Introduction

Bahiagrass (*Paspalum notatum*) is a hardy perennial forage that is productive throughout Florida and along the Gulf Coast. Bahia is tolerant of most soil conditions, but it is best adapted to sandy soils. A deep root system allows it to thrive on drought-prone soils; however, it can also survive on poorly drained soils. It is more tolerant to acidic soils than most other warm season grass species.

Bahiagrass can spread by rhizomes or by seed. It is very aggressive and can grow to a height of 12 to 20 inches. It is mainly productive from April until October and can be used for pasture or hay production. Bahiagrass is tolerant of low soil fertility and acidic soils. It responds well to nitrogen and potassium fertilization. One concern with fertilization is sulfur (S) concentrations available for the plant. Research by Mitchell and Blue (1989) has shown that bahiagrass will deplete available soil S quite rapidly in an Aeris Haplaquod under high N fertilization. Most soils in the southeast are highly leached soils. This allows for soils to become deficient when S is not added as fertilizer. Soils deficient in S not only results in reduced forage growth, but also reduced cattle productivity because low levels of S may reduce forage protein concentrations, dry matter (DM) intake, fiber digestion, and N and S retention (Rees et al., 1974).

The purpose of this study was to determine if fertilization at different levels of N and S and harvesting at different maturities has an effect on forage dry matter production in bahiagrass. The study was also conducted to determine if split applications of N would be beneficial to forage growth during the later parts of the summer.

Experimental Procedures

A field demonstration was conducted at Stewart Farms near Patmos, Ark., on Pensacola bahiagrass growing on a Kirvin fine sandy loam. These soils are deep, well drained, and gently sloping and are low in native fertility, with low soil pH and organic matter (Hoelscher and Laurent, 1979). On May 20, 2004, twenty-eight (10 ft X 15 ft) plots were cleared to a 2-inch stubble height using a sickle bar mower (Jari “Monarch” model “C”, Mankato, Minn.). Soil test results required for lime was applied at a rate of 1 ton/acre to amend a pH of 5.3. Due to nutrient concentrations of 60 lb/acre for P2O5 and 186 lb/acre for K2O, phosphorus and potash were applied at a rate of 100 lb/acre for each, respectively. Plots were replicated 4 times to receive 1 of 7 (N) and/or (S) treatments: (0N-0S, 50N-0S, 100N-0S, 150N-0S, 50N-24S, 100N-48S, or 150N-72S). Nitrogen was applied at 50 lb/N/acre, so split applications (4-wk intervals) were used for treatments containing 100 and 150 lb N/acre.

Plots were divided into 3 strips each 3 ft wide and randomly assigned to be harvested at 1 of 3 maturity dates (2, 4, or 6 week intervals). At each harvest, strips were scored by collecting 10 canopy heights and maturities. Maturities were based on the numerical scheme for bermudagrass growth stages (West, 1990). Strips were harvested to a 2-inch stubble height using a sickle bar mower. All (wet) clipped forage was weighed, and a subsample was collected and dried at 120°C to determine DM yield.

Field data were sorted by (N) treatment and harvest interval, and analyzed independently as a randomized complete block design with 4 replications using PROC GLM of SAS (SAS Inst. Inc., Cary, N.C.). Dry matter yield/harvest (lb/acre) and maturity were the response variables. When significant rate X interval interactions occurred ($P < 0.05$), data were sorted by harvest interval and reanalyzed. Cumulative yield data were sorted by N treatment and harvest interval and analyzed using PROC GLM of SAS.

Results and Discussion

Rainfall. Figure 1 shows the actual and normal precipitation collected during the trial for the Patmos (Hope) area. Rainfall was close to average for the early to mid part of this trial, but was below average for the later part of this trial. The last 2-week harvest had to be abandoned due to the lack of forage growth. Mitchell and Blue (1989) reported that bahiagrass responds to rates as high 350 lb N/acre, but the degree of response is dependent on the amount and distribution of rainfall during the growing season.

