Tall Fescue Control in No-Till Soybean

James R. Martin, J. D. Green, and Dottie Call
Department of Agronomy, University of Kentucky, Princeton Kentucky

Introduction

Tall Fescue *(Festuca arundinacea)* is a perennial cool-season grass that grows in Kentucky under a wide variety of environmental conditions (Lacefield and Evans, 1984). The ability of tall fescue to develop a sod cover on highly eroded soils is a major reason it is the primary grass used in pastures and in Conservation Reserve Program (CRP) fields. Returning CRP fields back to row-crop by utilizing conservation tillage practices (ie. no-tillage) would be beneficial since many of these fields have a high potential for soil erosion.

Research has shown that glyphosate (Roundup) or paraquat (Gramoxone Extra) generally provide consistent control of tall fescue when used in combination with atrazine in no-tillage corn (Witt et al., 1995). However, atrazine is not a viable tank-mix component for no-till soybeans because of crop sensitivity to this herbicide. Therefore, control of tall fescue sod in a no-till soybean production system is limited to glyphosate or paraquat without residual herbicides.

Results of studies on replacing endophyte-infected fescue with endophyte-free tall fescue (Smith, 1989; and Defelice and Henning, 1990) indicate that complete eradication of tall fescue plants including crown buds is difficult to achieve with glyphosate or paraquat. A high level of management was needed to obtain optimum control of tall fescue with these herbicides.

An experiment was conducted to compare various management practices on controlling tall fescue sod in no-till soybeans. Practices included timing of herbicide application, mowing, and tank mixing bumdown herbicides with 2,4-D.

Methods

A study was initiated in the fall of 1994 in a CRP field in Crittenden County, Kentucky. The field was sown to tall fescue in 1986 and has been previously used for no-till corn production. The field had an excellent cover of fescue sod.

The bumdown herbicides included either glyphosate at 1.5 lb ai/A plus nonionic surfactant at 0.5% v/v, or paraquat at 0.47 lb ai/A plus nonionic surfactant at 0.25% v/v. The ester formulation of 2,4-D at 0.5 lb ae/A rate was tank mixed with certain glyphosate treatments to evaluate potential antagonism of 2,4-D to glyphosate's control of tall fescue. Metribuzin (Sencor) at 0.38 lb ai/A plus metolachlor (Dual) at 1.5 lb ai/A were applied to all plots for preemergence control of annual grasses and broadleaf weeds. All treatments were applied with a C02 pressurized back-pack sprayer. Glyphosate treatments were applied in a spray volume of 10 gallons per acre (GPA), whereas, all other treatments were applied in a spray volume of 26 GPA.

The dates for herbicide applications included October 11, 1994 for the fall early preplant treatments (EPP); May 29, 1995 for the spring EPP treatments; and June 22, 1995 for the preemergence treatments (PRE). Soybeans were planted on June 22, 1995.

The site was divided in two blocks, with one block being mowed and the other block left non-mowed. Tall fescue in the mowed block was clipped with a rotary mower on May 11 and allowed to regrow to a height of about 6 inches before treating with spring EPP herbicides. The tall fescue in the non-mowed block was treated with Fall and spring EPP applications. Plot size was 10 feet wide by 40 feet long. Soybeans were planted with a no-till planter in rows 30 inches wide.

Tall fescue control was rated at various times throughout the season as percent brown vegetation. Soybean stand counts were made August 8, 1995. Plots were harvested with a plot combine October 22, 1995. Data from the mowed and non-mowed blocks were analyzed separately as a randomized complete block design with four replicates.

Results and Discussion

Timing of Herbicide Application

Multiple herbicide applications were usually needed to achieve optimum control of tall fescue in a no-tillage soybean system (Table 1). None of the fall or spring EPP treatments provided complete control of tall fescue control at soybean planting, therefore, paraquat was applied as a PRE treatment to all plots.

The long-term control of tall fescue was greater when control programs were initiated in the fall than in the spring. Glyphosate applied as a fall EPP treatment followed by paraquat applied as a PRE treatment at planting resulted in 95% control of tall fescue at soybean harvest, compared with only 33 % control of tall fescue when this sequential program was initiated in the spring.

Paraquat applied as three sequential sprays (fall EPP +

Table 1. **Effect of glyphosate and paraquat sequential applications on tall fescue control and soybean stands and yield in non-mowed sod (1994-1995).**

HERBICIDE TREATMENT[1]			TALL FESCUE CONTROL (%)						SOYBEAN	
FALL EPP	SPRING EPP	SPRING PRE	11/11	3/2	5/29	6/22	7/7	10/22	STAND[2] (Plants/1')	YIELD (BU/A)
glyphosate	-	paraquat	98	99	93	87	97	95	9.8	38
glyphosate + 2.4-D ester	-	paraquat	90	98	68	63	83	85	9.1	36
glyphosate + 2,4-D ester + AMS		paraquat	91	96	73	68	94	93	8.9	38
	glyphosate	paraquat		-		73	97	33	1.3	12
	glyphosate + 2,4-D ester	paraquat			-	70	96	33	2.5	20
-	glyphosate + 2.4-D ester + AMS	paraquat			-	73	99	20	1.9	26
paraquat	paraquat	paraquat	78	81	15	75	96	87	8.5	39
-	paraquat	paraquat			-	73	90	43	3.6	24
LSD (0.05)			4	7	10	14	7	29	1.9	17

[1] Herbicide treatments:
- paraquat 0.47 lb ai/A; glyphosate lb ai/A; AMS = Ammonium Sulfate 2%; 2,4-D ester 0.5 lb ae/A.
- Spray Volume: glyphosate 10 GPA, paraquat = 26 GPA
- Metribuzin at 0.38 lb ai/A and metolachlor at 1.5 lb ai/A were applied 5/29/1995 to all plots.
- Fall EPP = Fall Early Preplant on 101111994; Spring EPP = Spring Early Preplant on 5/29/1995; Spring PRE = Spring Preemergence on 6/19/1995
- Spring EPP and Spring PRE treatments were delayed due to wet spring weather.

