

## **Jump Start Corn This Spring**

*Starter fertilizers may provide just the boost your crop (and profits) needs*

Starter fertilizers work. That's the word from Dr. Larry Bundy, a professor and extension soil scientist in the department of soil science at the University of Wisconsin at Madison who has worked on identifying factors affecting corn response to starter fertilizers for more than 10 years

Granted, many factors will affect a crop's response to starters fertilizers, including existing soil fertility status, soil compaction, date of planting and the tillage system. But, Bundy says, significant research conducted over the years shows that, in most cases, a starter will jump-start a crop and boost profits.

“Starter fertilizer not only accelerates early season plant growth, which can result in increased yields, but it also reduces grain moisture at harvest, which translates into reduced grain drying costs,” he says. “What's more, the data available suggests that response to starter may be more frequent and greater in high-residue systems, especially no-till.”

This is important news, Bundy says, considering the current production trends toward more extensive use of reduced tillage systems.

### **Start-ling evidence**

Bundy refers to numerous reports that demonstrate the response to starter fertilizer in no-till or reduced tillage systems (Table 1). In each experiment, starter fertilizer significantly boosted yields most of the time, building a “strong case” for this early-season practice, he says.

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**Table 1. No-till corn yield response to starter fertilizer in selected experiments.**

Location	Starter treatment	Response
Missouri Scharf (1999)	N, P, K; 2 x 2	6 of 6 experiments <b>13 bu/a ave. increase</b>
Iowa Buha et al. (1999)	N, P, K; 2 x 2	7 of 9 experiments <b>4 to 18 bu/a. increase</b>
Wisconsin Bundy & Widen (1992)	N, P, K; 2 x 2	8 of 12 experiments <b>15 bu/a ave. increase</b>
Illinois Ritchie et al. (1996)	N, P, K; 2 x 2	8 of 9 experiments <b>14 bu/a ave. increase</b>

Clearly, when soils test low in needed nutrients, the likelihood of response will generally increase. But, according to Bundy, a starter can be just as impactful – and profitable - on high-testing soils.

He refers to another revealing study: In 100 on-farm trials over a 3-year period, the need for starter fertilizer on high or excessively high-testing soils was evaluated. Most of the sites selected had P and K soil tests in the excessively high range, and response to N-P-K starter applied in a 2 x 2 placement was measured relative to a no starter control.

The results? Statewide, starter fertilizer increased yields by an average of 4 bu/acre in each year (Table 4). A closer look at the individual sites uncovered a more surprising range, from -10 to *up to 42 bu/acre* with a positive economic response to starter at 40 percent of the sites.

**Table 4.**

Corn yield response to starter fertilizer in 100 on-farm trials, 1995-1997			
Year	No.	Starter_fertilizer	
		Without	With
----Yield, bu/a----			
1995	44	127	131
1996	31	137	142
1997	25	144	147
Ave.	100	134	139

In this same study, it was observed that the largest responses to starter coincided with later planting dates in no-till. According to Bundy, the beneficial effect of starter with the late no-till plantings was due to stimulation of early plant growth and development in an environment where late planting limited growth. The stimulation of early growth by the starter treatments allowed the crop to realize more of its yield potential by the end of the growing season, he says.

In addition, Bundy says that it's important to note that even on high-testing soils, a typical 10-20-20 starter recommendation would only supply a portion of the plants' nutrient needs for the growing season.

“If you look at what a corn crop is removing in terms of P and K, it's much more than what is being added in a typical starter treatment,” he says. “It's critical to implement a balanced fertilization program that supplies appropriate nutrient requirements during all the critical growth stages; a starter is a key part of that program, helping plants get off to a healthy start.”

### **Striking a balance**

And speaking of balanced fertilization, yet another 3-year study conducted by Bundy himself found that yield, plant height and grain moisture benefits were maximized when the starter fertilizer contained all three major nutrients: N, P and K (Tables 2 and 3).

Bundy and Widen's study (1992) involved four planting dates ranging from late April to late May, no-till and moldboard plow tillages, and four starter fertilizer treatments applied using a 2 x 2 placement. The experiment took place on a Plano silt loam soil with P and K soil testing in the high to optimum range, and where the previous crop was corn.

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**Table 2. Effect of starter fertilizer and tillage on grain moisture at late May planting dates. (Bundy and Widen, 1992).**

Starter N-P <sub>2</sub> O <sub>5</sub> -K <sub>2</sub> O lb/acre	Moldboard plow	No-till
	Moisture, %	
10-0-0	24.5 NS	32.7 a
10-25-0	25.8	28.7 b
10-0-25	25.5	27.3 b
<b>10-25-25</b>	<b>24.7</b>	<b>29.0 b</b>

**Table 3. Effect of tillage and starter fertilizer composition on corn yield. (Bundy and Widen, 1992).**

Starter N-P <sub>2</sub> O <sub>5</sub> -K <sub>2</sub> O lb/acre	Moldboard plow	No-till	Mean
	Yield, bu/acre		
10-0-0	153 b	143 b	148 c
10-25-0	157 b	149 ab	153 b
10-0-25	152 b	147 ab	150 bc
<b>10-25-25</b>	<b>164 a</b>	<b>152 a</b>	<b>158 a</b>

Average of four planting dates.

Results showed that starter fertilizer increased yields in 20 of 24 comparisons with positive responses to starter ranging from 0.6 to 26 bu/acre. The largest responses to starter were found in no-till at the latest planting date, and starter increased yield at all planting dates in moldboard plow tillage. Starter treatments usually increased plant height at the late planting date in no-till, and grain moisture at harvest was usually reduced by starter fertilizer, especially at the late planting dates in no-till.

A critical takeaway, however, is that *yield, plant height and grain moisture benefits were maximized when the starter fertilizer contained N, P and K*, Bundy says.

### **Start here**

Unfortunately, there's not one simple rate or application method that works best for everyone, he says. But if growers keep a few basics in mind, their crop will thrive:

- 1) Make sure that the fertilizer contains the three major nutrients. Studies show that starters containing N, P and K do more to maximize yield, plant height and grain moisture benefits.
- 2) A 10-20-20 per acre application will maximize the starter benefits.
- 3) A side placement (2 x 2) may be needed to allow application of that amount of nutrients. Seed placement of this amount of nutrients could reduce stands due to fertilizer injury.

In general, Bundy says that the use of starter fertilizer often is a profitable practice in corn production. And, it may be even more important in high residue reduced tillage systems than in conventional tillage because consistent responses to starter in no-till systems have been found even at high P and K soil test levels.

“Starter fertilizers in reduced tillage may help overcome detrimental effects of slow early growth, soil compaction and nutrient stratification,” he says. “With side-placed applications of an N-P-K starter fertilizer, growers can usually expect stimulated early-season plant growth, lower grain moisture at harvest, and potentially higher yields.”

**About Dr. Larry Bundy.** *As professor and extension soil scientist in the department of soil science at the University of Wisconsin at Madison, Bundy focuses his efforts on nutrient management for grain crop production. In addition to conducting research for the university, Bundy says an important component of his extension educational program is advising corn producers on a number of practices, including starter fertilization.*

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