

# LIME YOUR SOIL FOR BETTER CROPS

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## VALUE OF LIMESTONE IN CROP PRODUCTION

On most Missouri soils lime will not only increase crop yields, but will increase their feeding value as well.

On Putnam silt loam at Columbia, lime applied to soybeans increased the protein produced per acre by 131 per cent. In a similar experiment with lespedeza, protein yield per acre was increased 113 per cent by using lime and phosphate. In a feeding trial, only 7.6 pounds of lespedeza hay from land receiving lime and phosphate fertilizer was required to put a pound gain on lambs. But it took 12.7 pounds of hay from land receiving no lime or phosphate to produce an equal gain. Not only does limestone affect the protein supply, but often it is associated with adequate vitamins and minerals needed for growth and health.

## TESTING SOIL FOR LIME NEEDS

The first step in determining lime needs is to have your soil tested. How reliable these tests are depends largely on how well the samples are taken to represent the different kinds of soil in the field.

For the most reliable soil tests, take composite samples to represent the surface 7 inches of each *different kind*, or *differently treated soil* in the field. Each of these composite samples should be made up of at least 5 well distributed individual samples. After the samples are collected, take them to your county agent for testing. He will have tests made for both pH,\* or acidity, and exchangeable calcium, so you can obtain a more accurate measure of the lime needs of your soil.

## RELATIVE VALUE OF LIMING MATERIALS

**Purity or Calcium Carbonate Equivalent**—Purity of liming materials is usually expressed as calcium carbonate equivalent. If materials testing less than 95 per cent purity or calcium carbonate equivalent are used, proportionately more is needed.

## LIME NEEDS OF PLANTS VARY

Nearly all crops are benefited when lime is applied to lime-deficient soils. Legumes, however, usually give the greatest response.

\*pH is a measure of the degree of acidity or alkalinity.

As shown in Table I crops may be divided into groups on the basis of their requirements for lime.

**TABLE 1--CROPS GROUPED ACCORDING TO THEIR REQUIREMENTS FOR LIME**

Very High	High	Medium
<u>Legumes</u>		
Sweet Clover Alfalfa	Red Clover Mammoth Clover Alsike Clover White Clover Peas Lima, pole, snap beans	Soybeans Vetch Lespedeza Crimson Clover Field Bean
<u>Non-legumes</u>		
Barley Cabbage Cauliflower Lettuce Onion Spinach Asparagus Beets Parsnip Celery Muskmelon Rutabaga	Timothy Kentucky Bluegrass Corn Wheat Carrots Cucumber Brussels Sprouts Kale Kohlrabi Pumpkin Radish Squash Sweet Corn Tomato Turnip	Oats Rye Buckwheat Millet Sudan Grass Redtop Bent Grasses Potato Tobacco Parsley Sweet Potato

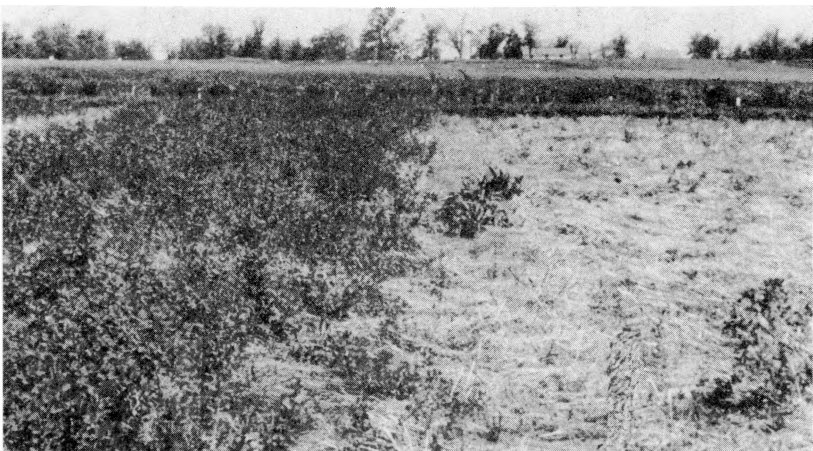


Fig. 1—Limestone is essential for sweet clover. The plot at left had limestone; the one at the right had none. (University South Farms).



## KINDS OF LIMING MATERIALS

Several different lime compounds can be used to correct soil acidity and furnish the needed calcium, and possibly magnesium. These are crushed limestone rock; lime oxide, sometimes called burned lime or lump lime; lime hydrate, often called hydrated (water-slaked) lime; and magnesium (dolomitic) sands.

Hydrated tailings, a by-product, obtained in making hydrated or water-slaked lime, waste lime from acetylene or water-softening plants, ground chat from lead and zinc mines, egg shells, slags, etc., contain varying amounts of the oxide, hydrate, and carbonate forms of lime. In calcium content, 1120 pounds of lump or burned lime, or 1480 pounds of fresh hydrated or water-slaked lime is equal to one ton of pure crushed limestone rock.

Hydrated tailings may be used economically in certain areas, but for most of Missouri, the pulverized raw limestone is cheaper than the burned or hydrated forms.

## TIME OF APPLICATION

Limestone can be put on the land any time machinery can be driven over the fields. For best results, place lime well into the soil in the zone of the plants' feeder roots. To do this, spread limestone on the surface and plow under, or work it into the soil when you prepare the seedbed.