[2] Soybean stands were collected Aug. 8 and represent plants per ft. of row in 30 in. row width.

Table 2. **Effect of glyphosate and paraquat sequential applications on tall fescue control and soybean stands and yield in mowed sod *(1994-1995)*[1].**

HERBICIDE TREATMENT[2]		FESCUE CONTROL (%)			SOYBEAN	
SPRING EPP	SPRING PRE	6/22	7/7	10/22	STAND[3] (Plants/1')	YIELD (BU/A)
glyphosate	paraquat	80	96	68	8.0	20.8
glyphosate + 2,4-D ester	paraquat	70	99	60	7.1	22.1
glyphosate + 2,4-D ester + AMS	paraquat	80	98	68	7.6	31.7
paraquat	Paraquat	65	88	65	7.5	28.3
LSD (0.05)		6.2	6.2	NS	NS	NS

[1] Mowed tall fescue. with a rotary mower May 11,1995.

[2] Herbicide treatments:

- paraquat 0.47 lb ai/A; glyphosate 1.5 lb ai/A; AMS = Ammonium Sulfate 2%; 2.4-D ester 0.5 lb ae/A.
- Spray Volume: glyphosate 10 GPA, paraquat = 26 GPA
- Metribuzin at 0.38 lb ai/A and metolachlor at 1.5 lb ai/A were applied 5/29/1995 to all plots.
- Spring EPP = Spring Early Preplant on 5/29/1995; Spring PRE = Spring Preemergence on 6/19/1995
- Spring EPP and Spring PRE treatments were delayed due to wet spring weather.

[3] Soybean stands were collected Aug. 8 and represent plants per ft. of row in 30 in. row width.

spring EPP + PRE) provided 87% control of tall fescue at soybean harvest compared with 43% fescue control with two sequential sprays in the spring (spring EPP + PRE).

The low soybean stands and yields associated with programs initiated in the spring were attributed to feeding damage from prairie voles. Initiating the control program in the fall appeared to minimize the damage by forcing the voles to move outside the area in advance of soybean planting in order to find a food source. Delaying the treatments until spring left a food source for the prairie voles until soybeans emerged.

Spring Mowing

Rotary mowing tall fescue in the spring tended to enhance the long-term control of tall *fescue*. The application of glyphosate in the spring followed by paraquat at planting provided 68% tall fescue control in the mowed plots (Table 2) compared with 33% where fescue was not mowed (Table 1).

Similar results were observed with sequential applications of paraquat (Witt et al, 1995). Results of a study in no-tillage corn indicated that spring mowing did not improve tall fescue control except where glyphosate at the low rate of 1 lb ai/A was applied. However, spring mowing did improve corn stands of all treatments by changing the habitat of voles and other pests that feed on corn seed and emerging plants.

Tank Mix Antagonism

A slight reduction on fescue control occurred where 2,4-D ester was mixed with glyphosate and applied in the fall. Including ammonium sulfate with the tank mixture helped to overcome the antagonism. Results of a similar study in no-tillage corn also indicated a tendency for 2,4-D to delay fescue control with glyphosate applications, yet the affect was small and temporary (Witt et al, 1995). Antagonism of glyphosate's toxicity to other grass species has been reported by other researchers (Flint and Barrett, 1989).

Conclusions

Results of this research indicate that a high level of management is needed to achieve effective control of tall fescue in no-till soybeans. Sequential treatments of a burndown herbicide will probably be needed for optimum control of fescue in no-tillage soybeans. Furthermore, long-term control of fescue may be more consistent when the initial treatment of either glyphosate or paraquat is applied in the fall compared to when it is applied in the spring. Spring mowing may improve the long-term control of tall fescue with glyphosate or paraquat treatments. Antagonism of glyphosate's toxicity can occur with 2,4-D ester, yet it is usually temporary. Ammonium sulfate can help limit the antagonism caused by 2,4-D.

References

Defelice, M. S. and J. C. Henning. 1990. Renovation of endophyte (Acremonium coenophialum)-infected tall fescue (Festuca arundinacea pastures with herbicides. Weed Sci. 38: 628-633.

Flint, J. L. and M. Barrett. 1989. Antagonism of glyphosate activity on johnsongrass by 2,4-D and dicamba. Weed Sci. 37:700-705.

Lacefield, G , and J.K. Evans. 1984. Tall fescue in Kentucky. University of Kentucky Ext. Bull. AGR-108.

Smith, A.E. 1989. Herbicides for killing tall fescue (Festucu urundinuceu) infected with fescue endophyte (Acremonium coenophialum). Weed Technol. 3:485-489.

Witt, W. W.. J. R. Martin, and C. H. Slack. 1995. Corn weed management in tall fescue sod. p. *3* 1-33. In Proc. of 1995 Southern Conservation Tillage Conference for Sustainable Agriculture. Jackson, MS.