

DISEASES OF SOUTHERN TURFGRASS AND THEIR CONTROL*

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A DECADE ago there were only two commonly recognized diseases of turf grasses in the South. These diseases were fairly clear-cut and distinct and could readily be recognized. The first of these diseases was called "DOLLAR SPOT", and was characterized by causing a spot in the turf about the size of a silver dollar (plus or minus fifty cents). The second disease was "Brown Patch", which caused a spot in the turf larger than that produced by "DOLLAR SPOT". These diseases did not always respond to treatments known to be specific for control of their casual agents. This was especially true for troubles diagnosed as "DOLLAR SPOT".

In recent years, the general knowledge about turfgrass diseases in the South has increased appreciably. This information has come from various sources, including disease-survey and fungicidal evaluation studies. The disease-survey work has included studies of numerous diseased turfgrass samples received from golf courses, grass nurseries, and professional gardeners as well as home owners from Florida, Alabama, Mississippi, Louisiana, Tennessee, North Carolina, South Carolina, and Georgia. The fungicidal evaluation studies have included tests of a wide variety of fungicides on some of the most destructive turf diseases. Effectiveness of recommendations for the control of known diseases throughout the Southeast have been studied. Generous use has been made of research conducted in other sections of the country for the control of certain diseases.

Disease Survey

Table 1 presents the ten most common turfgrasses used in the South, along with the number of diseases known to damage each grass in the United States and the

number of diseases which cause serious damage to the turf. Even though a number of factors enter into the use of different grasses for turf, susceptibility to diseases is frequently a limiting factor in the use of an otherwise valuable grass.

1. *Centipede*grass: There has been no serious fungus disease reported on this grass. However, plant parasitic nematodes have frequently been associated with Centipede grass failures and may be a major problem.

2. *Carpet*grass: A number of organisms that are damaging to other turfgrasses have been reported as occurring on Carpetgrass; however, they do not cause noticeable damage to the turf.

3. *Bahi*grass: Many strains and varieties of Bahi grass are susceptible to *Helminthosporium* "eyespot" and "culmrot", which may result in a very unsightly turf.

4. *St. Augustine*grass: The most prevalent disease of St. Augustine grass is "grey leafspot", which is caused by *Piricularia grisea*, and is omnipresent throughout the South. This disease may be of only passing interest, in some instances. However, it is frequently responsible for unsightliness and loss of turf over large areas. St. Augustine is very susceptible to *Rhizoctonia solani*, causal fungus of "Rhizoc" or "brown patch", and cannot be successfully grown on soil infested with this organism without following a rigid spray schedule.

5. *Tall fescue*: The most common disease of tall fescue is "net blotch" caused by *Helminthosporium dictyoides*. This disease has been observed killing out large areas of seedlings during the fall. Another *Helminthosporium*, *H. sativum*, has been observed as causing "culmrot" on tall fescue turf, and may completely kill out numerous areas. Tall fescue is extremely sus-

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ceptible to "Rhizoc" or "brown patch", and this disease is a major factor limiting the desirability of tall fescue for turf in the South.

6. *Bermudagrass*: Three *Helminthosporium* diseases, caused by *H. rostratum*, *H. cynodontis*, and *H. sp.*, have been observed causing considerable damage as "leaf spots" and "turfspots" on different strains or varieties of Bermudagrass grown for turf. Nematodes may be serious pests of Bermudagrass turf and represent a number of distinct diseases but are (for convenience only) treated as one disease at this time. Four diseases have been listed as serious on Bermudagrass. The recent release, however, of a new variety of Bermudagrass called "Sunturf", which is extremely susceptible to "rust", makes it necessary to mention "rust", caused by *Puccinia cynodontis*, as being a potentially destructive disease of Bermudagrass turf.

7. *Zoysia*: It may be noted in Table 1 that 8 diseases are reported as occurring on *Zoysia*, and that a question mark is placed for number of serious diseases. The eight diseases represent different organisms which have been associated with localized dying of *Zoysia* turf and may or may not become major pests as the acreage of *Zoysia* is increased throughout the South. These organisms include: (1 and 2) two species of *Helminthosporium*, (3) *Curvularia lunata*, (4) *Fusarium moniliforme*, (5) *Rhizoctonia solani*, (6) *Papulospora sp.*, (7) *Sclerotinia homoeocarpa*, and (8) a number of distinct species of nematodes.

