Management and Fertilization Practices Minimize Disease

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(At GCSA Convention)

Any discussion dealing with turf diseases must be directed toward golf courses with most emphasis on greens. Turf diseases are a major problem with them.

In lawn grass maintenance diseases are seldom serious. During bad winters snow mold is not uncommon, but serious loss of grass seldom occurs. St. Augustine grass, Zoysia to a lesser extent, and Kentucky blue grass in parts of the West are attacked by a disease which looks like brown patch. The spots are alike except for the absence of the smoky ring because cool weather does not produce wilting of the grass along the outside edges where the organism is active. Despite the similarity in appearance, it is unlikely that the causal organisms are the same. The leaf spot diseases are widespread and may seriously damage the bent grasses, Kentucky blue grass, and fescue. Merion blue grass is resistant to leaf spot, but it is attacked by rust. Management factors help keep it in check, and play a part in preventing serious turf loss with other diseases. Fungicides are rarely used by the homeowner, probably because damage is seldom severe and grass recovers of itself.

In order to minimize disease, the homeowner must depend upon good maintenance practices for the particular kind of grass and the locality. By doing that, disease troubles are seldom serious. Lime should be used on moderate to strongly acid soil. After providing for phosphorous and potash, if either or both are needed, the problem is one of nitrogen feeding. Modern practice is to use some in spring, in early summer, and again in early fall. Where snow mold is a possibility, fall applications of nitrogen should be made early and the rate should be moderate so grass can harden-off before the onset of winter.

Fungi Responsible for Diseases

The infectious diseases of humans are caused by bacteria. Fungi are responsible for the common parasitic grass diseases. The parasitic fungi depend upon living tissue for their livelihood. They are the organisms which cause dollar spot, brown patch, snow mold, pink patch, pythium, copper spot, leaf spot, rust, etc.

Other saprophytic fungi live upon dead organic matter. The fairy ring fungus is in this class. It does not attack grass, but competes with it for the soil supply of nitrogen and moisture. Its long range control depends upon depleting the soil of cellulose material, grass stems, leaves, etc. This is accomplished by the use of a little lime and insuring a supply of air in the soil.

There are functional disorders, such as iron chlorosis which is becoming more common. Chlorosis is associated with overwetness and high content of organic matter in the humid parts of the country. An over-abundance of phosphorous in the soil is an aggravating factor. In the semi-arid regions iron chlorosis is referred to as calcium induced chlorosis because the high pH and presence of carbonates immobilizes the iron in the soil. Overdoing lime in humid regions has the same effect. The tissues of chlorotic grass are soft and tender. They are ready prey for the organisms which cause leaf spot and every other fungal disease.

Fungicides Necessary Tools

Fungicides are useful and necessary tools in the maintenance of golf greens. One shudders to contemplate what could happen without them. The toll of grass-less greens would be appalling in a bad year.

A fungicide which has been consistently good in controlled tests does not necessarily receive the same acclaim in practice. It is praised by some and condemned by others — unjustly sometimes. The kind of grass or the management program may be such that nothing will stop or prevent damage from disease. These factors are overlooked in most discussions about diseases and their control. Maintenance can degrade as well as improve a grass.

One course may be plagued with disease and unable to secure control with any fungicide. The course across the road

has little or no disease and gets good control with the same fungicides. The soil, the grass, and the climate are identical so the difference is one of Management — with the emphasis on the MAN part.

Many years ago a Missouri club spent about five thousand dollars for fungicides and tried every known kind in frantic efforts to save the greens. They failed dismally. Every Monday the greens received ammonium sulphate at 5 pounds per 1,000 square feet in a vain attempt to control weeds by making the soil more acid. This was during the "Acid Era" in turf maintenance. The heavy sulphating made the grass so lush that it fell prey to every known disease and possibly to unknown ones. After the grass died weeds were worse than ever. A sensible feeding program was devised and used the year following. Fungicides performed as expected and the cost for the seasonal fungicide requirements dropped from astronomical to reasonable figures.

Skillful Management

Grass and people are alike in one respect at least. A person in a run-down or unhealthy condition invites disease. The same thing is true of grass. By skillful management an inferior grass may look like the best. An unsound maintenance program may make a superior grass resemble the poorest strain.

