

THE FOLLOWING TALK WAS PRESENTED  
AT OUR JANUARY MEETING HELD AT  
THE ITASCA COUNTRY CLUB

LIME IN THE LIFE OF THE PLANT

O. J. Noer

Old timers in the Midwest Association recall the acid era in golf turf management, but many younger members may not. It terminated 34 years ago after the memorable hot, wet and humid summer of 1928, when the bent grass on greens died.

That era was based on the turf grass plots at the Rhode Island Experiment Station. They were established by Dr. H. J. Wheeler when he became Director, after graduate studies in Germany, Dr. Wheeler compared ammonium sulfate and nitrate of soda singly, and in combination. At the time they were the only commercial sources of chemical nitrogen. All plots received phosphate and potash, but no lime. The sulfate plots became singularly free of clover, weeds and worm casting. Increased soil acidity caused by the sulfate was given credit for the striking results. Golf clubs were advised not to use lime on bent grass greens and the Green Section advocated the exclusive use of ammonium sulfate as fertilizer. The Green Section Director was also head of the U.S.D.A. Bureau of Plant Industry. He was a positive individual, well trained in the plant sciences but not well versed in soils and chemistry. He ignored warnings that soils could become too acid for the acid tolerant bent grasses.

Dr. Piper did not live to see the disasters in 1928. The grass on all eighteen greens was lost on many

courses. Lime especially, and other sources of nitrogen came back into favor.

Grass on the Rhode Island plots survived the 1928 holocaust, because of more moderate New England summer weather. Sometime later wintertime troubles started and became increasingly bad. At first grass collapsed in spots. Recovery was slow in spring. Finally all the grass on the sulfate plots suffered severe winter damage and failed to recover without reseeding. Then Dr. DeFrance decided the plots had outlived their usefulness. So lime helps grass survive adversity, in summer and in winter.

Lime has a manifold role in plant growth. It is a source of calcium, and magnesium also when dolomitic lime is used. Both are classed as major nutrient elements. Lime improves soil tilth, corrects acidity, affects soil micro-organisms, helps control thatch and in the form of hydrate exerts a very decided beneficial effect on scald, when it occurs in hot, wet, humid weather. This is true irrespective of soil reaction. Besides reviving grass the hydrate kills algae, present on the surface as a green scum which turns black and forms a skin-like cover that retards grass recovery.

Without an adequate supply of calcium plant roots are meager and brown instead of the normal white color. Calcium is needed for root tip development. In leaves, and other aerial parts, calcium is the support for cell walls. It forms a sieve through which essential elements enter the cell. Organic acids, such as oxalic, are by products of metabolic processes within the cell. If allowed to accumulate they would upset growth by making the medium too acid. Calcium neutralizes them and converts them into insoluble compounds, such as calcium oxalate.

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stressed because calcium has been plentiful in fertilizers. Ordinary superphosphate is a mixture of monocalcium phosphate and gypsum (CaSO<sub>4</sub> · 2H<sub>2</sub>O). So calcium as well as phosphoric acid must receive credit for benefits on new turf grass seedings. The swing to high analysis fertilizer will bring calcium into greater prominence because they are made from materials which do not contain calcium, ammonium phosphate for example.

Magnesium is a constituent of chlorophyll, the green substance of plants. It is the vehicle of transport for phosphoric acid within the plant, so it is vital to normal plant growth.

Dolomite is the usual source of magnesium. It contains calcium carbonate mostly with variable amounts of magnesium carbonate. Epsom salts (magnesium sulfate) technical grade, is a good source of soluble magnesium. Manure salts, is the original term used to describe mined fertilizer salts containing both potash and magnesium. Most of them have about 20 percent of magnesium. They are sold under various trade names.

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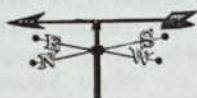
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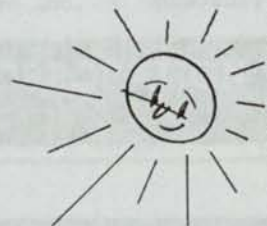
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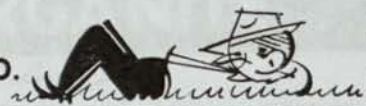
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For immediate results, when the need for magnesium is acute, technical grade of epsom salts, or one of the fertilizer salts containing potash and magnesium should be used. They are water soluble. For long time results dolomite is the thing to use. It should contain 15 to 20 percent, or more, of magnesium reported as the oxide.

Lime has the power to improve the tilth of acid loam and clay soils. It and gypsum (calcium sulfate) do the same thing for alkaline clay soils with sodium mostly in the clay complex. The calcium replaces the hydrogen in acid clays, and the sodium in the alkaline soil. A calcium clay flocculates, that is the term used to describe grouping of the individual particles into larger aggregates. This facilitates intake of air and water. Acid and sodium clays exist as dispersed particles. Then soil becomes more impervious to the entrance of air and moisture.

An athletic field was built in Milwaukee on an area which had been used as a dump. Fill for top soil was subsoil mostly. Turf cover was scant. Reseeding did not help. The same was claimed for fertilizer. Test plots disclosed that not enough had been used. Instead of 400 to 500 pounds per acre from 1-1/2 to 2 tons per acre were needed. Then grass really responded. Toward summer the only green grass was along the lime lines, following several weeks of dry weather. Moisture existed under the green grass, but otherwise the soil was bone dry. The soil was neutral but the level of exchangeable (available) calcium was low. The calcium provided in the lime line had a marked beneficial effect on soil tilth of the clay soil. So it is important to determine available calcium, besides the pH, because lime might be needed to improve tilth, and thereby increase water holding capacity.

(Cont'd Next Month)

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