



# Fungicides — Forever More?

*"The operation was a success but the patient died." Note the straight line pattern of turf loss on this green. Someone erred in application techniques.*

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Today, fungicides are a must in every golf course superintendent's management program. Unnecessary turf loss on greens from disease is no longer accepted. Preventive and/or curative control programs should be established on every golf course.

Broad spectrum fungicides are in common use for programs of preventive disease control. Selective fungicides, used for one particular

disease, or at a particular time of the season when a disease is more active, can be used on a preventive or curative basis. The frequency of application depends largely upon weather conditions. It is not unusual to find a normal program in the Northeast to call for applications every 5 to 7 days on a preventive schedule.

The more common diseases found in the Northeast, the active temperature (F.) and period of the season is as follows:

Disease	Active Temp. (F.)	Period
Brown Patch— <i>Rhizoctonia solani</i>	77-86°	June-August
Dollar Spot— <i>Sclerotinia homoeocarpa</i>	68-86°	June-August
Red thread— <i>Corticium fuciforme</i>	65-73°	May-June-August-Sept.
Copper Spot— <i>Gloeocerospora sorghi</i>	81-86°	June-August
Pythium— <i>Pythium</i> spp.	93° +	July-August
Helminthosporium— <i>H. vagans, sorokinianum</i>	68° +	April-August
Fusarium Blight— <i>Fusarium roseum</i>	—	April-September
Fusarium Patch— <i>Fusarium nivale</i>	68-70°	November-March
Typhula Blight— <i>Typhula itoana</i>	46-54°	November-March

For fungicidal control of the above diseases, check with your local State Agricultural Experiment Stations or noted authorities in the turf-grass field. They will be able to discuss with you the material best suited for your location.

When applying the fungicide to a given area, such as a green, tee, or fairway, the exact area must be known in order to achieve adequate protection. The normal amount of carrier (water) is between three to 10 gallons per 1,000 square feet at a pumping pressure above 200 pounds per square inch. Uniform coverage must be obtained if the fungicide program is to be a success; nothing should be left to chance.

### Green Measurements

Let's look to the important factor of knowing exactly how much area (in terms of 1,000 square feet) will be treated with each spray application. After all, fungicides, insecticides, herbicides,

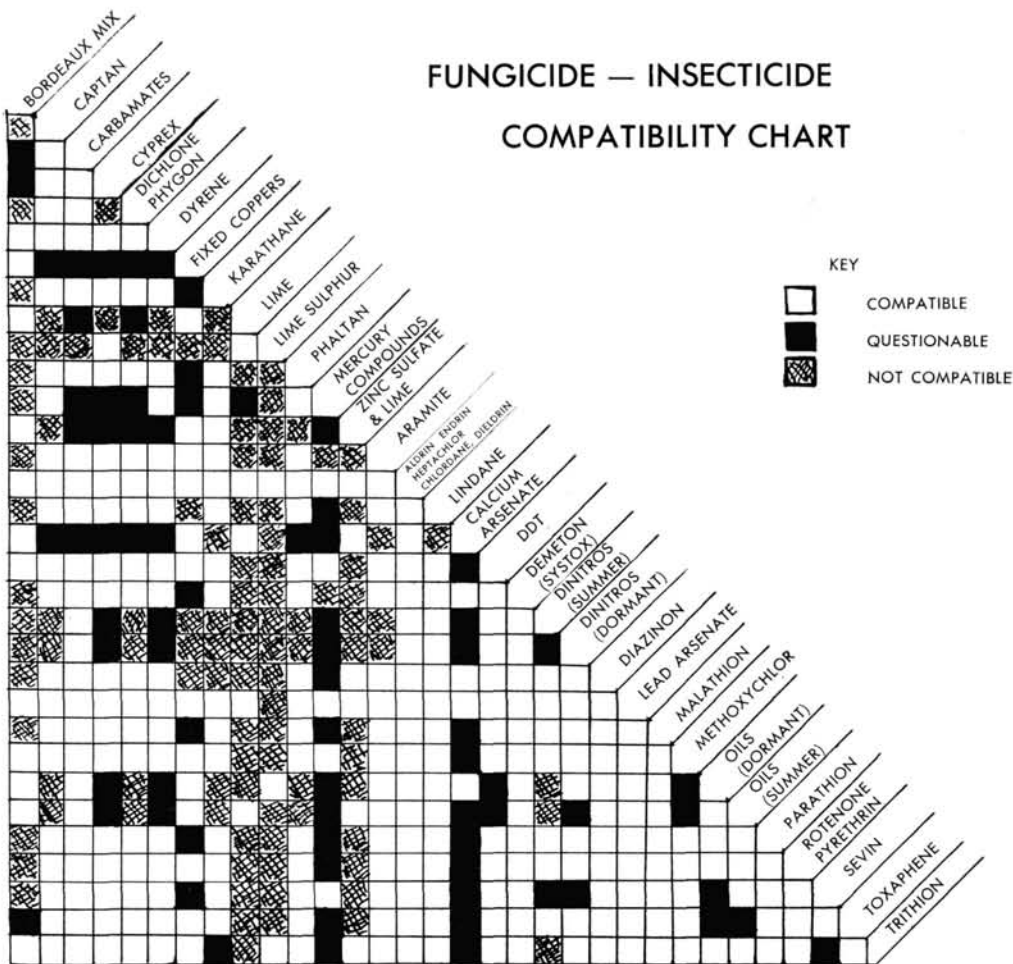
and fertilizers are not inexpensive, and with today's tight budgets, each dollar must count.

