Impact of Overseeding Cool-Season Annual Forages on Spring Regrowth of Tifton 85 Bermudagrass

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IMPACT OF OVERSEEDING COOL-SEASON ANNUAL FORAGES ON SPRING REGROWTH OF TIFTON 85 BERMUDAGRASS[1]

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Abstract

Field observations have shown stand reduction and slow spring regrowth of Tifton 85 bermudagrass (*Cynodon* spp.) pastures overseeded with temperate forages for grazing during the cool season. This experiment compared the effect of cool-season management programs, including overseeding and use of different grazing treatments, on productivity of Tifton 85 the following warm season. There were seven treatments: four were bermudagrass overseeded with a cool-season annual forage mixture (two grasses and two legumes) and grazed differentially, and three were bermudagrass controls with differences in amount of residual stubble remaining at beginning of autumn. There was only a slight delay in initiation of Tifton 85 spring regrowth relative to the unseeded controls and no apparent stand loss resulting from overseeding cool-season forages. Late spring and summer Tifton 85 production generally was greater on seeded than non-seeded areas, possibly resulting from the nitrogen (N) release from decaying cool-season legumes. Grazing management of winter species in seeded plots and stubble height of bermudagrass in control plots had no effect on bermudagrass performance. Nutritive value responses generally favored overseeded plots. These data, though from one year, show no negative effect on Tifton 85 bermudagrass performance from overseeding and grazing cool-season annual forages during winter.

Keywords: Cool season species, nutritive value, Tifton 85, weed

Introduction

In North Florida, forage systems are based on C_4 perennial grasses. Cold temperatures and/or drought limit production from these species during October through May. Overseeding pastures with temperate forages may provide an additional 75 to 150 days of grazing during winter through spring (Fontaneli, 1999; Johnson and Lee, 1997). This practice improves the seasonal distribution of forage and increases the crude protein (CP) and digestibility of forage on offer, resulting in higher animal performance (Fales et al., 1996; Frame et al., 1998).

Tifton 85 bermudagrass has greater yield (26%) and digestibility (11%) than bermudagrass cv. Coastal (Burton et al., 1993). Field observations in some years have shown stand reduction and slow spring regrowth of Tifton 85 pastures that were overseeded with temperate forages and grazed during the cool season (L.E. Sollenberger, personal communication). This response may be due to removal of bermudagrass cover and greater exposure to cold, to competition from cool-season species during bermudagrass regrowth in spring, or to grazing during early bermudagrass growth. This experiment compared the effect of cool-season management programs, including overseeding and use of different grazing pressures, on subsequent yield of Tifton 85 bermudagrass.

Material and Methods

The experiment was conducted from October 1998 through July 1999 near Gainesville, FL in a well-established sward of Tifton 85. Soils were Sparr fine sands (loamy, siliceous, hyperthermic, Grossarenic Paleudults) of pH 6.6 and Mehlich I extractable P of 38 g kg^{-1}, K of 44 g kg^{-1}, and Mg of 112 g kg^{-1}.

There were seven treatments; four included a mixture of cool-season forages overseeded on 23 October 1998 into bermudagrass and three were bermudagrass controls with no cool-season forages. Seeded treatments were defined based on grazing height (8 or 12 cm) during winter (through March) and spring (after March). Treatment combinations were winter-8+spring-8, winter-8+spring-12, winter-12+spring-8 and winter-12+spring-12. For the three controls, bermudagrass residue was (a) harvested to a 5 cm stubble on 16 October and the plot was not planted, (b) harvested to a 5 cm stubble on 16 October and the plot was passed over with a drill but not seeded, and (c) not removed (residue height was 20 cm) and the plot was not planted.

Plot size was 100 m^2 and the treatments were arranged in three replicates of a randomized complete block design. The cool-season forage mixture included rye (*Secale cereale* L. cv. Grazemaster), annual ryegrass (*Lolium multiflorum* L. cv. Surrey), crimson clover (*Trifolium incarnatum* L. cv. Flame), and red clover *(Trifolium. pratense* L. cv. Cherokee). Plots were overseeded using a drill at planting rates of 60 kg ha^{-1} for rye, 15 kg ha^{-1} for ryegrass, 9 kg ha^{-1} for crimson clover, and 6 kg ha^{-1} for red clover.

