No-Till Production of Corn and Sorghum Silage in Southeast Louisiana

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Much of the farmland in the southeastern United States is on hilly, highly erodable land. Erodable soils can be managed to produce row crops while protecting them from soil loss through use of minimum tillage.

No-till production of summer annual crops has been limited almost exclusively to plantings in crop residues and cool-season sods. The warm-season perennial grasses which dominate swards in the hill regions of the lower South offer a challenge to no-till production of summer annuals. Since sod and summer annual growth cycles peak at identical times, it is necessary to drastically suppress sod growth in order to obtain adequate production from annuals. However, it is also desireable to maintain the sod for cover and late season production, in addition to avoiding reestablishment costs.

This study was initiated to evaluate methods of no-till production of corn and forage sorghum for silage in the hilly Coastal Plain region of southeast Louisiana. The effects of planting date, sod type, sod suppressant herbicide and planting method have been evaluated.

METHODS

In 1982 and 1983 Dekalb-Pfizer XL-80 corn was established no-till, using a four-row Cole subsoiler planter, into Alicia bermudagrass and Pensacola bahiagrass sods. An adjacent area was prepared conventionally, as a check, by chisel plowing, discing twice, and planting with a conventional four-row John Deere planter.

Paraquat at 0.56 kg ha^{-1} glyphosate at 0.22 kg ha^{-1}, or atrazine at 1.68 kg ha^{-1} were evaluated in relation to an unsprayed control for suppression of sod and weeds in no-till plantings of corn in 1982. In both 1982 and 1983 these same chemicals were evaluated for use in no-till production of forage sorghum silage using Northrup King NK 300 seeded with the Cole planter. Corn was harvested by hand for silage yield and quality determinations at the early-dent stage each year, while forage sorghum was harvested at the hard-dough stage.

RESULTS

No-till yield of corn in neither bermudagrass nor bahiagrass was significantly ($p=0.05$) different from that of conventional tillage in either year of the study (Table 1). Grain content of the silage was unaffected by tillage method. Bermudagrass sod tended to offer more competition with corn plants for moisture and nutrients than did bahiagrass sod. This effect would be more severe in years of extreme drought stress.

Sod competition with corn was affected by planting date (Table 2). Early planting allowed corn seedlings to develop with a minimum of sod competition, producing a canopy which supressed the grass sod by shading. The improved performance of corn in bahiagrass plots treated with paraquat and glyphosate, as compared to the control or bermudagrass sod, suggests an earlier spring growth of bahiagrass in relation to bermudgrass. Residual weed control obviously is most important in early sod seedings as evidenced by silage yields of atrazine-treated plots.

There was also a much better distribution of rainfall in July during the grain filling stage of the late-planted corn which probably explains the higher grain percentage for this planting. Grain percentage was affected by herbicide treatment in the same manner as yield.

Late season plantings failed in bermudagrass sod unless glyphosate was utilized to supress the sod. Paraquat was ineffective in both sods, however, atrazine worked well in bahiagrass.

Forage sorghum was planted in early May each year of the study. Yield results indicate the same herbicide responses as for late-season corn (Table 3). These results emphasize the need for a strong sod suppressant chemical when silage crops are to be planted in actively growing sods.

A major problem with this system is loss of sod cover from heavy suppression when repeatedly planted to no-till silage crops. Since the goal is to develop multiple cropping, no-tillage systems in which a silage crop can be followed by grazing or hay harvest, it is necessary to identify a herbicide program which will suppress sod growth during the first month of corn growth to allow canopy development. If sod is then allowed to begin regrowth, shading will be sufficiently suppressive to allow corn maturation, while maintaining the sod stand.

Currently, a number of planter-herbicide combinations are being evaluated to address this problem. The erodable nature of many soils in the Southeast where warm-season grasses comprise the dominant sod type enhances the value of no-till research in this area. The findings of this study, indicating sod plantings to be comparable to conventional tillage, show that no-tillage silage production has potential in this area.

Table 1. Mean effects of tillage system, averaged over planting dates and herbicide treatments, in bermudagrass and bahiagrass sods, 1982–83.

Tilage method	Dry matter yield			Grain content		
	1982	1983	mean	1982	1983	mean
	Mg ha^{-1}			%		
Conventional	8.7	12.1	10.4	45.9	29.8	37.9
No-till bermudagrass	8.1	8.3	8.2	36.7	25.5	31.1
No-till bahiagrass	9.2	11.2	10.2	42.8	32.0	37.4
LSD (0.05)	NS	NS	NS	NS	NS	NS

Table 2. Effects of herbicide and planting date on no-till corn silage production, 1982.

Herbicide	Dry matter yield, Mg ha^{-1}			Grain content, %		
	Mar. 9	May 10	mean	Mar. 9	May 10	mean
	Bermudagrass sod					
Paraquat	6.2	3.2	4.7	10.8	36.5	23.6
Glyphosate	6.4	6.2	6.3	10.8	35.3	23.1
Atrazine	10.9	3.5	7.2	14.6	33.8	24.2
Control	7.9	0.5	4.2	12.4	18.5	15.5
LSD (0.05)	0.6	0.6	0.4	NS	7.7	5.5
	Bahiagrass sod					
Paraquat	8.5	3.5	6.0	9.4	35.6	22.5
Glyphosate	9.4	9.0	9.2	6.4	44.5	25.5
Atrazine	9.3	8.6	8.9	10.1	47.6	28.8
Control	6.4	1.9	4.1	6.0	25.1	15.6
LSD (0.05)	0.6	0.6	0.4	NS	9.2	6.5

Table 3. Effects of herbicide treatment on no-till sorghum silage production, 1982–1983.

Herbicide	Dry matter yield, Mg ha^{-1}			Grain content, %		
	1982	1983	mean	1982	1983	mean
	Bermudagrass sod					
Paraquat	5.2	6.9	6.0	13.1	19.1	16.1
Glyphosate	7.9	10.0	9.0	17.8	22.5	20.2
Atrazine	5.2	7.4	6.3	9.3	21.1	15.2
Control	3.3	4.7	4.0	11.6	21.0	16.3
LSD (0.05)	1.0	2.5	0.8	NS	NS	NS
	Bahiagrass sod					
Paraquat	7.3	10.5	8.9	9.5	25.4	14.2
Glyphosate	11.5	10.1	10.8	9.1	19.4	17.3
Atrazine	10.7	9.0	9.8	15.1	19.8	17.4
Control	8.7	5.6	7.2	5.6	29.0	17.4
LSD (0.05)	0.9	4.3	NS	NS	NS	NS