



nitrate) applied at 75 lb N/ac per cut of hay from May through August. The initial results indicated that yields were reduced by almost 50% when fertilized with the 42-0-0 foliar fertilizer compared to conventional N applications. Results also indicated that the cost of using 42-0-0 at equivalent university's nitrogen recommendations resulted in a much higher fertilizer cost to producers.



A diluted nitrogen solution on a weight basis is most of the time necessary to reduce leaf burning or desiccation from the application. Due to the dilution effect, these solutions tend to supply only small amounts of nutrients to the foliage. For example, let's assume that a producer is willing to use a foliar fertilizer containing 18% nitrogen, 3% phosphorous and 4% potassium weighing 9.8 lb/gallon. That means that you have 1.764 lb N per gallon of product (**9.8 lb/gal\*0.18 N = 1.764 lb N/gal**). If your recommendation calls for 50 lb N/ac per cut of bermudagrass hay, that means that you will need 28 gallons of this product to satisfy the recommended rate. On the other hand, without a soil test, there is the unknown part about what the soil P and K levels are or the pH necessary to optimize plant uptake. If we assume that the cost of the product is \$16/gallon, the price of N is \$9.07/lb N (\$16/1.764 lb N = \$9.07/lb N). The cost per acre to achieve the recommended application of 50 lb N/ac will be **\$453.50 per cut of hay**. If we use urea (46-0-0) and assume that the price is \$0.59 per lb of N (\$540/ton), the nitrogen cost per acre per cut of hay will be **\$29.50** (50 lb N\*\$0.59/lb N = \$29.50). The cost of application with this type of foliar fertilizer will be 15 times more expensive that using urea. This means that to achieve optimum yields, plants needs to efficiently use N to attain good levels of biomass production per pound of N applied (Table 1).

**Table 2. Annual nutrient removal by primary hay crops in the south.**

Forage Crop	Nutrient (lb/ton DM Forage)				
	Nitrogen (N)	Phosphate (P <sub>2</sub> O <sub>5</sub> )	Potash (K <sub>2</sub> O)	Magnesium (Mg)	Sulfur (S)
Annual Ryegrass	68	15	60	5	5
Bahiagrass	43	12	35	--	6
Bermudagrass	46	12	50	3	5
Clover/Grass	50	15	60	--	--
Dallisgrass	45	12	50	--	6
Mixed Grass Hay	40	60	13	--	5
Sorghum Sudan	40	15	58	6	--
Tall Fescue	39	19	55	4	4

Forage producers should be cautious of nutrient management that recommend foliar products on plant tissue analysis. Nutrient recommendations based on tissue analysis can vary regardless of crop condition or growth stage. Keep in mind that plant tissue analysis is a diagnostic tool to correct a nutrient imbalance and not a tool to develop a nutrient management program. Tissue analysis is used to determine nutrient sufficiency levels at a specific growth stage and not to make a fertilizer recommendation for the growing season. This is just an interpretive tool. To determine a fertilizer recommendation, plant tissue should be collected from a normal area and the area affected by nutrient deficiency along with a soil sample for analysis from the two areas.

There is a wide array of foliar fertilizers in the market that were developed in the turf industry and now they have been marketed for hay production with limited research information. Before developing a foliar fertilizer program for hay production, it will be good to review university research and ask your extension personnel if the concept is sound and economically sustainable for the hay operation. Foliar fertilizers can be used to quickly correct a micronutrient imbalance and stimulate increase in root uptake, but not used as a replacement for N and K, especially in hay production systems. The reason for this is because forage crops remove large quantity of nutrients (Table 2) and foliar uptake can be limited. For foliar application of nutrients to be effective, a dilute solution of the nutrient must be able to supply the amount needed by the plant. It also important to determine the composition of the ingredients in the formulation to make sure that are not highly volatile and can be readily absorb through the cuticle of the leaves (chelated nutrients).

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

- June 30, 2015— Coastal Plain Exp. Station Field Day, Newton, MS
- July 14, 2015— Simpson County Forage Field Day, Mendenhall, MS
- July 18, 2015— Goat Boot Camp, Philadelphia, MS
- November 13, 2015 – Mississippi Forage & Grassland Conference, Newton, MS

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