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Liming Your Lawn

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Proper soil pH is necessary to produce a healthy, high-quality, attractive lawn. Lime is often applied to Arkansas lawns to help raise the soil pH near neutral, which increases the availability of most plant nutrients. The first step in liming your home lawn is to obtain a soil test before applying any nutrients. A soil test provides key information including soil pH, potassium and phosphorous levels. Soil testing is free through county Cooperative Extension Service offices.

Collect soil samples in a bucket from the upper 4 to 6 inches of soil from ten or more locations around the yard. Remove any vegetative material such as stems and leaves. Air dry and mix the samples thoroughly. Take about 1 pint of the mixture to your county Extension office for analysis (for more information see FSA2121, *Test Your Soil for Plant Food and Lime Needs*). Soil can be sampled any time of the year, but sampling lawns in late fall, early winter or late spring will help expedite the process, since the soil test lab has many agricultural samples to test in late winter and spring.

Soil pH and Liming

Soil pH is a measure of the soil acidity or alkalinity. The pH scale ranges from 0 to 14. A pH of 7.0 is neutral. Values less than 7.0 indicate acid conditions, while readings over 7.0 indicate alkaline conditions. Soil pH can have a dramatic effect on plant growth and on soil nutrient availability. Nutrients essential to plant growth are most available between pH 5.8 and 6.5. Lime (usually $CaCO_3$, calcium carbonate) may be used to reduce soil acidity and improve nutrient availability. Data indicates that about 50 percent of lawns in Arkansas have a below optimum soil pH (≤ 5.7) (Figure 1).

Take-Home Points

- Most lawns prefer a soil pH from 5.8 to 7.0, although centipedegrass performs best under more acidic conditions (pH = 5.0 to 6.0).
- Before you lime your lawn, have your soil tested.
- Do not apply more than 50 lb lime per 1,000 ft^2 in any one application.
- Choose a product that has a relative neutralizing value or effective calcium carbonate equivalent > 80 percent to ensure the lime is of good quality.

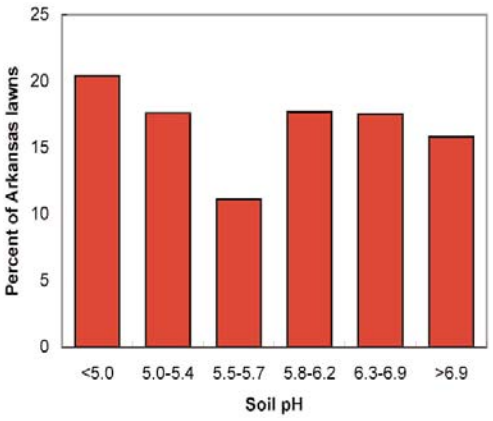

Figure 1. Summary of soil pH for 2006 Arkansas lawns soil tests. *Data kindly provided by the University of Arkansas Soil Test Laboratory.*

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Table 1. Arkansas lime recommendations for lawns.

Soil Texture	Soil Water pH Level Interpretation					
	Below Optimum			Medium	Optimum	High
Soil Test Ca	< 5.0	5.0 - 5.4	5.5 - 5.7	5.8 - 6.2	6.3 - 6.9	> 6.9
ppm	- lbs $CaCO_3$ lime/1,000 ft^2 -					
< 500	80†	57	46	0	0	0
500 - 1500	115	92	69	0	0	0
1501 - 2250	138	115	92	0	0	0
> 2250	138	138	115	0	0	0

†Lime rates are for $CaCO_3$ (Ag lime) sources that contain a 90 percent calcium (Ca) carbonate equivalent. Do not apply more than 50 pounds $CaCO_3$ lime/1,000 ft^2 in any one application. Water-in lime after application to avoid foliar burn. If magnesium (Mg) is recommended by a soil test, then use dolomitic lime ($MgCO_3$ • $CaCO_3$) or a lime with 10 percent or more magnesium instead of calcitic lime ($CaCO_3$)(< 2% Mg). Please contact your local extension specialist to determine how much lime is needed if using another source of lime such as hydrated lime. Collect soil samples every one to two years to monitor soil pH.

Each turfgrass species prefers a slightly different pH for optimum growth. Bermudagrass, tall fescue and zoysiagrass prefer a soil pH in the range of 5.8 to 7.0. St. Augustinegrass prefers more alkaline conditions with an optimum pH of 6.5 to 7.5. Centipedegrass is more tolerant of acid soils (pH = 5.0 to 6.0) compared to other species. Lime should not be applied to centipedegrass lawns unless soil pH is < 5.0, whereas other turfgrass species will benefit from lime if soil pH drops below 5.8.

