



Better Turf for Better Golf

TURF MANAGEMENT

from the USGA Green Section

Spring Dead Spots of Bermudagrass

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ABSTRACT

A disease of bermudagrass turf called spring dead spot has become prevalent in Oklahoma. During the past three years bermudagrass has suffered extensive damage which is characterized by dead areas of turf that are apparent only after the grass begins to grow in the spring. The cause of the disease is not known, but it appears to be due to fungi which attack the root system while the grass is dormant.

A disease, which is now called spring dead spot, was observed in a bermudagrass (*Cynodon dactylon*) lawn at Stillwater, Oklahoma during the spring of 1954. Since that time, this disease has been found throughout much of the State on lawns, golf courses and many other public and private turf areas. The prevalence and severity of spring dead spot has steadily increased and during the past 3 years has become the most important disease of bermudagrass in Oklahoma.

Conversation and correspondence with golf course superintendents and other turf grass area managers has led to the conclusion that this disease may have been present, at least locally, for many years. The only concrete information, however, came from Mr. Bob Dunning of Tulsa, Oklahoma, who believes, in the light of present investigations, that he observed spring dead spot as early as 1936.

Reports which indicate the distribution of the disease are rather vague. It was reported from Kansas in 1959, and was observed by the senior author in the turf plots at the University of Nebraska, Lin-

coln, Nebraska, the same year. Following a discussion of the disease at the Annual Conference of the Oklahoma Turfgrass Association in December, 1959, various individuals reported that this, or a similar disease, has been seen in Pennsylvania, Missouri, and Arkansas.

Symptomatology

When bermudagrass begins to grow in the early spring well defined, circular, dead spots may be present. Individual spots vary in size from a few inches to 3 or 4 feet in diameter. The margins are usually even but may become irregular when spots have coalesced to form large, dead areas several feet across. Foliage of the dead grass is a bleached straw color, while the stolons and roots are black and rotted. These plant parts characteristically appear to have been dead for some time, and there is no obvious indication at any time during the year that the causal agent of the disease is active. In other words, there are no obvious preliminary symptoms. The damage appears to occur while the grass is dormant; therefore, the appearance or spread of

the disease can be observed only each spring when grass resumes growth.

With few exceptions all of the grass in the affected spots is dead. Occasionally a tuft of grass may survive in the larger spots and, where this occurs, the affected area is doughnut shaped. The dead area of such spots may fill from the inside to the outside in 3 or 4 years. Usually, however, the larger dead spots will remain void of bermudagrass for a number of years and other grasses and weeds become well established in the affected area during this time. The presence of this disease often can be detected by this particular pattern of plant invasion.

There is a tendency for the surrounding grass to fill in the smaller spots when conditions are favorable. This occurs if the stolons bridge the dead spots and become rooted on the far side. Stolons that fail to bridge eventually die as the new, small roots rot away.

The disease has not been associated with any particular type of soil or topography.

Host Range

Spring dead spot has been observed only on bermudagrass. It is known to occur on the varieties African, U-3, Common, Tiffine, and Tifgreen; however, the most extensive damage has occurred on U-3. A number of other bermudagrass varieties have been introduced in recent years but their reaction to this disease has not been determined.

Spring dead spot on bermudagrass has been observed only under conditions of management which produce a high quality turf and not under conditions with a pasture grass type of management.

Etiology

Bermudagrass sometimes suffers from winter injury, snow mold, and insects, and these types of damage are commonly mistaken for spring dead spot. The true cause of the disease now known as spring dead spot, however, is not known. Fungi are found consistently associated with the disease and on extremely rare occasions white grubs and/or plant parasitic nematodes are present in small numbers. Isolations from diseased tissues yield many fungi; however, only certain unidentified species of *Helminthosporium* are consistently obtained.

African, U-3, Sunturf and Common

varieties of bermudagrass have been inoculated with eight different isolates of *Helminthosporium*; some of the inoculations have been in the greenhouse and some in the field. No symptoms of spring dead spot developed in any of these tests.

Bermudagrass taken from the periphery of dead spots and transplanted by various methods into flats of sterilized or screened soil and subjected to intervals of growth and dormancy over a 3-year period failed to develop symptoms of the disease.

Spring dead spot occurs most frequently in areas where high quality turf has been established; consequently, it was thought that certain fertilizer practices may influence the development of the disease. However, after comparing the fungicidal-fertilizer, calcium cyanamid, and ammonium nitrate for 3 years, there appears to be no difference in their effect on disease development.

