CORN AND SOYBEAN PRODUCTION IN SOD TO RENOVATE TALL FESCUE STANDS

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ABSTRACT: Herbicides, and other management factors, were evaluated for corn and soybean production in untilled sod on a Bude silt loam soil (fine, silty, mixed, thermic, Glossaquic Fragiudalf) at the Pontotoc station and on a Houston clay (Very-fine, smectitic, thermic Oxyaquic Hapludert) at the Prairie Research Unit. The objective is to develop a management system that minimizes soil loss potential on upland sites and includes the value of a grain crop to improve economics of pasture renovation. Although common in the Midwest, planting into untilled sod is not developed in the South because of past difficulty in controlling warm season perennial grasses prevalent in this region. Availability of corn and soybean cultivars that tolerate postemergence application of glyphosate has made this development possible. Both corn and soybean were planted in early April, corn with a no-tillage planter and soybean with a no-tillage drill from the Soil and Water Conservation District. Experimental herbicide treatments included various rates, tank-mix partners, and application timings. Several herbicide treatments controlled 95 to 100 percent of existing fescue plants and suppressed other weed species for both crops. All treatments included either paraquat or glyphosate at planting and successful treatments included one or two postemergence glyphosate applications at 3 to 4 weeks after planting. The resurgence of weed pressure in treatments not planted but sprayed with otherwise effective herbicides emphasized the role of crop competition (canopy closure) for effective weed control. At both locations, soybean yields were more than 30 bu/ac for several herbicide combinations. Corn yield was not measured at the Prairie location because of poor stands, however yield was at least 120 bu/ac at the Pontotoc location for the best treatments. Yields at this level are economically positive for both crops, based on historic commodity prices. Following crop harvest, tall fescue was no-tillage drilled into the stubble. Tall fescue establishment, stands and productivity will be measured.

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Management practices were evaluated for pasture renovation to replace toxic with non-toxic endophyte tall fescue (*Festuca arundinacea* Schreb.) using a cropping systems approach. Transgenic corn hybrids and soybean cultivars that tolerate postemergence applications of glyphosate make development of such systems possible. Costs for renovating existing tall fescue stands include weed control, seed, fertilizer, and loss of land use during renovation. Current recommendations for pasture renovation of toxic to non-toxic endophyte fescue will cost producers an estimated $200/ac, and require three years for improved animal productivity to defray expenses. Growing an annual grain crop as part of the renovation process to partly offset costs would improve cash flow and make the system acceptable to a larger group of producers. Although Broome et al., (2000) successfully demonstrated corn production in sod, soy production has not been developed. An effective management system should include fescue destruction, weed control, a crop yield that provides positive economic return, and successful reestablishment of the forage.

MATERIALS AND METHODS: In early April, glyphosate tolerant corn and soybean were no-tillage planted into pastures containing both tall fescue and warm season perennial grasses on a Bude silt loam soil (fine, silty, mixed, thermic, Glossaquic Fragiudalf) at the Pontotoc station and on a Houston clay (Very-fine, smectitic, thermic Oxyaquic Hapluderts) at the Prairie Research Unit. Group IV soybean was planted in 7.5 in rows with a no-tillage drill rented from the local Soil and Water Conservation District. In Mississippi, there are 60 drills in individual districts available for rental. These drills are also suitable for

seeding tall fescue following grain harvest. Corn was planted with a no-tillage row crop planter. Experimental herbicide treatments included various rates, tank-mix partners, and application timings.

RESULTS AND DISCUSSION: Several herbicide treatments controlled 95 to 100 percent of existing fescue plants and suppressed other weed species for both crops (Tables 1, 2, 3). All treatments included either paraquat or glyphosate at planting and most of the effective treatments included one or two postemergence glyphosate applications at 3 to 4 weeks after planting. This postemergence application is necessary because warm season perennial grasses bermudagrass (*Cynadon dactylon* (L.) Poir.) and dallisgrass (*Paspalum dilatatum* Flugge) are dormant at time of the preemergence herbicide application, rendering translocated herbicides ineffective. Residual herbicides improved control of annual weed species, but were not essential to success of the system. Late season resurgence of weed pressure in treatments not planted but sprayed with otherwise effective herbicides emphasized the role of crop competition (canopy closure) for effective weed control. Soybean yield was more than 30 bu/A for several herbicide combinations at both the Pontotoc and Prairie locations (Tables 1 and 3). Corn yield was at least 120 bu/A for the best treatments at the Pontotoc location (Table 2). Yields at this level are economically positive for both crops, based on historic commodity prices. Corn yields were not measured at the Prairie location because of poor stands. However, in earlier work, Broome et. al., (2000) demonstrated that corn could be successfully planted into untilled sod on vertisols common at the Prairie location. Following crop harvest, tall fescue was no-tillage drilled into the crop stubble. Tall fescue establishment, stands, and productivity will be measured.

