

# NO-TILL WHEAT LONG-TERM EFFECTS

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## OBJECTIVE:

The objective of this experiment was to verify the effects of no-till wheat and tilled wheat on the subsequent yield of soybeans and corn planted after wheat in a wheat, double-cropped soybean and corn rotation and measure differences in fertility and physical effects on the soil on a long-term basis.

## METHODS:

The experiment is at Princeton, Ky on a Huntington silt loam soil that is moderately well drained. Wheat was planted no-till and with tillage and the tillage plots were chisel plowed and disked twice. The plots were 10 ft x 30 ft. The soil test was pH – 6.2, P – 35, and K – 189 and 0-100-80 lbs/ac of N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O was applied before planting. N was sidedressed on corn at 150 lb/ac. Soybeans are planted no-till immediately after wheat harvest and no-till corn is planted the following year and wheat (tilled and no-tilled) is again planted after corn harvest.

## RESULTS:

### *Yields of Succeeding Crops*

The data (below) indicates that both no-till corn and no-till soybeans tend to yield more (3.5% for soybeans and 5.5% for corn) where the wheat is planted no-till. However, the differences are not always statistically significant, but the trend has been fairly consistent.

These yield differences indicate that changes between the two systems have taken place with time and the changes favor the system which has only no-tillage wheat plantings in it. The reason for the difference is not clear at this time, but research which is taking place indicate that the differences may be due to residue cover, soil moisture, soil physical changes and more specifically a change in pore size distribution.

### *Soil Changes*

There is no difference in the soil density between the systems. This indicates that there was no compaction of significance in either system. The soil strength, as indicated by penetrometer measurements was higher in the exclusively no-tillage system. Soil measurements indicate that the soil structure has changed and has larger aggregates and more medium sized pores than the system that is tilled every second year for wheat planting.

Moisture measurements taken during the 1999 growing season on the no-till corn and in 2000 on the no-till soybeans found more moisture available for plant growth in the treatments where tillage was not used for wheat. This resulted in an 18% and 6.2% higher grain yields, respectively, for these treatments during these years. There was little difference in measured soil moisture in the 2000 and 2001 no-till corn and there were also little differences in the yield.

<b>EFFECT OF WHEAT TILLAGE SYSTEMS ON THE YIELD OF SUCCEEDING CROPS</b>		
<b>Year</b>	<b>WHEAT TILLAGE SYSTEMS</b>	
	<b>No-Till</b>	<b>Conventional</b>
	<i>Soybeans (bu/ac)</i>	
2001	30.5	29.6 N.S.*
2000	45.6	42.9 N.S.
1999	14.9	15.4 N.S.
1998	16.5	15.8 N.S.
1997	45.1	42.7 N.S.
1996	54.5	50.8 N.S.
1995	24.4	22.2 N.S.
1994	49.5	51.6 **
Average	35.1	33.9
	<i>Corn (bu/ac)</i>	
2001	208.3	215.1 N.S.
2000	169.5	170.7 N.S.
1999	196.0	165.7 **
1998	203.7	190.2 **
1997	211.9	199.3 **
1996	--- Harvest Data Lost ---	
1995	186.0	191.0 N.S.
1994	206.0	178.0 **
Average	197.3	187.1
* N.S. means no significantly statistical differences.		
** Statistically different at the 0.1% level.		

### **SUMMARY AND CONCLUSIONS:**

A true no-tillage system seems to have a favorable effect on the crops grown on the yields of soybeans and corn. When no-till wheat was grown, the no-till corn and soybeans had 5.5% and 3.5% greater yields, respectively, than when these crops were grown after tilled wheat. The soil changes include larger aggregates and more medium pores which result in more plant available moisture for these crops.