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## KEY NUTRIENT MANAGEMENT QUESTIONS WHEN SWITCHING FROM CORN/SOYBEAN TO CORN/CORN ROTATIONS

There are many questions producers and their advisers are asking as more corn is being incorporated into crop rotations. Following are a few key questions and comments related to switching from corn/soybean (CS) to corn/corn (CC) rotations.

### How much do I need to change my N rate when moving from CS to CC?

- **Soybean effect on N credit.** A previous crop of soybeans can enhance N mineralization from organic matter. This can lead to reductions in the N rates applied to corn. When soybean is omitted from the rotation, more N may be needed to make up for reduced mineralization.
- **Soil NO<sub>3</sub> level.** Soybeans are good scavengers of soil NO<sub>3</sub>. When soybeans are omitted, residual soil NO<sub>3</sub> levels may increase, although levels are very dependent on the weather. Given such variability, it is usually a good practice to test for residual soil NO<sub>3</sub> before deciding how much N to apply.
- **Attainable yield.** University research has shown that there is a potential for CC systems to yield, on average, less than CS systems. If, over time, yields have in fact decreased, N rates will need to be adjusted downward in recommendation systems using yield goal as a factor.
- **Monitoring tools.** Incorporation of monitoring tools (e.g., chlorophyll meter, stalk NO<sub>3</sub> test, etc.) can be very helpful when the switch is first made from CS to CC.

**What happens to soil pH when I apply N more often?** Switching from CC to CS means applying N every year, rather than biennially. Most N fertilizers have an acidifying effect on soils. In some cases, the initial reaction may be alkaline, but over the long run, the ultimate reaction is acid. Whether or not soil acidification rates will increase with CC compared to CS will depend a lot on the soil. The possible influence of rotation and the known impact of N fertilization upon soil acidification reinforce the need to regularly monitor soil pH, especially in the first few years when switching from one rotation to the other.

**How does nutrient removal change?** A CC sequence at a given yield level will remove more P, Mg, and S, but less N and K than a CS sequence. For example, with 180 bu/A corn and 60 bu/A soybean the removal difference (CC-CS) in a sequence is -66 lb N, 18 P<sub>2</sub>O<sub>5</sub>, -29 K<sub>2</sub>O, 4 Mg, and 4 S. To estimate this for yourself, multiply your corn and soybean yields by per bushel removal values (see [www.ipni.net/northcentral/nutrientremoval](http://www.ipni.net/northcentral/nutrientremoval)).

**Do I need to consider applying starter fertilizer?** Several factors affect response to starter fertilizer (e.g., soil temperature, moisture, compaction, hybrid, etc.). In a 4-year Minnesota study, starter fertilizer produced equally beneficial responses (8 bu/A average) for CC and CS under a variety of tillage systems: no-till, zone till, strip till, and conventional tillage. The need for starter fertilizer for corn, regardless of rotation, may arise from the rapid influx of nutrients by corn roots early in the season and the positive effect of N and P on root proliferation.

An expanded version of these observations is available in the fall article series at the IPNI website: [www.ipni.net](http://www.ipni.net).

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Abbreviations in this article: N = nitrogen; NO<sub>3</sub> = nitrate; P = phosphorus; K = potassium; Mg = magnesium; S = sulfur;