

Strip-till improves soybean yield

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Crop yield can be improved by ensuring adequate nutrient availability. But how should you place the fertilizer and what cropping system gives the best yields?

Research conducted by University of Illinois assistant professor of [crop sciences](#) Fabián Fernández, professor of crop sciences Emerson Nafziger, and graduate student Bhupinder Farmaha looked at how tillage, and phosphorus and potassium placement and rates, affected the distribution of soybean roots and the levels of water and nutrients in the soil.

"Strip-till produces higher yields than the no-till systems," said Fernández. "We were interested in understanding why."

In a three-year field experiment conducted near Urbana with soy following corn, they applied different rates of potassium and phosphorus in no-till broadcast (NTBC), no-till deep-band (six inches below the planted row) (NTDB), and strip-till/deep-band (STBC). Roots and shoots along with water, phosphorus, and potassium were measured periodically in-row and at between-rows positions at various depth increments up to 16 inches.

What they found was that, when they looked below ground, root density in strip-till systems was slightly lower than for no-till broadcast systems. "Basically, the plants are putting less energy into the root systems," explained Fernández. The NTBC system probably put more stress on the plants, and the plants compensated by putting out more roots.

"When we look at the total phosphorus and potassium taken up by the plant, we see that the strip-till definitely had a more efficient system because with a smaller root system, these plants ended up with much higher nutrient levels in the plant and higher yields," said Fernández

Strip-till seems to provide better conditions for plant growth, including more soil water. The researchers found slightly more soil water in the strip-till than the no-till in the between-row position.

"We are not sure why that happened," said Fernández. "We cannot say whether it was due to better infiltration or if the tillage of the strip-till is allowing more [water](#) to come into the soil, but we saw it consistently."

The other question they considered was whether deep-band applications allow for improved fertilizer use efficiency – specifically, can less fertilizer be used in deep-banding than in broadcast applications?

"We found no evidence for that," said Fernández. "It doesn't save you anything, and it might cost more to deep-band the [fertilizer](#) than to broadcast it."

The finding that strip-till works well for soybeans is important, because farmers tend to think about the system as being mainly for corn.

More information: This research, "Distribution of Soybean Roots, Soil Water, Phosphorus and Potassium Concentrations with Broadcast and Subsurface-Band Fertilization," will be published in the May-June 2012 *Soil Science Society of America Journal*.

Provided by University of Illinois at Urbana-Champaign

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