PUBLICATIONS: Broome, M. L., G. B. Triplett, Jr., and C. E. Watson. 2000. Vegetation control for no-tillage corn planted into warm-season perennial species. Agron. J. 92:1248-1255.

Table 1.Vegetation control and Soybean yield, Pontotoc site.

Treatment	Rate	Application	Weed Control 8 Weeks After Planting		Yield
Name	lb ai/ac	Timing	Fescue	Bermudagrass	bu/ac
Roundup Canopy Prowl Roundup Roundup	1 0.22 0.75 0.75 1	PRE PRE PRE 2WAP 4WAP	100	92	36
Roundup Roundup Roundup	1 0.75 1	PRE 2 WAP 4 WAP	100	93	39
Roundup Roundup	1 1	PRE 3 WAP	94	80	31
Roundup Roundup Roundup Roundup	1 0.5 0.5 0.5	PRE 2 WAP 3 WAP 4 WAP	93	60	32
Paraquat Canopy Prowl Roundup Roundup	1 0.22 0.75 0.75 1	PRE PRE PRE 2WAP 4WAP	100	87	38
Paraquat Roundup Roundup	1 0.75 1	PRE 2 WAP 4 WAP	99	75	33
Paraquat Roundup	1 1	PRE 3 WAP	100	55	29
Paraquat Roundup Roundup Roundup	1 0.5 0.5 0.5	PRE 2 WAP 3 WAP 4 WAP	100	66	30
Paraquat Canopy Prowl Roundup Roundup	1 0.22 0.75 0.75 1	PRE PRE PRE 2WAP 4WAP	100	98	No yield, not planted
No herbicide			0	0	1
LSD .05			3.3	16	7.3

Table 2. Vegetation control and corn yield, Pontotoc site.

Treatment	Rate	Application	Weed Control 7 Weeks after Planting			Yield
Name	lb ai/ac	Timing	Fescue	Dallisgrass	Bermudagrass	bu/ac
Roundup Roundup	1 1	PRE 3WAP	99	92	93	133
Roundup Bicep Atrazine	1 2.8 0.5	PRE PRE PRE	98	91	28	74
Roundup Bicep Atrazine Roundup	1 1.4 0.25 0.75	PRE PRE PRE 3WAP	98	96	95	115
Roundup Roundup Exceed	1 1 0.64 oz	PRE 3WAP 3WAP	100	95	96	116
Roundup Roundup Weedar 64	1 1 0.5	PRE 3WAP 3WAP	100	90	93	121
Roundup Roundup Simazine	1 1 3	PRE 3WAP 3WAP	98	97	96	124
Paraquat + Surf. Roundup	0.625 1	PRE 3WAP	100	89	90	97
Paraquat + Surf Bicep Atrazine	0.625 2.8 0.5	PRE PRE PRE	100	0	32	52
Paraquat + Surf Bicep Atrazine Roundup	0.625 1.4 0.25 0.75	PRE PRE PRE 3WAP	100	91	94	105
Paraquat + Surf Roundup Exceed	0.625 1 0.64 oz	PRE 3WAP 3WAP	100	95	71	60
Paraquat + Surf Roundup Weedar 64	0.625 1 0.5	PRE 3WAP 3WAP	100	90	80	116
Paraquat + Surf Roundup Simazine	0.625 1 3	PRE 3WAP 3WAP	100	93	86	69
Roundup Bicep Atrazine Roundup	1 1.4 0.25 0.75	PRE PRE PRE 3WAP	100	91	95	Not Planted
LSD 0.5			3.5	7.3	10.2	40.4

Table 3. Vegetation control and soybean yield, Prairie site.

Treatment	Rate	Application	Weed Control at 8 WAP		Yield
Name	lb ai/ac	Timing	Fescus	Bermudagrass	bu/ac
Roundup Canopy Prowl Roundup Roundup	1 0.22 0.75 0.75 1	PRE PRE PRE 2WAP 4WAP	95	94	25
Roundup Roundup Roundup	1 0.75 1	PRE 2WAP 4WAP	95	94	25
Roundup Roundup	1 1	PRE 3WAP	94	94	31
Roundup Roundup Roundup Roundup	1 0.5 0.5 0.5	PRE 2WAP 3WAP 4WAP	95	95	31
Paraquat Canopy Prowl Roundup Roundup	1 0.22 0.75 0.75 1	PRE PRE PRE 2WAP 4WAP	95	94	37
Paraquat Roundup Roundup	1 0.75 1	PRE 2WAP 4WAP	95	94	31
Paraquat Roundup	1 1	PRE 3WAP	93	80	29
Paraquat Roundup Roundup Roundup	1 0.5 0.5 0.5	PRE 2WAP 3WAP 4WAP	95	94	29
Paraquat Canopy Prowl Roundup Roundup	1 0.22 0.75 0.75 1	PRE PRE PRE 2WAP 4WAP	95	94	No yield, not planted
No herbicide			0	0	1
LSD .05			2	5.3	6.4