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SULFUR CONCENTRATION AND UPTAKE BY TIFTON 85 BERMUDAGRASS IN FIVE CUTTINGS IN 2004

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Background. The response of Tifton 85 bermudagrass to sulfur (S) was evaluated in a potassium rate and source at two N-rates study that was adequately fertilized with 180 lb P₂O₅/ac disked into the Darco soil at initiation of the study in 2001. In 2002, 2003, and 2004, an additional 120 lb of P₂O₅/ac/yr as triple superphosphate (0-46-0) was surface-applied at growth initiation of the Tifton 85 bermudagrass each spring. Potassium sources were potassium chloride (KCl, 0-0-62-47% Cl), potassium sulfate (K₂SO₄, 0-0-50-17.6% S), and KCl plus elemental S. Potassium rates from all sources were 0, 134, 268, and 402 lb/ac as K₂O split-applied one-third at growth initiation and one-third each following two early-season harvests to 10 x 18-ft plots that received 80 or 160 lb of N/ac for each bermudagrass regrowth during the 2004 growing season. Sulfur as K₂SO₄ was applied at rates of 47, 94, and 142 lb/ac. Equal rates of S were applied as granular elemental S (Dispersal, 90% S) in the KCl + S treatments. Yield data and samples of Tifton 85 plant material were collected from each plot at each harvest for dry matter/chemical analysis using a Swift Machine forage plot harvester (Swift Current, Saskatchewan Canada.) Plant samples were dried at 60 °C, ground in a Wiley mill to < 20-mesh, and analyzed for S in an Elementar VarioMax CNS analyzer.

Research Findings. The season average S concentration in Tifton 85 bermudagrass declined from 0.29% to 0.27% as the N rate applied for each bermudagrass harvest was increased from 80 to 160 lbs/ac (Table 1). However, bermudagrass plant uptake of S tended to increase with increasing N rate (Table 2). As a rate of K₂O from all sources was increased from zero to 402 lb/ac, both the concentration and total uptake of S for the season were incrementally increased with each increase in K₂O rate averaged over all sources including KCl without S. Bermudagrass S concentration increased from 0.18% when no S was applied to 0.34% at the highest rate of S application. Sulfur uptake was about 48 lb/ac for the season at the high S application rate. Application of S as K₂SO₄ significantly increased S concentration to 0.37% compared to 0.33% when elemental S was applied with KCl. Sulfur uptake was significantly increased to 50 lb/ac when S was applied as K₂SO₄ compared to about 46 lb/ac when elemental S was applied with KCl. These differences in S concentration and plant sulfur uptake generally occurred throughout the growing season with increasing S rate.

Application. Sulfur is important for plant protein formation. From the beginning of this study in 2001, bermudagrass growing in plots that received no S continually exhibited a pale

yellowish green color indicative of S deficiency. Sulfur application, averaged over all rates, increased Tifton 85 bermudagrass dry matter yields 1300 lb/ac where K₂SO₄ was the sulfur source and by more than 1.0 ton of dry matter/ac when elemental S was applied with KCl compared to KCl without applied S. Sulfur levels in soil will be in a separate report.

Table 1. Tifton 85 bermudagrass S conc. response to N and K rates and K and S sources in 2004.

N rate lb/ac/harv.	Plant S concentration [†]					
	Harvest 1	Harvest 2	Harvest 3	Harvest 4	Harvest 5	Season avg.
	-----%					
80	0.32 a	0.32	0.22 a	0.30	0.28	0.29 a
160	0.29 b	0.30	0.20 b	0.27	0.28	0.27 b
K rate						
lb K ₂ O/ac						
0	0.26 c	0.22 d	0.13 d	0.15 d	0.17 d	0.18 d
134	0.30 b	0.27 c	0.17 c	0.23 c	0.24 c	0.24 c
268	0.30 b	0.32 b	0.22 b	0.30 b	0.29 b	0.29 b
402	0.34 a	0.40 a	0.29 a	0.35 a	0.35 a	0.34 a
K Source						
KCl	0.27 b	0.21 c	0.13 b	0.15 c	0.15 c	0.18 c
K ₂ SO ₄	0.33 a	0.41 a	0.27 a	0.44 a	0.40 a	0.37 a
KCl + S	0.35 a	0.36 b	0.27 a	0.31 b	0.34 b	0.33 b
R ²	0.72	0.86	0.90	0.96	0.93	0.96
c.v.	14.9	17.4	17.9	12.7	14.3	9.1

[†]Values in a column/group followed by a dissimilar letter are significantly different statistically ($\alpha = 0.05$).

Table 2. Tifton 85 bermudagrass S uptake response to N and K rates and K and S sources in 2004.

N rate lb/ac/harv.	Plant S uptake [†]					
	Harvest 1	Harvest 2	Harvest 3	Harvest 4	Harvest 5	Total
	-----lb/ac-----					
80	3.40	4.85	6.15	10.13 b	9.21	33.74
160	3.60	5.05	5.71	11.81 a	12.16	38.33
K rate						
lb K ₂ O/ac						
0	2.38 c	2.47 d	2.34 d	3.94 d	5.00 d	16.13 d
134	3.25 b	4.05 c	4.32 c	8.70 c	8.79 c	29.11 c
268	3.62 ab	5.08 b	6.28 b	12.17 b	10.82 b	37.97 b
402	4.01 a	6.56 a	8.39 a	14.36 a	14.34 a	47.66 a
K Source						
KCl	2.93 c	3.03 c	2.91 b	5.12 c	5.33 b	19.31 c
K ₂ SO ₄	3.75 b	6.70 a	7.97 a	17.06 a	14.40 a	49.88 a
KCl + S	4.20 a	5.95 b	8.12 a	13.06 b	14.22 a	45.55 b
R ²	0.74	0.86	0.87	0.93	0.93	0.93
c.v.	21.8	21.2	26.1	18.9	17.8	12.5

[†]Values in a column/group followed by a dissimilar letter are significantly different statistically ($\alpha = 0.05$).