

NO-TILLAGE WHEAT

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OBJECTIVE:

The objective of this experiment is to see if high yields can be produced by no-till wheat and to see if no-till wheat is an economical alternative to conventionally planted wheat on a long-term basis. The experiment includes different tillage methods, nitrogen rates and herbicides.

METHODS:

The experiment is at Princeton, Ky on a Pembroke silt loam soil that is moderately well drained. Pioneer 2540 was planted on Oct. 12 at 35 seeds/sq. Ft. Conventional plots were chisel plowed and disked twice. The plots were 10 ft. x 30 ft. The soil test was pH 6.0, P-39, and K-247 and 0-60-30 lb/ac. As N-P₂O₅-K₂O was applied before planting. Warrior insecticide was sprayed at 3 oz/ac and Tilt was sprayed at 4 oz/ac at heading.

RESULTS:

Tillage

There were no differences between the yields of no-tillage and conventional planted wheat. The highest yielding treatment was no-tillage wheat with 120 lbs/ac of N. However, the average of all conventional planted treatments was 2 bu/ac higher than the same no-tillage treatments.

The seven-year average is 5.0 bu/ac greater with conventional tillage planting.

YIELDS ACCORDING TO TILLAGE

Treatment	1999 Yields (bu/ac)	Yields ('93-'99)
Conventional	89.3 a	92.7
No-Till	87.3 a	87.7

Nitrogen Rate

Nitrogen was managed for intensive production with 1/3 of the N applied at Feekes 3 and the remainder at Feekes 5. Conventionally planted wheat yields were not effected by the nitrogen rate. However, the 120 lb/ac of N rate was necessary for highest yields with no-tillage planting.

The above normal temperatures for most of the winter and spray may have resulted in more fertilizer N being immobilized in the surface residue. This is the third year of seven that the highest N rate resulted in a significantly higher yield with no-till wheat.

YIELDS ACCORDING TO NITROGEN RATE

Treatment (lb/ac)	Yields (bu/ac)	Yields ('93-'99)
No-till 90	83.0 b	85.6
No-till 120	91.6 a	88.3
Conv. 90	88.4 a	91.1
Conv. 120	90.3 a	93.3

Nitrogen Timing on No-Till Wheat

In 1996, a split N application of 60-60 in February and March was a better combination than the 40-80 split. To look at this nitrogen timing in more detail, several treatments with different timings were added.

The 0-60-60 (Fall-Feb.-March) treatment has been similar to all the other treatments the last two years. In fact, there was no difference between any of the treatments in 1999.

The fall application of N has never been an advantage in any of the four years. The 0-0-120 (Fall-Feb.-March) treatment yields were as good as any. The warm fall and winter encouraged tillering so early N was not necessary this year for this variety.

YIELDS ACCORDING TO TIME AND PLACEMENT OF NITROGEN APPLICATION

Fall	Treatment (lb/ac)		Yields (bu/ac)	Yields ('97-'99)
	February	March		
0	40	80	93.8 a	88.6
0	60	60	88.7 a	86.2
30	30	60	94.1 a	85.4
30	45	45	83.6 a	84.9
0	0	120	87.1 a	

Weed Control

On April 20, 1999 weed control was evaluated based on the percent ground cover occupied by weeds in the row middles. Henbit and common chickweed were the dominant weeds observed. Other species noted in the spring included annual bluegrass, curly dock, field pepper weed, hairy bittercress, hairy chess, shepherd's-purse, star-of-Bethlehem, wild carrot, catchweed bedstraw, and speedwell.

The overall weed control observed in conventional-till wheat with spring Harmony Extra was essentially equal to that found in no-till wheat with fall applied Gramoxone Extra followed by spring applied Harmony Extra. Weed control with Harmony Extra was substantially better when applied in the fall compared to when it was applied in the spring. Plots treated in the fall with Sencor at 4 oz/A had very little henbit or chickweed, but did have other weeds, particularly wild carrot.

Wheat yields for all weed management practices exceeded 90 bu/ac in 1999. The yields of plots receiving a herbicide treatment were similar and were at least 5.5 bu/ac greater than the yield of no-till wheat where no herbicide was used. The seven-year averages for wheat yield tended to be less with Harmony Extra applied in the spring compared to other weed management practices, however, this trend was not observed in 1999.

EFFECT OF WEED MANAGEMENT ON THE PRESENCE OF WEEDS AND WHEAT YIELDS

Weed Management	1999 Weed Cover (%) ¹			Wheat Yield (bu/ac)	
	Henbit	Chickweed	Total Weeds	1999	'93-'99
Conventional Till Spring Harmony Extra	11 ab	4 bc	20 de	90.3 a	
No-till Fall Harmony Extra	4 b	0 c	10 e	92.4 a	89.7
No-till Spring Harmony Extra	27 a	15 ab	52 b	90.4 a	88.2
No-till Fall Sencor	4 b	2 c	37 c	92.7 a
No-till Fall Gramoxone Extra Spring Harmony Extra	17 ab	4 bc	27 cd	91.6 a	90.1
No-till No Herbicides	28 a	18 a	76 a	84.8 b	76.6

¹Gramoxone Extra at 1.5 pt/A was applied on Oct. 12, 1998.

Fall Harmony Extra at 0.5 oz/A & Sencor at 4 oz/A were applied Nov. 18, 1998.

Spring Harmony Extra at 0.5 oz/A was applied March 29, 1999.

²Weed Control was evaluated on April 20, 1999 based on a visual rating of percent ground cover occupied by weeds in the row middles.

Fungicides and Diseases

Fungicide applications were managed for intensive production on all treatments and there were no differences observed in disease among the treatments.

Insects

Insect pests were not a significant factor on this test this year. Plots were monitored weekly for the presence of insect pests including aphids, cereal leaf beetle and armyworm. However, no populations of any importance developed. To prevent Barley Yellow Dwarf, Warrior was sprayed 30 and 60 days after planting.

Wheat Stands

The fall stand counts over a six-year average show about 10% less plants in the no-till plots as compared to the conventional plots when planted at the same rate. This year, stand counts were high in both tillage methods, but no-till was 13% less than the tilled method of planting.

Treatment	WHEAT STANDS (Plants/Sq. Ft.)	
	Fall - 1999	Fall - 6-years avg.
No-till	30.2	26.4
Conventional	34.8 a	28.8

Wheat Head Density

Head counts made at maturity were significantly higher for the no-till planting. The number of heads/ft² were in the range where high yields might be expected for both tillage treatments. It appears that the wheat plant with no-tillage tillered more than the conventional wheat since fall stands were lower with no-tillage.

Treatment	Head Counts Heads/ft2	1993-99 Average
No-till	70.8 a	63.3
Conventional	66.2 b	65.2