8. *Ryegrass*: The following five diseases are considered serious on ryegrass turf: (1)

"cottony blight", which is a seedling disease during the warm humid fall season, (2) "brown patch" or "Rhizoc" which may attack ryegrass at any stage of growth when temperatures are 70° F. or higher, (3) "crown rust", which is especially destructive to ryegrass, cut at lawn height during the entire winter in the southernmost areas and in the late spring in the northern areas, and (4 and 5) the two "*Helminthosporium* leaf spots and turfspots" which usually are prevalent from January on throughout the ryegrass season.

9. *Kentucky Bluegrass*: More diseases (a total of 47) have been reported on Kentucky bluegrass than on any other turf species. Since blue grass is not usually subjected to the intensive management comparable to grasses used for golf greens, certain diseases that are serious on other species are not considered as serious diseases on bluegrass turf. The six serious diseases are: (1) "brown patch", (2) "dollar spot", (3) "*Fusarium* rootrot and culmrot", (4) "*Helminthosporium* leaf spot and fading-out" and (5 and 6) two "rust" diseases. The three most damaging of these diseases in the South are: (1) "brown patch", (2) "*Helminthosporium* leaf spot and fading-out", and (3) one of the "rusts" on Merion Bluegrass.

10. *Bentgrass*: Bentgrass has 36 diseases (eleven less than Kentucky bluegrass) which include the following ten that are considered to be serious: (1) "*Curvularia* melting-out", (2) "*Helminthosporium* leaf spot and fading-out", (3) "*Fusarium* culmrot and snow mold", (4) "rust", (5) "copper spot", (6) *Pythium* "spot blight"

TABLE 1
Significance of Diseases on Different Southern Turfgrasses

Turf Grass	No. of diseases	No. of serious diseases
1. Centipedegrass	4	0
2. Carpetgrass	14	0
3. Bahiagrass	8	1
4. St. Augustine	10	2
5. Tall Fescue	23	3
6. Bermudagrass	28	4
7. Zoysia	8	?
8. Ryegrass	20	5
9. Kentucky Bluegrass	47	6
10. Bentgrass	36	10

and "cottony blight", (7) "brown patch", (8) "dollar spot", (9) "snowmold", and (10) "fairy rings". The diseases that have been sent to this laboratory for diagnosis include: (1) "brown patch", (2) "*Carrularia* melting-out", and (3) "*Fusarium* snowmold", (4) *Helminthosporium*, and (5) one outbreak of "cottony blight" in experimental plots at Tifton.

Evaluation of Fungicides for the Control of Cottony Blight and Helminthosporium Turf Spots of Ryegrass

Limited fungicidal evaluation studies on both "cottony blight" and "*Helminthosporium* turf spots" of ryegrass were conducted during the 1953-54 and 1954-55

ryegrass seasons. The comprehensive disease control study outlined in table 2 was conducted during the 1955-56 ryegrass season. The "cottony blight" epidemic in 1955 was initiated by uniformly distributing over the test area a culture of *Pythium aphanidermatum* which had been grown on steamed ryegrass seed. "*Helminthosporium* turf spot" epidemics developed from natural sources. *Helminthosporium siccans* was the major cause of damage during January and February. *Helminthosporium sativum* increased in importance in March and appeared to be far more serious than *H. siccans* in April.

Disease ratings made eighteen days after establishment of the ryegrass and fungi-

TABLE 2.

Effectiveness of different fungicides for the control of "cottony blight" of ryegrass caused by *Pythium aphanidermatum* and "*Helminthosporium* turf spots" of ryegrass caused by *H. sativum* and *H. siccans* on experimental plots at Tifton, Georgia, during 1955 and 1956. ("Cottony blight" from artificial epidemic. "*Helminthosporium* turf spots" from natural infection).

