

When Brown-patch Appears

By JOHN MONTEITH, JR.

Associate Pathologist, United States Department of Agriculture

IN the June number of THE NATIONAL GREENKEEPER it was explained that brown-patch disease of turf was caused by a fungus feeding upon the blades of grass. This fungus or mold is a plant and therefore influenced by a great variety of favorable and unfavorable soil and climatic conditions just as are grass or other living plants. It is well known that golf course grasses have a fairly definite range of temperature most favorable for their growth. In cold seasons grass is checked and finally becomes dormant, whereas in periods of excessive heat it is likewise checked. However, the extremes of heat and cold, as well as the most favorable temperature, vary with the different grasses.

Thus Bermuda grass and *Poa bulbosa* which may both be used in the same piece of sod appear at different seasons due chiefly to this difference in response to temperatures the former producing the turf during the summer months but becoming dormant during the winter months when *Poa bulbosa* succeeds it. Grass often does not receive enough fertilizer; and occasionally it is given too much. Most growing plants may be checked by an insufficiency or an excess of water. Likewise there might be cited any number of conditions which most greenkeepers well know may alone or collectively affect the growth of grass.

Influences of Soil and Climate

In the same manner the plant (fungus) causing brown-patch is influenced by various soil and climatic conditions. A condition which is most favorable to growth of a certain grass may also be most favorable to the growth of a fungus, but frequently the effect is opposite. Moisture is an example of the latter. Periods of excessive rain, watersoaked soil, heavy dews and little sunlight are unfavorable to grass, and cause it to develop a growth which greenkeepers usually speak of as "soft". Although such a period is unfavorable to growth of grass, it is most favorable to the growth of most fungi. Under such circumstances if other influences, such as temperature for instance, are favorable for the growth of the brown-patch fungus, the disease will soon appear.

From the standpoint of control of brown-patch it is



John Monteith, Jr.

Mr. Monteith's field in his connection with the U. S. Department of Agriculture is the investigation of forage crop diseases, and for several years he has been conducting experimental work on the identification, cause and cure of the diseases of golf turf on plots furnished by the United States Green Section for this purpose. In a later article Mr. Monteith will describe the methods he has used in controlling Brown-patch and the results of his careful experiments. Prior to the scientific investigation for which Mr. Monteith is responsible, many putting greens were completely destroyed by this turf disease.

therefore apparent that if one could keep all the conditions of soil and climate such that they would be most favorable for the growth of grass and unfavorable for the growth of the fungi causing brown-patch, there would be no such disease. Obviously such ideal conditions cannot be maintained throughout the summer in most sections of the country since they involve so many complicated conditions; including moisture, temperature, fertilizers, sunshine, air circulation, drainage, proper soil texture and many others.

But even though one can not control all of these it is often possible to greatly reduce the damage caused by brown-patch simply by modifying one of these factors to throw the balance in favor of the grass. These possibilities will be merely suggested in this article without giving any discussion of the various methods available to greenkeepers for such modifications. In many cases any changing of these conditions is practically impossible due to local circumstances, but in other cases a greenkeeper who carefully examines his course may

find that some attention to these matters may greatly check and at times entirely prevent brown-patch on his most troublesome green.

There are several chemicals which prove effective against brown-patch disease but, as in the case of human diseases, it is more desirable to first give careful consideration to the various conditions influencing the health and vigor of the grass; using chemicals (medicines) as a last resort. For this reason some of these environmental factors affecting brown-patch will be mentioned first.

Original Construction Flaws Contribute

In dealing with turf diseases the construction and maintenance of a green is of primary importance. If the location and soil of a green are unfavorable for the growth of grass, the injuries caused by diseases are of much greater consequence for the damage may not only be more severe but it will be more lasting due to the slow development of new grass to hide the scars. For this reason the construction of a green may always have a bearing on the severity of brown-patch on that partic-

ular green. Poor soil; poor drainage, both surface and sub-surface; layers of sand, ashes, clay or other unsuitable material near the surface; steep mounds which dry out quickly; and many other construction flaws all serve to contribute to lack of vigor of grass and therefore indirectly have a bearing on damage by brown-patch.

This is not meant to imply that expensive construction is always best for it is well known that some of the most elaborately constructed greens in the country are from the standpoint of grass maintenance, far inferior to many where the construction consisted simply of the ordinary procedure of plowing and harrowing.

