NO-TILL WHEAT IN RESIDUE

D. L. Wright
Extension Agronomist
University of Florida

Introduction

The growing season for warm season crops in North Florida is in excess of 235 days. This allows for the use of many multicropping systems. One of the most widely used double cropping systems is wheat or other small grain followed by soybeans. This system is used without rotation by some growers which may lead to serious nematode problems in the soybean crop. However, where large acreages are grown, timely planting and management are important factors for economical yields of both wheat and soybeans. The research reported in this paper was conducted to determine the effect of tillage treatments on yield and physiological factors of wheat when planted into soybean stubble or dormant summer perennial grasses.

Results and Discussion

Florida 301 wheat was planted into residue of soybean stubble and dormant sods of bermudagrass and bahiagrass in the fall of 1981 and 1982. Tillage treatments (moldboard plow, chisel plow, disk harrow, and no-till) were accomplished after harvest or dormancy in each of the systems which usually occurred around November 15. Fertilizer was broadcast over all systems before any tillage was accomplished. A Tye no-till drill was used to plant the experiments. Average wheat yields were higher in 1983 than in 1982 (Table 1). After soybeans, Table 1 shows that no-till wheat yielded least of all tillage treatment in 1982 and most in 1983. Different fields were used for soybeans in each of the years. In 1982, wheat was no-till planted after soybeans that had not been subsoiled and a traffic pan was noted at the 6 inch depth using a recording penetrometer (Table 2). In 1983, wheat was no-till planted after soybeans that had been no-till planted and subsoiled for a number of years. This system had decayed roots down to the 8 inch depth which left channels through the traffic pan that were not destroyed by tillage and this soil was less compacted than the soil in any of the tillage treatments (Table 2). The loose nature of the soil where soybeans were grown gave a better environment for root exploration of both water and nutrients which resulted in highest yields.

Wheat grown in bahiagrass yielded more across all tillage treatments in 1983 as compared to 1982 (Table 1). No-till wheat was significantly less in both years than with any tillage treatment. Obtaining stands of wheat in bahiagrass with the no-till method was much more difficult than in either of the other 2 systems. Wheat no-tilled into bahiagrass develops more slowly than with tillage and is often yellow as it grows. No difference was noted between the tillage treatments in 1982 but the harrow treatment yielded highest in 1983 (Table 3). However, 4 harrow passes were made in the bahiagrass to prepare a seedbed. The higher yields in bahiagrass

from tillage may be explained by soil compaction in 1982 (Table 4) but cannot be as readily explained in 1983 except that stands were less under no-till plantings but test weights were not different.

In bermudagrass, yields of wheat were similar for both years (Table 5). Tillage treatments did not significantly influence yields or test weight. There was some difference in soil compaction in each year but did not seem to have any influence on the wheat. Stands of wheat were as good when planted no-till bermudagrass as with any tillage treatment in both years.

Soil compaction can be a major yield limiting factor in a shallow rooted crop such as wheat. Rain is often adequate for high wheat yields in the Southeast but can suffer yield losses by droughts of 2 weeks or more during the head filling period where root systems are limited by compaction.

Planting Method Suggestions for Wheat Following Soybeans, Bahia and Bahiagrass

Soybeans

1. If wheat is to be no-till planted after soybean harvest, select only those fields which have no traffic pans.

2. Use a moldboard plow after soybean harvest for soils with compacted layers. An increased yield of 10 or more bushels wheat may be made over no-till plantings or using a harrow.

3. A chisel plowing will result in higher yields than shallow or no-tillage where compaction layers exist in the plow layer.

Bahiagrass

1. Do not plant wheat into bahiagrass unless the soil is wet enough to allow good penetration for adequate seed placement with a no-till planter.

2. When planting conventionally following bahiagrass, allow several weeks for plants to decay before planting.

Bermudagrass

1. No-till planting of wheat into bermudagrass should be accomplished in a dormant sod and yields as good as with any type of tillage may be expected.

2. Bermudagrass residue should be no higher than 2"-4" to prevent shading on young seedlings.

3. An early maturing wheat should be used so as not to have competition from the bermuda during the grain fill period in the spring.