Fungicide	Rate per 1,000 sq. feet*		Avg. No. of disease spots April 2, 1956**		
	First application sprayed on seed	Subsequent application sprayed on turf	Per plot 18 days after seeding	Average disease rating	Average turf rating
1. Control	—	—	14.0	8.8	6.0
2. Kromad	8 oz.	4 oz.	9.2	5.2	2.8
3. Caloclor	4 oz.	2 oz.	6.4	6.2	4.4
4. PMAS	3 oz.	1½ oz.	7.2	6.6	3.8
5. Cleary's (Exp.)	16 oz.	8 oz.	16.2	Discontinued	
6. Vancide 51	24 oz.	12 oz.	6.2	3.0	1.6
7. Tersan 75	12 oz.	6 oz.	7.8	4.6	2.6
8. Zineb (Z-78)	12 oz.	6 oz.	3.2	4.8	2.4
9. Captan 50-W	16 oz.	8 oz.	2.0	4.8	3.2
10. Actidione A***	1.2 g.	0.6 g.	9.6	9.2	7.4
11. Actidione B	2.4 g.	1.2 g.	5.2	9.0	5.8
12. Captan 50-W + Actidione	16 oz. + 1.2 g.	8 oz. + 0.6 g.	0.4	6.0	4.6
13. Actidione dust (1%)	120 g.	60 g.	16.9	8.8	6.0
14. Upjohn Exp. 2468 WK34 A	80 g.	40 g.	7.8	9.8	7.0
15. Upjohn Exp. 2463 WK34 B	160 g.	80 g.	9.0	9.8	7.8
16. PCNB	12 oz.	6 oz.	30.4	10.0	9.4

*First application on date of seeding. Subsequent rate of application at 10-day intervals. Applied with ten gallons of water per 1,000 sq. ft.

**One represents desirable rating and ten represents most undesirable rating.

***Actidione A and B are tablet form and differ only in rates. Indicated rates of Actidione A and B are rates of active materials. Rates of all other compounds are rates of formulations.

cide treatments reflect the effectiveness of the different compounds for control of "cottony blight". A number of fungicides reduced the damage caused by "cottony blight", but only Captain 50-W + Actidione, Captan alone, and Zineb gave sufficient control to be considered worth recommending.

The test area was not reseeded after the "cottony blight" epidemic.

Thus, the disease and turf quality ratings made on April 12, 1956, reflect the combined effectiveness of these compounds against the "cottony blight" outbreak in the fall and the "Helminthosporium turf spots" infestation during January, February, and March. Since the fall rating took into account only the number of spots per plot and not the size of the spots, along

with the fact that some "cottony blight" activity continued after the fall rating, the differences between fall and spring ratings for effectiveness of compounds do not necessarily reflect effectiveness for the control of "Helminthosporium turf spots." However, it is to be assumed that compounds receiving a good rating in the spring did give a high degree of protection against both diseases.

It is interesting to note that Tersan was a very poor fungicide in the 1953-54 season but appeared to do much better during the 1955-56 season. The difference is perhaps due to the fact that Tersan was applied at four and two times the rate used in 1953-54. On the basis of the first year's results (1953-54), the mercury-containing fungicides were superior, but the results

TABLE 3.
Suggested practices for the control of the more troublesome Southern Turfgrass diseases.

Disease	Recommended Control
1. "Brown Patch" or "Rhizoc"	Mercury-containing fungicides every ten to fourteen days while temperature is above 70° F.
2. "Gray leaf spot" of St. Augustine	Mercury-containing fungicides as needed.
3. "Helminthosporium leaf spot and turfspot"	Mercury-containing fungicides, heavy rates of Tersan, Vancide 51, Zineb and Kromad also look good and may prove desirable. Use the latter compounds at 2 x recommended rate.
4. "Curvularia leaf spot and melting-out"	On bentgrass Actidione and Mercury-containing fungicides; on the strictly Southern grass we prefer to recommend only mercury-containing fungicides.
5. "Cottony-blight"—Pythium	Captan 50-W + Actidione (one pound and 1.2 grams, respectively) per 1,000 sq. ft. at time of seeding and additional applications at ½ these rates as required by disease activity. Captan, Phygon XL, and Zineb are to be considered at rates recommended for Captan (one pound at time of seeding and subsequent application of ½ pound).
6. "Nematodes"	The new low phytotoxic nematocides look like the answer.

