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Late-Planted Corn & Seeding Rates

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- What seeding rates are optimum for normal planting dates?
- General advice: Don't change from optimum rates.
- Certain exceptions may call for increasing or decreasing rates.

Among the many questions raised by Indiana & Ohio corn growers as the rain-delayed planting season continues is whether delayed planting should influence their seeding rate decisions for corn. As might be expected, several factors need to be considered.

First of all, what defines 'optimum' final population for corn in our two states? For most of our production areas, the answer is a range of final stands from 28-32,000 plants per acre (Nafziger, 1994; Paszkiewicz & Butzen, 2001). Some exceptions exist for that rule of thumb. Marginally yielding soils (consistently less than about 120 bu/ac) probably respond best to final populations nearer to 24,000 plants per acre, while exceptionally high yielding environments (greater than 180 bu/ac) probably respond better at final stands approaching 34-36,000 plants per acre (Paszkiewicz & Butzen, 2001).

So, the first step for Indiana & Ohio corn growers when considering late planting consequences for seeding rates is to determine whether they are normally seeding at rates that will achieve the optimum final stands for the productivity level of each field in their operation. Typically, seeding rates are calculated based on an assumed 90 percent success of germination, emergence, and seedling survival. For example, to achieve a targeted final stand of 30,000 plants per acre at harvest, one would seed at a rate equal to about 33,300 seeds per acre (30,000 divided by 0.90).

If you are already following these seeding rate guidelines, then delayed planting should not alter those seeding rates because the range of optimum final plant populations is similar for early and late planted corn. Table 1 illustrates the similarity of yield responses to population for corn planted at varying planting

dates in research conducted by the Univ. of Illinois. Regardless of planting date, optimum grain yield occurs for most situations within a similar range of final populations.

Table 1. Expected corn grain yield due to various planting dates and final plant populations.

Planting	Plant population (final) per acre													
date	10,000	12,000	14,000	16,000	18,000	20,000	22,000	24,000	26,000	28,000	30,000	32,000	34,000	36,000
	Percent of optimum yield													
10-Apr	62	68	73	78	82	85	88	91	92	93	94	94	93	91
15-Apr	65	71	76	81	85	88	91	94	95	96	97	96	96	94
20-Apr	67	73	78	83	87	90	93	96	97	98	99	98	98	96
25-Apr	68	74	79	84	88	92	94	97	98	99	100	100	99	97
30-Apr	68	74	79	84	88	92	95	97	99	100	100	100	99	97
05-May	67	73	79	83	87	91	94	96	98	99	99	99	98	97
10-May	65	71	77	82	86	89	92	94	96	97	97	97	96	95
15-May	63	69	74	79	83	87	89	92	93	94	95	95	94	92
20-May	59	65	71	75	80	83	86	88	90	91	91	91	90	89
25-May	55	61	66	71	75	79	81	84	85	86	87	87	86	84
30-May	49	55	61	65	70	73	76	78	80	81	81	81	80	79

Source: Nafziger. 1994. J. Prod. Ag 7:59-62

Caveats: Choose What Fits Your Situation.

That said, it is important to recognize that no two farming situations are the same. Caveats and exceptions abound and should be considered when making a decision about seeding rates for late plantings.

Scenario #1: Soil temperatures for corn planted in late May or early June will be quite warm relative to that of usual late April or early May plantings. Couple that with the likely ample availability of soil moisture and the odds are that germination and emergence success will be greater than normal. Consequently, you may elect to reduce your seeding rate accordingly. Instead of planting 33,300 seeds to achieve 30,000 plants (90% success rate), you may elect to plant only 30,600 seeds per acre (98% success rate).

Scenario #2: If you eventually switch from your normal hybrid maturity to a much earlier maturity hybrid, you may actually want to increase your seeding rates by several thousand. Hybrid maturities (Nielsen, 2002 .pdf) of 100-day CRM or less often respond better to higher final stands than later maturity hybrids. Instead of aiming for final stands from 28-30,000 plants per acre, these very short season hybrids may respond better to final stands of 34-36,000 plants per acre (Paszkiewicz & Butzen, 2001). Consult your seed company sales representative for specific hybrid planting rate information.