The drainage problem is an important one in brown-patch control for the fungi causing this type of disease are directly affected by moisture. This is especially the case with large brown-patch. Where drainage was not considered in the construction plans or where provisions are inadequate, it is usually a relatively simple matter to correct this mistake without too great an interruption of play. It must be remembered that, regardless of tile or other sub-surface drains, surface drainage is of utmost importance especially in the heavier types of soil. It cannot be assumed that a green is well drained simply because it is on high ground. Frequently a high green

even on a steep hillside is badly water-logged because no provision is made to carry off the water that seeps out from the soil above.

Open Up "Air Pockets"

Provision for "air drainage" is another item frequently overlooked in building greens and this results in the so-called "air pockets" where during hot periods the absence of breeze and the high humidity is distinctly noticeable as soon as one walks into such an area. Such humid conditions are extremely favorable to the large brown-patch fungus. In many cases it is practically impossible to correct this difficulty but there are many greens which could well be ventilated by cutting out a few trees or branches from the direction of the prevailing wind.

Early Morning Watering

Damage by brown-patch can frequently be greatly reduced by modifying the watering of greens. Since these fungi are helped by water, especially in the form of heavy dew, it is desirable to remove dew from the grass as early as possible during periods when the brown-patch fungi are active. A light sprinkling early in the morning will wash the large drops of water from the grass blades and cause them to dry more quickly. Evening sprinkling on the other hand will moisten the grass



Two strains of creeping bent growing under identical conditions. The resistant strain at the right remained healthy during this attack of small brown-patch

early and create favorable conditions for fungi during a longer period than would be the case if the turf remained dry till dew settled upon it. Therefore, wherever practical it is more advisable to sprinkle greens early in the morning whenever brown-patch is developing. Otherwise greens may be watered at any time, day or night. General early morning watering is not recommended for brown-patch control for the reason that many times when the disease is spreading the greens already have too much water and additional sprinkling would serve to further aggravate this water-soaked condition. On such occasions the common method of "whipping" the greens with bamboo poles to remove the drops of dew is preferable. Dragging a rope or hose across a green serves the same purpose and will usually cause the grass to dry more quickly than if left undisturbed.

Fertilize After Checking, Not Before

The proper use of fertilizers also is important in fighting brown-patch. Excessive use of those which will produce a soft growth of grass during a period when the disease is active will usually result in greater damage. On the other hand, after the disease has been checked a light application of fertilizer to stimulate the grass quickly will produce enough new blades to soon hide the browned scars. Long grass, at least as long as can be allowed on greens, apparently is as susceptible as closely clipped turf so, from the standpoint of disease control, there is nothing to be gained by changing the regular mowing schedule.

Varieties Grass Resistant to Disease

Another means for reducing the damage caused by brown-patch is that of using resistant varieties of grass. In many of our agricultural crops there have been developed during recent years varieties which are better able to withstand attacks of disease. Some of these specialized varieties have made it possible for farmers to produce crops where seed of the common varieties is practically worthless. So far there has been little done in developing grass resistant to diseases. There are, however, a number of strains of bent and fescue which show striking possibilities for future development along these lines. The two most commonly used strains of bent which show marked resistance to brown-patch are the Washington and Metropolitan, as distributed by the Green Section of the United States Golf Association. There are others which show promise. Some of the so-called resistant or "immune" strains have never been sufficiently tested and most of them probably are little better than average in this respect.

It is perhaps well to define more clearly what is meant by resistant strains. To be classified as "resistant" to a disease, a strain of grass need not be "immune." When

various strains of grass are grown side by side on the same soil where they receive the same fertilizers, watering, clipping and in every other way are treated in the same manner, it is apparent that some of them are regularly the first to be affected by brown-patch and that others are usually the last to be affected. Those which are first attacked and most severely injured are classed as the most "susceptible", whereas the last to be affected are most "resistant."

In mild attacks of disease the resistant varieties frequently are in no wise affected, but when brown-patch is especially active it is able to injure even the most resistant strains that are at present available. There have been strains of grass advertised as "immune to brown-patch" but so far we have not seen a strain possessed of such marvelous qualities. Nor is it likely that a fine turf grass capable of withstanding attacks of the brown-patch fungus under all conditions will be developed in the near future; if indeed it is ever likely to be accomplished.

For the present we can hope only for resistant strains which will be able to withstand mild attacks of disease and which are capable of quick recovery when injured by severe attacks. Such resistant varieties when given the proper soil conditions and when properly cared for will greatly reduce the need for chemicals in checking brown-patch during the greater part of an ordinary summer.