Further studies on etiology and control of spring dead spot area are in progress.

Discussion

It seems likely that the recent importance of spring dead spot is due to greater prevalence than in previous years. The increase in disease prevalence may be the result of a greater use of bermudagrass turf for home lawns and public areas, and since spring dead spot is found only in well-cared-for turf, it is possible that the disease will continue to increase in prevalence and importance.

The cause of spring dead spot is not yet known. However, observation of the disease since 1954 leads to the conclusion that it is due primarily to root-rotting fungi. The damage appears to occur during the winter season while the grass is dormant, which might suggest that the causal agent involved is a cool weather pathogen. This suggestion may be misleading, however, since there are frequent warm periods of short duration throughout the winter, at least in the southern and southwestern areas of the United States.

Many fungi have been obtained by isolation from the rotted root systems and stolons but the only fungi found consistently were *Helminthosporium* spp. Several species of this genus have been isolated and any one or all may have

been involved in the disease. If one or more of these species of *Helminthosporium* were involved, however, the conditions favorable for infection and/or disease development were not easily reproduced.

White grub worms and plant parasitic nematodes have been found associated with spring dead spot also but not with sufficient regularity to be considered as primary causal agents. When either or both of these agents were associated with the disease they probably only enhanced the damage already done.

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WAYNE ALLEN CALLED TO ACTIVE MILITARY SERVICE

W. Wayne Allen, agronomist, who has served for two years in the USGA Green Section's Southwestern Office, began a tour of active military duty on October 15. Mr. Allen is a member of the 49th Armored Division which was one of the two divisions called up for the purpose of strengthening our nation's active military force. He has been granted a military leave of absence and it is expected that he will return to the Green Section staff upon completion of his tour of duty.

Why Keep Records?

By **MARVIN H. FERGUSON**

Mid-Continent Director, and National Research Coordinator, USGA Green Section

The most obvious reason for a golf course superintendent to keep records is that of enabling him to account to the members of his club for their money which he has expended in the process of maintaining their golf course. This alone is reason enough for adequate records. It is the club's property. It is their money. The members have a right to know how their money was spent and what was accomplished through its expenditure.

There are many additional dividends to be gained from the keeping of adequate records. Good records help the superintendent to gauge the effectiveness of his operations, to accurately estimate costs of future work, to prepare a sound budget, to be able to predict machinery and equipment replacement needs, to evaluate the performance of men and equipment, and to compare maintenance costs with others (on a valid basis).

Measuring Effectiveness of Work Done

The turf around trees near tees and alongside fairways has been nicely trimmed and provides a pleasing appearance. Most club members like it that way and usually no questions are asked. But suppose an economy-minded member inquires about the cost of this trimming. He is entitled to know. Can you give him the answer?

There is some evidence of grub damage

on fairways. This damage will not be excessive but it could be cleared up completely with an application of a soil insecticide. Is it worth the cost of treatment now or should the operation be postponed until next year? How much will it cost for materials and for application? The answer to the first question must be based upon one's budget position and the attitude of his club with respect to standard of maintenance. It is a question of judgment. The second question is one of fact, however, and can be answered rather precisely on the basis of records kept in the past.

Grass in fairways is growing rapidly. Clippings are so heavy they are lying on top of the turf. They are unsightly and they stick to one's shoes when they are wet with dew. Why have these clippings become so heavy? Has rainfall been heavier than normal? Has the night irrigation man been spending more time than usual on the fairways? How much fertilizer was applied? When? Good records will provide this information and perhaps give a clue to the factors contributing to the excessive growth.

There is excessive *Poa annua* in the collars of greens—more than in other years. Could a weed control treatment, which eliminated some existing vegetation, have coincided with the period of *Poa annua* germination? Or was there a

severe disease attack which thinned the bent at a critical period? Records may reveal the reason for the excessive **Poa annua**. Memories often are so faulty as to be unreliable in one's efforts to recall dates and events of such a nature.

Frequently, the Green Section agronomist asks a superintendent a question such as, "When did you last apply insecticide for sod webworm control?" The answer may be, "Oh, about 3 weeks ago." Upon checking records it is frequently found that the elapsed time is much greater. Memories just cannot be completely trusted during a busy, hectic season. Only a written record which can be referred to during a less busy season can be the basis for an analysis of the effectiveness of one's activities.

