

Diseases of Bermudagrasses

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Bermudagrass, *Cynodon dactylon* (L.), has a wide adaptation and is therefore subjected to many diseases and adverse weather elements. Bermudagrass is believed to have been introduced from Africa or India. It is reported to have been brought to Savannah, Georgia, about 1751 in hay for horses or for packing purposes. This grass is very versatile, being used in all phases of sports, lawns, parks, and school grounds. In some areas, it is considered a noxious weed but it is often cursed and praised at the same time.

Bermudagrass is a warm season perennial, growing best with temperatures above 70° F. It will suffer with prolonged high temperatures accompanied by a shortage of water. Lack of cold hardiness limits the northern distribution, but new selections are gradually extending the area to which it is adapted. One reason for wanting to grow it on golf courses farther north is the desired playing condition it creates. Demands for better turf keep standards high for disease-free bermuda. Because of greater interest in diseases there is a need for still further evaluation on new selected bermudas.

Unfortunately, bermuda becomes dormant during the winter months except in the extreme southern portion of the United States. Bermuda on greens commonly is overseeded for winter play. Even fairways and tees are overseeded in some cases to mask the brown color. Overseeding creates two transition periods on the greens, one in autumn and the other in spring. Sometimes the spring transition can hold an unpleasant surprise. Frequent examination of rhizomes and stolons

prior to the transition period in the spring can cause one to expect survival of bermuda following a severe winter. Subsequent late spring cold spells and disease activity may sometimes cause loss of turf after it apparently has survived the winter.

The transition of bermuda greens from cool season grasses in 1965 has been very favorable. Nevertheless recent visits to courses in the lower Piedmont area and in northern Alabama and Tennessee have shown considerable loss of grass from disease during the winter months. The gross symptoms of the disease activity appeared as circular areas from 6 inches to 3 to 4 feet in diameter. This is similar to the spring dead spots so common in the Missouri, Kansas, and Oklahoma areas. Some areas are showing regrowth while others show only dead grass and young weeds. The selections of bermuda may vary in their susceptibility. Considerable numbers of these circular areas were observed in early May on Tifway and Tifgreen fairways three years old and none was observed where the grass was one year old. This may indicate a gradual build-up of disease in the bermuda after being planted 2 to 4 years. In another instance Tifway on the lawn at a local sewerage disposal plant shows no disease pattern where the basic sewerage sludge was applied while the area fertilized with inorganic fertilizers was pitted with dead patches. This turf is three years old.

Pathologists have done an excellent job in keeping abreast of fungicides and evaluating their uses on the many strains of bermudas which have been selected during the past 10 to 15 years. Most states have published home

owners bulletins and fact sheets on turf diseases and their control, but few are directed toward golf courses. However, the same diseases may be found on the same grasses regardless of the purpose for which they are used. The home owners using the new selected bermudas are experiencing the same disease problems as are golf courses.

In 1932, the USGA Green Section published a bulletin entitled "Turf Diseases and Their Controls" by John Montieth, Jr. and Arnold S. Dahl. This bulletin established basic principles, many of which are used today in identification and control of turf diseases. It said in part:

"The question as to when diseases first appeared on golf course turf will probably never be settled. Among the older golfers there are many who insist that turf diseases never appeared on golf courses in the good old days. Other golfers of equally long experience testify that they observed browned areas of turf similar to the modern turf ailments when they first played the game. Some of the old cuts showing players near the cup indicate that the putting greens of early days were by no means exempt from thin and perhaps dead patches of turf which were possibly the result of diseases. It has been demonstrated many times that memory is not dependable for recording information of this type. From all information available it is entirely safe to assume that turf diseases date back much further than the origin of golf. It is quite apparent, however, that early golfers were not as critical of the turf on which they played as are the golfers of today, and consequently the question of disease was to them of little importance."

It is interesting that the foregoing

paragraph was written 33 years ago and yet sounds similar to conversations today.

