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Disease Forecasting for Warm Weather Pythium Blight of Turfgrass

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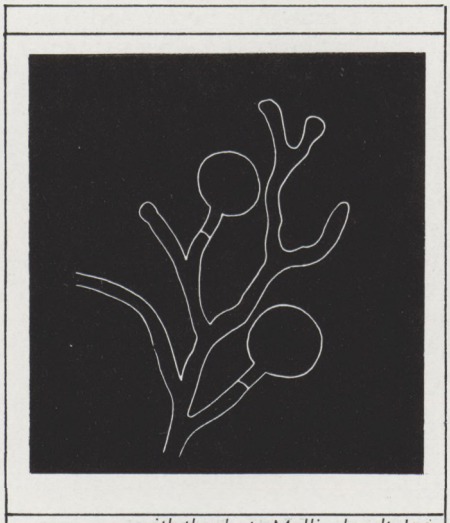
Turfgrass is a perennial vegetative cover which is not seasonally harvested, a situation which favors introduction and long-term buildup of pathogenic organisms. Pythium and other important pathogens are usually present at all times, requiring only favorable environmental conditions to become sufficiently active to cause damaging disease levels. Warm weather Pythium blight, caused primarily by *Pythium aphanidermatum,* may occur infrequently during the season, but can cause extensive damage in a short period if temperature and moisture are favorable. If the turf is largely bentgrass (*Agrostis palustris*), large areas may be killed, requiring extensive stand renovation.

Turfgrass managers weigh savings from not applying preventive fungicides on a regular basis against the cost of renovating blighted areas should a serious outbreak occur. They must take into account the large areas to be protected. Calculated savings from not spraying can be very large; so can renovation costs if serious disease occurs. Aesthetic factors are part of the equation. In a 1979 survey, (Sanders, personal communication) of Pennsylvania golf course superintendents, 5 percent applied preventive *Pythium*-specific fungicides on a regular basis to fairways; 35 percent applied them to greens and tees. These figures probably reflect the superintendent's informal cost-benefit judgment.

Golf course superintendents have repeatedly observed the close association between periods of high temperature and high moisture and the occurrence of warm weather Pythium blight. Our research results have substantiated these observations. The optimum temperature for disease development for *P. aphanidermatum* is negligible.



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Microscopic view of pythium

Research Procedures

In 1978, three golf courses were selected for weather and disease monitoring. One course varied little in topography and Pythium blight was perceived to have a high disease potential in all locations. Another course was also limited in topographic variation but in general was perceived to present a low-to-moderate disease risk depending on location. The last course varied greatly in topography and was thought to have very low-to-very high Pythium risk depending on the specific location.

Hygrothermographs (Model H311, Weather Measure Corp., Sacramento, CA 95841) were placed in areas within the golf courses where Pythium blight occurred most often in previous seasons, in areas where disease occured in some years, and in areas where blight rarely occurred. Each hygrothermograph, housed in a standard white shelter, was about 15 cm above the soil line. Weather data were recorded from June 8 to September 15; i.e., 100 days of data were collected for three locaitons on each of three golf courses. Hygrothermograph records were used as the basis for computation minimum, maximum, and mean daily temperatures, the number of hours relative humidity (RH) was greater than 90 percent as well as the mean temperature and the number of hours that temperatures were greater than 20°C during this high humidity period. Rain gauges recorded precipitation to the nearest mm and irrigation to the nearest tenth of an inch.

Pythium blight was monitored daily by the course superintendents. Only new outbreaks or continued activity were recorded. Although residual symptoms might have been present after an outbreak, these would not have been recorded as disease occurrence unless new activity or spread took place.

The weather data obtained were subjected to various statistical procedures.

Comments & Opinions

Zoysiagrass Has A Place In Turf

I have been criticized severely by both zoysia lovers and haters during my turf career. Some have said I should be punished for not promoting it; and others wish a curse on me for not stifling mention of this grass. While turf seed suppliers have often opposed zoysia, the complaints I received did not always come from this group.

Zoysiagrass has been most interesting from its agronomic aspects and the psychological response it seems to evoke. I am not sure we have developed appreciably in the best use of this turfgrass. However, at least we know some reasons for its use and non-use.

Among turfgrasses, the aesthetic and psychology of zoysia use is the most imponderable. Good zoysia turf is both a great pleasure to see and easy to maintain in hot summer weather, but its light straw color for six months or more in cold weather will cause some persons to either dislike it, use a green dye, or decide to destroy it.

People differ in their acceptance of zoysia. Both personal taste and turf conditions are responsible.

