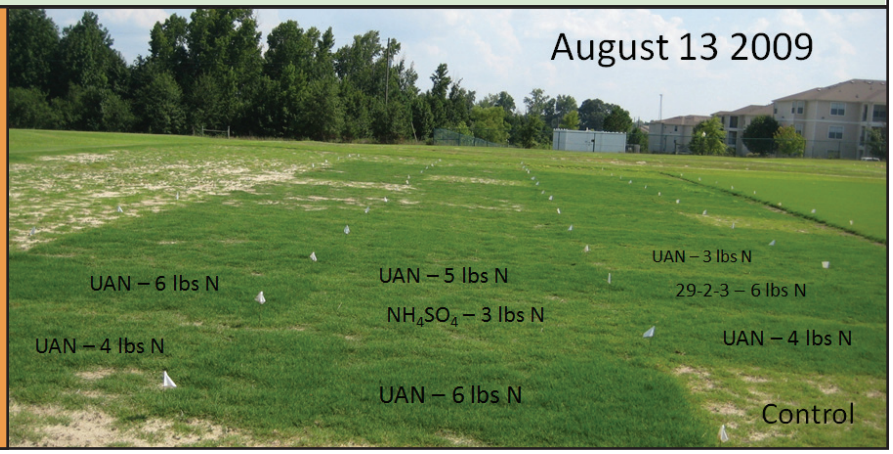
Fluids Compared To Granular In Sod Field Tests

Fluid N sources shown to offer alternative source for sod growers.

Dr. Elizabeth Guertal

The Fluid Journal • Official Journal of the Fluid Fertilizer Foundation • Winter 2012 • Vol. 20, No. 1, Issue # 75

Summary: *In both years of the study (2009-2010), use of fluid N sources such as UAN did not negatively affect sod establishment or strength. Sod that received 29-2-3 (fluid triazone) as the N source had greater sod strength than that which had been fertilized with UAN or ammonium sulfate. In 2010, there was no difference in sod strength due to N source and all fertilized sod was stronger than unfertilized.*



As nitrogen (N) 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.

Interspecific hybrids. 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 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.

Fertilization. A typical N fertilization schedule for bermudagrass reestablishment is to apply from 4 to 6 lbs N/1,000 sq. ft (175 to 260 lbs/A) during the months when the grass is actively growing. Consultation with local sod producers has revealed the following typical N fertilization plan for their crops:

- April and May: 1 pound of N per 1,000 sq. ft. (44 lbs/A) with a late-May/early-June harvest to follow
- June after harvest: 1 pound of N
- August: 1 pound of N

That is a total of 4 lbs N/1000 sq. ft. for the growing year, with a harvest in the following spring after winter dormancy and spring greenup. Other growers push the sod with additional summer N, allowing the crop to be harvested in the fall.

N Timing. Thus, fertilization issues in sod production include not only N rate and N source questions, but also the question of N timing. This is especially true in warm-season grass production since fall dormancy and spring green-up affect harvest time and N fertilization.

Objective of this research proposal was to examine various N fertilization programs (N source, rate, and timing) to determine the best program for the production and maintenance of hybrid bermudagrass destined for harvest as a sod crop.

Experimental design

N rates. The experiment consisted of four N rates and 3 N sources with all N applied at the rate of 1 lb/1,000 square feet per monthly application. Nitrogen rates were 3, 4, 5, or 6 lbs/1,000 sq. ft. per year (130, 175, 218, or 260 lbs/acre/year).

N sources. Nitrogen sources were:

- UAN (32-0-0)
- Ammonium sulfate (21-0-0)
- 29-2-3 (20.88% urea-triazone and 8.12% urea)

The selected N rates bracketed those used by most southern sod growers for bermudagrass production.

N application was four split applications of 0.75, 1.0, 1.25, or 1.5 lbs/1,000 sq. ft./month. For 2009 the fertilizers were applied in June, July, August, and September. In 2010 the fertilizers were applied in April, May, June, and July.

Plots. 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.

Equipment. Ammonium sulfate was applied using a Gandy fertilizer spreader, while UAN and urea-triazone were applied using a backpack CO2 sprayer carrying a total volume of 4 gallons/1,000 square feet.

Turf. 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 were then collected from this tilled area, as the

sod was allowed to regrow for the next harvest.

Data collection. Each week the following data were collected from each plot by:

1. Phytoxicity using a 1-9 relative scale (1= none, 9 = complete damage) 24 hours after spraying, with repeated ratings until damage was gone
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 to 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 the harvested sod.

Results

In both years of the study 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 our conclusions to follow will focus on the separate main effects of N source and N rate.

N source. In 2009 sod that had received 29-2-3 (fluid triazone) as the N source had greater sod strength than that 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). Shoot density (2009 data only) 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 lbs/1,000 square feet/year, indicating that the highest N rate of 6 lbs 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 lbs/1,000 square feet/season.

Conclusion. To date, use of 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.

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

Sod Strength Data
Auburn Fluid Sod test
Numbers are the foot pounds at which the sod tore
Data is the average of five randomly selected pieces of sod, per plot, average of 4 replications

2009 Study			
	Oct 19 2009	April 19 2010	
Control	25.3 b	41.9 c	
UAN	49.6 a	73.0 b	
29-2-3	65.4 a	87.5 a	
AS (21-0-0)	47.1 a	74.4 b	
2010 Study			
	14-Jul-10	17-Aug-10	18-Nov-10
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
AS (21-0-0)	23.2 a	36.6 a	51.7 a

Within each sample date and year means followed by the same letter are not significantly different from each other at alpha = 0.05.

Dr. Guertal is a Professor of Turfgrass Soil Fertility at Auburn University.