Climatic Conditions Affect Control

In spite of all precautions in construction and maintenance of greens, there are times when the climatic conditions are such that the brown-patch fungi are given every advantage, and disease is sure to develop unless further precautions are taken.

As in the case with most of our other plant diseases, there are certain chemicals which are poisonous to the fungi causing brown-patch but which are harmless to grass, at least in the concentrations needed to check the fungus. In controlling many orchard and vegetable diseases it is customary to spray or dust with mixtures containing some compound of sulphur or copper. The first attempts to control brown-patch naturally included some of these mixtures. Unfortunately, sulphur compounds at once proved ineffective against brown-patch and also were poisonous to grass.

The Danger in Use of Bordeaux

Mixtures containing copper (especially Bordeaux mixture) were found to be effective against large brown-patch but were of little value against the dollar-spot type. Bordeaux mixture soon became generally used on golf courses. It was later found that the copper contained in this mixture accumulated in the soil from year to year and finally there was sufficient of it to become extremely poisonous to the roots of grass. As a result, on most

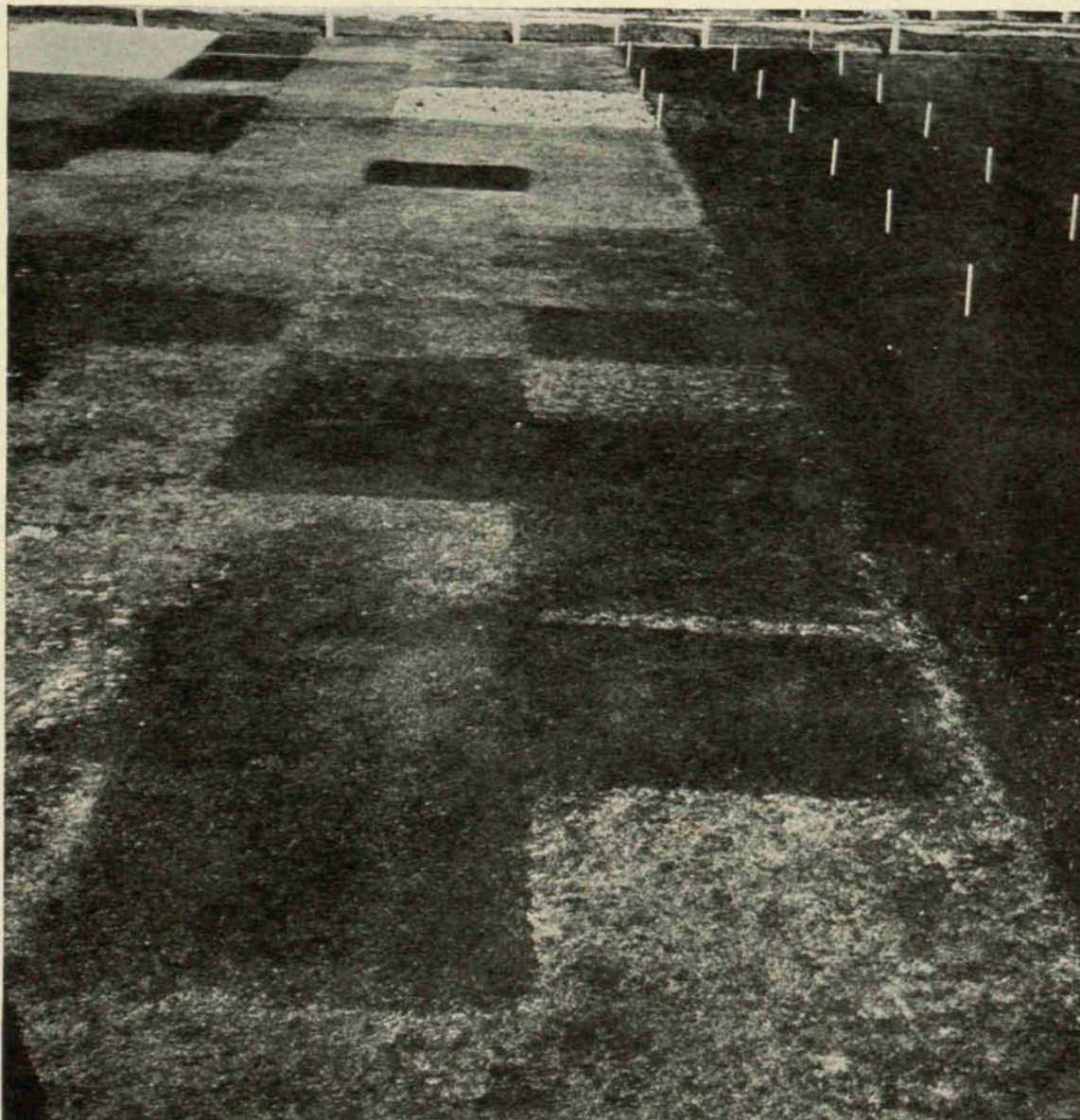
courses, it is considered unwise to take a chance with this accumulation of copper in the soil; consequently, Bordeaux mixture is now little used against turf diseases.