4. Plant as soon after November 15 as possible, since bermudagrass is entering dormancy and early planting results in earlier maturity of the grain so that the bermuda hay crop is not interfered with.

5. Residual fertilization from the wheat can be used by the bermudagrass during summer months.

Table 1. Wheat yield as influenced by tillage treatments on 3 previous crops (Quincy, 1982).

Previous crop	Tillage treatment: Moldboard plow		Chisel plow		Harrow		No-till	
	wheat yield bu/A							
	1982	*1983*	*1982*	*1983*	*1982*	*1983*	*1982*	*1983*
Soybeans	*60.8* a	*62.8*	*53.4* a	*57.2*	*48.5* a	*56.4*	*36.3* a	*68.4*
Bahia	*42.5* b	*61.5*	*36.8* a	*59.0*	*41.4* b	*75.3*	*20.6* b	*42.4*
Bermuda	*47.8* b	*52.5*	*50.1* a	*54.2*	*52.0* a	*54.7*	*47.1* a	*47.7*

Table *2.* Influence of tillage on soil resistance 6 weeks after planting wheat into soybeans (Quincy, 1982).

Soil depth (in.)	Tillage method at planting: Moldboard plow		Harrow		Chisel plow		No-till	
	soil resistance (lbs/sq in)							
	1982	*1983*	*1982*	*1983*	*1982*	*1983*	*1982*	*1983*
2	*0*	*46*	*0*	*42*	*0*	*25*	*54*	*8*
4	*0*	*54*	*8*	*75*	*0*	*46*	*104*	*8*
6	*21*	*83*	*171*	*133*	*75*	*133*	*242*	*8*
8	*63*	*79*	*329*	*271*	*183*	*221*	*404*	*63*

Table 3. Wheat yield and test weight as influenced by tillage in bahiagrass (Quincy, 1982).

Seedbed treatment	Grain yield bu/A		Test wt. lbs/bu	
	1982	*1983*	*1982*	*1983*
moldboard plow	*42.5* a	*61.5*	*55.3* a	*62.0*
chisel plow	*36.8* a	*59.0*	*57.5* a	*62.0*
harrow	*41.4* a	*75.3*	*59.1* a	*62.9*
no-till	*20.6* b	*42.4*	*57.5* a	*59.8*

Table 4. Influence of tillage on soil resistance 6 weeks after planting wheat into bahiagrass (Quincy, 1982).

Soil depth	Tillage method at planting: Moldboard plow		Harrow		Chisel plow		No-till	
	soil resistance (lbs/sq in)							
	1982	*1983*	*1982*	*1983*	*1982*	*1983*	*1982*	*1983*
2	*4*	*33*	*42*	*42*	*67*	*17*	*192*	*71*
4	*104*	*67*	*133*	*121*	*154*	*71*	*246*	*79*
6	*204*	*150*	*325*	*196*	*238*	*183*	*354*	*192*
8	*250*	*238*	*483*	*254*	*350*	*200*	*479*	*304*

Table 5. Wheat yield and test weight, as influenced by tillage in bermudagrass (Quincy, 1982).

Seed treatment	Grain yield bu/A		Test wt. lbs/bu	
Moldboard plow	*47.8*	a	*52.5*	*54.5* a *61.3*
Chisel plow	*50.1*	a	*54.2*	*54.9* a *61.3*
Harrow	*52.0*	a	*54.7*	*52.5* a *62.0*
No-till	*47.1*	a	*47.7*	*56.5* a 62.5

Table 6. Influence of tillage on soil resistance 6 weeks after planting wheat into bermudagrass (Quincy, 1982).

Soil depth (in.)	Tillage method at planting: Moldboard plow		Harrow		Chisel plow		No-till	
	soil resistance (lbs/sq in)							
2	*0*	*79*	*0*	*50*	*0*	*33*	*71*	*65*
4	*4*	*100*	*0*	*164*	*8*	*81*	*183*	*124*
6	*121*	*142*	*167*	*299*	*171*	*185*	*308*	*208*
8	*183*	*206*	*346*	*451*	*292*	*228*	*429*	*293*