Fertilization management simulated that used by producers in the region. On all seeded plots, N was applied at 40 kg ha^{-1} on 12 November 1998 and K at a rate of 110 kg ha^{-1} on 28 December 1998. Subsequent N applications of 40 kg ha^{-1} were made to seeded plots following grazing in February and March, and to all plots following grazing in April. An additional application of 110 kg K ha^{-1} was made to all plots following the April grazing.

Pastures were sampled on 9 February, 29 March, 26 April, 18 June, and 12 July 1999. The data will be presented correspond to April, June, and July sampling dates because Tifton 85 mass was measurable only in those dates. At each sampling date, pre-grazing herbage mass was measured in each plot by clipping two representative $0.25/m^2$ quadrats to a 4 cm stubble and drying during 48 hours at 65 ^oC. Two additional $0.25/m^2$ quadrats per plot were clipped to a 4 cm stubble, separated into rye-ryegrass, clover, bermudagrass, and weed fractions, and dried. After weighing, all fractions within a plot were composited for laboratory analyses of crude protein (CP), neutral detergent fiber (NDF), and in vitro organic matter digestion (IVOMD).

After sampling, yearling heifers weighing an average of 350 kg were used to graze the plots to the target stubble height. Grazing was generally completed in two to six hours.

Data were analyzed using the General Linear Models procedure of SAS for a randomized complete block design. Treatments effects were tested using pre-planned single degree of freedom contrasts.

Results and Discussion

Winter and spring grazing management of the overseeded cool-season species had no effect ($P>0.05$) on yield and nutritive value of Tifton 85 spring regrowth. Because there were no differences among them, and to simplify data presentation, only the average of the overseeded plots will be presented.

Tifton 85 pre-grazing herbage mass was greater for the unplanted short stubble controls than for the average of the seeded plots on spring (Table 1). In contrast, herbage mass of Tifton 85 was greater for the seeded plots than for the unseeded controls on summer. So, although seeding winter forages slowed early-season growth of bermudagrass, it clearly benefitted bermudagrass later in the summer, possibly due to a release of N from decaying roots and nodules of the cool-season legumes.

Weed mass was greater in the unseeded than seeded plots on 26 April and 18 June, but there were no treatments effects on 12 July (Table 1). Competition from cool-season forages likely suppressed spring weed mass in the seeded plots.

Herbage mass of cool-season forage was greater than 2 t ha^{-1} in all seeded plots on 26 April, resulting in greater total herbage mass in seeded than unseeded plots (Table 1). The potential of cool-season annuals to increase forage production during the winter has been reported by Johnson and Lee (1997) and Fales et al. (1996). There was greater total herbage mass on seeded plots on 18 June and differences favored seeded plots on 12 July (Table 1).

Crude protein concentration of total herbage was greater on seeded plots at all dates (Table 2). On 26 April this result was due to the presence of the cool-season species, and to winter-spring N fertilizer applications. At the later dates it could have been a function of N being made available to bermudagrass from decaying legume plants. Total herbage IVOMD also was greater for seeded plots at all dates, except for 12 July when there was no difference between seeded and the unplanted short stubble plus drill treatment (Table 2). There were few and no consistent differences among treatments in NDF concentration (Table 2).

Unlike previous field observations, these data showed only a slight delay in initiation of Tifton 85 spring regrowth resulting from overseeding of cool-season forages. Subsequent Tifton 85 production generally was greater on the seeded than non-seeded areas. Grazing pressure of winter species had no effect on bermudagrass stand survival or subsequent yield. Nutritive value responses generally favored overseeded plots. Average daily temperatures for November 1998 through April 1999 were 1.5 ^{o}C above normal suggesting that the experiment should be repeated in colder winters to more conclusive results and to determine if overseeding may have a negative effect on bermudagrass production.

References

Burton, G.W., Gates R.N., and G.M. Hill. (1993). Registration of 'Tifton 85' bermudagrass. Crop Sci. **33**:644-645.

