


# MESSENGER-INQUIRER

 Cooperative  
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## Farm Update

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AGRICULTURE & NATURAL RESOURCES  
EDUCATION

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### **Crop Rotation Soil Health**

Unless the price of corn increases relative to the value of soybeans before planting time next year, we are certain to see continuous soybeans planted on more farms across the area. That change is not surprising. We need to be aware of the consequence of yield reduction compared to fields kept in a soybean/corn rotation. There are countless soil health benefits to crop rotation, proven by yield. Extension Soil Specialist, Dr. John Grove has conducted research for years on crop rotation versus monoculture crop systems, he explains his results in the following article.

One basic soil health concept is that of plant diversity – a diversity of plant species grown in your fields to benefit soil health. Crop rotation is a well applied example of that soil health concept. The impacts of crop rotation on weeds, diseases and insects are numerous and help to explain how rotation raises yield of corn and soybean. I remember that in the 1980s, Johnsongrass control in soybean benefited the following corn crop. Take-all disease has long prevented growing wheat after wheat. Soybean cyst nematode reduces our ability to grow soybean after soybean. Corn rootworm can hinder continuous corn production.

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When changes in weed, disease and insect pressure don't explain the 'rotation effect', changes in soil pH, aggregation, tilth, and fertility are often talked about. But the 'rotation effect' can occur in the absence of all the previously described causes. This means that the effect is probably due to differences in soil microbiology that are induced by rotation versus monocrop cultivation. The differences in soil microbiology associated with this phenomenon are not well understood.

There is a long term, ongoing grain crop rotation research trial at the Spindletop research farm near Lexington. Besides continuous corn, continuous soybean, and the 2-year corn-wheat/double crop soybean rotation, there was a 4-year corn-corn-soybean-soybean rotation. All crop rotation components were grown every year. This research trial confirms that corn benefits a great deal from rotation. In these plots the 'rotation effect' was proven when 1st year corn exhibited greater maximum yield potential at 203 bu/acre, 2nd year corn 193 bu/acre and continuous corn 191 bu/acre. Interestingly, the larger portion of the 'rotation effect' was lost with 2nd year corn, whose maximum yield potential was not very different from that for continuous corn. Different nitrogen rates are also part of the research data collected from these plots. More fertilizer N was needed to achieve maximum yield in the corn after corn systems. Maximum yield was achieved with 141, 169 and 177 lb N/acre for the 1st year, 2nd year and continuous corn, respectively. That said, the greater corn after corn fertilizer N requirement did not overcome the 'rotation effect'.

In this long-term field study, the continuous corn and corn-wheat/double crop soybean systems have been around for the longest time, over 25 years. For those of you considering an expansion is soybean acres next spring - full season soybean is not immune to the 'rotation

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effect'. This long-term field study area does not have soybean cyst nematode and there were some years when soybean after soybean outyielded soybean after corn. However, the general yield trends indicate that soybean after soybean yield potential was inferior to that for soybean after corn and that the rotation effect was larger with a greater seasonal yield potential. Again, 2nd year soybean yield potential was not very different from that for continuous soybean.

The 'rotation effect' is one of the earliest known indicators of soil health – reported in ancient Roman agricultural texts. Most of us understand the benefits of crop rotation without knowing exactly how/why the 'rotation effect' occurs. The 'rotation effect' is derived from the soil, likely a change in soil microbiology brought on by changing the crop species production sequence and thereby improving soil health and increasing grain crop productivity. Most grain producers are promoting soil health in this regard every production season.

## **Agriculture Development Council Meeting**

The Daviess County Agricultural Development Council will meet next Monday November 27, 6:00 p.m. at the Daviess County Cooperative Extension office. Call me at the office for questions or to submit a funding request.

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