



Liming Acid Soils: What You should and should not Expect

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Summary: Soil acidity is a common problem limiting crop yields in central and eastern Oklahoma. The problem is corrected by adding lime to the soil in amounts ranging from one-half ton to as much as two ton of effective calcium carbonate lime per acre. Special lime formulations, like liquid lime, are only as good as the actual lime that is in them. Soil testing or having a test strip of lime are good ways of telling when lime will help crop production.

Soil acidity is a common problem in parts of the world where rainfall exceeds evaporation and plant use. In these climates some water leaches through permeable soils each year. Over thousands of years) even elements like calcium (Ca), magnesium (Mg),

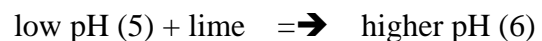
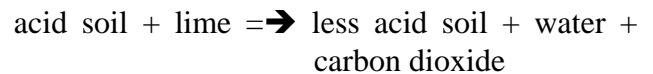
Acid soil problems. Plants that are native to high-rainfall, acid soil conditions (such as fescue, blueberries, azaleas, etc.) tend to be tolerant of them and may not respond to liming. Crops native to low rainfall conditions (such as bermudagrass, wheat, sorghum) have less tolerance for soil acidity and will usually respond when severely acid soils are limed. Aluminum and manganese toxicity are the most common causes for reduced crop yield when soil pH is below 5.5.

Liming. Sustaining high production in acid soils is only possible if lime or amendments containing lime are regularly added back to the soil. Liming is a common agricultural practice in eastern Oklahoma, yet many questions remain about the practice and lime materials. A few of these questions are addressed below:

and potassium (K), that are quite immobile in soils from year-to-year, can be “washed” out to a large degree. It is these same chemical elements that are responsible for maintaining the soil pH at a near neutral (pH 7) level. For this reason soils in Oklahoma tend to be acidic when they have developed in regions where rainfall is above about 30 inches annually (see figure below). Naturally occurring acidic soils become more common as annual rainfall increases toward the eastern and southeaster regions of Oklahoma. Production and removal of high yields, especially forages, increases development of soil acidity, so acid soils have been frequently found in non-acidic geological regions.

FREQUENTLY ASKED QUESTIONS

How does lime work in the soil? As the surface of lime particles come in contact with moist acid soil particles a reaction takes place that uses up or consumes some of the acid. The reaction may be illustrated as follows:



What is ag lime? Ag lime is calcium and magnesium carbonate from geological deposits that have been mined, crushed, and sieved to produce a dry, powdery material that reacts well in acid soil.

How do I know when I have good lime? The effective calcium carbonate equivalent (ECCE), which lime vendors must provide, is an indicator of how well the lime should work to neutralize and acid soil.

What is liquid lime? Liquid lime is a *formulation* using lime and water. Often the lime is excellent quality (such as 100 % ECCE) and it is mixed with an equal weight of water. Thus, if 10,000 lb of 100 % ECCE lime is mixed with 10,000 lb of water the result will be 20,000 lb of liquid lime. This “liquid lime” formulation will have an ECCE of 50 % because the ECCE of the lime has been diluted with water.

Is liquid lime better than other lime? No, “liquid” lime is just small particles of lime suspended in water. Lime is so insoluble (even pure lime) that when 10,000 lb is added to 10,000 lb of water only 0.14 lb of lime will dissolve. The water in liquid lime is just a carrier for solid lime. Therefore, if a field needs 0.5 ton ECCE lime it will need 1.0 ton of the liquid lime that is 50 % ECCE or about 0.8 ton of 60 % ECCE ag lime. Liquid lime can be spread without resulting in a dust problem, but it

has no advantage over other lime materials for correcting acid soil.

When liquid lime is added to the soil, will it make more lime? No, the only characteristic unique to liquid lime is that it is about one-half water. Its reaction in the soil is the same as regular lime.

How long does it take for soil pH to change? It usually takes a year or more for pH to reach the target value. When high rates are used and there is good mixing of lime with soil, change may take place faster. If both lime and soil are mixed in a powdery dry condition just before rain, pH change may occur in just a month or two.

When should lime be applied? When soil acidity is severe enough to reduce yields, lime should be applied. Soil testing every three years will help identify this point. Another approach is to apply a strip (spreader width) of lime several hundred feet long through a representative part of the field or pasture. Use a two ton rate of ag lime. The lime will stay for several years and until the strip of lime produces noticeably better yield the field doesn't need to be limed.