and yield predictions follow in Table 3 for the four locations based on actual weather form the mid- to late 1980's through the 2012 cropping season.

Results and Discussion

Results of the computer model simulations are shown in Table 3. Among hybrids, fuller-season hybrids as expected take longer to mature, are more prone to late-season frost, but when planted at the earliest planting date, yield as well as the two mid-season hybrids. Within hybrids, as planting delays occur at each location, R6 date – physiological maturity – is delayed and the risk of a frost before maturity increases.

If planting at the middle planting date, June 11, the two earliest-season hybrids yield the best at the two northern locations; of course frost risk is higher with the 93 day hybrid than the 83 day hybrid at those locations when planted on June 11. For the Central location planted on June 11, the three earliest hybrids outperform the latest hybrid (112d) with the least frost risk (33 percent, with the earliest hybrid (93d)). At the SE location, all four hybrids had similar simulated yields when planted on June 11; of course higher frost risks are associated with the later-maturing hybrids. With the last planting date, June 25, the earliest hybrid had the highest simulated yield at all locations. However, at the northern locations, frost risk was at or near 100 percent even with the earliest-season hybrid (83d).

Summary of Modeling Approach

- Full-season hybrids planted in June will encounter high probabilities of frost damage before maturity.
- Earlier hybrids perform as well or better than full-season hybrids when planted late at all locations.
- Late-planting of full-season hybrids carries more risk and lower yield potentials than earlier-season hybrids especially at the northern locations.

Conclusion

Decisions to plant corn late or replant are never easy. A checklist for replanting is included on the ISU agronomy corn production website. As mentioned above, Part 2 in this series will look at the same question using actual field data. In that article, we will also compare and contrast the two approaches. The crop-model simulation discussed in this article summarizes average simulated hybrid responses with a weather data base going back to the mid to late 1980's. Certainly the data are most useful in estimating maturity dates and frost potentials on those dates.

Table 1. Hybrid-Maize model input factors that were the same across locations and years

Factor	Factor Input Value/ Date
Planting dates	28 May, 11 June, 25 June
Plant population	32,000 plants per acre
Soil moisture	
Top soil	Loam 75% Field capacity (FC)
Sub soil	Loam 100% Field capacity (FC)
Rooting depth	40 inches

Table 2. Hybrid-Maize model input factors that varied by location

		ISU Research & Demonstration Farm (Location)			
		Northwest (Sutherland)	Northeast (Nashua)	Central (Gilbert-Ames)	Southeast (Crawfordsville)
Year†		1988	1988	1986	1988
Hybrid					
Relative Maturity (Days from planting to R6)	GDU§				
83	2175	X	X		
93	2320	X	X	X	X
98	2582	X	X	X	X
105	2625	X	X	X	X
112	2780			X	X

† Year when automated weather data collection began

§ GDU = Growing Degree Units

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