Nitrogen Management For Hybrid Bermudagrass Sod Production – Preliminary Report

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Introduction

As nitrogen prices continue to climb sod producers are searching for alternative N sources to the commonly applied granular sources ammonium nitrate (AN), urea (U) and ammonium sulfate (AS). In sod production, the application of N fertilizers is a balancing act between adding sufficient N to push the crop towards timely harvest, and then sustaining regrowth until the next harvest. Unlike a grain crop, which is harvested in a certain time window, with the grain then stored off-site, sod is 'stored' in the field until the market creates a need to harvest. Thus, N fertilizer is often applied for both agronomic and market needs.

Hybrid bermudagrass is a warm season grass that is widely used in the south, west and some areas of the Midwest as a lawn, sports and golf course turf. Because most of the the bermudagrass cultivars are interspecific hybrids (*Cynodon dactylon x C. transvaalensis*) they are sterile, and can only be propagated via sprigs or sod. Hybrid bermudagrass represents a significant portion of the southern sod market, and is grown on the greatest number of sod-production acres in the southeast. The only exception is Florida, which has more acres of Saint Augustinegrass. Hybrid bermudagrass is also prized as a sod crop because it grows quickly, and sod can be harvested more frequently than comparable fields of zoysiagrass.

A typical N fertilization schedule for bermudagrass re-establishment is to apply from 4 to 6 lbs N/1,000 sq. ft (175 - 260 lb N/A) during the months when the grass is actively growing. Consultation with local sod producers revealed the following typical N fertilization plan for their 2008 sod crops: 1 lb N/1,000 sq. ft (44 lb N/A) in April and May, with a late May/early June harvest to follow, 1 lb N in June, after harvest, and 1 lb N in August. That is a total of 4 lb N/1,000 sq. feet for the growing year, with a harvest in the following spring, after winter dormancy. Others plan to push the sod with additional summer N, allowing the crop to be harvested in the fall.

Thus, fertilization issues in sod production include both N rate and N source questions, but the question of N timing also needs to be answered. This is especially true in warm-season grass production, as fall dormancy and spring greenup affect harvest time and N fertilization. The objective of this research proposal was to examine various N fertilizer programs (N source, rate and timing) to determine the best program for production and maintenance of hybrid bermudagrass destined for harvest as a sod crop.

Experiment Design:

The experiment consisted of 4 total N rates and 3 N sources, with all N applied at the rate of 1 lb N/1,000 sq. ft per monthly application. Nitrogen rates were 3, 4, 5, or 6 lb N total/1,000 sq. ft per year (130, 175, 218, or 260 lb N/acre/year), with the N applied as either granular ammonium sulfate, fluid urea-ammonium nitrate (UAN) or fluid slow-release urea-trizone. Specifically, the N Sources were: 1) UAN (32-0-0), 2) ammonium sulfate (21-0-0), 3) 29-2-3 (20.88% urea-triazone and 8.12% urea). The selected N rates bracketed those used by most southern sod growers for bemudagrass production. N applied was 4 split applications of 0.75, 1.0, 1.25 or 1.5 lb N 1,000 ft^{-2} $month^{-1}$. For 2009 the fertilizers

were applied in June, July, August, Sept, and in 2010 the fertilizers were applied in April, May, June and July.

The study consisted of 48 plots (4 N rates x 3 N sources x 4 replications, plus a zero N control), each measuring 6 x 8 feet. Ammonium sulfate was applied using a Gandy fertilizer spreader, while UAN and urea-trizone were sprayed applied using a backpack CO_2 sprayer as liquids in a total carrier volume of 4 gal 1,000 ft^{-2}.

The experiment was conducted on an existing stand of Tifway hybrid bermudagrass located at the Auburn University Turfgrass Research Unit (TGRU). In both years the turf was first harvested for sod, simulating typical harvesting procedures. The fertilizer treatments and all data collection were then collected from this tilled area, as the sod was allowed to regrow for the next harvest.

Each week the following data was collected from each plot: 1) phytoxicity using a 1-9 relative scale (1 = none, 9 = complete damage), 24 hr after spraying, with repeated ratings until damage was gone, and, 2) percent establishment as determined via a line-transect method (a string with 50 marks was stretched across each plot in 2 places, and the number of times plant tissue hits a mark was counted towards a measurement of percent establishment). Additional data collection included determinations of shoot density and fall soil analysis (0-3 inch sampling depth) for 2M KCl extractable soil nitrate and ammonium.

One-half of each plot area was used for destructive data collection as the plots matured. Three sections of sod (18 x 24 inches) were randomly collected from the destructive half of each plot, cut using the sod cutter. These sections were used to determine sod strength, using a sod strength machine, which determined the tensile strength (measured as a resistance against a measured pull) of harvested sod.

Results

In both years of the study (2009 and 2010) there was never any evidence of phytotoxicity (turf burn) due to the application of any N sources. Additionally, the interaction of N rate and N source was rarely significant for any of the measured variables. Thus, results discussed in this report will focus on the separate main effects of N rate and N source.

N Source

In 2009 sod which had received 29-2-3 (fluid trizone) as the N source had greater sod strength than that which had been fertilized with UAN or ammonium sulfate. Any fertilized sod was stronger than that which was not fertilized. In 2010 there was no difference in sod strength due to N source, and all fertilized sod was stronger than unfertilized (Table 1, below).

Table 1. Sod strength of harvested hybrid bermudgrass sod as measured by tensile pull, 2009 and 2010, Auburn, AL.

N Source	Harvest Month/Year		
	Foot pounds of force at which the sod tears		
	Oct 19 2009	19 April 2010	
Control	25.3 b	41.9 c	
UAN	49.6 a	73.0 b	
29-2-3	65.4 a	87.5 a	
NH4SO4	47.1 a	74.4 b	
	14 July 2010	17 Aug 2010	18 Nov 2010
Control	0 b	17.6 b	29.6 b
UAN	21.7 a	37.5 a	49.5 a
29-2-3	22.9 a	37.8 a	51.9 a
NH4SO4	23.2 a	36.6 a	51.7 a

Shoot density (2009 data only at this point, 2010 data to be collected this spring) was also unaffected by N source.

N Rate

In both years establishment was maximized at an N rate of between 5.6 and 6.0 lb N/1,000 square feet/year, indicating that the highest N rate of 6 lbs N was often needed to effectively and quickly grow a sod crop. In both 2009 and 2010 sod strength was maximized at an N rate of 4.6 lb N/M/season.

Conclusion – To Date

Use of liquid N sources such as UAN did not negatively affect sod establishment or strength. These sources offer an alternative N source for sod growers, and may be especially useful in fertigation.