In 1962, Dr. C. L. Lefebvre summarized turf research throughout the United States as indicated by projects in the files of the United States Department of Agriculture, Co-operative State Experiment Station Service. Of these 6,000 projects supported in part by Federal funds, only 69 were connected with turfgrass diseases. Nineteen dealt primarily with diseases of turfgrasses or of other grasses. The other 50 were concerned chiefly with cultural problems but were related to pathology in such connections as breeding for disease resistance, and fertilizer effect on diseases.¹

MAJOR DISEASES

There are several fungi that attack bermudas but the ones that appear to be the most prevalent are species of the genera *Helminthosporium*, *Rhizoctonia*, *Sclerotinia*, *Fusarium*, and *Curvularia*. *Fusarium* species are active in the upper South during the winter, while *Pythium aphanidermatum* is very active on cool season grasses used for overseeding bermudas during warm periods. The frequency of attacks by these pathogens may depend upon variations in weather, growth, and vigor of the grass, the use of fungicides, the height of mowing, and other environmental factors. While local conditions may determine the pattern of disease activity to some extent, there usually is a similarity of behavior which appears to be independent of local conditions.

HELMINTHOSPORIUM

There have been about six species of *Helminthosporium* found on bermuda with varying degrees of damage, and no doubt there will be new ones as in-

1. *Turf-Grass Disease Problems in North America*, Dr. C. R. Gould, Golf Course Reporter



Diseased spots on this green appear to be caused by the "spring deadspot" disease. While this problem usually occurs on fairways, it appears capable of attacking turf on greens also.

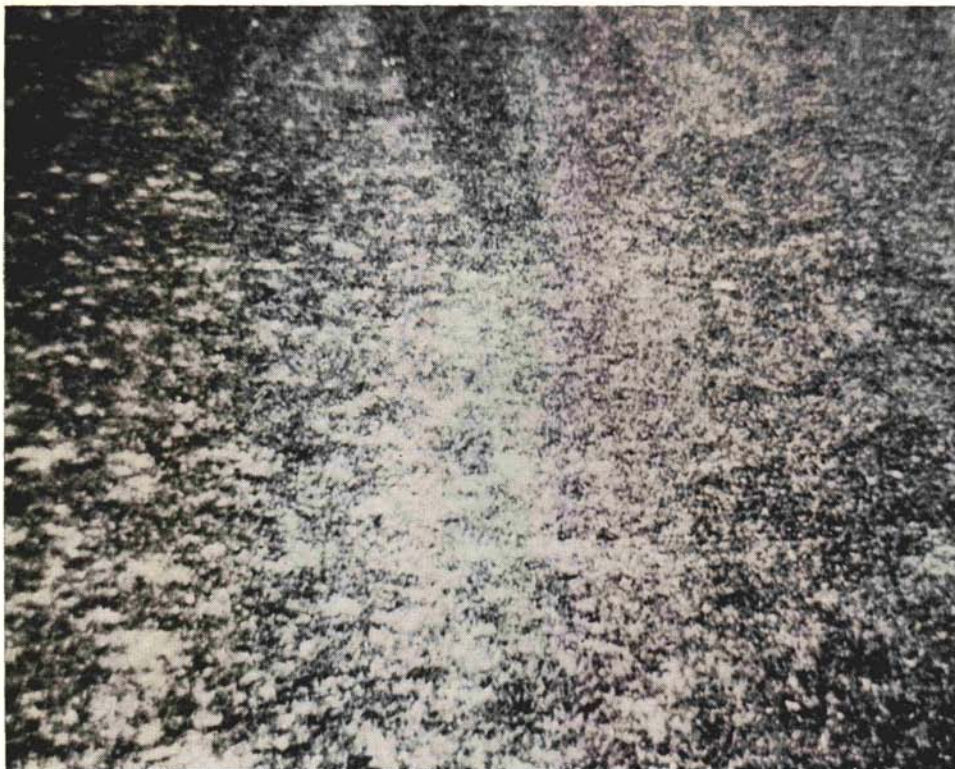
vestigations become more intensive. Symptoms of *Helminthosporium* are found on all parts of the bermuda plant in the form of small purple-like flecks. If these flecks are very numerous, indicating a serious infection, the plant begins to die. Under certain weather conditions, this disease can spread rapidly. While spores undoubtedly exist in turf in abundant numbers, airborne spores make it easy to spread and golfers track it from fairways and adjacent areas onto greens. Also, greensmowers may provide a means of transporting the fungi from infected areas into disease-free greens. *Helminthosporium* usually occurs in two stages, one affecting the leaf, the other

the rhizomes and the terminal crown. When the roots and crown are affected severely, the condition is referred to as "crown rot" or "root rot." These parts of the bermuda plants become dark or deep brown in color. They become limp and flaccid and decay occurs rapidly, permitting the affected parts to be torn apart easily.

