Forage News

MISSISSIPPI STATE UNIVERSITY EXTENSION SERVICE

Selecting a Nitrogen Source For Your Hay Operation

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The cattle industry in Mississippi is highly dependent on hay to maintain steady livestock production during the winter months until annual ryegrass is available for grazing. Nitrogen is the main nutrient utilized by hay producers in the state to increase production. Yield, quality, and seasonal distribution can be influenced by the source, rate and timing of nitrogen applications. It is critical that producers identify the production potential of the site and fertilize according to that potential. Having a soil test analysis will provide the necessary information on nutrient availability.

Nitrogen Sources

Optimum N fertilizer management requires an understanding of the different N fertilizers that are commonly available for hay production.

Ammonium nitrate (AN, 34-0-0) has been the standard for summer applications for many years. The nitrate half is mobile in the soil and can move to roots for rapid uptake. The ammonium half attaches to clay particles and releases nitrogen over time. One of the advantages of using AN is that it is not usually subject to volatilization. One of the disadvantages is the high cost per pound of nitrogen.

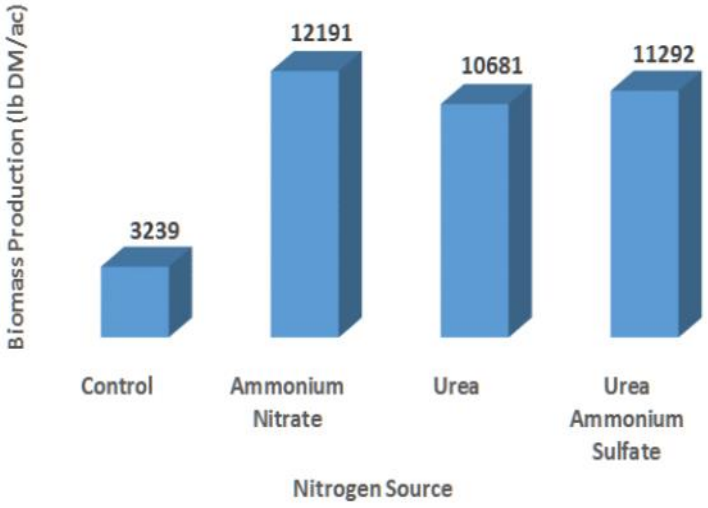

Figure 1. Three-year average bermudagrass biomass production when treated with different fertilizer sources. Fertilizer sources were applied at 50 units of nitrogen per cut of hay in a four-cut hay system over three years. Hay was cut in a 28 to 35 day interval.

Urea (U, 46-0-0) has been used extensively in forage production and its use has increased due to the decrease in AN availability. Advantages of urea are its high N content (46%), relatively low cost per lb of N, and rapid conversion to plant available N. The biggest disadvantage is the potential for volatilization. Although estimates vary, up to 50% of the nitrogen may be lost. The amount of volatilization depends on soil pH, soil moisture, air temperature, humidity and wind speed. In forage production, urea could be used in early spring applications or late fall when cooler temperatures might decrease losses. One way to reduce losses is to apply urea ahead of a possible rain within a 24-hr period to incorporate the nitrogen.

Urea ammonium nitrate (UAN) is a combination of the above materials. It is a liquid formulation that can vary from 28 to 32% nitrogen. The liquid formulation of this product allows the blending of herbicides for spring applications which reduces labor. Like urea, this product can be used in the spring and fall. Most liquid nitrogen sources have urea as part of their makeup and are volatile on the soil surface in the presence of moisture. The combination of high humidity and temperatures during the summer can make this product the least desirable N source because it has the potential for foliar burn, which can set back plant growth and affect the timing of harvest. Amine herbicide formulations are generally not compatible with liquid N as a carrier as 'salt out' occurs. Like urea, UAN will lower the pH because of conversion of ammonium to nitrate and subsequent release of hydrogen. The benefits of this product are its uniformity, ease of storage, handling and application.

Urea ammonium sulfate (UAS) is usually a 50/50 blend of urea and ammonium sulfate (33-0-0-18S). Ammonium

sulfate is a good source of sulfur when it is needed. This blend could help reduce some of the issues associated with urea volatilization. Keep in mind that sulfur is also an acidifying agent which can react with water and lower soil pH. Monitoring applications of ammonium sulfate based fertilizers is recommended.

