NO-TILL WHEAT

L.W. Murdock, J.H. Herbek,
J.R. Martin, J. James, and Dottie Call

No-till wheat production has been practiced in Kentucky for many years. As of 2002, between 25 and 30 percent of the wheat acres in Kentucky were no-till planted. More farmers are adopting the practice but long term information is needed.

The Kentucky Small Grain Growers Association entered into a cooperative effort with the University of Kentucky has taken an intensive look into no-till wheat and its long term effects.

RESEARCH APPROACH:

A replicated trial was established on a Huntington Silt loam soil at Princeton, Kentucky, in the fall of 1992. Two small adjacent fields were placed in a three-crop, two-year rotation of corn, wheat, and double-cropped soybeans. Both no-till and conventionally tilled (chisel-disk) wheat were planted and compared with different nitrogen, fungicide, and herbicide treatments. The corn and double-cropped soybean crops were planted no-till. Stand counts, weed control ratings, disease, and insecticide ratings, as well as yield and compaction results, were obtained for wheat. The long-term effects of the two different wheat tillage practices on the succeeding soybean and corn crops and on soil changes were also measured and are included in another report.

RESULTS:

Ten years of results (1993-03) are presented in this report.

Yields

The eleven-year average yields have been high (Table 1). The conventional till planted wheat averaged about 3.9 bu/a more than the no-till wheat. The yields of no-till wheat have been significantly lower than wheat planted with tillage six of the eleven years, due to compaction one year (1993) and freeze damage or cool conditions in 1996, 1998, 2001 and 2003. The yields of no-till wheat have been similar or exceeded that of conventionally tilled wheat the other five years.

Stands

The number of emerged plants is usually lower with no-till. Planting at the rate of 32 viable seeds/sq. ft., the final stands averaged 27.3 and 29.6 plants/sq. ft. for no-till and conventional till, respectively over the eleven years. Both stands were high enough for maximum yields. Seeding rates may need to be increased by ten percent as one moves from conventional till to no-till seeding.

Nitrogen Rates

No-till wheat may require more nitrogen than conventional tilled wheat. Nitrogen in this trial was managed for intensive production with one-third applied at Feekes stage 3 (February) and the remainder at Feekes stage 5 (mid-March). The no-till wheat sometimes appeared to be slightly nitrogen deficient before the second

application, but in most years this had little effect on yield. Increasing the nitrogen rate from 90 to 120 lbs/A had only a small effect on yield for the eleven years (Table 1). Although more nitrogen is recommended for no-till plantings, it may not always be justified. The years that the high rate of nitrogen resulted in higher yields were when late winter freezes resulted in wheat damage or when excessive amounts of rain fell after the first application of spring nitrogen. The 90 lb/ac rate has been as good as the 120 lb/ac rate 6 of the eleven years for no-till. The cost of the extra 30 lb/ac N would be higher than the return on the tilled wheat and slightly above a breakeven situation with no-till wheat over the eleven year period.

Weed Control

Good weed control was obtained in no-till wheat by three treatments: 1) Harmony Extra applied in the fall, 2) a contact herbicide at planting plus Harmony Extra in the spring, and 3) Harmony Extra in the spring. Yields were similar for all three herbicide treatments (Table 1). Wild garlic, which is sometimes associated with no-till wheat, was not a significant problem when Harmony was used. Without fall or spring herbicide treatments, weed competition was a problem (especially with henbit and some chickweed, annual bluegrass, field pansy and field pansey resulted in lower yields (no-till check).

Insects

Diseases and insects were monitored over the life of this experiment. No significant insect infestations occurred. There was no significant disease on any treatments over the ten years except for Barley Yellow Dwarf during the first year. This is consistent with no yield increases from the use of fungicides found during the first five years.

SUMMARY:

No-till wheat can produce as well as conventionally tilled wheat when properly managed. Stand establishment and weed control appear to be where the greatest changes in management are necessary.

TABLE 1. SUMMARY OF TEN-YEAR WHEAT RESULTS (1993-03)

Treatment Comparison	Yield (Bu/Ac)	Wheat Stands (Plants/sq ft)
Tillage Effect		
Conventional	97.1	29.6
No-Till	93.2	27.3
Nitrogen Rate (lb/ac)		
No-Till (90)	91.4	
No-Till (120)	95.3	
Conventional (90)	95.8	
Conventional (120)	97.9	
Weed Control		
No-Till Fall Gramoxone + Spring Harmony Extra	95.3	
No-Till Fall Harmony Extra	94.6	
No-Till Spring Harmony Extra	92.9	
No-Till Check	80.4	

ACKNOWLEDGEMENTS:

The authors want to thank the Kentucky Small Grain Grower's Association for their financial support and encouragement for this long term project.