The *Helminthosporium* species which have been found on bermuda are:

1. *Helminthosporium giganteum* causes a disease commonly referred to as zonate eyespot. It was first reported on bermudagrass in Texas in 1911.² It has an extended period of growth but usually occurs during times of excess moisture and warm weather. This

2. *New Species of Texas Fungi*, Head, F. D. and Worf, F. A., 1911



Dollarspot is an unusual disease. It attacks grass that is inadequately fertilized with nitrogen. In this photo, the area on the left is unfertilized and diseased badly, while the well fertilized strip on the right is much less severely damaged.

condition is aggravated by irrigating at night during the summer. The spores can multiply on leaves of grass on the golf course. It can over-winter in thatch and debris or in living parts of the plants. The increased use of vacuum machines for picking up clippings from vertical mowed fairways, tees and greens should decrease the debris. This disease is very common on bermuda (*Cynodon dactylon*) and is readily recognized by large circular spots on the leaves. Early morning watering alone has helped to reduce the seriousness of the disease.

2. Helminthosporium vagans
Drechsler. The common name is Blue-

grass Purple Spot and shows the best growth during cooler temperature ranges of 30 to 70° F. The disease has a purple black to a reddish brown appearance, later becoming lighter in the center. While this species is most commonly associated with the leafspot disease of bluegrass, it can seriously damage bermudagrass as well.

3. Helminthosporium cynodontis
Marig. This fungus is common on bermuda in the southern United States, especially along the seacoasts, north to Washington, D.C. and west to San Francisco. It sometimes disfigures turf but is not a serious parasite. Natrass (1939) reported it as the cause of



A badly damaged flagstick area. The hole was left in one place too long during adverse weather conditions. Wear and disease combined to nearly eliminate the turf.

brown patch of bermuda lawns in Kenya.³ This fungus is also reported as being present on goosegrass or crowfoot. These two grasses may be good hosts for this particular species.

4. *Helminthosporium sativum*

P. K. B. was first described in Iowa in the United States in 1910 and in Russia in 1891. In Russia it is called *H. sorokinianum* Sacc. It seems that all our literature in the United States has used *H. sativum* and it is doubtful that it will ever be changed. The fungus appears to be universally adapted and is found on many turf grasses, mainly bluegrass. It is associated in the cereals with root rot and kernel blight.

The symptoms are purplish spots later turning light brown with purplish edges with age. In bermuda it is associated with brown blight and fading out. This is involved with what is known as the disease complex of *Curvularia-Helminthosporium*. Under environmental conditions the spores will germinate in 30 to 40 minutes. Temperatures of about 80° F. accompanied by sufficient moisture appear to be conducive to rapid development and infections may occur within 10 hours. Cooler weather will cause a decrease in disease activity.

5. *Helminthosporium siccans*

Drechsler is commonly called Brown

3. *Diseases of Cereals and Grasses in North America*, Sprague, Roderick, Ph.D.

Blight and is active during cool weather. The symptoms start at the tip, blighting the leaf or elongated spots, and is associated with the condition described as melting out.

6. Helminthosporium rostratum
Drechsler is called Leaf Spot and is found in a warmer climate. These fungi live in the soil as well as in thatch built up on many courses. The spores are spread by wind, traffic, and water.

7. Helminthosporium stenospilum
Drechsler is often called Brown Stripe and has been reported on bermuda-grasses. It appears as very narrow linear brown streaks becoming extensive later.

There is no doubt that with this *Helminthosporium* spp. collection, wherever bermuda is grown there is apt to be some possible infection when the appropriate environmental conditions exist. Fortunately, the new selected hybrid bermudas appear to be more resistant than the common *Cynodon dactylon*. *Helminthosporium* can be reduced in activity by a good maintenance program and can be controlled in most cases by fungicides. The organic mercury fungicides are fairly effective as are some of the rather complex organic materials. One of the common materials that appears to offer a boost to mercury fungicides is ferrous sulfate.