Estimate Costs of Future Work

Records of labor and material requirements for routine operations permit precise estimates of costs of performing this or similar work in the future. Suppose, for instance, that a club wishes to establish a different grass on fairways. During the golfing season it may be possible to maintain bluegrass satisfactorily with two mowings per week, whereas, bermudagrass which requires closer cutting and which grows during the summer months may require four mowings per week. How much more time will be required? Will presently owned mowing equipment be sufficient to take care of the problem? Will a new tractor be needed?

It may be decided that fairways should be aerified more frequently, that flagstick positions be changed twice daily, that sand traps be raked more frequently, that divots in tees be repaired and top-dressed daily, or that new towels on ball washers be replaced more frequently. Conversely, it may be proposed that only the putting green should be sprayed with fungicide and that fringe areas be skipped in order to save money. The superintendent with complete facts at hand can answer all such proposals intelligently. He can predict the amount of savings in the latter case and perhaps forestall a decision that would prove to be false economy. In the case of increasing the frequency of some maintenance operations, he can accurately estimate the increased costs and committee members may not wish to provide this amount of money for the improved conditions.

Budget Planning

It is virtually impossible to plan intelligently and accurately a budget for a future year's operations unless records of former operations are available. Labor costs may change, but experience in other years with respect to labor requirements by hours are helpful in figuring costs. Thus, hours required multiplied by current or foreseeable labor costs will provide a very accurate prediction for budget purposes.

A budget which is prepared realistically should take into account the depreciation rates of equipment. A budget item for equipment replacement should be inserted annually so that major items of capital expense are spread over a number of years rather than being shown on a single year's budget. It is distressing to find that some clubs not only fail to provide for depreciation but do not have an up-to-date inventory which shows the remaining useful life and estimated value of equipment owned. Costs of supplies can be estimated with fair accuracy by studying the invoices or purchase orders from past years. In the case of fungicides and insecticides it is well to maintain a supply of materials on hands even though sizable quantities must be carried from one year's inventory to the next. More accurate estimates of material needs may be made by referring to records of weather conditions, disease incidence, severity of insect attacks, etc. If quantities of materials used can be related to the conditions prevailing during the season, such information is more valuable than a total figure which simply expresses costs of materials used.

Comparing Costs

It has been said frequently that comparisons between golf courses cannot be made. Regardless of the validity of the statement, comparisons will continue to be made. If records are accurate and detailed, some comparisons are possible and in some cases they may be helpful.

For instance, two clubs may compare the average time required for mowing an acre of fairway or to rake 1000 square feet of sand trap or to cultivate 1000 square feet of putting green. It may be helpful to know that a seven unit gang mower allows one superintendent to easily mow his fairways three times a

week with one tractor, whereas his neighbor, operating with a five unit gang cannot get over his golf course in the same length of time.

Finding Maintenance Weaknesses

It is frequently the case that the membership of a club is not overly critical of the conditions existing on a golf course. While superintendents may dream of this kind of membership, it is not a good situation because without the benefit of golfers' criticism and comment, a superintendent may fall into a maintenance routine that neglects some feature of the course.

Recently one superintendent found in going over his records that he had spent hardly anything for tee repair, ball washers, and towels. His records immediately revealed to him a matter that he had overlooked on the course and one about which his players had not complained. He immediately undertook a program of regularly servicing ball washers and repairing tees. This situation may seem unusual, but it happens more frequently than most of us realize. It is often difficult to see ourselves. When records can help reveal such weaknesses they perform a real service.

Kinds of Records

Records systems may be simple or complicated and they may consume little or much time. The dislike of a complicated, time-consuming system has deterred many from keeping anything like complete records.

The simplest and most desirable is a daily diary. If routine operations as well as special jobs are recorded and weather conditions noted, this diary together with payroll records and invoices for materials purchased will provide the basic information needed by the superintendent.

Because of the fact that records hold a fascination for many people, it is easy to progress to certain other types of records that will provide useful information.

The illustrations and their explanations indicate some of the types of information that will provide a complete and detailed history of the year's operations on any golf course.

Complete records do require a considerable amount of time. Those who have kept such records feel that they are well worth the trouble and time. They en-

able the superintendent to subject his operations to a constant, critical analysis. He can spot his weaknesses, he can precisely predict next year's costs, he can defend those maintenance tasks he believes to be important, he can recommend the elimination of costly course features which he believes to be unimportant, and finally, he can demonstrate his responsibility to the club by showing his membership exactly what he has done for them with their money.