Have you measured each green to determine exactly how many square feet you have under treatment, or has this requirement slipped by for several years? Greens may have been enlarged. More collar area is being treated today, or should be, and maybe the man who always sprayed has become noticeably older and doesn't walk as fast as before. No matter the reason, it is important to know how many square feet of putting green and collar area you are actually treating.

Some of the standard means of determining these areas are as follows:

**Rectangular Green**—Square the corners to exclude an area equal to the amount of fringe inside the rectangle. Multiply length by width.

**Irregular Green**—The long axis has to be determined. Lay a string along this axis and



EXTENSION CHART #3

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place stakes at ten-foot intervals. Using a T square, measure to the edge of the green at right angles to the axis at each stake. Multiply the individual measurements by 10; the sum of those figures equals the area.

**Circular Green**—Four steps are needed: (1) find the diameter, (2) divide by 2 (this is the radius), (3) multiply radius by itself, (4) multiply this by 3.14.

#### Proper Distribution

Learning how to apply material evenly is an art. Uneven distribution may result in ineffectiveness or chemical burns. Rhythm in walking back and forth is needed in order to judge the approximate gallonage for each 1,000 square feet. Not all fungicides are applied in a liquid state. Some are applied dry using many different forms of carriers. Some superintendents choose to do all the fungicide spraying themselves. They realize a putting green, once lost, can never be replaced at the height of the season. Applying the fungicide material at half-rate, but making two applications at right angles, is a sound practice. Other practices vary from high pressure mist booms which shoot the material across a green without walking on it, to vehicles that ride across and around greens. Many methods of accomplishing the fungicide program have been tried and have met with varying degrees of success. Your method may not be the same as your neighbor's method. However, if your program shows results and you are satisfied with it, stick with it and continue with it. It's difficult to argue with success.

#### Fairway Measurements

Fungicide applications are not uncommon on fairways today. Again we come to the problem of determining how much area there is in any given fairway. Remember, there are 43,560 square feet in an acre.

By knowing the average width of any fairway, the following chart will give you the approximate fairway acreage involved:

35 yards wide, each 140 yards in distance = approximately 1 acre.

40 yards wide, each 120 yards in distance = approximately 1 acre.

50 yards wide, each 100 yards in distance = approximately 1 acre.

60 yards wide, each 80 yards in distance = approximately 1 acre.

70 yards wide, each 70 yards in distance = approximately 1 acre.



