



The Use of Liquid Lime in Forage Systems

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Rocky Lemus
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Optimum soil pH is important in forage systems to increase nutrient uptake, plant persistence and biomass production. Many forage species in the southern USA can be sensitive to pH below 5.8 and some species such as legumes (clovers, alfalfa) will require a soil pH greater than 6. Maintaining the recommended pH based on soil test recommendations can allow plants to have stronger root systems and provide the capability to mine nutrients from deeper soil layers and use them for growth.

As we approach the hay season, I have forage producers for the last few months asking about alternative liming products such as liquid or fluid lime for forage production. It is important to know or remember that soil pH is a measure of hydrogen ion (H⁺) concentration in the root zone. It is used to determine the needs of limestone (calcium carbonate) application based on a buffer-pH test and to predict the amount of limestone needed to raise the soil pH to the desired level for the a specific forage crop being grown. Soil acidity can affect plant root development, soil nutrient availability, and plant nutrient uptake. The lower the soil pH, the lower is the efficiency of the applied fertilizer.

Once the liming requirements have been established, there is a need to determine what liming material availability and cost in your area. Lime comes in different forms, but these are the most common used in forage systems in Mississippi:

- ◆ **Dry Agricultural lime (Ag lime):** It is crushed or ground limestone rock and is probably the most widely used liming material. It has the lowest cost per ton, it is easy to transport and apply. Most ag lime materials are calcium and/or magnesium carbonates. The chemical purity of ag lime determines the amount of soil acidity the material can neutralize.
- ◆ **Liquid Lime:** It is also known as “fluid lime.” It is fine ground, high quality ag lime has been dissolved in water along with a suspending agent such as clay (1 to 2%) to make a suspension that is 50 to 60% solids. Liquid lime is usually a formulation of 50% high quality dry ag lime (more than 90% RNV) and 50% water. It is supposed to raise the pH faster than dry ag lime due to its particle size for a few months application. Three distinctive disadvantages are the higher operational cost due hauling water and lime across the pasture or hay field, having to apply more often than dry lime sources due to quick reactivity, and under-liming due to spread rate to achieve high enough rates to correct all the soil reserved acidity. Two distinctive advantages of liquid lime are fast acting and better uniformity of spread. Liquid lime application will require the use of a tank truck with a boom and high-volume nozzles. It is important to determine the active ingredient in liquid lime. Products sold as liquid lime containing calcium chloride do not have liming value or liming ability. Another product sold as liquid lime is liquid calcium. Liquid calcium does not neutralizes soil acidity. Calcium is a positive ion and you need carbonates to reduce and displace hydrogen activity.
- ◆ **Pelletize Lime:** It is made by granulating finely ground ag lime using a binding agent and it may be dolomitic or calcitic depending on the nature of the original limestone. It is more generally one of the most expensive liming materials, but provide a most consistent soil pH stabilization due to slower activity.

Lime is the cheapest source of fertilizer that a forage producer can apply before developing a more comprehensive nutrient management program. Before selecting a liming agent, it is important to know how much active ingredient or relative neutralizing power you are paying for the determine the economic feasibility of the selected product. Liquid lime usually has a high relative neutralizing value (RNV) greater than 90%. However, due to lime solubility in water, you might be getting an application of 0.5 ton of lime per acre of liquid lime applied since 50% is water. That means that if soil test recommendation calls for a lime application of 2 tons of per acre at 100% effective lime, you will need to apply over 4 tons of liquid lime. A gallon container of liquid lime might weight approximately 15 lbs and it may contain approximately 7.5

pounds of actual limestone product because it typically consists of approximately 50% lime and 50% water by weight. The lime calculation and economic comparison in Table 1 shows the actual estimated amounts of products needed when comparing liquid lime and Ag lime. Always consider cost, purity, and neutralizing value to make comparison among liming materials.

