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How to plant all the acres

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Abstract
Planting dates are earlier today than ever before, with 50 percent of the crop planted by April 25 last season. In general, research has shown a small yield loss with very early planting dates and a larger yield loss with later planting dates. Research conducted during 1998-2000 showed that planting approximately between April 20 and May 20 resulted in 100 percent yield (see Iowa State University Extension's Planting Guide). Based on newer research (2003-2006), we believe that this window is actually earlier; corn can be planted prior to April 20 and reach 100 percent yield.

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How to plant all the acres

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Should planting date or population vary in corn following corn versus corn following soybean?

Planting date

Planting dates are earlier today than ever before, with 50 percent of the crop planted by April 25 last season. In general, research has shown a small yield loss with very early planting dates and a larger yield loss with later planting dates. Research conducted during 1998–2000 showed that planting approximately between April 20 and May 20 resulted in 100 percent yield (see Iowa State University Extension's *Planting Guide* at **www.extension.iastate.edu/Publications/PM1885.pdf**). Based on newer research (2003–2006), we believe that this window is actually earlier; corn can be planted prior to April 20 and reach 100 percent yield.

Again, yields are reduced more when planted too late rather than too early. Because producers will have more acres of corn to plant, the possibility of having corn planted outside the optimum window is increased. We recommend that corn be planted earlier than later, if seedbed and environmental conditions allow.

The amount of residue will be significantly greater in corn following corn unless it was completely buried beforehand. Corn-following-corn ground will likely be cooler and wetter in the spring, and these fields should not be the first planted. Corn-soybean acres should be the primary focus when planting before April 20. When planting corn early, be aware that your established population will potentially be less than what it would be if planted later due to a prolonged length of time the seed is in the soil. A higher percentage of seeds generally emerge with later plantings. Figure 1 shows Iowa

The amount of residue is significantly greater in corn-following-corn fields. *(Lori Abendroth)*

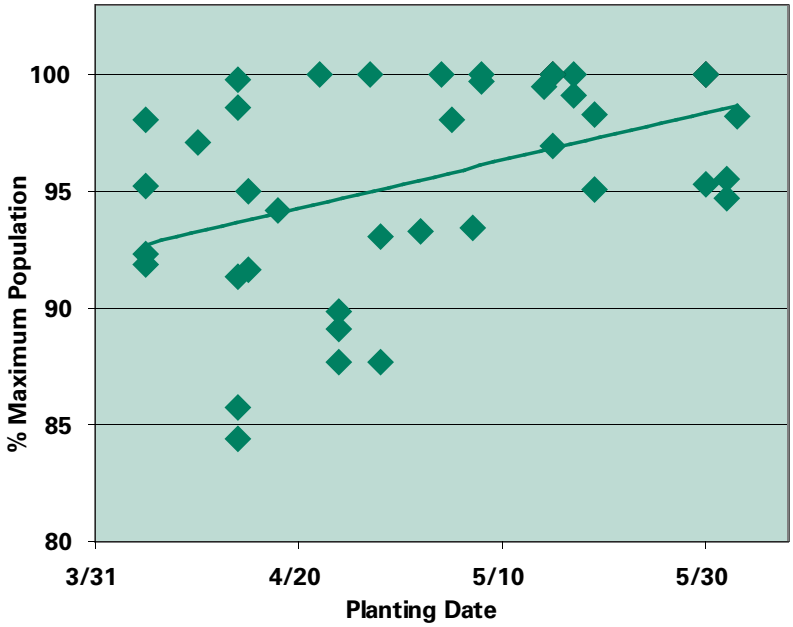


Figure 1. Final plant population across nine planting date research trials in Iowa, 2006. Percent maximum population (100% is maximum) relative to planting date (three outliers were removed from data set).

research data across nine planting date trials in 2006. Data is graphed relative to the highest established plant population within each research location. Therefore, at each location, the planting date that resulted in the highest plant population was set to 100 percent, and all other data at that site were relative to this. Greater variability in final population exists with planting dates prior to May 1. If planting early, especially before mid-April, the seeding rate should be taken into consideration and potentially increased by up to 5 percent.

Plant population

Data from USDA-ERS show a decreased seeding rate for corn following corn compared to soybean in Iowa (see Figure 2). This difference may be due to the locations that generally raise multi-year corn versus other areas of the state. In other words, most acres are in corn-soybean production across Iowa, and therefore, more seeding rates are taken into account when figuring plant populations for a corn-soybean system than corn following corn. The data bring in a valid question—should different seeding rates be used for corn following corn than corn following soybean?