*Measuring fungicides can be done in a number of ways. Just be sure your method has been accurately calibrated and closely followed.*

Using the right nozzle at the recommended height for an even pattern or degree of spray application is important on fairways. To determine this, first look at your nozzle. The first two numbers represent the degree of spray. If your spray boom is set 17 to 19 inches above the ground, an 80-degree nozzle is suggested. From 19 to 21 inches, a 73-degree nozzle will do the best job, and from 21 to 23 inches, a 65-degree nozzle is necessary.



*A new disease? Not really. It was reported in 1932 by Monteith & Dahl in The Green Section Bulletin. Nevertheless, Ophiobolus graminus has been reported more frequently on Pacific Northwest fairways in recent years.*

The numbers on the nozzle also act as a guide to the g.p.m. (gallons per minute) the nozzle will deliver at 40 p.s.i. (pounds per square inch). Count three spaces from the left, place your decimal; the remaining numbers will determine the g.p.m.

#### **Sprayer Conditioning**

Keeping your power sprayer in top condition at all times is essential. A suggestion would be to have one power sprayer for fungicide use only and a second sprayer for your herbicides. Should you not have two, be cautious in cleaning out the tank after using herbicides. A standard cleaning suggestion is one using a quart of household ammonia in 25 gallons of water. Wash the tank, hose, and boom thoroughly. Then run another 25 gallons of clean water through the tank, hose, and boom.

Having a clean piece of spray equipment available is just another step in today's good turf management practices. For those wooden barrel spray tanks, when they are out of use in the winter, put 4 to 6 soaked burlap bags inside the tank before sealing it up. This should keep adequate moisture in the tank, allowing little, if any, of the wood to dry out.

#### **The Fungicides**

Fungicide materials containing mercury can be classified as organic or inorganic. The reason is simple. When mercury is combined with an

inorganic acid it is termed an inorganic mercury compound, and when it is combined with an organic acid it is termed an organic mercury compound.

Mercurial fungicides should be handled carefully. Air temperatures at time of application play an important role. Normally it is advisable to build up the resistance in a plant by beginning early in the season with a mercurial fungicide. When temperatures exceed 80° F., mercury materials can cause a grass blade burn. It would be best to cut your normal rate by  $\frac{1}{4}$  or  $\frac{1}{2}$  the dosage and apply the fungicide more frequently when temperatures exceed 80° F.

#### **Timing**

The actual time for beginning a preventive fungicide program is determined by weather conditions, grass species, or early evidence of the disease. Fungicides are more effective when fungal populations are low.

Actually, the preventive fungicide gives a coating to the external leaf surface, preventing infection by fungal parasites. This type of protection stops the diseased area from spreading. It will not cure diseased plants. A preventive fungicide program may leave a coating on the plant surface for a week or more. This will depend upon mowing practices and weather conditions.

#### **Measuring Materials**

Fungicides can be damaging to plants if they are used at higher than recommended rates. Every caution should be taken at time of application to be sure that the exact amount is being applied to the given area. Different measuring devices are used; beakers, bottles, tin cans, scales, etc. Any measuring device is acceptable so long as you know it has been accurately calibrated and is being properly used.