At about the time the acid theory was falling into disfavor, Mr. Joe Valentine used the nursery at Merion Golf Club as a testing ground. He applied lime on a portion of the Washington bent plot. Dollar spot struck three weeks later. There was none on the limed portion. Damage was very severe on the unlimed part. In this instance lime was the thing needed to make the grass more robust so it could resist the disease.

When Victor Larson was in charge at Minneapolis Golf Club he had no end of trouble with dollar spot on his Washington bent green. There would be a bad outbreak every three weeks. Routine practice was to apply Calo-Clor to check the disease and some ammonium sulphate to speed recovery. Soil tests disclosed nothing unusual. The answer was simple but did not come until after Victor's death. We now know that dollar spot is aggravated by too little as well as too much nitrogen. A change in the fertilizer program to insure a continuous and more uniform supply of nitrogen would have lessened dollar spot, saved fungicide, and eliminated Larson's summertime misery.

In May, 1953 leaf spot played havoc with the grass on all the greens at a prominent Buffalo club. Damage occurred in a matter of hours. Leaf spot was the immediate but not the basic cause of injury. This fact was substantiated by the failure of two of the better known leaf spot fungicides to do any good. The grass was mostly Virginia bent and poa annua. The turf was badly matted, the soil was strongly acid from the continuous use of ammonium sulphate. Greens were low in magnesium and in potassium. By changing the management program, greens staged a quick comeback and were good all that year and again in 1954. The greens were aerified and the mat was removed gradually. Dolomitic limestone was applied generously after aerifying. Greens got more potash. The type of nitrogen was changed and the rates and interval of application were designed to furnish the grass with a continuous and uniform amount of nitrogen. The new program worked wonders on the grass and enabled fungicides to do the job expected of them.

It is only human to blame disease for everything, especially when the signs seem so plain. The examples just cited show the fallacy of that approach. Ability to recognize and evaluate these secondary causes and effects is important. Then one can devise a program to improve conditions for growth; one which will strengthen the grass and thereby help it cope with disease.

Important Management Factors

The most important management factors include use of the right grass, watering and fertilization. This triumverate usually makes or breaks the MAN of Management.

Grasses differ in their susceptibility to disease, or in their ability to resist it. Seaside is very susceptible to snow mold and would be a bad choice in regions where this disease is bad. Washington, Congressional, or one of the better colonials would be better choices because of their resistance to this disease. The old Virginia strain was among the first to suffer injury from leaf spot. Washington takes dollar spot but is more resistant to brown patch than Metropolitan. The latter is less apt to get dollar spot, but is more susceptible to brown patch. Arlington and Cohansy are very good grasses in the regions where summers are hot. The mixture of equal parts Arlington and

Congressional seems to be a good one generally. The new Pennlu strain from Pennsylvania is said to be an excellent putting green grass.

Water management is as important as selection of the right grass. Improper watering is responsible for many bad greens. The tendency is to overwater. Some fail to recognize the necessity for hand syringing during hot weather. It is the only way to save shallow rooted turf. Such greens must be watched for wilting on Saturdays and Sundays as well as during the week. Failure to do that is the reason why some greens deteriorate over the weekend. They may be reasonably good Friday night and bad by Monday.

The workman who waters the greens is the key man on the force. He should be selected for intelligence and trained to do the job. Instruction should include something about the why as well as the how to use water.

Drainage is another important item associated with water management. It includes air drainage as well as quick removal of surplus water. Good internal soil drainage is extremely important, especially in regions where heavy rainfall is a probability during hot weather. Tile is not needed when greens are located on a porous subsoil. With tight compact subsoil tile is desirable. The herringbone system is best. The distance between tile lines should not exceed 15 to 20 feet. Trenches should be backfilled with coarse material such as pea gravel. A gravel blanket on top of the subgrade is a desirable feature provided a tile system is installed underneath to remove gravitational water when it reaches the gravel blanket.

Surface run-off is the best way to remove water quickly. Greens should be designed so surface water leaves the green in several directions. Pocketed areas which hold ponded water should be absent.

Good air drainage insures passage of air across the surfaces to remove moisture laden air during humid periods. When the air in immediate contact with the grass is saturated with moisture dew and gutated water remains on the surface in droplet form, this provides a favorable medium for disease. Air movement across the green enables evaporation to occur and the grass becomes dry.

Effects of Lime and Fertilizer

Lime and fertilizer affect the well-being of grass in many ways. Both have profound effects upon the amount and severity of turf diseases. The examples cited earlier are proof of that fact. The discussion about lime and about fertilizer was left to the last purposely, because fertilizers are blamed by some for all of the ills of turf. Nothing is farther from the truth. Although fertilizers can be misused, no other tool is as useful or has as profound an effect upon turf quality and density.