Scenario #3: Later planted corn will be taller than early planted corn because its stalk elongation phase occurs during a time period that is relatively warmer (later in the season) than when early planted corn goes through the same phase. Not only will the plants themselves be taller, but ear placement will also be higher (same stalk node, but higher off the ground due to stalk elongation).

Consequently, a hybrid that is on the tall side to begin with will be even taller and its ears placed higher when planted unusually late. Such a combination of a tall hybrid and delayed planting will result in an increased risk of stalk lodging this fall if strong windstorms occur before harvest (anyone remember last October?).

One strategy to minimize this risk is to seed such a hybrid at rates closer to the low end of the optimum range in order to minimize the plant-to-plant competition that can cause etiolation (elongation under shade conditions) and thinner diameter stalks. Another strategy is to simply switch to a physically shorter hybrid.

Scenario #4: Later planting of corn, in and of itself, does not increase the risk of stalk rot development later in the season. However, taller, high-eared, late-planted corn will be more susceptible to the stalk lodging consequences of stalk rot IF stalk rot develops.

One of the primary factors that contributes to stalk rot development is severe stress (heat, dry soils, disease, hail, insects, cloudy weather, soil compaction) occurring early in the grain filling period that severely limits photosynthesis. The timing of that stress relative to grain filling is the critical determinant to whether stalk rots develop in corn of any planting date (anyone remember two years ago?). Planting strategies to minimize this risk would be similar to those of Scenario #3 above, as well as to avoid wet fieldwork (compaction) yet this spring.

Scenario #5: There will undoubtedly be a few fields tilled and planted on the wet side once field conditions get even close to being suitable for field work over the next few weeks. One consequence of doing so is a cloddy seedbed that does NOT promote good seed-to-soil contact for rapid and uniform germination.

IF the weather should suddenly switch from frequent rains to total dryness after such fields were worked and planted, germination would be extremely variable, if not disappointing (anyone remember 1991?). Along with the cloddy seedbed preparation, tilling and planting wet fields creates various forms of soil compaction (Vyn, 2002.pdf) that are not conducive for successful root development.

IF you are forced into this wet fieldwork scenario, you may want to increase your seeding rate beyond what you normally use, in anticipation of unsuccessful stand establishment. Similarly, IF you decide to forgo some tillage in fields where seedbed conditions are marginal (characterized by a cloddy surface, ruts, uneven residue distribution) and plant no-till, you may want to increase seeding rates to compensate for the higher probability of greater seedling mortality.

Related Information:

Nafziger, E.D. 1994. Corn planting date and plant population. J. Prod. Ag. 7:59-62.

Nielsen, R.L. (Bob). 2002. Interpreting Hybrid Maturity Ratings [Online]. Purdue Pest & Crop Newsletter, 10 May. Purdue Univ., W. Lafayette, IN. Available at http://www.entm.purdue.edu/Entomology/ext/targets/p&c/P&C2002/P&C8_2002.pdf (Verified 5/9/02).

Paszkiewicz, Steve and Steve **Butzen**. 2001. Corn Hybrid Response to Plant Population [Online]. Crop Insights, Vol. 11, No. 6. Pioneer Hi-Bred Int'l Inc., Johnston, IA. Available at http://www.pioneer.com/agronomy/corn/population_response.htm (Verified 5/9/02).

Vyn, Tony. 2002. [Online]. Purdue Pest & Crop Newsletter, 10 May. Purdue Univ., W. Lafayette, IN. Available at http://www.entm.purdue.edu/Entomology/ext/targets/p&c/P&C2002/P&C8_2002.pdf (Verified 5/9/02).

KingCorn.org The Corn Growers' Guidebook

For other information about corn, take a look at the Corn Growers Guidebook on the World Wide Web at http://www.kingcorn.org

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