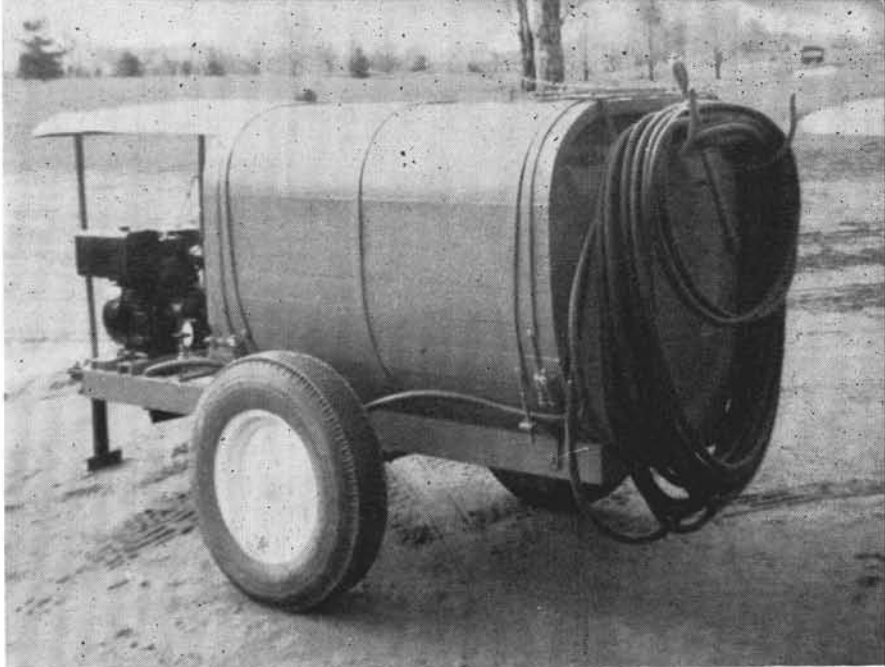
Keep a chart or log of the dates, temperature, and time of application, and also the fungicidal material used. Practice using mixtures of fungicides, or alternating specific fungicides of your choice. Fungi may become semi-resistant to a particular fungicide, and if mixtures or alternate fungicides are used, additional protection is given to the turf plant.

#### **Mixing With Other Materials**

At the time of fungicide applications, fertilizers, insecticides, iron and a host of other materials are sometimes added to the con-



*"We would be lost without it." Four to six wet burlap bags placed in wooden spray tanks prevents drying out during winter storage.*



coction. This is not the most practical method of applying the different materials. Frequently there is a wide difference in the amount of water carrier recommended. Although it is a poor maintenance practice, it is being used occasionally, and is justified because of high labor costs, heavy traffic, time available, etc. Should you ever find it necessary to use a mixture, by all means know the compatibility of each material.

#### **Contributors To Diseased Turf**

Many factors influence the activity or incidence of turfgrass diseases. Some develop under low soil fertility conditions. If overfertilization is practiced, soft, succulent turf results and it is equally, if not more susceptible to disease.

Temperatures, available moisture and humidity play key roles. Poor water management must place high on this list. Inopportune thunderstorms with high humidities, heavy fog and dew, and 'casual' water caused by poor surface or internal drainage all take their toll. Different fungi respond to different temperature ranges as pointed out on an earlier chart. All of these factors are influenced by air movement through turf areas and point up the importance of good air drainage.

Thatch accumulation invites fungi activity in several ways. Excessive thatch retains considerable moisture and high humidity develops within its micro-climate zone. Disease-producing spores thrive and multiply and finally become epidemic in proportions. Thatch accumulation also reduces water, air and nutrient movement into the soil and root zone, thus weakening the

grass plant. Of course, some thatch is necessary. From  $\frac{1}{2}$  to  $\frac{3}{4}$  inch on any green can be managed with today's machinery. But when thatch is in excess of this, one must become concerned and consider corrective measures.

Physically bruising or damaging turf, whether by machinery or by golfers, can also spur a disease attack. Frequent mowing under stress conditions, or removing excessive clippings leave the plant in a weakened condition and open to disease attack.

In fact, **any practice** or condition that weakens the grass plant and places it under severe stress contributes to turf loss through disease.

A strong cultural program will do much to guard against and prevent disease activity. Careless management practices have no place on today's golf courses. Educate your employees. Keep greens firm. Have adequate surface and internal drainage. Watch your water management practices closely; indeed very closely. Aerate, vertically mow, and keep the thatch zone within manageable reason. Plan and follow a good fertilizing program. Keep mowers sharp and never bruise the turf by turning machinery on greens or tight collars. Provide adequate air drainage and, above all, set up a strong preventive fungicide program this year!

With present machinery; with the excellent fungicides now supplied to us by the chemical industry; and with today's know how in turf management, we never have been in a better position to develop a sound turf management program free from disease.