

### Methods of Golf Turf Disease Control

With the increasing demand for better turf by the golfing public, particularly on putting greens, the greenkeeper is compelled to stimulate an artificial growth of grass with its attendant increase in severity of disease. Each disease has distinct symptoms, and the greenkeeper should learn to know these symptoms in order that he may choose the proper method of control. The aim of plant-disease control is not to cure plants, or parts of plants already diseased, but to prevent the spread of disease to parts or entire plants that are still healthy.

When large numbers of plants of the same species or variety are grown close together the opportunities for the spread of disease from one favorable host plant to another are enhanced. When plants are stimulated by intensive culture and abundant fertilizer they become better mediums for many fungus growths and thus more susceptible to serious damage from diseases. Therefore diseases often occur more frequently and more seriously on good turf than on poor, neglected turf. Intensive culture of plants also tends to increase the danger from several nonparasitic diseases, because some of the daily practices used in maintaining putting green turf may have a harmful cumulative effect on the grass.

The control of turf diseases essentially involves three principles of plant-disease control: the use of disease-resistant grasses, the employment of correct cultural practices, and the judicious use of fungicides.

#### DISEASE CONTROL WITH RESISTANT VARIETIES

It has been observed for generations that there are different degrees of resistance to disease in many species of plants, but this phase of the subject has only recently been studied extensively. Theophrastus, in 286 B. C., recognized a difference in resistance of grains to rust, but no attempts at artificial selection were made to improve the plants cultivated, such as have been made so successfully in modern times.

There are many degrees of disease resistance in plants. A resistant plant is one which is not attacked by a fungus except under conditions which are unusually favorable to the fungus and unfavorable to the plant. A plant which is never attacked by a fungus, even under favorable conditions, is said to be immune. Varieties of plants have often been considered immune to a disease because no attacks had been observed, but when the plants were grown under conditions more favorable for the attack the disease caused slight damage. Such varieties of plants are considered highly resistant but are not classed as immune.

There are two ways in which disease-resistant plants are obtained; by selection and by breeding. By selection, a search is first made for naturally-resistant individual plants, and propagation is made solely from these, excluding seeds or cuttings from any plants susceptible to the disease. Several seasons may be required to develop a resistant plant. In selecting resistant plants it is important to select not only for resistance but for desirable types. The second way, breeding, consists essentially in creating new varieties by crossing disease-resistant plants with other plants. It often happens that disease-resistant plants are of poor type, and it may be necessary to cross them with

plants susceptible to the disease in order to improve upon the type of the resistant parent.

#### Disease-Resistant Turf Grasses

There is a wide variation in the resistance to diseases among the different grasses, particularly on the putting greens where the most serious disease problems occur. This variation is found not only among the different species of grasses, but also among the different strains within a single species. Particularly is this true with creeping and velvet bents, some strains of which are resistant to some diseases while susceptible to others. No strain of these bents has thus far been proved to be immune to brownpatch or to dollarspot although many have been found to be highly resistant to these diseases. Disease resistance is influenced largely by cultural practices, site of the green, and age of the turf. These factors vary to such a degree that a strain of grass which is resistant on one putting green may be very susceptible in another location where conditions are more favorable for the development of disease. It is impossible to compare the relative resistance of two grasses on different courses or even on different

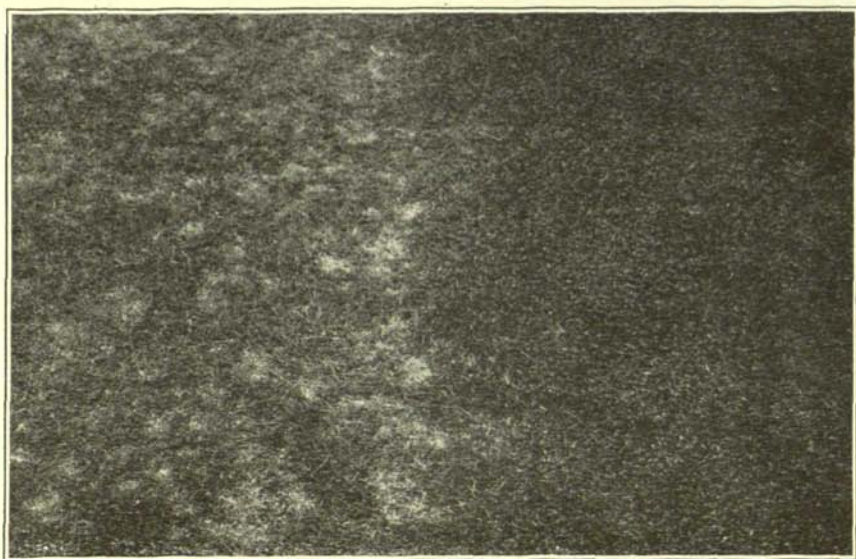


Figure 10.—Difference in resistance of strains of creeping bent to dollarspot. On the right is the Metropolitan strain, which is highly resistant, and at the time the photograph was taken it was entirely free from the disease. On the left, immediately adjoining, is the very susceptible strain of Columbia creeping bent. Both plots were planted at the same time and grew under identical soil and cultural conditions. The economy in the use of resistant strains is obvious.

putting greens on the same course. Only when grasses of the same age are grown side by side and given the same treatment can comparisons of relative resistance be made.

Brownpatch occurs with widely-varying severity on the different strains of creeping bent. Washington creeping bent is much more resistant to brownpatch than is Metropolitan; seaside creeping bent is moderately resistant; and colonial bent is very susceptible to it.



The different strains of velvet bent have varying degrees of susceptibility. The disease in the early stages seems to cause little damage to velvet bents and, if treated, the damaged turf recovers quickly.