Microorganisms which are troublesome but aren't strictly disease producers.

7. "Slime Mold"	Remove with a heavy stream of water, any good fungicide will aid in control.
8. "Algae"	Good turf is best preventative, 2-5 lbs. of hydrated lime per 1,000 sq. ft. will kill Algae, any good copper fungicide should be of value.

Minor element deficiencies

9. "Chlorosis" or "yellowing" (primarily Centipede)	Foliage spray with ferrous sulphate or chelated iron for temporary relief, for permanent relief have soil tested, adjust pH, add iron, etc. as recommended.
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obtained from the heavy rates of application of Tersan, Vancide, Zineb, and Kromad suggest that further experimentation along this line is desirable.

Suggestions for Control of the More Troublesome Southern Diseases

Suggestions for the control of the more common turf diseases in the South are based on: (1) the identity of the disease-producing organism, (2) results of experimental fungicidal evaluation trials at Tifton and Sea Island, Georgia, (3) information obtained from other workers on the control of specific diseases. Some of the more common diseases and recommended control practices are presented in Table 3.

As a general rule, pathogens causing diseases of Southern turf grasses cannot be identified with certainty in the field. An accurate diagnosis is dependent on microscopic examination of the diseased specimens. It is suggested that Southern golf course superintendents and greenkeepers send fresh specimens of diseased grass to the laboratory at the University of Georgia Coastal Plain Experiment Station, Tifton, Georgia, for diagnosis. In addition to being of direct benefit to the golf clubs concerned, this practice will give research workers much needed information on the distribution and damage caused by the different turf pathogens.

It can be seen from the number of different diseases and the selectivity and lack of selectivity of the different fungicides for the control of various diseases that none of the fungicides on the market at present warrant an across-the-board recommendation. On the other hand, an individual should find out what disease is causing trouble and apply protective measures which are most effective in correcting his specific problem.

Summary and Conclusion

1. Southern turfgrasses are subject to many diseases, a few of which are frequently very serious.

2. No satisfactory control has been found for cottony blight. At present, the most effective compounds appear to be

COMING EVENTS

FEBRUARY 18-21

Penn State Turfgrass Conference
The Pennsylvania State University
University Park, Pa. Prof. H. B. Musser

FEBRUARY 25-26

Southern Turfgrass Conference
Colonial Country Club
Memphis, Tenn. Reg Perry

FEBRUARY 27-28 and

MARCH 1

Minnesota Turf Conference
Curtis Hotel
Minneapolis, Minn. Roy W. Nelson

MARCH 4-6

Midwest Turf Conference
Purdue University
Lafayette, Indiana Dr. Wm. H. Daniel

MARCH 11-12-13

23rd Annual Iowa Turfgrass Short Course
Memorial Union
Iowa State College
Ames, Iowa Dr. Harvey L. Lantz

MARCH 14-15

27th Annual Michigan Turfgrass Conference
Kellogg Center for Continuing Education
Michigan State University
East Lansing, Michigan Prof. James Tyson

MARCH 18-19

School of Soils, Fertilization and Turf
Maintenance
Ontario Agricultural College
Guelph, Ontario C. E. Robinson

APRIL 12

Truro Turfgrass Conference
Nova Scotia Agricultural College
Truro, Nova Scotia Dr. George Smith

Captan 50-W, Captan 50-W plus Actidione, Phygon XL, and Zineb. Some new experimental compounds show promise and may prove satisfactory. Treating top-dressing soil with methyl bromide will prevent the introduction of the pathogen in the topdressing material.

3. Information suggests that *Helminthosporium* turfspot can be controlled by mercury-containing fungicides. Vancide, Zineb and Kromad also looked good during the past year.

4. Experiments and effectiveness of recommendations show a need for knowing the cause of disease before treatment and using the treatment which is most effective against the specific disease.