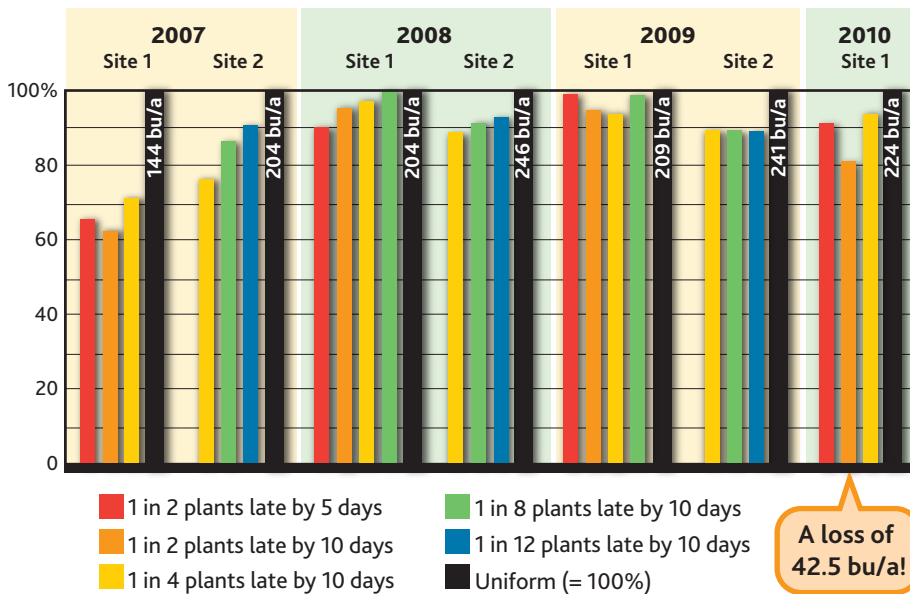




## Uniform timing of emergence trumps uniform spacing for yield effect:

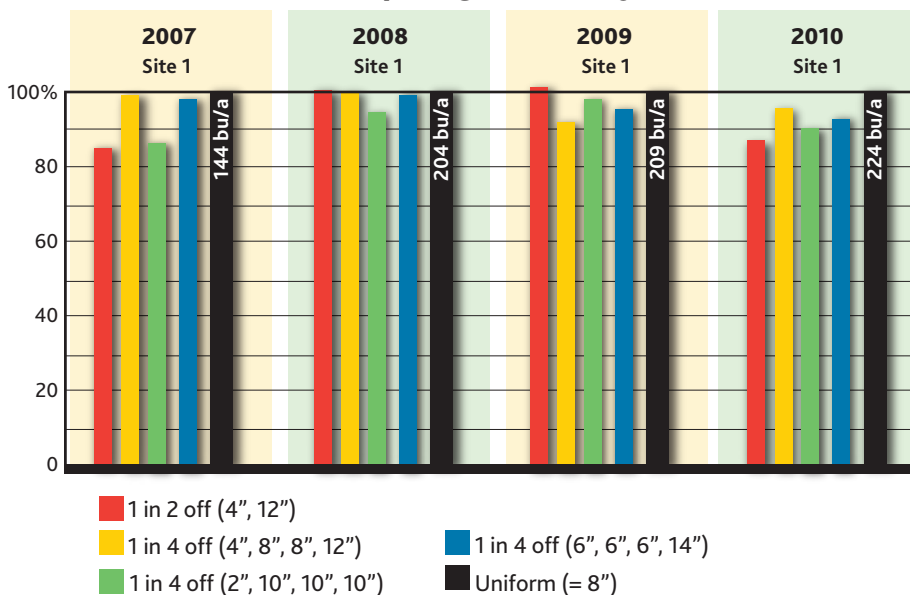
Studies conducted by Paul Jasa, Extension Engineer with U.Neb.-Lincoln, at Rogers Memorial Farm near Lincoln, NE. Site #1 was upland on a silty clay loam, while #2 was bottomland silt loam. All trials were no-till into soybean stubble, with ~20 years of continuous, low-disturbance no-till history. Each year, Site #1 was planted by hand, while Site #2 was planted with a planter and the extra seeds slipped in by hand (and/or plants removed by hand). Three replications were used in '07 for each treatment, and 4 replications for 2008 - 2010. A population of 27,000 was used in '07 on upland (Site #1), but was increased to 30,000 thereafter.

### Uniform Timing of Emergence



Graph A shows the effects of delayed emergence.