Lime is the great soil regulator. Need for it must be considered first and then it is easy to devise a sound fertilizer program.

A few plants such as gardenias and camellias need an acid medium. Otherwise they cannot obtain the minute amount of iron required by the green portion of the leaves and stems. Centipede is a good example among grasses. Applications of lime are often fatal to its well-being. At one time it was thought that bent grasses require an acid soil. That is not true.

Most plants grow best in the range of pH 6.0 to pH 8.0. The range is narrow in many instances — such as blue grass, alfalfa, etc. Other plants can withstand greater acidity and grow over a wider reaction range. That is the case with the bent grasses and fescue. Velvet appears to be more acid tolerant than any of the other bent grasses. The beneficial effects of lime seldom show in the amount of growth. Lime helps grass withstand adversity. The grass on unlimed acid soil starts to turn brown first with the onset of dry weather. The greener grass along each edge of the lime lines on football fields is a good example. The reduction in disease following the use of lime on an acid soil was cited earlier. Sometimes a light dusting of hydrated lime stops brown patch better than anything else.

The use of lime is justified whenever soil reaction is below pH 6.0. A dolomitic type of lime is best when the soil supply of magnesium is low. Dolomite corrects acidity and eliminates a possible soil deficiency in magnesium.

After providing lime, or eliminating need for it, the problem is one of devising a sensible fertilizer program. In doing so this fact must be kept in mind. The farmer depletes the soil by harvesting the crop. Greens maintenance resembles farming in this one respect. The clippings are the crop which is removed. On other turf areas the clippings fall on the ground. As they undergo decay the mineral elements

are released and restored to the soil in forms which the grass can use. Plant food losses are confined to nitrogen.

Iron Chlorosis on Increase

The growing season in Wisconsin is five to six months. Clippings have been weighed and analyzed from one green at Brynwood. During the season the dry weight of clippings from each 1,000 square feet was 100 pounds in round numbers. Where the growing season is longer, the amounts would be proportionately more. The clippings contained about 5 pounds of nitrogen, 2 pounds phosphoric acid, and 4 pounds of potash. The plant food removed during the season was equivalent to a 100-pound bag of 5-2-4 fertilizer. It is significant that there is almost as much potash as nitrogen, and only half as much phosphoric acid. This 5-2-4 ratio is vastly different than 5-10-5, 4-12-4, etc., which have been used in the past. No wonder many greens are becoming low grade phosphate mines and iron chlorosis is on the increase.

Based on the Brynwood findings, bent greens should receive about 1 pound nitrogen, ½ pound phosphoric acid, and ¾ pound of potash each month per 1,000 square feet of surface to replenish the amounts removed in the clippings.

The easy way is to apply the potash and phosphate all in the late fall or to apply one-half in the spring and one-half in the fall. Both are taken up by the soil so they resist leaching. Then use from 1 to 2 pounds of nitrogen per 1,000 square feet per month. The other alternative is to make monthly or semi-monthly applications of all three — nitrogen, phosphoric acid, and potash. When this is done, the fertilizer ratio should be something like 1-1-1 or 2-1-2, rather than 1-2-1 or 1-3-1.

Iron chlorosis is becoming more common. It was responsible for many bad greens during the summer of 1954. Most of these greens could have been saved by prompt use of copperas which is ferrous sulphate. The secret is to use 2 to 3 ounces per 1,000 square feet with not more than 5 gallons of water. The iron sulphate must be left on the leaf. At least 4 to 5 hours should elapse after spraying with iron sulphate before it is watered-in, or before the green is watered. Promptness is important, otherwise the weakened grass will fall prey to one of the many fungus diseases.

It is only natural that discussions of disease emphasize fungicides and their use. However, the role of management cannot be ignored. Fertilizer and water practice are the things which have profound effects on disease and the effectiveness of fungicides.

"KIDS' DISEASE" RUINS GREENS

One of the worst cases of juvenile vandalism was the case in the Michigan and Border Cities district. Lame-brained kids drove a car over nine greens with results shown above.

Repairs were made by constructing a device which removed damaged strips to uniform width and depth, and which cut replacement sods from green borders and nurseries. Despite superintendent's ingenuity, heavy expense and time beyond value are required to repair the destruction.