TURFGRASS DISEASE CONTROL

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Turfgrass diseases vary in severity from year to year and from one locality to another, depending on the environment (principally moisture, temperature, humidity, and grass nutrition), the relative resistance or susceptibility of the grass host, and the causal organism. For disease to develop, all three factors must be present and in "balance." For example, if the environment if favorable for a disease and the disease-producing organism is present but the host plant is highly resistant, little or no disease will develop. Similarly, if the causal organism is present and the host is susceptible, but the environment is unfavorable, the disease usually does not appear.

We can put this relationship in the form of a simple equation:

Susceptible grass + Disease organism
+ +
Proper environment + Method of distribution
= DISEASE

No disease will develop if **any one** of the above ingredients is lacking. Effective disease control measures are aimed at "breaking" this equation in one of three basic ways: (1) the susceptible plant is made more resistant or immune; (2) the environment is made less favorable for the causal organism and more favorable for the grass plant; and (3) the disease organism is killed or prevented from reaching the plant, penetrating it, and producing diisease.

Let's discuss these three basic methods of control:

1. **The grass plant is made more resistant or immune—** This is the ideal method of control. All grass breeders, and everyone else concerned with turf, are hoping to develop more resistant grasses. Some progress has been made. We now have grass varieties that are somewhat resistant to dollar spot, snow mold, leaf spot, rust, powdery mildew, and other diseases. But this important control measure is still in its infancy. For some diseases like brown patch, where the causal fungus is composed of an infinite number of biotypes or strains, the development of highlv resistant or immune grass varieties is remote and may never come about. Before such grasses can be developed and released sources of resistance in wild or cultivated grass must be found. Then comes the long, time-consuming process of workinq this reristance into otherwise desirable grasses. We will probably never have a lawn or fine turf gratt that is resistant to all common diseases.

   Another way to make the grass more resistant is through proper nutrition. Dollar spot, pink snow mold or Fusarium patch, powdery mildew, brown patch, and other diseases are less serious where a uniform level of soil nutrients is maintained in the root zone. This mav mean making fewer and lighter applications of fertilizer plus keeping the three major nutrients, N, P, and K, in balance. When nitrogen is high in relation to potash and phosphorus, you may be heading for trouble, especially in hot weather!

   Grass cut at the proper height also has more resistance than turf that is scalped. Without sufficient green leaves to manufacture food to produce new leaves, roots, and stolons, the grass is definitely weakened. Grasses in a lawn, park,

fairway, or golf green grow under artificial conditions and are more subject to attack by disease organisms than they would be in their natural environment. Healthy, vigorously growing, adapted turf grasses — that are properly managed — can best ward off disease attacks.

2. **The environment is made less favorable for the causal organism and more favorable for the grass plant.** Fungi that cause turf diseases require much the same sort of environment that turfgrasses require: food, moisture, oxygen, and a favorable temperature. The basic concept here is to grow grass in an environment that will be unfavorable to the growth, multiplication, and spread of disease-producing fungi. This we can do by:

a. **Keeping the grass blades as dry as possible** for as long as possible. Fungi, with the exception of the powdery mildews, require free moisture on the grass plant for 3 to 12 hours or more to infect a plant. Poling, brushing, and hosing are means of removing dew and guttated water in which these organisms thrive. There are reports of superintendents' applying non-toxic, surface-active detergents to grass that prevented dew from clinging to the grass blades. The fungi coudn't penetrate without moisture, and no disease developed. Poor surface and subsoil drainage causes compaction and soil aeration problems. Roots are suffocated from lack of oxygen or are "drowned." The result, too frequently, is disease. "Dead," humid air over a pocketed turf area causes disease problems. There is no wind to dry off the grass blades. If we cauld keep grass dry — and this includes the thatch — we would have no disease problems aboveground. Root rots that cause "wilt" of golf green in July and August are commonly due to overwatering of the root zone to keep the turf soft. Keeping the soil near the saturation point prevents normal root growth and favors the growth of organisms like Pythium, a common water mold. Proper water control is the single, biggest environmental factor in keeping disease in check on golf greens or other frequently watered turf areas.