Soil pH is the greatest variable that directly influences chemical and biological functions in the soil. Even when applied at the equivalent rates of ag or pelletized lime, liquid lime is only effective for rapid pH adjustments and not a long-term soil pH stabilization. Although the fine material in the liquid lime can have a greater neutralizing effect on a per pound basis, the faster reaction time will also have a short life of actual neutralizing capabilities. There-

fore, the liquid lime might only be effective at neutralizing acidity from a few weeks to few months depending on rate of application. Forage producers should monitor their soil pH very often, especially in hay production systems. For information on how collect a representative soil sample, contact your local County Extension Office.

Table 1. Estimated lime application and cost analysis when comparing liquid lime and dry ag lime application at the same recommended rates. Example calculations are based on bulk lime products to meet a 2 ton per acre lime application and assuming RNV values of 95 (range 90 to 95%) and 65% for liquid and Ag lime products, respectively.

Liquid Lime Product	Dry Ag Lime Product
Adjust the bulk rate of liquid lime based on RVN: (100/95) x 2 tons per acre = 2.1 tons per acre	Adjust for RNV of Ag lime: (100/65) x 2 tons per acre = 3.1 tons per acre
Convert to pounds of liquid lime product: 2.1 tons x 2,000 pounds per ton = 4,200 pounds per acre	Calculate total pounds of Ag lime needed: 3.1 tons x 2,000 pounds per ton = 6,200 pounds per acre
Calculate total gallons of liquid lime product needed: Liquid lime product = 15.0 pounds per gallon 4,200 pounds per acre / 15.0 pounds per gallon = 278 gallons per acre	
Calculate cost: Cost is \$50 per 5-gallon case 278/5 = 55.6 (or 57) cases \$50 x 57 = \$2,850 per acre*	Calculate Ag lime cost: Cost is \$55 per ton of lime spread: \$55 x 3.1 tons per acre = \$170.00 per acre
*Cost does not include shipping cost	
Cost Difference = \$2,850 - \$170.05 = \$2,680 per acre There is a 1,576% increase in lime application cost with liquid lime	

Upcoming Events

June 6, 2019—Hay Production Field Day, Newton, MS

July 24—25, 2019—Grazing and Forage Production Workshop, Starkville, MS

July 16-17, 2019—Southern Cover Crop Conference, Auburn, AL

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

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MISSISSIPPI STATE UNIVERSITY EXTENSION SERVICE

Mississippi Grazing & Forage Production Workshop

June 24 and 25, 2019

MISSISSIPPI STATE UNIVERSITY—BOST CONFERENCE CENTER
190 BOST Dr., STARKVILLE, MS 39759



June 24, 2019

A late afternoon (4:30 pm to 7:30 pm) outdoor forage production tour will be held at the Henry H. Leveck Animal Research Farm (South Farm). Producers will participate on demonstrations and research trials related to:

- Forage Variety Trials
- Fertility
- Crabgrass production
- Summer Annual Grass/Legumes
- Grazing Management of Summer Annual Grasses
- Weed Control
- Fencing and Rotational Grazing
- Baleage/Hay Production Demonstration

June 25, 2019

The indoor workshop (8:00 am to 4:30 pm) will provide producers with up to date forage management recommendations to enhance their forage management strategies and become more efficient in extending the grazing season and reducing supplementation.

Topics:

- Annual Ryegrass Grazing with or without Supplementation
- Grazing Efficiency of Livestock Classes
- Extending your Grazing Season with Stockpiled Forages
- Weed Control Strategies
- Grazing Management of Cover Crops
- Production Practices for Quality Hay
- Mineral Needs During Grazing
- Economic Strategies in Grazing Systems



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REGISTRATION INFORMATION

Register at <https://www.pss.msstate.edu/workshops/grazing/>

Before May 31—\$50/person

After May 31—\$60/person



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SPACE IS LIMITED TO THE FIRST 100 PARTICIPANTS AND REGISTRATION WILL CLOSE JUNE 15, 2019 at 5:00 PM CST.

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