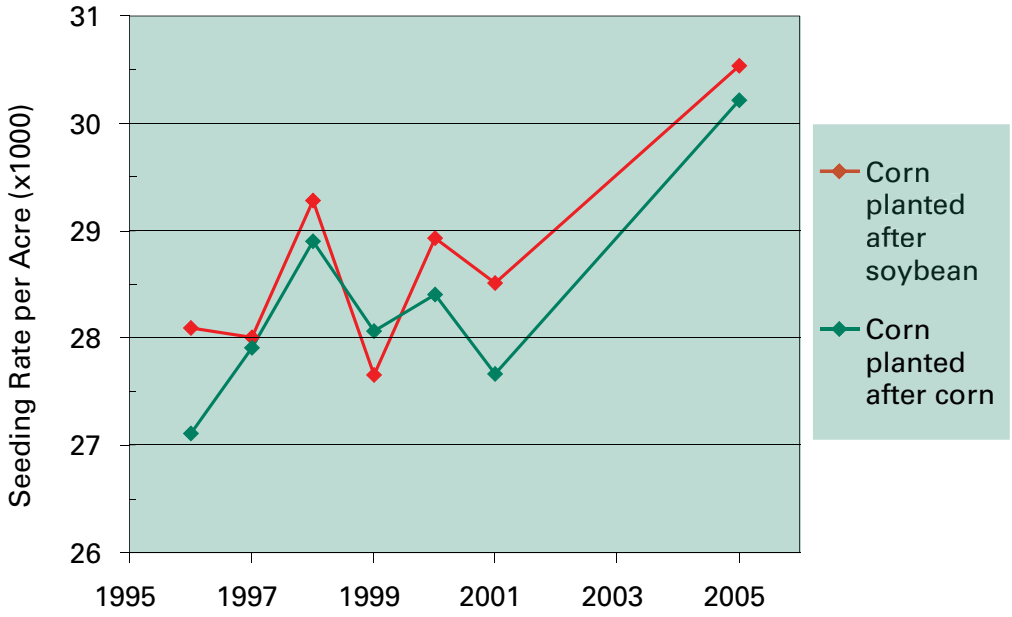


Figure 2. Seeding rate for corn following corn and soybean in Iowa during 1996–2005. ***(United States Department of Agriculture-Economic Research Service)***

Corn does require more moisture (generally a few inches) per growing season than soybeans. Therefore, multi-year corn is at a slight disadvantage because of the reduced available moisture. If moisture is taken into consideration in seeding rate decisions, producers may want to reduce their seeding rates if they believe moisture to be limited in the upcoming growing season. This would be an attempt to tailor the seeding rate to what the environment can "handle." The U.S. Drought Monitor as of February 6, 2007 (Figure 3), reveals that most of Iowa has normal moisture; the exception is southeast Iowa. Therefore, a moisture deficit may not be a major factor to consider when determining seeding rates in 2007 for most areas, although available moisture in the growing season should always be considered.

Previous Iowa State University data (1997–2000) showed that a harvest population of 32,000 plants per acre generally gave the optimum yield across the state, although hybrids continue to be bred for good performance under increased populations. Based on 2006 data, the highest yields were associated with a final population that was approximately 2,000 plants per acre higher (approx. 34,000). Therefore, in typical growing environments, we believe the optimum plant population has increased. The next question is whether seeding rates should be changed to reflect the cropping system they are planted into.

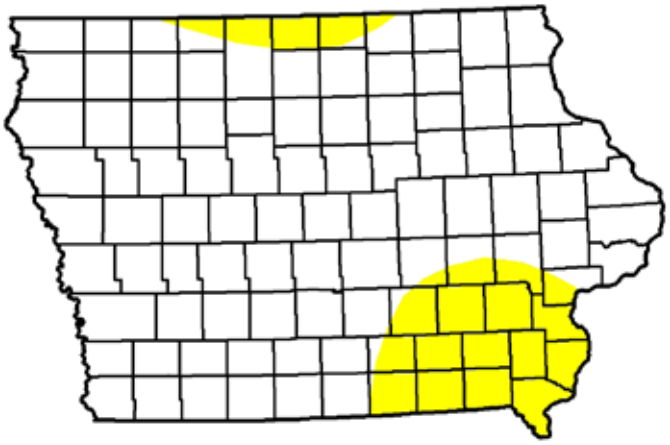
U.S. Drought Monitor

February 6, 2007
Valid 7 a.m. EST

Iowa

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	85.0	15.0	0.0	0.0	0.0	0.0
Last Week (01/30/2007 map)	85.0	15.0	0.0	0.0	0.0	0.0
3 Months Ago (11/14/2006 map)	72.5	27.5	5.5	0.0	0.0	0.0
Start of Calendar Year (01/02/2007 map)	64.9	35.1	4.4	0.0	0.0	0.0
Start of Water Year (10/03/2006 map)	75.7	24.3	4.1	0.0	0.0	0.0
One Year Ago (02/07/2006 map)	26.5	73.5	62.2	30.2	0.0	0.0



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Released Thursday, February 8, 2007

http://drought.unl.edu/dm

Author: Mark Svoboda, National Drought Mitigation Center

Figure 3. U.S. Drought Monitor, February 6, 2007, www.drought.unl.edu/dm/monitor.html.

Research conducted by the University of Wisconsin during 1995–1997 investigated final plant populations relative to the system they were placed into. The yield response to plant population did not differ, whether corn followed corn or soybean. The highest yields were associated with a final population of approximately 30,000 plants per acre (this was the highest population included in the study). Based on this research, we can conclude that yields follow the same response trend to population regardless of what system they were placed into.