b. **Eliminating the dead grass (mat or thatch)** in which disease-organisms thrive. Removal helps to "starve out" these fungi and forces them to compete unfavorably with the multitude of bacteria and fungi in the soil, many of which are antagonistic or even parasitic to the disease-producing organisms that attack grass. The thatch also acts like a sponge in holding excess moisture. Elimination of thatch has cut the fungicide budget of many golf clubs in half.

c. **Keeping large trees away from greens** or installing root barriers.

d. **Not injuring the grass** by careless use of pesticides, using a mower out of adjustment, leaving the cup too long in one spot, walking or riding on turf that is soggy, removing half or more of a grass blade at one mowing, etc. Remember that anything you do to grass to weaken it may lower its natural resistance, allowing a disease organism to "take over."

3. **The disease organism is killed or prevented from reaching the plant and producing disease.** We have talked about removing moisture and thus preventing a fungus from penetrating. We could also mention using sand or other sharp particles to improve surface and subsurface drainage and aeration. You can probably think of other ways to prevent distribution of the organism. But the principal means of control here is chemical. We can apply a soil fumigant to the turf area before planting and kill fungi, nemotodes, insects, and weed seeds — all at once, using a single chemical like methyl bromide, chloropicrin, Vorlex, Vapam, or V. P. M. Soil Fumigant. The expense is fairly high, but more and more of this type of control is being used before seediing or sodding greens, tees, stadium turf, and even home lawns. Generally a polyethylene cover is placed over the treated area to retain the fumes of the fumigant. The only problem is that disease and nematode problems may become **more** severe later because of lack of competitive fungi, bacteria, and nematodes in the treated area. Once a disease-producing organism is introduced (blown, washed, or tracked) into a treated area, there is no "biological check and balance."

This discussion brings us to the use of turf fungicides on a preventive schedule — applied **before** the disease strikes. We recommend that you follow the manufacturer's directions on the package label as regards rates to use, interval between applications, compatibility with other chemicals, grasses on which the chemical is to be used, etc.

The method of application is very important. We suggest at least 5 to 10 gallons of spray per 1,000 square feet to adequately wet the grass blades, thatch, and top quarter inch or more of soil. I would use five gallons of spray against such diseases as powdery mildew and rust, which attack only the grass blades. Other diseases, such as dollar spot, brown patch, Pythium, melting-out, and snow molds, attack the crown and root area before growing on and over the grass surface. Here 10 gallons per 1,000 square feet as barely adequate. For diseases like brown patch, where the causal fungus is known to survive in the form of sclerotia buried in the soil, 15 gallons would probably do a better job.

High pressures are **not** necessary! It is much more important that the fungicide be applied evenly. In most cases the best way is to use a multi-nozzle boom and apply the chemical equally in two directions. The time interval between spray applications should vary with temperature, expected disease, grass condition, chemicals used, and amount of rainfall or artificial watering. The spray interval may be as short as two or three days in hot, wet weather or stretch out to two weeks if the weather is cool and dry. Some fungicides give some protection for a week or 10 days even when four to six inches of water has fallen as rain or been applied by sprinkler. Another chemical may last only two or three days under similar conditions. The problem is complex and one that you have to "feel out" for yourself, based on your knowledge of the chemical and its past performance, the problem turf area involved, past fungicide and other records, and knowledge of the factors that cause a particular disease to flare up. It is only through keeping records that you can hope to determine why a certain fungicide failed — or did the job. All the

fungicides in the world cannot replace a poor turf management program.

The equipment you use is also important, especially on a golf course. How fast you can get around and complete a spray application? I Pythium strikes, is this fast enough? These are questions you have to answer for yourself. The important thing is to get uniform coverage of the grass. You may have to put in a commercial spreader-sticker or wetting agent to insure wetting of the grass blades and better penetration of the thatch and soil surface.

Table I gives a summary of turfgrass diseases and the fungicides that have been reported by various research workers as giving some dregree of control. The success (or possible failure) **you** have with these fungicides, however, will depend on how well you have put the pieces of the overall turfgrass disease control picture together.

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