

## COMPARISON OF DIFFERENT MULCHES FOR CONTINUOUS NO-TILL CORN<sup>1</sup>

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Continuous no-tillage corn is practiced on many farms where soybeans is not a good alternative due to a livestock system on the farm or because of soils with high erosion potential. Research in several southern states has shown that a properly utilized mulch can result in significant increases in yield of crops, greater conservation of soil water, reduced water runoff, reduced soil erosion and better weed control. When no-tillage corn is grown continuously without a winter cover crop or any soil disturbance, the corn stalk residue accumulates and weed control usually becomes more difficult and grain yields decline. Most farmers are not seeding winter cover crops in continuous no-tillage corn systems.

Research was initiated to determine the effect of a small grain cover crop on no-tillage corn grain yield on a poorly-drained and a well-drained soil. Rye and wheat were used as cover crops to determine the advantage of one over the other.

### Soil Characteristics and Treatments

On farm field experiments were established on two different soils to determine the effect of a small grain cover crop on grain yield and weed control in a continuous no-tillage corn production system.

Cavode silt loam is poorly-drained with a clayey, slowly permeable sub-soil. The four treatments established on this soil were: (1) rye cover crop, (2) wheat cover crop, (3) corn stalk residue, and (4) conventional prepared seedbed (plowed and disked).

Maury silt loam is a deep, well-drained soil. This has a 2-6% slope and is severely eroded. Three treatments on this soil were: (1) rye cover crop, (2) wheat cover crop, and (3) corn stalk residue.

In the fall, the wheat and rye were broadcast seeded in strips, corn stalks were shredded, and the soil double-disked to disturb the upper soil layer (2-3 inches) and to cover the seed. The corn stalks were shredded in the fall on all plots. Each treatment was replicated four times.

### Results and Discussion

Poorly Drained Soil -- The yield data for the first two years is shown in Table 1. It was quite evident that no-tillage was unsuccessful in this

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soil when planting in the stalk residue. Since this soil has a high clay content, the wet conditions encountered when planting caused a slight pan barrier to be formed beneath the no-tillage double disk openers resulting in a poor stand and poor plant vigor. A loss of 40-50 percent stand occurred in the stalk residue plots. This treatment was discontinued after two years. The three year average yields (Table 1) indicated that the rye cover crop was equal to plowing the soil and both resulted in significantly higher yields than the wheat cover crop treatment. In 1983, chisel plowing replaced the moldboard plow in the plots. However, due to the severe drought of 1983 this data was meaningless.

The effect of the mulch on weed control is shown in Table 2. In 1981, the weed control was good in all plots except the stalk residue until late in the growing season. Fall panicum and giant foxtail developed late in the plowed and wheat mulch plots but did not affect final yields. The extra growth and cover from the rye helped in keeping these plots nearly weed free until harvest. Another factor on this wet soil is that more dry matter is produced by the rye as compared to wheat by early to mid-May when the corn is planted. This provides a better mulch cover for the no-till corn.

Table 1. Effect of a cover crop on continuous no-tillage corn yields in a Cavode silt loam soil.

Treatment	Yield (Bu/A)			
	1980	1981	1982	3 Year Ave.
Rye Mulch	163	97	130	127.1a <sup>1</sup>
Wheat Mulch	141	96	115	114.9b
Stalk Residue	97	55		
Plowed	162	91	150	131.9a

<sup>1</sup> Values within a column followed by the same letter are not significantly different at the 5% level according to DNMR

Table 2. Effect of a mulch on weed control with continuous no-tillage corn.

Treatment	Cavode Silt Loam			Maury Silt Loam		
	1981	1982	Ave.	1981	1982	Ave.
Rye	1.2 <sup>1</sup>	6.2	3.7	2.8 <sup>1</sup>	3.8	3.3
Wheat	5.0	8.0	6.5	3.8	3.8	3.8
Plowed	4.0	1.0	2.5			
Stalks	9.0		9.0	5.1	6.7	5.9

<sup>1</sup> Weed pressure rated from 0 to 9 at harvest.  
0 = No weeds.

Well Drained Soil -- The yield data from the Maury silt loam soil is shown in Table 3. The yield differences between the two cover crops and stalk residue were small on this soil. The rye mulch treatment consistently gave the highest yields each year and the stalk residue treatment produced the lowest yields. As shown in Table 2, there was better weed control in the mulch plots as compared to the stalk residue. Fall panicum was a serious problem in the stalk residue plots.

In another study by Wilbur Frye, Research Agronomist, University of Kentucky, on a Maury silt loam soil, rye was used as a cover crop in comparison with corn stalk residue. After six years of this study, the corn grain yields were 10.3 percent higher with a rye mulch as compared to the stalk residue for no-tillage corn.

Table 3. Effect of a cover crop on continuous no-tillage corn yields in a Maury silt loam soil.

<u>Treatment</u>	<u>Yield (Bu/A)</u>			<u>Ave.</u>
	<u>1980</u>	<u>1981</u>	<u>1982</u>	
Rye Mulch	89	100	88	92
Wheat Mulch	85	98	83	89
Stalk Residue	87	90	80	86

#### Conclusions

On heavy textured, wet soils, continuous no-tillage corn does not appear to be feasible unless a cover crop such as rye is seeded in the fall. Otherwise, some form of tillage may be necessary to get a good stand of corn, control weeds and obtain high yields. In Table 4 the percent yield above the stalk residue treatment shows a dramatic increase on the Cavode silt loam for all treatments.

On a well drained soil such as the Maury silt loam, no-tillage corn into a wheat or rye mulch produces a slightly higher yield (Table 4) as compared to continuous no-tillage corn planted into stalk residues. Advantages from the use of cover crops are to reduce erosion and obtain better weed control.

Table 4. The percent yield above stalk residue of continuous no-tillage corn.

<u>Treatment</u>	<u>% Yield Above Stalk Residue</u>	
	<u>Cavode</u> <u>Silt Loam</u>	<u>Maury</u> <u>Silt Loam</u>
Rye Mulch	70.5	8.3
Wheat Mulch	55.4	3.5
Plowed	66.1	

Where there is a need to grow continuous no-tillage corn, the use of a good covercrop to provide a good mulch will enhance potential yields. In Kentucky, climatic conditions are such that rye is a superior cover crop as compared to wheat.