Story in Brief

A small-plot demonstration study was conducted to determine the productivity of common bahiagrass at different fertilizer treatments and cutting intervals. Plots received 1 of 7 fertilizer treatments supplying 0, 50, 100, and 150 lb N/acre from ammonium nitrate and ammonium sulfate and were harvested at 1 of 3 harvesting intervals (2, 4, and 6 wk). Dry matter (DM) yield/harvest was not affected by N rate or source of N ($P = 0.17$), but there were linear ($P < 0.0001$) and quadratic ($P = 0.015$) harvest interval effects. Cumulative yields were greater ($P < 0.0001$) at 4 weeks than at 6 or 2 weeks (5,229, 4,769, and 4,045 lb DM/acre, respectively), and ammonium sulfate tended ($P = 0.06$) to produce more forage than ammonium nitrate (4,927 vs 4,555 lb DM/acre). There was a rate of N by source of N ($P = 0.03$) interaction where at the lowest nitrogen level, ammonium sulfate produced more cumulative yield than ammonium nitrate.

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Yield. Dry matter yield per harvest (DM) was not affected by N rate ($P = 0.63$) or the source ($P = 0.17$) of N (average 1,277 lb DM/acre). Yields were linearly ($P < 0.0001$) and quadratically ($P = 0.02$) greater at the 6-week harvest interval than at the 4- and 2-week intervals (2,384, 1,742, and 674 lb DM/acre, respectively). Forage maturity was not affected ($P = 0.99$) by N rate or source of N ($P = 0.58$). Maturity stages were early emergence, mid anthesis, and early seed maturation for 2, 4, and 6 week intervals, respectively.

Cumulative results are shown in Figures 2, 3, and 4. Rate of N ($P = 0.35$) had no significant effect on cumulative yield data (average 4,681 lb DM/acre) (Figure 2). Ammonium sulfate tended ($P = 0.06$) to produce more forage than ammonium nitrate (4,927 vs. 4,555 lb DM/acre) (Figure 3). Kalmbacher et al. (2005) found that N increased bahiagrass yield at all levels of S fertilization when grown on a Pomona fine sand. Cumulative yields were greater ($P < 0.0001$) at 4 weeks than at 6 or 2 weeks (5,229, 4,769, and 4,045 lb DM/acre, respectively) (Figure 4). There was also a rate of N by source of N ($P = 0.03$) interaction where at the lowest N level of ammonium sulfate produced more yield than ammonium nitrate (Table 1).

Table 1. Interaction in cumulative yield between rate of N and source of N.

<table>
<thead>
<tr>
<th>Source of nitrogen</th>
<th>Rate, lb N/acre</th>
<th>Ammonium nitrate</th>
<th>Ammonium sulfate</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50</td>
<td>4,168</td>
<td>4,902</td>
<td>623.5</td>
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<tr>
<td></td>
<td>100</td>
<td>4,499</td>
<td>5,299</td>
<td>1,292.5</td>
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<tr>
<td></td>
<td>150</td>
<td>4,999</td>
<td>4,579</td>
<td>821.3</td>
</tr>
</tbody>
</table>

**Means within rows with different superscripts differ ($P < 0.05$).**

Implications

This trial showed that when common bahiagrass was grown on a sandy soil, nitrogen rate had no effect on bahiagrass growth; however, ammonium sulfate tended to produce more forage when compared to ammonium nitrate over the entire summer. Cumulative yields were greater for the 4-week cutting interval when compared to the 2- and 6-week intervals.

Literature Cited

West, C.P. 1990. Page 38-42 in Proc. AFGC.
Fig. 2. The cumulative effect of rate of N (lb N/acre) on ‘Pensacola’ bahiagrass harvested at Patmos, Ark. No difference found \((P = 0.35)\).

Fig. 3. The cumulative effect of source of N on ‘Pensacola’ bahiagrass harvested at Patmos, Ark. Nitrogen source effect on dry matter yield \((P = 0.06)\).

Fig. 4. Effect of harvest interval on cumulative yield of ‘Pensacola’ bahiagrass harvested at Patmos, Ark. * Four-week harvest interval yield significantly higher than 2 or 6 wk.