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Analog Years for Weather Forecasting and Correlating Corn Planting Dates with Yield in Iowa

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Abstract

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Keywords

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Analog Years for Weather Forecasting and Correlating Corn Planting Dates with Yield in Iowa

By Roger Elmore and Elwynn Taylor, Department of Agronomy

As of May 12, 15 percent of Iowa's corn was planted ([USDA-NASS](#)). This is a slower pace than what Iowa's experienced even in the flood year, 1993, when 20 percent was planted at this time in May. The 8 percent planted before May 5 was subjected to dramatic soil temperature changes as well as up to a foot of snow in parts of Iowa. Many [Integrated Crop Management News](#) articles, blogs, Twitter posts, and other media document spring 2013 conditions and concerns.

To the surprise of many, soil moisture profiles across the state are filled or closely filled as we write. The [U.S. Drought Monitor](#) receded to the west and northwest every progressive week. Based on what has already happened, what does the 2013 cropping season look like from this mid-May perspective?

Analog: A person or thing seen as comparable to another

When faced with different weather patterns like those we've experienced so far this year, we often turn to analog years. These are years considered as having similar trends in temperature and/or precipitation as those we are currently experiencing. Whether we agree or not, people use analog years to compare data like planting progress as well. It is often tempting to speculate that if we've had similar trends in weather or planting dates historically, we can use that as an analog year to forecast conditions – and thus corn yields – the rest of the current growing season. Even if the analog year is not a totally reliable for the yield outlook it does at least provide an idea of the risks and potentials that could be experienced during the growing season.

Spring weather analog year for 2013: 1947

Figure 1 displays Iowa state average Growing Degree Day (GDD) accumulations, Precipitation, and Stress Degree Days (SDD) for April 1 through May 8 for 1947, 1995 and 2013. 1947 is suggested as a spring-weather analog year for 2013. This is probably based on certain similarities of April weather in both years. April through June 1947 was cold and wet. Corn stands were reduced by 'water damage' across the state. The cold-wet weather transitioned to drought in July (Figure 2). By July 20th, 1947, heat stress set in and GDD exceeded normal (Figure 2).

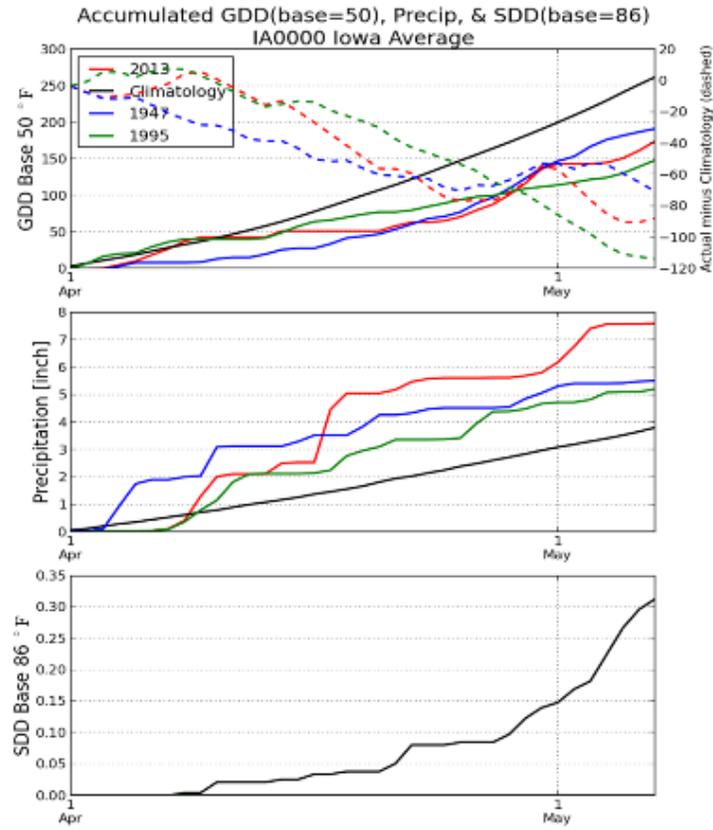


Figure 1. Iowa Average Accumulated Growing Degree Days (GDD), Precipitation, and Stress Degree Days (SDD) for Spring 1947, 1995 and 2013. Graphs from Mesonet. [Full-size image](#)