Experiments with Mercurial Compounds

Later experiments showed that various chemicals con-

Uspulun. These two preparations are practically the same chemically and are equally effective in controlling brown-patch.

In the tests conducted during the last few years at the Arlington Turf Gardens, under the auspices of the Green Section of the United States Golf Association, it has been found that there are many chemicals



Control of brown-patch with chemicals. Experimental plots at Arlington Turf Garden where various chemicals are tested. The dark squares are of healthy grass previously treated with several different mercury preparations

taining mercury were effective against both types of brown-patch. Mercury compounds, especially bichloride (corrosive sublimate), have been used for many years against various plant and animal diseases but were not used against turf diseases until recent years. Two of the chemicals containing mercury which have been widely advertised during the past two years are Semesan and

containing mercury which apparently are equally effective in checking these diseases. There are differences in the degree of "burning" of grass caused by these mixtures so that some of them are more desirable than others.

Thus bichloride of mercury which is more likely to cause a burn must be used with more care than either

(Continued on page 31)

When Brown-Patch Appears

(Continued from page 21)

Uspulun or Semesan. However, it has a decided advantage over these preparations in its effectiveness in bringing up earthworms, in addition to lower cost. Its use, however, must be restricted to cooler weather or to courses where more than average care is exercised in applying chemicals to greens.

During the past season it was found at Arlington that calomel was valuable in controlling brown-patch and promised to become a valuable chemical for greens. It will be widely tested during the present summer and we shall soon know how generally it may be recommended for golf course use. No attempt will be made to give here the rates for applying these chemicals. The companies who sell them have followed closely the tests at the Arlington Turf Gardens and the recommendations made as a result of these tests are generally those given in the directions sent with these chemicals.

In general it may be stated that none of the mercury mixtures will prevent brown-patch for any definite period. The period of prevention following a treatment will vary from a couple of days to several weeks, depending on the severity of the disease, rainfall, temperature and probably many other conditions which are as yet not determined. These preparations may be applied in larger quantities than are usually recommended and will usually give longer protection for the larger amounts.

However, this increased protection does not increase in proportion to the increase in cost. Thus if one pound per 1000 sq. ft. will protect a green for 2 weeks it does not follow that 2 pounds will offer protection for twice that time; instead the additional protection is usually little more than a few days and therefore it is economical to use the lower rate of 1 pound.

On the other hand a smaller quantity than is usually advised will check the disease under most conditions and many greenkeepers will find that the cost of the treatments can be greatly reduced by using smaller quantities. If one reduces the amount of material too low the applications will have to be so frequent that savings in cost of material will be more than counterbalanced by the increased labor costs of repeated applications.

DON'T FORGET

to send in all information possible covering attacks of SNOW MOLD on your course.

Please mail complete reports to Association headquarters,

405 Caxton Building, Cleveland

DEPENDABLE SEEDS

To use
clean, dependable
seed
is an important step
in developing
good turf!

An opportunity
to quote you
will be appreciated.

THE PHILADELPHIA SEED CO.

Refiners of

Imported and Domestic Grass Seeds

103-105 Arch St.

Philadelphia, Pa

Greenkeepers

will find the Spalding line of Golf Course Supplies unsurpassed in point of quality, workmanship and completeness.

Steel Hole Cutters

Improved style with point for centering, and device for ejecting earth.

Turf Cutters

For repairing greens and tees. Eight inches in diameter.

Hole Rims Rim Setters
Tee Stands Teeing Plates

Marking Flag Supports and Poles.

Direction and Marking Flags.



Stand



Setter



Write for catalog.
Mailed on request.

A. G. Spalding & Bros

New York Chicago Philadelphia San Francisco
—and all Principal Cities