Effect of Burndown Herbicide, Tillage, and N Rate on Fall Growth of Sod-Seeded Ryegrass

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Introduction

Ryegrass *(Lolium multiflorum* Lam.) is grown in Mississippi as a fall and winter annual forage crop for beef and dairy production. Ryegrass provides high quality forage in the fall when summer grasses are maturing and decreasing in quality.

Traditionally, ryegrass has been seeded into a conventionally prepared seedbed. Ryegrass is typically grown on highly erodible soils as defined by the Natural Resources Conservation Service (NRCS). It should not be seeded in a conventionally prepared seedbed unless the soil is not erodible. Establishment of ryegrass into a live sod or herbicide-treated sod offers alternatives to the prepared seedbed. However, reduced earliness and yield have been reported with these no-till treatments (Brock et al., 1992 ; Ingram et al., 1993; and Lang, 1989).

Summer fallow with herbicide or tillage 30 days prior to seeding allows moisture to accumulate, thus giving the ryegrass needed moisture for early fall growth (Brock et al., 1992). This experiment was conducted to determine the effect of burndown herbicide, tillage, and N rate on fall growth of sod-seeded ryegrass.

Methods and Materials

This study was conducted at Mississippi State University's Leveck Animal Research Center, Starkville, MS, on a Savannah fine sandy loam soil from fall 1992 to spring 1994 in a predominantly crabgrass *(Digitaria sanguinalis* (L.) Scop.) sod. The experiment was a randomized complete block design with four nitrogen (N) rates and three seedbed treatments replicated four times. The four N rates were *0,* 50, 100, and 150 lb N per acre; the three seedbed treatments were burndown herbicide plus residue removal prior to seeding, live sod mowed close just prior to planting, and rototilled.

Herbicide application and tillage were done the first week of August each year 6 weeks prior to seeding. The first year, 2 pints of Gramoxone@ (paraquat) per acre was the burndown herbicide applied on Aug. 11, 1992; the second year Roundup@ (glyphosate) at 2 qt/A was used to burn down the sod on Aug. 10, 1993. The planting date for first year was Oct. *7,* 1992; the second year it was Sept. 24, 1993.

The planting rate was 35 lb/A of 'Marshall' ryegrass planted with a Tye no-till drill on an 8-inch row spacing. All plots were repacked with tractor wheels prior to seeding. The N rates were applied shortly after ryegrass had emerged to a good stand about 3 weeks after planting. Other fertilizer nutrients were applied according to soil test each year. One quart of Weedmaster@ was applied Feb. 16, 1994 for broadleaf weed control. Fifty pounds N/A as ammonium nitrate were applied in February 1992 to all plots. Ryegrass plots were harvested five times in 1992-1993 and four times in 1993-1994. Stand and cover were estimated visually three times each year. Data were analyzed using computer-based ANOVA procedures (SAS, 1985).

Results and Discussion

Ryegrass stands were good both years of the study. Stand estimations ranged from 60 to 100%, with full stands achieved in all plots by March of each year. Tilled plots had significantly higher stands than either herbicide burndown or live sod ($P \le 0.05$) early in the fall, but later in the spring there was no difference (data not shown).

N rates had no effect on percent stand at any observation date either year. Tilled soil produced significantly higher ryegrass cover than either burndown or live sod each year early in the season ($P < 0.05$). Ryegrass cover from either sod plot was too low in the November-December months to produce good yields for fall grazing programs (data not shown). Only the tilled plots in 1992 produced enough ryegrass in the fall to utilize.

The December 1992 ryegrass yield from tilled plots was significantly higher than for either herbicide or live sod plots (Table 1). The 50, 100, and 150 lb/A N rates applied to tilled plots in fall 1992 had high enough forage yields to have been grazed, whereas neither sod at any N rate had sufficient fall forage growth either year (Tables I and 2). Ryegrass sown in sod was not grazable until March of each year, regardless of N rate. In the second crop year, very little growth occurred until late February and early March because of an extremely dry summer and fall (Figure 1, Table 2). Total ryegrass yields in tilled plots were 1.3 to 1.9 times higher than total yields in herbicide treated or live sod plots.

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Table 1. Ryegrass yield as affected by seedbed and N rate, 1992-1993.