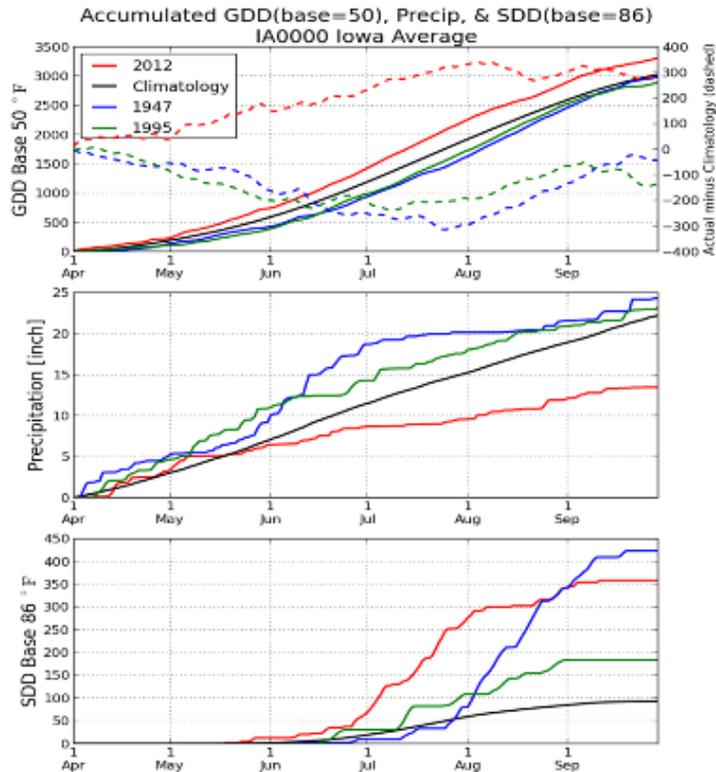


Figure 2. Iowa Average Accumulated Growing Degree Days (GDD), Precipitation, and Stress Degree Days (SDD) for the 1947, 1995 and 2012 Growing Seasons. Graphs from Mesonet. [Full-size image](#)

Planting dates in 1947 ranged from May 5 to May 21 (Elmore unpublished data). About half of the 1947 corn crop was planted by May 15. This may seem late to us now, but this range of planting dates and the 50 percent planted date were normal for that era. However, early rains probably resulted in shallow rooting. This coupled with stress later in the 1947 growing season probably reduced corn yield (Figure 2). Mid-season heat coupled with limited rain reduced Iowa average corn yields to 31 bushels per acre, 39 percent below the 1937-2012 trendline yield (Figure 3).

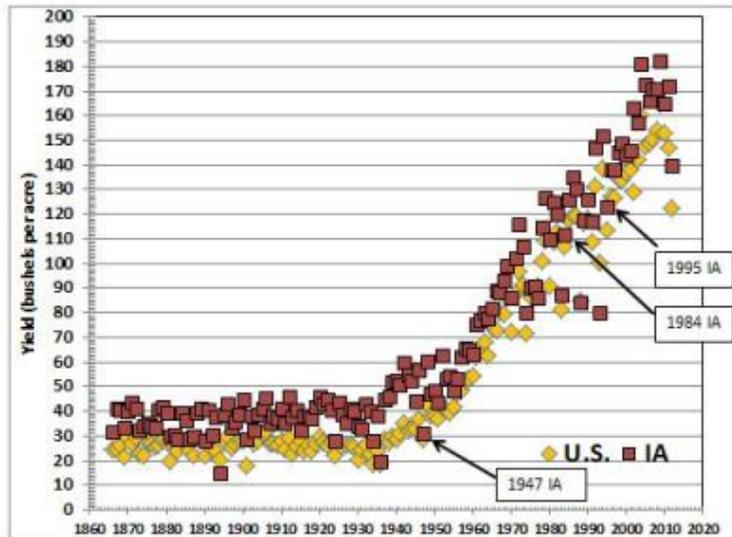


Figure 3. Corn yield United States. and Iowa, 1866-2012. Data from USDA-NASS. [Full-size image](#)