Fales, S.L., Laidlaw A.S. and Lambert M.G. (1996). Cool-season grass ecosystems. Cool-Season Forage Grasses. Moser, L.E., Buxton, D.R., Casler, M.D. American Society of Agronomy. Madison, Wisconsin. pp. 267-296.

Fontaneli, R.S. (1999). Forage systems for year-round grazing by lactating dairy cows. Ph.D. thesis, Univ. of Florida, Gainesville, FL.

Frame, J., Charlton J.F.L. and Laidlaw A.S. (1998). Temperate legumes. CAB International. New York.

Johnson, J.T., Lee, R.D. (1997). Pasture in Georgia. Univ. of Georgia Bulletin 573. 36 p.

Table 1 - Pre-grazing herbage mass of Tifton 85 bermudagrass (T85), seeded cool-season species (CS), weeds (W), and total herbage at three dates in response to different winter management treatments.

	Sampling Date									
Treatment⁺	26 April				18 June			12 July		
	T85	CS	W	Total	T85	W	Total	T85	W	Total
Unplanted-tall (1)	0.4	0	0.8	1.3	2.6	0.3	2.9	3.6	0.08	4.0
Unplanted-short (2)	0.3	0	0.9	1.3	1.9	0.4	2.3	3.1	0.10	3.2
Unplanted-short w/ drill (3)	0.2	0	1.5	1.8	1.5	0.5	2.0	3.2	0.09	3.3
Overseeded (4)	0.1	2.8	0.3	3.2	2.8	0.1	2.9	4.5	0.03	4.6
Contrast	Contrast P value									
1 vs. 2	0.41		0.66	0.10	0.27	0.25	0.39	0.23	0.57	0.27
2 vs. 3	0.40		0.03	0.41	0.49	0.74	0.55	0.89	0.62	0.94
2 vs. 4	0.03		0.01	<0.01	0.08	<0.01	0.24	0.02	0.09	0.04
3 vs. 4	0.19		<0.01	<0.01	0.02	<0.01	0.07	0.03	0.25	0.05

" Unplanted treatments" were: Tifton 85 bermudagrass pastures not overseeded with cool-season species; "Tall" indicates 20 cm bermudagrass stubble going into winter; "Short" indicates 5 cm stubble; "With drill" indicates that a drill was run over the plot but no seed were planted; "Overseeded" indicates bermudagrass pastures with a 5 cm stubble and overseeded with cool-season species.

Table 2 - Crude protein (CP), in vitro digestibility (IVD), and neutral detergent fiber (NDF) of total pregraze herbage in response to different winter management treatments.

	Sampling Date								
Treatment[+]	26 April			18 June			12 July		
	CP	IVD	NDF	CP	IVD	NDF	CP	IVD	NDF
Unplanted-tall (1)	14.7	60.7	49.3	9.6	58.6	78.1	8.3	56.2	81.4
Unplanted-short (2)	12.5	60.2	46.2	9.1	56.1	76.5	6.9	52.9	80.3
Unplanted-short w/ drill (3)	12.5	57.5	45.1	9.9	55.4	71.5	6.5	55.8	80.4
Overseeded (4)	16.8	65.7	54.8	13.1	64.4	77.4	8.5	58.5	81.5
Contrast	Contrast P value								
1 vs. 2	0.14	0.80	0.56	0.55	0.14	0.41	0.11	0.26	0.41
2 vs. 3	0.97	0.18	0.85	0.39	0.67	0.03	0.70	0.33	0.92
2 vs. 4	<0.01	<0.01	0.06	<0.01	<0.01	0.54	0.03	0.03	0.28
3 vs. 4	<0.01	<0.01	0.04	<0.01	<0.01	<0.01	0.01	0.26	0.33

" Unplanted treatments" were: Tifton 85 bermudagrass pastures not overseeded with cool-season species; "Tall" indicates 20 cm bermudagrass stubble going into winter; "Short" indicates 5 cm stubble; "With drill" indicates that a drill was run over the plot but no seed were planted; "Overseeded" indicates bermudagrass pastures with a 5 cm stubble and overseeded with cool-season species.