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Abstract

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Don't Underestimate the Value of Starter Fertilizer for Corn Planted Late

By Antonio P. Mallarino, Department of Agronomy

The weather changes rapidly and unexpectedly in Iowa. We went from worrying about planting in dry soil to late planting in cold soil. Therefore, farmers and crop consultants are wondering about using starter fertilizer to speed up early corn growth and increase yield.

When is starter fertilizer beneficial?

The placement of small amounts of nutrients in bands beside and below the seeds or in the seed furrow increases the concentration of nutrients where seedling roots grow. Common starter fertilizers are N-P or N-P-K products or mixtures, although other nutrients often are added. Research in Iowa and the north central region has shown that corn growth in response to starter fertilizer usually is more frequent in conditions that reduce early root growth or activity, the concentration in the soil of simple nutrient compounds that plants can absorb, or the nutrient diffusion through soil to the root. The same research shows, however, that starter fertilizer effects on grain yield are not as consistent. Yield responses are likely to occur with cool and wet soils and with reduced tillage because high residue cover keeps soils cooler and wetter in spring. Inconsistent yield responses to starter fertilizer often cannot be clearly explained and are attributed to complex interactions between initial soil conditions, planting dates and climate changes after planting.

Phosphorus is a relatively immobile nutrient; its diffusion to the root surface and uptake is limited by cold soil temperature, and it is critical for plants during early growth. Therefore, it is not surprising that corn early growth response to starter mixtures often is explained by P, sometimes even in high testing soils. Nitrogen often explains corn response to starter, especially when the primary N rate is not applied pre-plant in spring, and in continuous corn. Both in-furrow application and side planter attachments could be used, but available Iowa research can't answer the question if the low "safe" N rates that can be applied in-furrow actually help much if N deficiency is serious. Potassium seldom increases early corn growth in soils with adequate soil-test K levels, so it is desirable in a starter mixture when soil K levels across a field are low or with high small-scale variation and many low-testing small areas.

What about corn planted late?

We seldom think of a need for starter fertilizer when corn is planted late, even with full-season hybrids, because soils usually are warm and plants emerge and grow quickly. We assume that it may advance maturity and grain drying in the fall, but that will not affect yield much.

But this year corn will be planted late and in wet, cold soil, mainly in central

and northern Iowa, where the season is shorter. Unfortunately, we have not had research under these conditions in Iowa. Wisconsin research from a few years ago by Dr. Larry Bundy and collaborators demonstrated, however, that starter application was as likely to increase corn yield with early planting dates as with late planting dates and full-season hybrids. We should not blindly extrapolate these results to Iowa because most of the research sites were north of most Iowa fields, but they should apply well to the northern tiers of Iowa counties.

Therefore,

1. Do not underestimate the value of starter for corn planted late, mainly in northern Iowa cold soils and with a shorter season.
2. Starter P will provide the most benefit with low or optimum soil test P levels and low pre-plant broadcast application rates. But do not expect much yield response if the two-year P rate for the corn-soybean rotation was applied last fall or this spring.
3. Starter N may also be beneficial, mainly without high N rates applied pre-plant or near planting in the spring and with corn on corn.

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