If the seedbed is prepared without plowing, the limestone should be worked into the soil with a disc, spring tooth harrow or field cultivator. When spread on pastures or meadows, it would be best to plow it under but satisfactory results may be had if the limestone is cut deeply into the surface with a sharp disc, field cultivator, or spring toothed harrow.

Adequate amounts of limestone worked through greater depths of soil will encourage deeper rooting of legumes. This was shown on the typical gray prairie soil of Northeast Missouri, where at the beginning of the experiment, limestone was applied and fertilizer was drilled in the surface on all plots. See Figure 3.

## APPLY PROMPTLY

If your soil needs lime, the sooner you apply and work it into the soil the sooner you will reap the benefits. If you need it, *don't put it off—put it on*. How long it takes to get benefits from putting lime on your soil depends on rate of application, fineness of material used, how well it is mixed with the soil, amount of organic matter in the soil, soil texture and weather conditions.

For best results, work it into your soil 6 to 12 months ahead of seeding legumes.

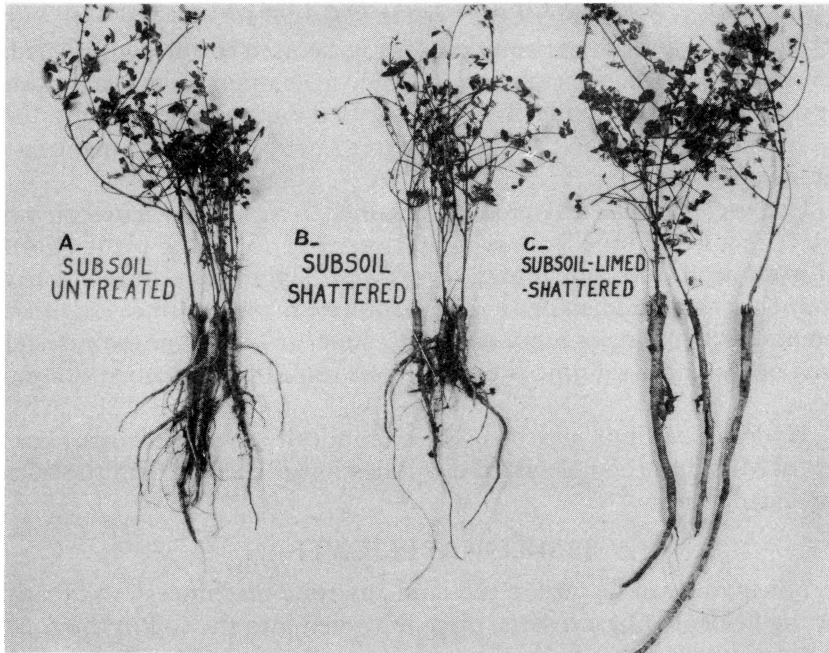


Fig. 3—Development of sweet clover roots. A) Normal plowing without disturbing the subsoil. B) Deep surface plowing followed by plowing in the bottom of the furrow of the first plow to a total depth of about 18 inches. This shattered the subsoil. C) Double plowing as in B, with limestone and fertilizer mixed with the shattered subsoil.

### METHOD OF APPLICATION

Any way you can get limestone spread evenly is satisfactory. Where spread in large amounts when hauled to the field, less labor will be required if a large truck spreader is used.

Ordinary manure spreaders may be used by putting 6 or 8 inches of manure or straw in the bottom of the spreader, or by tacking a canvas over the apron slats to keep the limestone from sifting through.

#### Using Small Amounts

Small applications of limestone have helped obtain good stands of clover and alfalfa where the regular 10-mesh material was not spread far enough ahead of seeding for good results.

On the more fertile soils, medium in calcium, fair crops of legumes may be grown with about 500 pounds of 10-mesh limestone per acre drilled through the fertilizer attachment of a grain drill similar to the way a starter fertilizer is used. This will only help meet the current needs of the crop and should be applied each time a legume is seeded. Usually it is more practical

in either case to make the heavier applications of regular 10-mesh lime 6 to 12 months ahead of legume seedings, according to needs as shown by soil tests.

### RELATION OF LIME TO OTHER FERTILIZERS

Lime cannot take the place of other plant nutrients. When lime increases crop yields, the need for other plant foods increases. Nitrogen, phosphorus or potassium, or a combination of one or more of these plant foods, may be needed in varying amounts in addition to the lime for most satisfactory returns. Wise use means it should be properly used in conjunction with other needed soil treatments as indicated by soil tests on samples taken to represent each different kind of soil in the field.



Fig. 4.—The right amount of lime spread on lime-hungry soils will help you grow better crops. Lime and fertilizer made the difference between good clover on the right and none on the left.

### LENGTH OF TIME LIME WILL LAST

How long limestone applications last will depend on the lime needs of your soil, the amount of lime put on, fineness and quality of material used, cropping systems used, size and kind of crops harvested, amount of erosion, and the texture of your soil.

If you use limestone according to soil tests, it will usually supply the

lime needs of the soil for 6 to 10 years. But, before making another application at the end of this period, it would be well to make another soil test to determine whether more is needed and, if so, how much. Also, it's possible there may be a greater need for magnesium limestone than was the case with the first application.

The more often legumes are grown, the higher their yields and those of other crops harvested from the land, the larger the amount of lime removed. If erosion is not controlled, some of the lime will wash away with the soil. Crops that cover the land most of the year will reduce leaching and erosion, thus giving a longer benefit from the lime. Light or sandy soils lose lime faster by leaching than do heavy clay soils.

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