Turfgrass health will improve with lime applications if your soil pH is less than 5.8 and your lawn species is not centipedegrass. Your soil pH and the amount of calcium already on your soil's cation exchange sites provide the information necessary to determine how much lime you should apply to increase your soil pH (Table 1). When you receive the results of your soil test, the soil test report will indicate whether or not your lawn needs liming and how much lime to apply. Lime is best applied in the spring or fall, but regardless of application timing, it may take several months before the lime can effectively raise the pH of your soil. It is important not to apply more than 50 pounds/1,000 ft^2 in any one application when applying lime. Additionally, irrigating the lawn after liming will help reduce the risk of any foliar burn from the lime.

If it is recommended that you apply < 50 pounds lime/1,000 ft^2, apply this in the spring or fall as a single application. If between 50 and 100 pounds lime/1,000 ft^2 is recommended, apply half the recommended rate in the spring and the other half in the fall. If more than 100 pounds lime/1,000 ft^2 is recommended, apply 50 pounds in the spring and 50 pounds in the fall. Continue to lime and retest your soil annually until the pH is optimum for turf growth.

There are many lime choices available to the homeowner. They contain different quantities of calcium and magnesium. Additionally, these products have different particle (mesh sieve) sizes that influence how quickly these products affect soil pH. The quality of lime is determined by various calculations, taking into consideration the fineness and nutrient content. Each product should include information about calcium and magnesium content as well as fineness (Table 2). State lime regulatory laws vary, so each state measures lime quality differently. Regardless of the state where the lime is manufactured, a good rule of thumb is to choose a product that has a relative neutralizing value (RNV) or effective calcium carbonate equivalent (ECCE) > 80 percent in order to ensure that the lime is of good quality.

Table 2. Information commonly included on a lime label.

Minimum guaranteed screen analysis	
Screen size	% Passing
8 mesh	100
10 mesh	100
20 mesh	95
40 mesh	90
50 mesh	85
60 mesh	80
100 mesh	70

Minimum guaranteed chemical analysis (dry)	
Calcium (Ca)	21.6%
Magnesium (Mg)	10.0%
Calcium carbonate equivalent (CCE)	95.0%
Relative neutralizing value (RNV)	92.0%
Effective calcium carbonate equivalent (ECCE)	86.0%

Liming materials with a fine particle size such as pulverized limestone may be difficult to distribute accurately with a rotary spreader but can be more easily distributed with a drop spreader (Figures 2 and 3). Lime can be pelletized so that many small particles are bonded together, which allows the product to be more easily applied (Figure 4). Pelletized liming materials can be distributed with a rotary spreader or a drop spreader.

Figure 2. Comparison of pelletized lime (left) and pulverized limestone (right).

Liming Terminology

1. **CCE**: Calcium carbonate equivalent. Relative purity of the liming material using pure calcium carbonate ($CaCO_3$) as the standard.

2. **ECCE**: Effective calcium carbonate equivalent. An expression of lime effectiveness based on the combined effect of chemical purity (CCE) and fineness (sieve size). This calculation method differs between states.

3. **Lime**: A soil amendment that contains calcium carbonate ($CaCO_3$), magnesium carbonate ($MgCO_3$) and other materials. Lime is used to neutralize soil acidity and provide calcium and magnesium, macronutrients required for plant growth.

4. **pH**: Negative logarithm of the hydrogen ion concentration. It is a measurement of acidity or alkalinity.

5. **RNV**: Relative neutralizing value. An expression of lime effectiveness based on the combined effect of chemical purity (CCE) and fineness (sieve size). This calculation method differs between states.

Figure 3. Pulverized limestone has a very fine texture and is more easily applied with a drop spreader.

Figure 4. Pelletized lime can be applied with either a drop or rotary spreader.

Additional fact sheets available at http://publications.uaex.uada.edu/.

For more information about turfgrass, visit http://turf.uark.edu/.

References

1. Carrow, R.N., D.V. Waddington and P.E. Rieke. 2001. *Turfgrass Soil Fertility and Chemical Problems: Assessment and Management*. Ann Arbor Press, Chelsea, MI.
2. Espinoza, L., M. Mozaffari and N.A. Slaton. 2007. University of Arkansas lime and fertilizer recommendations. University of Arkansas Cooperative Extension Service.
3. Johnson, B.J., and R.N. Carrow. 1992. Influence of soil pH and fertility programs on centipedegrass. *Agron. J.* 84:21-26.
4. Slaton, N.A. 2007. Associate professor of Soil Fertility and director of Soil Testing, University of Arkansas, Fayetteville. Personal communication.

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