Corn planting date analog years for 2013: 1984, 1993 and 1995

Another way to think about analog years is planting progress. As mentioned in our introduction, as of Sunday, May 12, only 15 percent of Iowa's corn was planted. That was an increase from 8 percent the week before. Little corn planting occurred May 6–10 because of mid-week rains that unfortunately re-saturated fields just when they were nearly dry enough for planting following the early May snow; this delayed planting once more.

Since 1980, planting progress in early May of three years - 1984, 1993 and 1995 - was similar to what we've experienced this year. Because flooding resulted in delayed planting in 1993, let's focus on the other two as possible analog years for planting date.

1984: Six percent of Iowa's corn was planted by May 6; however, one week later, by May 13, Iowa farmers planted another 29 percent (Figure 4). Planting in 1984 began by April 29 and ended by June 10. Half the crop was planted by May 15, 10 days behind the 1978-1987 average of May 5 (Elmore, 2013, in press). By May 12 of this year, 2013, we only had 15 percent of our corn planted for the reasons we mentioned above. Corn yields in 1984 were 3 percent above trend line (see [Pierson & Elmore](#)) (Figure 3). The delayed planting in early May was correlated with increased yields. Although 1984 SDD were slightly greater than normal, there were fewer SDD in that year compared to either 1947 or 1995.

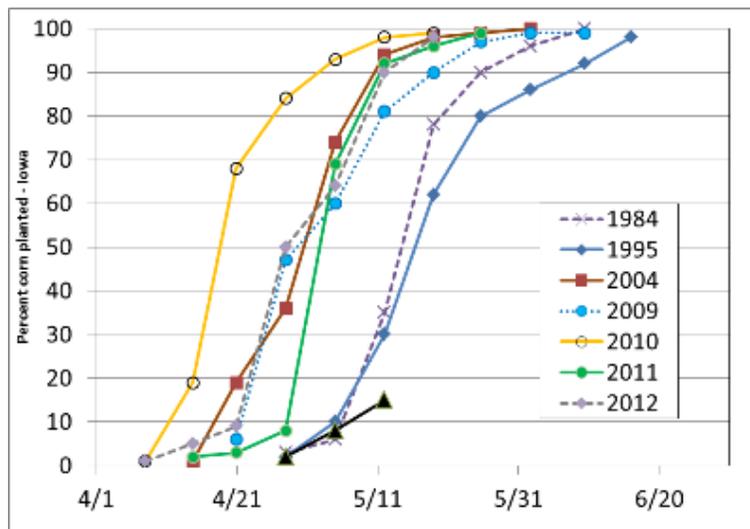


Figure 4. Percent of Iowa's corn planted at different dates and years. 2004 and 2009 yields were well-above trend line. Record breaking planting progress occurred in 2010. Adapted from USDA-NASS data. [Full-size image](#)

1995: Only 10 percent of Iowa's corn was planted by May 7, 1995 (Figure 4). Another 20 percent was added the next week and 62 percent of the crop was in by May 21. Although planting progress was similar to that of 1984, yields in 1995 were 9 percent below trend line ([see Pierson & Elmore](#)) (Figure 3). Planting delays in 1995 were correlated with reduced yields; please note this doesn't mean delays that year actually reduced yields. The primary impact in 1995 was high heat stress following silking relative to normal (Figure 2).

Cautions

Although analog years for weather and corn planting dates are interesting and help us understand potential hazards as well as opportunities, they may or not be accurate predictors of what will happen in 2013. Weather patterns the rest of the growing season will dictate that.

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