



Summer 2005, No. 6

### STRIP TILLAGE AND FERTILIZATION FOR CORN

**Corn producers can often increase profit by minimizing or eliminating tillage.** Potential advantages of reducing tillage include decreased soil erosion, increased water use efficiency, and improved soil quality. However, in some situations no-till can actually reduce corn yield, usually as the result of early season stress from cool, moist soil conditions, especially on fine-textured or poorly-drained soils. Fall strip tillage (also called zone tillage or strip-till) is one way of overcoming some of the problems with no-till while retaining many of its benefits. Consequently, the adoption of strip tillage in the central and southern Great Plains has increased substantially over the past few years.

**The concept of tilling narrow strips in the fall is attractive for several reasons.**

- It requires less time and energy than conventional tillage.
- It provides a zone of bare soil that warms and dries more quickly in the spring.
- It retains residue cover on the untilled land, protecting against wind and water erosion and maintaining infiltration.

**Strip tillage also opens up new fertilizer placement options.** During the tillage operation, plant nutrients can be placed several inches deep directly below the seedbed. This can be an economical and agronomically efficient way of supplying some of the crop's nutrient requirements, particularly nutrients with limited mobility like phosphorus and potassium where deep placement can enhance positional availability. Furthermore, getting some of the fertilizer application job done in the fall helps streamline spring field operations, resulting in a better chance of timely planting.

**Kansas research comparing strip-till to no-till has shown that corn (rainfed) in strip-till treatments emerged quicker and more uniformly, likely due to higher soil temperatures in the spring.** In addition to the better early growth, strip-till has significantly increased corn yields compared to no-till at several locations. For example, the average corn yield increase of strip-till over no-till was 28 bushels per acre in Manhattan in 2003. Little difference in yield has been observed where fertilizer (nitrogen+phosphorus+potassium+sulfur) applications were made in the fall with the strip-till operation as compared to applying fertilizer in the spring during planting (2x2 placement). Nitrogen rate effects varied by location and previous crop, but increasing nitrogen rates generally increased grain yields.

**Strip-till for irrigated corn production has been evaluated at the Irrigation Research Foundation (IRF) in eastern Colorado for several years.** This work has shown a 4-year average corn yield increase of 16 bushels per acre in strip tillage compared to conventional tillage, with a range of increase from 11 to 24 bushels. Strip-till also produced deeper and more abundant roots to explore greater volumes of soil for water and nutrients. For example, 90 days after emergence (2002) total corn root length with strip-till was about three times that of conventional tillage and rooting depth was 12 in. greater. Water infiltration was also significantly increased in strip-till.

**Adoption of strip tillage continues to expand.** While there is certainly plenty of good information available, we need to learn more about optimum placement and timing of nutrients in these systems. One thing is certain...any system in which yield is increased will ultimately result in greater nutrient demands. Strip tillage has the potential to increase profitability of corn production in some areas by improving soil-plant-water dynamics, reducing energy inputs, providing new options and flexibility in fertilization, and ultimately increasing yield and decreasing cost per unit of production.

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