CURVULARIA

Curvularia is mentioned almost always as a part of the Curvularia-Helminthosporium complex. Although Sprague⁴ lists 4 species which attack grasses in North America, it is rather commonly believed that Curvularia on turfgrasses is a secondary ailment. It is seldom, if ever, found on grass that

has not first been injured by some other agent or organism. Curvularia is not easily identified and can be confused with *Helminthosporium*, drought, chemical burn, and even nutrient deficiencies. A pathologist should be contacted for verification. One of the best control measures is healthy grass. The same fungicides used for *Helminthosporium* are suggested for Curvularia.

RHIZOCTONIA

Brown patch, a disease caused by *Rhizoctonia solani* Kuehn is associated with high temperature and high humidity, and high nitrogen in relation to phosphorus and potassium. It is characterized by the presence in the turf of a ring which has a light brownish center and a bluish periphery. The "smoke-ring" at the edge of the circle is an indication of active growth. The size of the ring can vary greatly. The disease normally affects the leaves, sheaths, or culm bases of most turfgrasses and is considered to be a soil borne fungi. It survives the winter in plant tissue or in the soil surface in the sclerotial stage. The organism becomes active at about 67° F. but above 90° F. it is again less active. It has a wide range of host plants. It enters the plant through the stomates and the mowed or damaged part of the leaf. This is one reason that the mowers should be in excellent cutting condition at all times. Mercury base fungicides, PCNB, thiram, Acti-dione, and others are used for the control of this disease. Raising of the pH (5 pounds hydrated lime per 1,000 square feet) will sometimes reduce the disease as it does best under an acid condition. Removal of dew will help to reduce its progressiveness. Addition of nitrogen

4. *Diseases of Cereals and Grasses in North America*, Sprague, Roderick, Ph.D.

seems to aggravate brown patch and the diseased area may become larger.

SCLEROTINIA

Sclerotinia homoeocarpa, a pathogen causing the disease known as dollar-spot, is about the size of a silver dollar and has a white straw or bleached appearance. The small spots run together if the fungus is allowed to extend its infection, and the coalescing spots soon lose their original characteristic. Ormond bermuda is quite susceptible to dollarspot, but fortunately in Florida the use of nitrogen does an excellent job in reducing the disease. Usually dollarspot is not a problem on properly managed bermuda.

FAIRY RING

Fairy ring is usually associated with *Marasmius oreades*, *Agaricus campestris*, *Calvatia cyathiformis*, and *Lepiota morgani*, as well as numerous other species. These fairy rings are widely adapted throughout the world. Repeated heavy applications of phenyl mercuric acetate, captan, and other fungicides have been suggested as a control means. Deep aerification, fertilization and irrigation are practices which have helped the grass recover from this damage.

MULCHING GREENS AND TEES

Mulching of bermudagrass greens during the winter with clean straw,

pine needles, or some other type of fiber is practiced to some extent. Either the course is closed or the golfers play on temporary winter greens. By mulching, the bermuda starts growth earlier and the greens are in solid bermuda turf sooner in the spring. Before the greens are covered with a mulch, they should be treated with an organic base mercury fungicide or some other fungicide that will keep the disease activity to a minimum. It is advisable to leave the mulch on the bermuda until danger of heavy frosts has passed.

If bermuda greens are not mulched or played, disease can still be a problem. It is advisable that the dormant bermuda be sprayed 2 to 3 times during the winter to keep disease attacks to a minimum.

Tees that are mulched could be handled in the same manner as the greens, except usually a portion of the tee is played and then sodded in the spring where the grass is worn out.

Mulching, when practiced in combination with adequate disease control, will provide very satisfactory turf during the growing season. The club must decide whether this "insurance" is worth the trouble and expense of alternate greens and tees during the winter months.

PUTTING GREEN CONSTRUCTION ASSISTANCE

Greens constructed according to procedures outlined by the USGA Green Section must have a seedbed that conforms to a rather narrow specified range of physical qualities. The tests for determining the mixture of your materials which will most nearly meet these requirements are available through the Green Section. Cost of the analysis is \$100. Contact any Green Section office for further details. (See inside front cover).