What fertilizer source is ideal for me and when is the optimum application time?

Ammonium nitrate has long been an affordable and efficient inorganic N-fertilizer used in forage production. However, the availability of AN has declined because of national security and public safety concerns regarding the fertilizer's explosive characteristics. Alternative nitrogen sources were evaluated at Mississippi State University over a three year period to pro- vide sound recommendations to forage growers to produce high yields. The seasonal distribution of forage can also be managed with nitrogen applications, but choosing the right nitrogen source and the timing of application are key components of the overall nutrient management approach. Data indicated that application of urea and urea ammonium sulfate had a 14% and 8% decrease in average seasonal biomass production in bermudagrass when compared to ammonium nitrate, respectively (Fig. 1). Research on common bermudagrass also indicated that N application at green up (when there is 3 inches of new growth) also had a significant impact on seasonal yield production. Nitrogen applications of 50 lb N/ac should be sufficient to generate optimum forage biomass per cut of hay. A study conducted across two bahiagrass varieties (Pensacola and Tifton indicated that 50 units of nitrogen per cut in a four-cut system per year will have greater impact than only using 25 units of nitrogen per year in a four-cut system (Fig. 2). Nitrogen should be applied when plants have at least 3 inches of re-growth to optimize uptake and utilization.

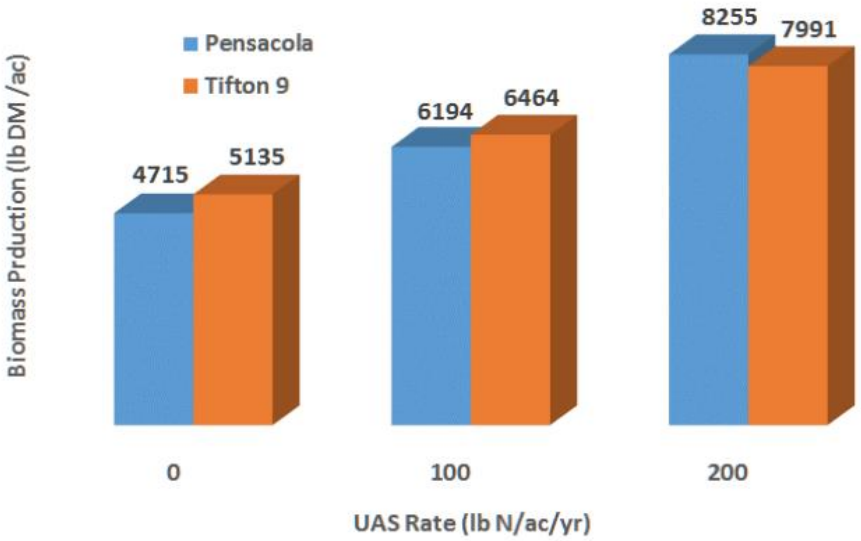

Figure 2. Two-year average biomass production of two bahiagrass varieties when fertilized with urea ammonium sulfate (33-0-0S) at a rate of 0, 50, and 200 units of N per acre per year. Fertilizer was applied at 25 or 50 units of nitrogen per cut of hay in a four-cut hay system over two years. Hay was cut in a 28 to 35 day interval.

Most hay fields in Mississippi are also low in pH and deficient in potassium (K). Soil testing and adjusting those two components are also an important part of a good hay nutrient management program. Potassium has a synergistic effect in nitrogen uptake and utilization. If your soil is low in potassium, there is a possibility that your forage crop in not utilizing nitrogen to its optimal potential. Also, keep in mind that potassium is removed in very large quantities (approximately 60 lbs of K per ton of hay produced). If your soil report indicates K deficiencies and calls for more than 80 lb K/ac, it is recommended to split the application in a 50/50 ratio. Apply 40 lb K/ac at green up and apply the rest after the second cut of hay to balance K availability throughout the growing season. A three-year study at Mississippi State University utilizing six hybrid bermudagrasses has indicated significant yield responses when lime and K were applied with uniform nitrogen rates throughout the growing season.

Upcoming Events

May 23, 2018—Coastal Plain Experiment Station Hay Production Field Day, Newton, MS
May 24, 2018—Hinds Co Forage Field Day, Terry, MS

For upcoming forage related events visit: ***http://forages.pss.msstate.edu/events.html***