LIME

How It Is Used in Turf Culture And What Benefits It Brings About

LIME, A MIXTURE of calcium and oxygen in various amounts, is found in three forms, all of which can be used on the turf in varying quantities and conditions.

The slowest acting and the best form to use is calcium carbonate, commonly called ground limestone. It is found in limestone rock, marl and oyster shells. It contains 56 per cent calcium oxide.

Calcium oxide, known as burned or quick lime, is made by heating limestone to a temperature sufficient to drive off the carbon dioxide. It contains 100 per cent calcium oxide and is very caustic and will burn turf unless used very carefully. This form is the most powerful of the limes and 56 lbs. of this quick lime is equivalent to 100 lbs. of ground limestone. This form is seldom used on turf.

Calcium hydroxide or hydrated lime is the product of the action of water on calcium oxide or burned lime. Considerable heat is evolved when the calcium and water combine. This process is known as slaking. Hydrated lime is more powerful than ground limestone but not as powerful as quick lime. It is quite often used on turf when immediate results are wanted and when it is capably handled. This substance contains 65 per cent calcium oxide 74 lbs. of hydrated lime is equivalent to 100 lbs. of ground limestone and 56 lbs. of quick lime.

Lime in its caustic state has the property of rapidly decomposing vegetable or organic matter, thus hastening the natural process by which it is destroyed. This decomposing action causes gases to be given off, some of which the carbonate of lime will absorb and prevent from mixing with the air. These gases form a large part of the necessary food of plants. It is obvious that a soil which contains carbonate of lime may retain the gases and store them up for use, while they would be lost in soils of a different nature.

Lime will also neutralize the acids of the soil, therefore increasing the amount of acting bacteria, since bacteria are retarded by acidity.

Caustic lime is dangerous because it corrodes and destroys living plants such as grasses and vegetables, and destroys the organic matter to such a degree as to injure the soils' fertility. Ground limestone is the best because of its slower action.

Lime combines with the silicious matter of the soil and therefore makes the soil more friable. It is the formation of this to which we are inclined to ascribe the valuable mechanical properties of loaming soils and the gradual improvement produced by the use of lime as a fertilizer.

Lime with much magnesia is harmful, as the magnesia does not carbonate as rapidly as the pure lime and therefore retains its corrosive quality long after the lime has become mild by its union with carbonic acid. In small quantities it is practical.

Uses of Lime in Turf Culture

When a soil contains inert animal or vegetable matter, their decomposition may be promoted and it may be rendered fit for the food of plants, by the addition of lime.

If the soil is acid, neutralization of the acid and the permitting of the organic matter to decompose, that was prevented by the acid, is a result of applications of lime.

Clay may be rendered less retentive of moisture and more friable by the same means.

The gases which are formed by decomposition of the organic matter can be held by the lime for further plant use. These gases being a great part of the plant nutrient.

Lime may also be used in breaking down the organic matter in compost piles before applying to the turf.

Grasses on soils of increased acidity by the use of sulphate of ammonia or ammonium phosphate show a tendency to become easily injured in periods of extreme heat during July and August. These grasses are also more susceptible to fungous diseases. After lime applications these turfs show a remarkable change and become more resistant to fungi and scald. It indicates that the use of certain acid-reacting fertilizers can be overdone and

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that previous tabooing of lime on golf courses is erroneous.

These facts indicate that neither lime nor an acid-reacting fertilizer can be used excessively but must be judiciously blended in use. Any extreme change in acidity should be avoided.

Lime should be used as needed to correct soil acidity or to correct the harmful effect of the excessive use of certain fertilizers, although they may not have made the soil acid.

Excessive use of lime should be avoided just as the excessive use of any other chemical should be avoided.

Sign Post to Lime's Need

The need of lime is expressed in various ways. A common symptom in bent grasses is a yellowing and generally unthrifty appearance, especially during the heat of midsummer. If soil and moisture conditions are favorable and turf does not promptly respond to a nitrogenous fertilizer, it indicates that lime may be needed. If irregular patches of turf turn brown as though scalded and the soil in these patches dries and becomes almost impervious to water, there is a possibility of lime deficiency. If fungous diseases are active and are not easily controlled by fungicides, this also may be regarded as an indication of lime shortage.

Any of these symptoms of lime deficiency may be produced by other causes. However, if considered collectively, they are of great importance in pointing to the need of lime.

Applying Lime to Course

Applications of lime should be about 25 lbs. per 1,000 sq. ft. on greens and 1 ton to the acre on fairways.

Hydrated lime can be used for quick results but should not be used within 10 days after applying ammonia fertilizers. Neither should such fertilizers be applied for several days after hydrated lime has been used. Neglect in these precautions may result in severe burns due to the release of ammonia gas.

Under field conditions when lime is applied to the surface it becomes effective in lowering the acidity, first, of the upper portion of the soil, later extending gradually to the lower levels. Since the feeding roots of most turf grasses are fairly near the surface the effect of light liming may soon be observed.

Sulphate of ammonia is still regarded as one of the best fertilizers for golf course use. It must be properly balanced with other materials used for plant food in order to give best results in turf culture.