Dollarspot attacks Metropolitan creeping bent, colonial bent, and some strains of velvet bent less frequently than Washington, seaside, and some other strains of creeping and velvet bents which are found to be rather susceptible to it.

Spotblight occurs most frequently on Columbia creeping bent, colonial bent, and some strains of velvet bent, and fescue, when the conditions of moisture and temperature are favorable. Severe attacks have occurred on more-resistant strains of creeping bent when conditions have been unusually favorable for disease development.

Snowmold occurs infrequently on Metropolitan creeping bent, some strains of velvet bent, and colonial bent. It occurs frequently on Washington and Virginia creeping bents but usually not severely.

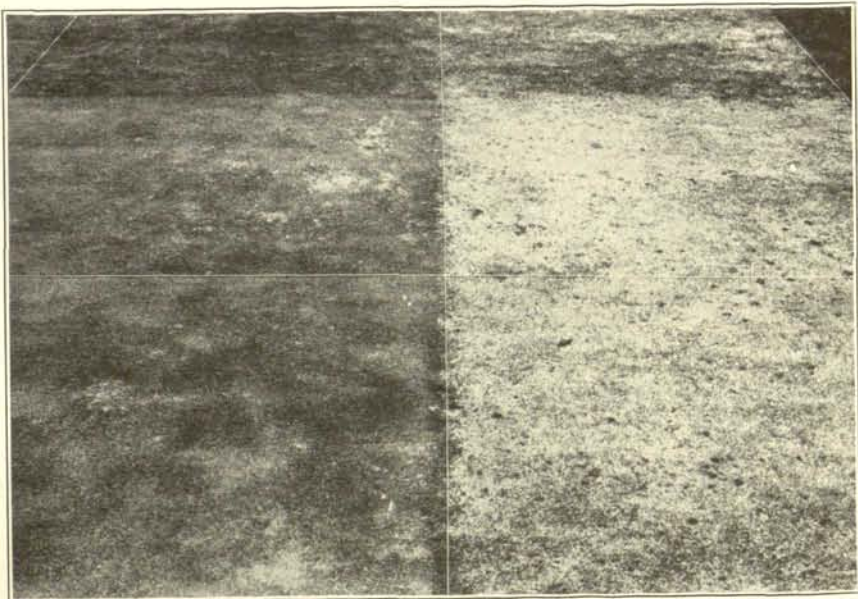


Figure 11.—The difference in disease resistance among strains of grasses is sometimes remarkable. Here Washington creeping bent (left) and Virginia creeping bent (right) are growing side by side. The latter is ruined by zonate eyespot, a disease to which the former shows marked resistance. The turf in the background is not cut as close as that in the foreground and the disease is not causing as much damage on the long grass. The scattered injury to the grass on the left was caused chiefly by dollarspot.

Columbia and seaside creeping bents, and fescue are the most susceptible to it.

The zonate eyespot is most virulent on Virginia creeping bent. It occurs on other turf grasses in such slight attacks that they generally escape notice.

The growing conditions of the plant determine in a large measure its resistance to disease. Even an exceptionally resistant species or strain of bent may become susceptible under certain cultural prac-

tices. Therefore it is not possible to select a resistant strain and then have it remain resistant regardless of cultural practices. The most desirable turf is produced by a strain of grass which is naturally resistant, treated in such a way that conditions are always unfavorable for injury from any source. All of the grasses used on putting greens must be treated with fungicides for fungus diseases, the amount and frequency of the fungicidal treatments varying with the natural resistance of the grasses together with the conditions under which they are growing.

#### DISEASE CONTROL WITH CULTURAL METHODS

The selection of resistant varieties or strains of plants is the first step in controlling diseases; but that method would be ineffective if the occurrence of disease was not discouraged by other means. The first attempts to control plant diseases, as referred to on page 99, led to the development of certain cultural practices which served to decrease greatly the occurrence or severity of diseases. Many of the cultural methods devised for controlling diseases of farm crops can not be applied to golf course practices, because of the wide difference between cultural methods used in handling certain annual or biennial farm crops and the care of turf which is planted with the view to being more or less permanent. On the other hand, there are many cultural practices suitable on golf courses that would be impractical on a farm.

To understand the value of cultural practices in disease control one may therefore take a lesson from the farmer. Practices of this nature widely used by farmers are crop rotation, drainage, irrigation, application of lime and fertilizers, proper preparation of the seed bed, cultivation to create a mulch to prevent loss of soil moisture, seed selection in order to guard against obtaining seed from disease-infested areas, and planting at a time to avoid disease attacks. Further, after the plants are up, removal of infected plants or parts of plants, prevention of wounds on the plants, and avoidance of disseminating the parasite, are common practices that prevent certain diseases from becoming more serious.

After harvest it is necessary to burn the crop remains and other refuse to control some diseases. The destruction of wild host plants and of complementary host plants of the causal organism is also practiced. In general, crops are not planted in locations where diseases are apt to occur, such as in fields where the previous crop was badly infested, or on sites where topographical conditions are favorable for the development of the causal organisms.

The above is a general review of many ways in which the occurrence of a large number of diseases may be discouraged. A disease can not usually be completely controlled by cultural practices alone, but may be discouraged so that direct control measures can be effective. A number of different cultural practices, together with the application of a fungicide, can often completely protect a crop from the ravages of a serious disease.

#### Soil Preparation in Relation to Disease Control

A great many of the troubles of some greenkeepers would be lessened if their putting greens could be rebuilt according to modern improved methods. The unhealthy grass and poor putting surfaces of many putting greens are due entirely to faulty construction. Fre-