### Spacing Uniformity



For Graph B, on spacing effects, note that all of the spacings shown resulted in the same final population (each of them averaged 8" spacing). Some other spacing treatments were also included in the study wherein actual doubles and actual skips were created so that the population was higher or lower than the target population—we have chosen to omit those results here because the effects predominately are due to population effects x year, and typically with doubles improving yields and skips costing yield for these site-years.

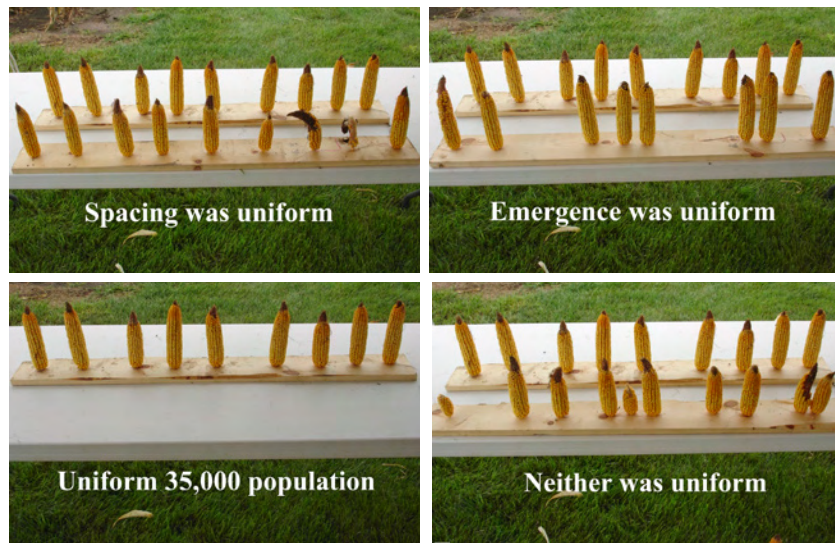
Jasa comments: "In 2007, we had a warm, dry spring and the early emerging plants got off to a quick start and the late ones couldn't catch up, resulting in yield losses."

With the more benign growing season in '08 (no drought), the negative effects from non-uniform timing of emergence decreased as compared to '07, but still were far greater than the yield loss from non-uniform *spacing*. Jasa summarizes: "Uniform [timing of] emergence is even more critical as individual plant competition for resources becomes greater, such as in droughty conditions."

"The 2009 season was cool and wet early, and the late emergers weren't that far behind the early ones, thus not much yield hit. Growth stage behind is much more important than days behind. But it's easier to control days behind when it comes to planting."

For 2009, "It was really interesting what the 1 in 4 doubles did for yield (+11%), telling me that the population was too low for the way the season turned out. Our Jan 1 to Oct 1 rainfall was about 10 inches behind normal (May 1 to Oct 1 was about 6 inches behind). We still had fairly good yields."

Finally: "Spacing errors didn't affect yields much when the growth was fairly uniform....Emergence uniformity was more important than spacing uniformity."



Corn ears from one of Jasa's studies, left.

Interestingly, another study conducted in Nebraska in the early 1970s by one of Dale Flowerday's Ph.D. students showed the same thing, although the results were quite unexpected. Flowerday's study was part of the reason Jasa revisited the topic with further research.

In the meantime, other Corn Belt studies had found similar effects (see chart below, and comments by one of the researchers).

### Is precision placement in your budget?

Late Plants (Delay)	% of Max Yield
1 in 6 late by 6 days	96% ●
1 in 6 late by 12 days	92% ●
1 in 4 late by 10 days	94% ●
1 in 4 late by 21 days	90% ●
1 in 2 late by 7 days	94% ●
1 in 2 late by 10 days	94% ●
1 in 2 late by 14 days	83% ●
1 in 2 late by 21 days	80% ●
3 in 4 late by 10 days	94% ●
3 in 4 late by 21 days	77% ●

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● Liu et al. 2004 (27K) Ontario ● Nafziger et al. 1991 (26K) Illinois & Wisconsin ● Ford & Hicks 1992 (32K) Minnesota

"Research indicates that uneven *emergence* has a greater adverse effect on yield than uneven *spacing*."

—Ohio State University Fact Sheet 150-01, by Greg La Barge & Peter Thomison, reviewing the research on the subject

The take-home message of this research is that despite all the worries about obtaining the proverbial 'picket-fence' plant spacing for corn, the yield losses from non-uniform spacing are almost trivial in comparison to losses from erratic timing of emergence. And, yes, planter setup and adjustment create uniform timing of emergence, or lack thereof. Let's control what we can!



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