Grasses on an acid soil stimulated frequently by sulphate of ammonia are more susceptible to fungous disease and other injury than is true of grasses grown under normal conditions. It is recommended that the soil pH for golf turf should be between 5.8 and 6.5, and that superphosphate and limestone be applied each year. If sulphate of ammonia is used as a source of nitrogen, ground limestone should be applied at the rate of 75 lbs. for each 100 lbs. of ammonium sulphate applied.

In many instances the failure of turf grasses during the summer months is due to the toxic effect of the soil acidity and not to the invasion of fungous diseases. This is proved by the fact that the mercury compounds have no effect in restoring the turf to the normal color and vigor, and that an application of lime does restore the grasses to normal condition.

Ground limestone is best to use during the growing season. Hydrated lime has a tendency to cake and discolor the green, while ground limestone particles are larger and heavier and work in between the grasses, disappearing entirely from view.

It has been found that under turf conditions there exists at certain growing seasons a scarcity of soil nitrates. This is due to several causes. Under turf there exists keen competition between the grasses and soil micro-organisms for the available nitrogen present. In the case of greens frequently rolled, nitrification is reduced due to poor aeration. In the case of extreme acidity, the activity of the nitrifying bacteria is considerably reduced. The excess amount of ammonia salts brought about by poor drainage has been found to reduce nitrification. This is due to applications of large amounts of sulphate of ammonia.

Certain mineral salts also affect nitrification. One of these is mercury, which is ordinarily used as a fungicide. The effect of these minerals is to destroy the cell structure of soil micro-organisms.

Tests showed that on an unlimed soil mercury considerably reduced the activity of nitrifying organisms. Arsenate of lead, on the other hand, has stimulated the production of soil nitrates. The addition of lime eliminates the injurious effect of

the mercuric compounds, proven by the fact that nitrification is reduced 25 per cent on an unlimed soil, while on a limed soil it is only reduced 15 per cent.

Mercury compounds also produce an injurious effect on nitrifying organisms in acid soils. The addition of lime overcomes this toxic effect.

These results should not discourage use of mercuric compounds in fungus control, but rather to call your attention to the fact that such materials may reduce the available nitrogen of the soil, especially in the case of those soils which are in need of lime.

The slow recovery of grasses, often noted following repeated application of fungicides, may be due to the reduction in the supply of available nitrogen in the soil as the result of injury to nitrifying organisms.

The use of ground limestone at the rate of 25 to 50 lbs. per 1,000 sq. ft. is recommended for a soil of pH 4.5 to aid in checking brown patch.

To change a green with an acidity test of pH of 4.5 to the desired pH of 6 by the addition of ground limestone can be worked out by this formula:

Subtract the present pH from the desired pH, and multiply by the factor of the soil you have. The constant factors for soils to be used are: Sandy or loamy sand, .75; sandy loam, 1.00; loam, 1.25; clay or clay loam, 1.50. This will give the tons of limestone per acre needed to change the acidity.

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Paper read at Mass. State College Short Course.

Rake Is Handy Aid to Raising Long Ladder

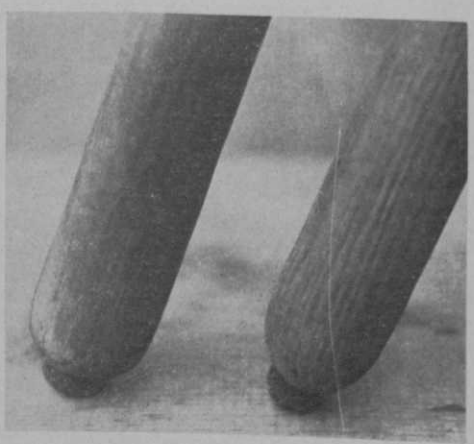
IT IS often necessary for one to raise a long heavy ladder alone. Trying to prevent the lower end from slipping is not an easy matter; the leverage accumulated as the end of the ladder rises is often near the limit of the strength of the ordinary man.

Do it easily with a common rake. Place the teeth of the rake over the first rung and start the ladder up. The resistance needed at the end of the ladder is but little, only you cannot be in both places at once. Step on the handle end, pressing it lightly to the ground. This slight amount of resistance will keep the ladder end nicely down and afford the leverage pivot with which a long heavy ladder can be easily, quickly and safely raised right

where you want it on either ground or cement. No danger of breaking the rake nandle, as one step forward is all you need to take.

Helps to Stack Tools on Slippery Floor

RAKES, trimmers, scuffers, and other long handled tools are commonly stacked as neatly as possible in a convenient corner, often with metal end up to protect flooring. The handle ends, resting on smooth concrete or board flooring, are an easy thing to slide when moving or selecting a needed tool to work with. When one handle starts skidding,



the whole stack is liable to crash to the floor. Drive a rubber headed tack in the handle end of each as shown above. The tack is never in the way when using the handle, and no matter how smooth a surface they may rest or set on, it stays put and does not "scoot" away from you. Saves your floor, tools and temper.