WORKMAN'S DAILY TIME SHEET

Form 1

Name _____ Date _____

Hrs.	Operation	Hrs.	Operation
	GREENS		ROUGH
	___ Mowing		___ Mowing
	___ Poling		___ Trimming
	___ Irrigating		___ Weed control
	___ Change cups		___ Other
	___ Fertilizing		WOODLAND
	___ Cultivating		___ Brush control
	___ Vert. mowing		___ Tree care
	___ Topdressing		___ Mowing
	___ Spraying		___ Other
	___ Other		SWAMPLAND or BOG
	GREEN COLLARS		___ Drainage
	___ Mowing		___ Weed control
	___ Irrigating		___ Other
	___ Fertilizing		NURSERY - Grass:
	___ Spraying		___ Planting
	___ Cultivating		___ Mowing
	___ Other		___ Trimming
	GREEN APRONS		___ Spraying
	___ Mowing		___ Irrigating
	___ Irrigating		___ Fertilizing
	___ Cultivating		___ Other
	___ Spraying		NURSERY - Trees, etc.
	___ Fertilizing		___ Planting
	___ Other		___ Spraying
	FAIRWAYS		___ Irrigating
	___ Mowing		___ Fertilizing
	___ Irrigating		___ Cultivating
	___ Fertilizing		___ Other
	___ Cultivating		WATER HAZARDS
	___ Spraying		___ Trimming
	___ Other		___ Weed control
	TEES		___ Other
	___ Mowing		BUNKERS - Sand:
	___ Irrigating		___ Raking
	___ Fertilizing		___ Weed control
	___ Repair		___ Trimming & Edging
	___ Cultivating		___ Other
	___ Spraying		BUNKERS - Grass:
	___ Ball washers		___ Mowing
	___ Other		___ Other
	TEE SLOPES		MISC. MAINT.
	___ Mowing		___ Equipment
	___ Irrigating		___ Roads
	___ Fertilizing		___ Service Bldgs.
	___ Spraying		___ Benches, shelters
	___ Cultivating		___ Other
	___ Other		

FORM 1: A daily time sheet for the individual workman. Each workman should check the items on which he has worked during the day and record the hours in the appropriate column. Where the work does not fit any of the categories listed, the workman should check "Other" and make an explanatory note somewhere on the sheet. This form should be turned in daily to the superintendent.

INVENTORY OF EQUIPMENT

TYPE OF EQUIPMENT	Identifying No.	(a) Estimated Value	(b) Estimated Remaining Useful Life Years	(a) + (b) Annual Depreciation

FORM 6: An inventory of equipment. This should show each item of equipment owned by the club, an identifying number, its estimated value, its estimated useful remaining life, and the annual rate of depreciation. Small items, such as hand tools, should be placed on a separate inventory. A budget item usually takes care of replacement needs of such "expendable" items.

Form 2a

WEEKLY PAYROLL SHEET

For Week of _____, 19__

WORKMAN'S NAME	DATE							HOURS REGULAR PAY	RATE PER HOUR	TOTAL REGULAR PAY	HOURS OVER- TIME	OVER- TIME RATE	TOTAL OVERTIME PAY	TOTAL EARNINGS	DEDUCTIONS	NET PAY
	S	M	T	W	Th	F	S									

FORM 2a: A weekly payroll form. On this form each workman's time for each working day is recorded, (this also is transferred from the daily time sheet Form 1). Form 2a provides a record of the total hours of labor for each man, his rate of pay, his total earnings, net pay and the totals of these items for the entire crew.

COMING EVENTS

- November 16-17
Arizona Turfgrass Conference
University of Arizona
Tucson, Arizona
- November 27-30
Fifty-Fourth Annual Meeting of
American Society of Agronomy
Sheraton-Jefferson Hotel
St. Louis, Missouri
- December 5-6
16th Annual Oklahoma Turfgrass
Conference
Student Union Building
Oklahoma State University
Stillwater, Okla.
- December 11-12-13
16th Annual Texas Turfgrass Conference
Memorial Student Center
Texas A. & M. College
College Station, Texas

- December 11-14
Weed Society of America
Sheraton-Jefferson Hotel
St. Louis, Missouri
- 1962
- January 26
USGA Green Section Educational
Program
Biltmore Hotel
New York, N. Y.
- January 28-February 2
33rd International Turfgrass Conference
and Show
Golf Course Superintendents Association
of America
Deauville Hotel
Miami Beach, Florida
- February 19-22
Penn State Turfgrass Conference
The Pennsylvania State University
University Park, Pa.