



Liming Your Pastures: Your First Approach in Nutrient Management

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Rocky Lemus
Extension Forage Specialist

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When it comes to forage production, most producers tend to focus on fertilizer application (nitrogen, potassium and phosphorous) to increase yields. The reality is that lime application should be the first rule of nutrient management to increase forage yield and to enhance fertilizer use efficiency. It has been estimated that over 70% of the soils in forage production in Mississippi has a pH imbalance.

Nutrient Availability and pH -

Acidic soils can limit plant root growth and development, microbial activity and increase toxicity of elements such as aluminum. It has been shown that lime can affect the solubility of nutrients in the soil and make some of them more available to the plant in cases reducing plant toxicity caused by excessive concentrations and also by decreasing fertilizer use (Figure 1). The decrease in fertilizer use can have a significant economic impact and increase environmental losses. To determine soil pH, a producer should properly collect a soil sample at a 6-inches minimum depth. This sample should be sent to the Mississippi State University Soil Testing Laboratory for analysis. Contact your local County Extension Office for more information in collecting and submitting a sample.

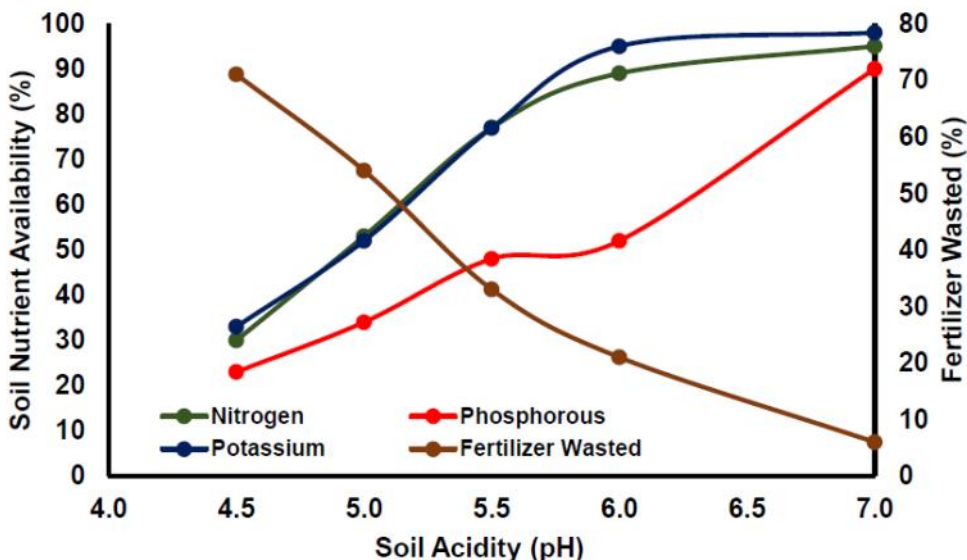


Figure 1. Impact of soil acidity in soil nutrient availability and losses in mineral soils of applied fertilizers. Source: Adapted from Buckman and Brady.

Most forage crops prefer a soil that is slightly acidic with pH range from 6 to 7.

Lime application depends on the soil type, forage crop and fertilization strategy. Target pH for different forage crops can be found in Table 1. Lime should be incorporated into the soil to reduce neutralization of acidity, but this recommendation is very difficult in permanent pasture systems. Although anytime is the right time to lime, it should be applied at least 3 to 6 months ahead of the typical growing season for a forage crop and the implementation of a nutrient management plan. Fall is the ideal time to take inventory of what your forage crop is going to require for next year growing cycle.

Lime Neutralizing Power – One important thing is to choose a liming material based on the Relative Neutralizing Value (RNV). The RNV is calculated based on the Calcium Carbonate Equivalent (CCE, or purity) of the liming material and its fineness (particle size). This means that liming materials with a higher percent of CCE and greater screen size sieve will have higher RNV value. The formula to calculate RNV will be: $RNV = \%CCE \times 0.5 (\% \text{ sieve size } 10\text{-mesh} + \% \text{ sieve size screen } 50\text{-mesh or greater})$. For example, a liming material with a 90% CCE, 95% passing a 10-mesh sieve and 44% passing a 50-mesh or greater will have a 65% RNV [$RNV = 0.90 \times 0.5 (95 + 44) = 62.5\%$]. That means that if the liming recommendation for a soil is 2 tons per acre, then the producer will need to apply 3.2 tons ($2 \text{ tons} / 0.625 = 3.2 \text{ tons}$) of the liming material to achieve 100% neutralizing value. This is very important because most producers only apply the lime recommendation given in the soil test report without adjusting for the RNV of the liming material. Keep in

mind that most liming materials sold does not have 100% RNV. I would recommend to ask your lime supplier for the RVN value of the liming material and make the necessary adjustments.

Liming Materials – There is a large amount of liming materials and by-products in the market such dolomitic lime, burned lime, papermill lime sludge, calcitic limestone, water treatment limestone, wood ash, fly ash, hydrate lime, air-slaked lime, sugarcane mill lime, etc. To make a decision cost effectiveness of a liming material, the producers should compare both the RNV value per unit weight of each product and the cost per unit weight. Some of the lime by-products are very fine, which means that these materials neutralize soil acidity in the soil faster, but will require more frequent applications to neutralize soil reserved acidity. It is important to check these by-products for heavy metal concentrations and making sure that applications are made within soil loading limits.

Liquid Lime – Another important aspect is the use of liquid lime that can vary considerably in the liming material being used and it is usually a 50/50 ratio of liming material and water. Liquid lime can provide the advantage of more uniform application over the field compare to dry lime, but it usually has disadvantages such as higher operational cost, potential for under-liming, and more frequent applications. Although liquid lime might be more appealing to forage producers because of reaction time and uniformity of spread, they must be very careful on the rate at which lime is applied. It is important to know the active ingredient and the neutralizing power of liming material you are investing in before making that financial decision.

Table 1. Target pH of different forage crops grown in Mississippi.

Forage Species	Forage Crop	Target pH
Grasses	Bahiagrass	5.8 – 6.0
	Bermudagrass	5.8 – 6.0
	Dallisgrass	5.8 – 6.0
	Tall Fescue	6.0 – 6.3
	Annual warm-season grasses (crabgrass, sorghum, sorghum/sudan hybrids, millets) and annual cool-season grasses (ryegrass, wheat, oats, cereal rye).	6.0 – 6.5
Legumes	Alfalfa, white clover, red clover, annual clovers (arrowleaf, ball, berseem, crimson).	6.0 – 7.0

Summary – Liming your soils have great benefits to forage production such as correcting soil acidity, increasing microbial activity to breakdown organic material and make more nutrients available to the plant, providing an environment for better root development, increasing nitrogen fixation, and reducing weed competition of opportunistic species. Determining the cost and neutralizing power of the liming material will allow to make a wise decision that impact forage production and soil quality in the long-term. Although lime can be applied whenever it is practical, applications should be done in advance to allow sufficient time for properly reacting with the soil and neutralizing acidity before any subsequent nutrient management plans are implemented. If there is only one thing that you can help to improve soil quality, lime might be the cheapest fertilizer.

Upcoming Events

October 27, 2016—Cattlemen College, Hattiesburg, MS
 October 28, 2016—Cattlemen College, Batesville, MS

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

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