

Benefits of Lime in Agriculture

BASICS

Lime comes in many forms today: dry crushed limestone from quarries or deep mines, wet (stockpiled) limestone from quarries, settled from water supply treatment plants, collected as industrial by-products, dug as marl. In many ways, it is similar to its cousin, gypsum, also known as "land plaster". Type and availability vary by region.



SOIL CHEMISTRY

Soil tests can produce a lot of useful data. One very useful number is the "pH". This refers to a range of values from 0 to 14. Zero is the most acid and 14 is the most alkaline. Pure water is considered neutral with a pH of 7. Lime is alkaline, while plant and microbial growth and nitrogen fertilizers produce acid. Adding lime to acidic soil causes the soil's pH to rise from acidic toward alkaline, or from pH 5 to pH 7, for example.

Most crops grow best at the mid-point of the pH range. However, potatoes are often grown at the lower end, while cabbages are grown at the higher end to control certain diseases such as scab or club root.

TABLE I - Sample pH Ranges For Selected Crops

Crop	Acceptable pH Range
Alfalfa	6.3 - 7.8
Cabbage	6.5 - 7
Red Clover	6 - 7.5
Corn	5.5 - 7.5
Potatoes	5.3 - 6.5
Rye	5 - 6.5

Mobility of soil chemicals depends upon soil pH. This table refers to the downward movement of

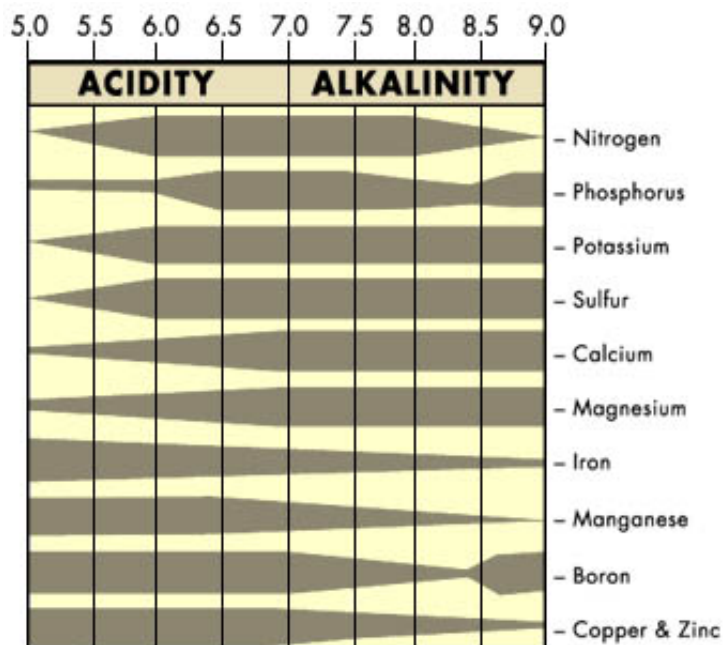
chemicals under the natural influence of normal rainwater infiltration.

TABLE II - Natural Mobility of Chemicals in Soil

Chemical	Mobility
Calcium carbonate	immobile
Calcium sulfate	mobile
Phosphorus	immobile
Potassium	immobile
Nitrogen	mobile

This table shows the relative availability of plant nutrients as soil pH changes. Notice how a neutral pH of 7.0 yields the best overall availability of key nutrients.

TABLE III - Effect Of Change In pH On The Availability Of Nutrients



Lime application affects many aspects of soil and growing conditions. Here is a brief outline of the primary benefits of lime use.

SOIL REACTIONS

The following reactions will occur:

- pH adjustment toward alkaline
- Reduced Al and Mn buildup from acid rain

- Increased N₂, PO₄, K, Mg, Ca, S, B, Mn availability adds calcium (Ca) and manganese (if dolomite)
 - Balances acidic results of N fertilizer use
 - Offset surface acid zones in low-till farming
 - Balances acid produced through harvesting; i.e., removal of calcium in crop
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SOIL PROPERTIES

Lime also benefits soil by changing physical and biological properties.

- Increases microbial activity
 - Better soil structure (air and water flow)
 - Accelerates soil's decay system
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OTHER RESULTS OF LIME APPLICATION

- Reduces certain acid-loving weeds such as quackgrass and jimson weed
 - Increases fertilizer effectiveness by freeing bound ions
 - Acts as natural irritant to insects
 - Increases certain herbicide effectiveness such as triazines
 - Offsets acid from plants, N fertilizer, rain, and harvesting
 - Depresses acid tolerant microbial species
 - Supplies Ca for "high calcium" legumes and alfalfa
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