Seedbed & N Rate	Harvest Date 12/3/92	2/1/93	3/11/93	4/5/93	5/4/93	Total
			ib/A			
Burndown						
0	126	40	34	1,097	1,279	2,576
50	518	154	554	1,960	1,321	4,508
100	427	262	954	2,196	1,262	5,100
150	441	524	1,687	2,533	1,407	6,591
Live Sod						
0	105	40	0	807	1,390	2,342
50	308	85	453	1,729	1,245	3,820
100	217	97	429	2,153	1,347	4,243
150	238	234	1,137	2,550	1,228	5,387
Tilled						
0	413	68	24	1,097	1,100	2,703
50	3,495	1,020	1,031	1,770	1,066	8,382
100	2,458	1,458	1,629	1,767	989	8,301
150	2,907	2,131	2,251	2,512	1,159	10,959
LSD (0.05)	320	171	159	171	196	573
Seedbed	***	***	***	NS	***	***
Nitrogen	***	***	***	***	NS	***
Seedbed*N	***	***	***	NS	NS	NS

*** P <0.001

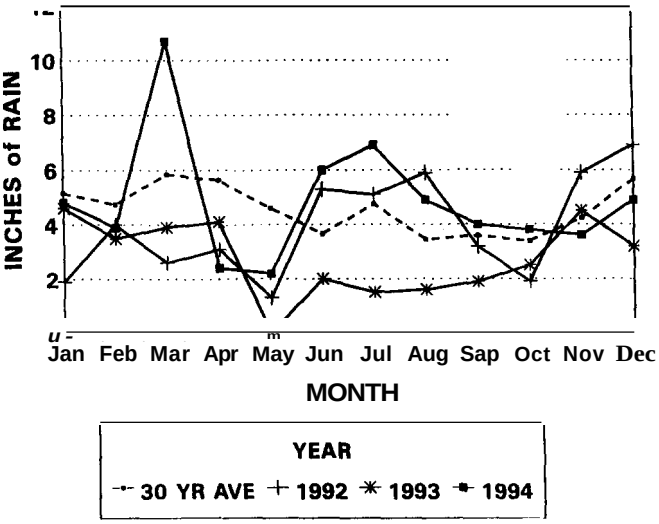

Figure 1. Monthly rainfall, 1992-1993, Mississippi State University.

Table 2. Ryegrass yield as affected by seedbed and N rate, 1993-1994.

Seedbed & N Rate	Harvest Date 1-24-94	3-15-94	4-11-94	5-9-94	Total Yield
			lb/A		
Burndown					
0	16	317	939	1,118	2,390
50	51	390	1,118	1,123	2,682
100	65	663	1,428	1,363	3,519
150	58	840	1,770	1,450	4,117
Live Sod					
0	17	263	1,061	1,164	2,505
50	66	643	1,365	1,179	3,253
100	73	597	1,376	1,133	3,178
150	83	886	1,809	1,358	4,136
Tilled					
0	14	429	1,117	980	2,540
50	174	1055	1,463	863	3,555
100	101	1509	1,865	945	4,439
150	158	2066	1,826	970	5,021
LSD (0.05)	91	244	231	230	462
Seedbed	*	***	***	***	***
Nitrogen	**	***	***	*	***
Seedbed*N	NS	***	*	NS	**

* P <0.05
** P <0.01
*** P <0.001

Higher rainfall in July and August 1992 thanthe same period 1993 accounted for more fall growth in 1992 than 1993 (Figure 1). The tilled plots in 1992 accumulated more moisture than either herbicide burndown or live sod plots, thus producing higher ryegrass yield. The below-normal rainfall during May through October 1993 apparently depleted the soil of moisture, which impacted fall 1993 growth of ryegrass until early 1994. Even the tilled plots in 1993 had insufficient fall growth to utilize.

Summary

Tilled plots produced higher yields in the fall, whereas the no-till plots produced more in the spring. There was generally no difference between planting into live annual sod and planting into herbicide-treated sod. There was a 1,000 to 1,500 lb/A advantage to using a herbicide burndown in a wet year; however, there was no advantage to using a burndown herbicide in a dry year. The warm-season grasses were sufficiently dormant by the end of September to not interfere with the growth of the ryegrass.

It should be noted that this study was located in North Mississippi; summer grasses may remain sufficiently active in South Mississippi to warrant suppression. There was an inhibitory factor within both the sod treatments that retarded fall growth of ryegrass compared with ryegrass growth in tilled plots.

Although ryegrass responded to N when applied to either sod, the N response was much greater for ryegrass growing in tilled soil. This reduction was alleviated by spring and, in fact, the sod plots had higher yields in May than tilled plots. Similar results have been previously observed (Lang, 1989; Lang et al., 1992).

References

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