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The Aglime Council of Indiana

"Your Resource for Aglime Information"

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Dial in Soil pH

From [Farm Journal Media](#)

By Darrell Smith, Farm Journal Conservation & Machinery Editor

Calculate Your Correction Factor [Click here to view chart](#)

Every farmer knows lime is a cornerstone of high, efficient crop yields. Keeping soil pH at 6.0 to 7.0 makes nutrients and micronutrients more available, boosts herbicide effectiveness, promotes populations of soil microorganisms and improves soil structure.

That impressive list of advantages makes it important to ensure you maximize lime applications—and dial in pH. A poor choice of product can waste money, and sloppy application can create a patchwork pH pattern that can take years to correct. Here's how to make sure you get your money's worth when you apply lime.

Understanding Lime and Lab Recommendations

Agricultural lime is ground-up limestone bedrock. It contains calcium carbonate and magnesium carbonate, which neutralize acidity in soil. Calcitic lime is mainly calcium carbonate. Dolomitic lime contains both calcium carbonate and magnesium carbonate. Soils become acidic because of excessive hydrogen ions in the soil solution and attached to soil particles. Calcium and magnesium ions in lime displace some of the hydrogen ions—and take their place on soil particles. Then the carbonates neutralize the hydrogen ions.

Some soil test laboratories make recommendations in terms of calcium carbonate others make recommendations in tons of lime—meaning tons of lime product with a typical CCE for that state or region. If a lime product varies from that standard, you must apply a correction factor to determine how many tons you need to apply. “I recently encountered a dealer who discovered he had been under applying because he misinterpreted tons of CCE as tons of lime,” says Farm Journal Field Agronomist Ken Ferrie.

Be sure you and your dealer or lime applicator understand whether your recommendation is for tons of CCE or tons of a standard lime, as well as how to compare products.

Finally, adjust your rate for incorporation depth. Most recommendations are based on 9" moldboard plowing. If you till shallower, reduce the application proportionately. If you no-till, apply only one-third as much (as if you were incorporating 3" deep).



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What's the Best Lime Quality?

All lime products are not equal in value because they are not equal in neutralizing power. "There are no national or regional standards for lime quality," explains Randall Warden, director of client services, A & L Great Lakes Laboratories.

Even so, lime quality determines how many tons to apply to achieve the necessary pH change. The quality is influenced by the calcium carbonate and magnesium carbonate content, which is determined by laboratory analysis and expressed as CCE. The CCE figure represents the neutralizing power of the lime product compared with pure calcium carbonate.

The coarseness or fineness of the ground lime product also impacts the quality. The fineness of the grind is expressed as the percentage of particles passing through several standardized sizes of mesh screens.

The finest particles provide the quickest reaction with acidic soil. Particles that pass a 60-mesh screen are effective the first year. Bigger particles need more time. If you have doubts about the grind, ask your crop consultant to run a test just for you. "People understand the purity [CCE] factor, but I think they often overlook fineness," Warden explains.

In most cases, he notes, lime quarries grind their product for customers other than farmers, such as road builders. Those clients want a coarser product, and the fine particles, of various sizes, which are left over are what is sold to farmers for ag use.

Editor's Note: Most Indiana lime quarries specifically produce aglime.

When you're buying lime, your supplier should be able to tell you the CCE and the fineness of the grind. For Indiana suppliers, check the Aglime Council Quality Report at www.aglime.org

What's the Best Buy?

Using CCE and fineness, you can calculate a correction factor for different lime products. (See page 31). The correction factor lets you determine which one is the best buy.

The lower the correction factor, the higher the quality of the lime and the less required. Say one quarry is selling higher-quality lime with a correction factor of 0.53 for \$8 per ton and another quarry is selling lower-quality lime with a correction factor of 1.52 for \$5 per ton. (These prices do not include delivery and application charges, which often equal the cost of the lime.)



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If your recommendation calls for 3 tons of lime per acre, you'll need to apply only 1.59 tons of the higher quality material, costing \$12.72 per acre. You'll need to apply 4.56 tons of the cheaper material, costing \$22.80 per acre. So the cheaper lime is no bargain.

The Ideal Grind for Lime

The finest-ground lime is the hardest to spread, requiring great attention to detail during calibration and avoiding spreading on windy days. That's why you need a mixture of small and large particles (besides the fact that small particles neutralize acidity immediately, and larger particles continue neutralizing over several years).

For ideal spreadability, Warden suggests a product meeting the follow criteria: 95% of particles passing an 8-mesh sieve, 70% passing a 20-mesh sieve, 50% passing a 60-mesh sieve and 40% passing a 100-mesh sieve.

Getting Uniform Coverage

Improved hydraulics on today's applicators allow wider spread patterns, and rate controllers make delivery very accurate. "But they make calibration even more important than it was before," says Lynn Dolan, Linco Equipment, a New Leader dealer, El Paso, Ill.