Research by Iowa State this past year agrees with University of Wisconsin data, in that there was no interaction between population and rotation sequence (i.e., population caused the same yield response trend). Yet, this does not mean that there are no overall population differences between the systems. In other words, are the number of seeds planted and the number of final plants at harvest similar between the two systems? Research from Iowa (2006) shows an overall difference in final population relative to the seeding rate (see Figure 4). Note that at Nashua (northeast Iowa), the final population for corn following soybean was greater than corn following corn by

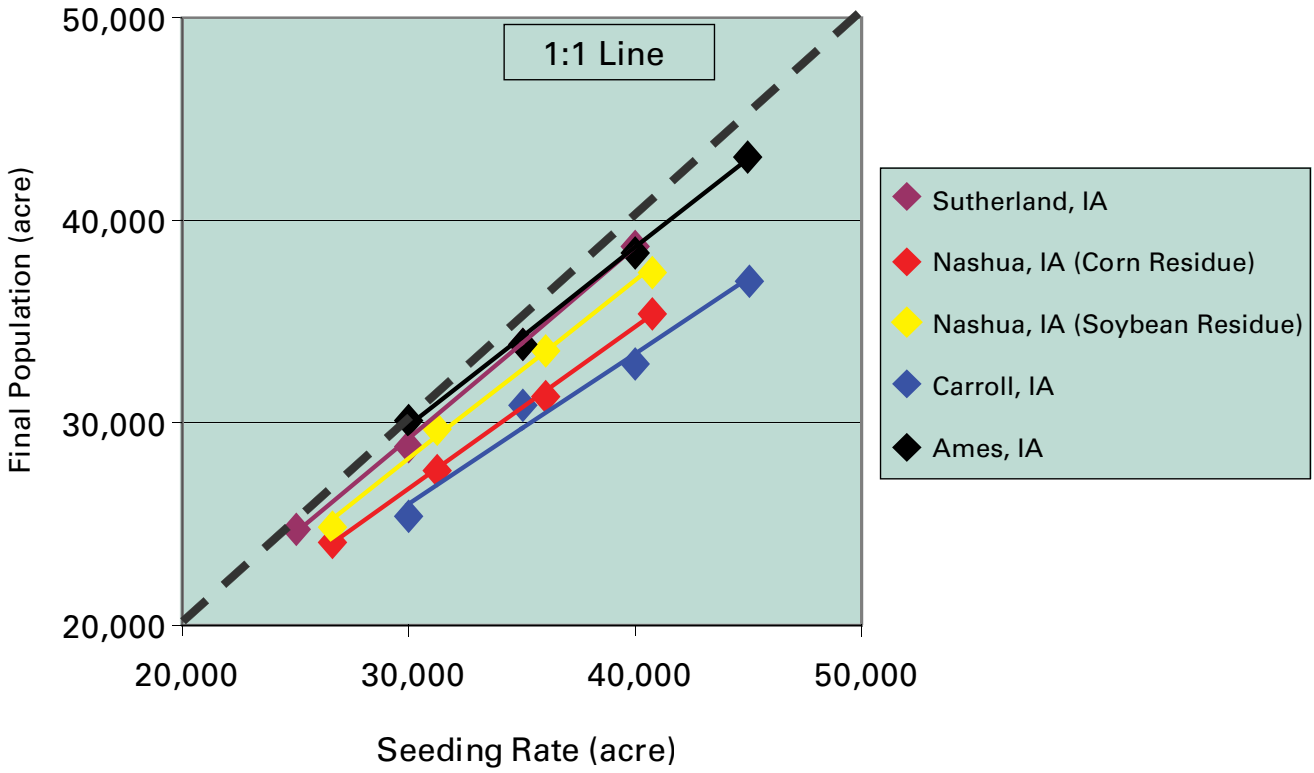


Figure 4. The relationship between seeding rate and harvest population. Ideally, we would like to have every seed planted be present at harvest; this would signify a 1:1 ratio. Most hybrids have a 95 percent germination rate, which means that each seeding rate should parallel the 1:1 line, except that it would be slightly below it. As the seeding rate increases though, the final populations start to drag down from the 1:1 line.

approximately 2,000 plants, although the linear responses are nearly parallel to one another. In this one location, the final population was less for corn planted into corn residue than soybean residue. We expect heavy residue to have been partially responsible for the reduced stand in corn following corn (see "Allelopathy: A cause for yield penalties in corn following corn?" on pages 16–17 to understand the relationship between residue and seed germination and plant growth).

ISU and the University of Wisconsin data show that yields will respond similarly to population regardless of the system in which they are placed. Yet, slightly greater harvest populations could be realized in corn following soybean than in corn following corn. To have the same harvest population between both systems may require a higher seeding rate into corn residue, especially if the residue is heavy. Increasing the seeding rate slightly may not result in increased yields though—only that your stands between the two systems may be more closely related.

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