Your applicator owner's manual will contain calibration instructions, but here are a few general tips:

- Calibrate for the type of lime you will be spreading. With a coarser product, you can cover a wider swath—maybe 50' compared with 30' or 35' with a finer grind. To check the uniformity of your spread, set several large, flat pans on the ground across the width of your swath and make a pass over them.
- Remember to take the density of the lime into account as you calculate the flow rate, says Gary Cooper of The Andersons Farm Center in Litchfield, Mich. It can vary from about 70 lb. to about 90 lb. per cubic foot. Your supplier can tell you the density or provide a density scale.
- Calibrate your groundspeed radar, as well as your applicator.
- If you tow an applicator behind your tractor, Dolan recommends investing in a lightbar swather for guidance. "If a field has been tilled across the rows, it's very easy for the driver of the applicator to switch from following the old rows to following the tillage passes," he says.



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- **Consider dealer support when you buy an applicator, Dolan suggests. Ask if the company provides a service team to calibrate your machine. If you buy a used spreader, consider hiring a service team to calibrate it.**

Fluid Lime Suspensions

Fluid lime contains lime recycled from municipal water systems and industries—very fine particles suspended in water. University of Illinois research indicates the rate of reaction and neutralizing power are the same as for dry lime of the same particle size. To get the product applied evenly, there are some procedures you need to keep in mind, Ferrie says. Your goal with any lime product is to apply it as uniformly as you would paint on a wall.

Buy from a dealer with a sound reputation and who pays attention to detail. A good dealer will mark each semi load with its solid-lime content. That can vary from 14% to 25%, depending on whether the material was drawn from the top, middle or bottom of the lagoon. A skilled floater operator will adjust his application rate to reflect the solid content.

If the truck hauls suspended lime a long distance, it may settle out and need to be agitated, Ferrie says. A well-trained operator will run the load through the applicator and back onto the truck to mix it uniformly.

“After application, you can tell if no one paid attention,” Ferrie says. “The limed field will have a quilt-like appearance, with dark and light spots.”

If you’re offered a partially dried suspended lime product with a semi-solid consistency—sometimes free from municipalities—you’d be wise to reject it, Ferrie says. “Usually, farmers try to apply it with a manure spreader, and they wind up with clods of all sizes,” he explains. “To be useable, the semi-solid product needs to be dried and pulverized or pelletized.”



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Calculate the Correction Factor for Aglime:

Calculate Your Correction Factor

Some states calculate the correction factors for lime from quarries in and just outside the state. If you have to calculate your own factor, here's how Illinois does it:

Particle sizes	Efficiency Factor	
	1 year after application	4 years after application
Greater than 8-mesh	5	15
8- to 30-mesh	20	45
30- to 60-mesh	50	100
Passing 60-mesh	100	100

(Note: Individual states use slightly different mesh sizes.)

The formula requires an efficiency factor, which represents the relative speed of reaction for each size particle. Let's say you want to calculate the efficiency factor for one year, for lime that has 13.1% of particles greater than 8-mesh, 40.4% between 8- and 30-mesh, 14.9% between 30- and 60-mesh and 31.6% passing 60-mesh. It has a calcium carbonate efficiency (CCE) of 86.88. Here's how:

Step 1: Use the fineness efficiency factor to calculate total fineness efficiency:

$$\begin{aligned}
 13.1/100 \times 5 &= 0.65 \\
 40.4/100 \times 20 &= 8.08 \\
 14.9/100 \times 50 &= 7.45 \\
 31.6/100 \times 100 &= 31.60 \\
 \hline
 &47.78 \text{ total fineness efficiency}
 \end{aligned}$$

Step 2: Calculate the effective neutralizing value (ENV):

$$\begin{aligned}
 \text{ENV} &= \\
 &\frac{\text{total fineness efficiency} \times \text{percent calcium carbonate equivalent}}{100} \\
 &\frac{47.78 \times 86.88}{100} = 41.51
 \end{aligned}$$

Step 3: Dividing the ENV of typical lime, 46.35, by the ENV of the lime product gives you the correction factor:

$$\frac{46.35}{41.51} = 1.12$$

Therefore, if your soil test recommendation calls for 3 tons of lime, you need to apply 3.36 tons (3 x 1.12) of the lime product.

Most states have their own formula and terminology for expressing lime quality and calculating the correction factor. Consult your state Extension service to obtain your state's guidelines.

Farmers in Illinois, Indiana, Michigan, Ohio and Wisconsin can calculate the correction factor using a free spreadsheet available from A & L Great Lakes Laboratories. Just plug in the CCE and fineness information. But remember that the spreadsheet only includes formulas for those five states. To obtain the spreadsheet, e-mail your request to lab@algreatlakes.com.

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For more information, including locations of aglime sources, see our Aglime Producers Map at www.aglime.org or contact your local county extension office.