When our cool-season grass lawns develop a bright green early-spring color, we become more aware that zoysia lawns are still popular and probably increasing in number. This suggests that some people find it satisfying as lawn cover. Therefore we might conclude that many people choose a zoysiagrass lawn rather than seeing its presence as a weed. In my opinion, it is incorrect to call this grass a weedy species.

As turf professionals, we might review a few of the agronomic concerns that will help us use zoysiagrass properly. First, New Jersey might be considered the northern limit for this grass. In this state, zoysia growth is better and more persistent on sandy textured soils. Zoysia is most appropriate where summer conditions and appearance are important. It is not tolerant of heavy winter traffic and needs full sun for adequate growth wtih moderately short summers. Second, Zoysiagrass persists and often thrives with little or no nitrogen fertilization, another advantage is its low water requirement.

Reckoning with zoysias slow establishment and equally slow re-establishment is important and limits its potential. Better zoysia strains will develop, but types that will remain green more weeks per year are a long way off. Regardless of how you or I think about zoysia, the amount grown will tend to increase. While some plantings are a mistake, zoysia often has appropriate uses where it has been overlooked in the past. More observation and research on this grass will help us use it properly at the present and in the future.

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Pythium Blight (cont'd.)

In 1979, the study was expanded to include two additional golf courses. Three locations were monitored on each golf course for 100 days.

For weather analysis and weather/Pythium blight correlation analysis a "Forecasting Day" ran from noon to noon, a period which would usually include both the maximum temperature and the nighttime high humidities.

In 1980, a test was made of the forecasting system developed from 1978-79 data. A single hygrothermograph was located in the most Pythium-blight-prone area of three golf courses. Each superintendent made his own forecast. When the need for a fungicide was indicated, chloroneb was applied as a spray at the rate of four ounces of Tersan SP 65 percent WP in four gallons of water per 1000 square feet. An area of several thousand sq. ft. in the immediate vicinity of the hygrothermograph was left unsprayed to verify predicted Pythium outbreaks.

Results

Analysis of the 1978 hygrothermograph and Pythium occurrence records indicated that in all instances, appearance of Pythium blight was preceded by a warm day and a warm, moist night. Temperature sometime during the preceding day always exceeded 30°C and temperatures during the humid or wet period never fell below 20°C. Overall, our observations were in agreement with earlier researchers with regard to temperature and moisture conditions for Pythium blight occurrence.

When the average duration of high humidity at various locations within an individual golf course was compared with the Pythium occurrence record, there was an obvious relationship between increased hours of relative humidity (RH) greater than 90 percent and blight occurrence. High risk sites also had slightly lower minimum and maximum temperatures. But, in most instances, the temperature differences among sites on an individual golf course were not statistically significant. The one consistent difference among sites on an individual golf course was the duration of high RH. The duration of high moisture expressed as RH was far more important than the quantity of precipitation.

The best correlation coefficients were obtained for all golf courses in all instances with the combination of weather, i.e. maximum temperature greater than 30°C followed by RH greater than 90 percent for at least 14 hours during which the minimum temperature was greater than 20°C.

In 1980, Pythium data from the most Pythium-prone area on each of three additional courses were tested against the same set of environmental parameters. These results were very similar to the 1979 results. Three golf superintendents were also asked to apply a fungicide spray of Chloroneb 65 percent WP at four ounces per 1000 square feet to an area adjacent to the hygrothermograph as soon as the weather criteria had been met. In all instances, Pythium blight damage was prevented in the areas which had been sprayed. In contrast, Pythium blight appeared in almost every instance in the unsprayed check. Pythium blight symptoms appeared in the early morning of the first day or during the 24 hours following the first blight-favorable forecasting day.

Discussion

A warm weather Pythium blight forecasting program has been developed based upon the occurrence of weather criteria *during a noon to noon forecasting day: A maximum air temperature greater than 30°C must have occurred; and a relative humidity greater than 90 percent must have been present over a period of at least 14 hours during which time the minimum temperature was 20°C or higher.* The recording conditions should be a standard white weather shelter 15 cm above the soil line. In actual use of the hygrothermograph forecasting system, the turfgrass manager may check the weather record early in the morning prior to completion of a forecasting day. If the criteria have been met, a fungicide spray should be applied as soon as possible without waiting for the completion of the forecasting day. Pythium blight symptoms often were present in the early morning of the first blight-favorable day. In all instances, however, a protective spray applied at the time of this observation prevented significant Pythium damage from occurring.

In addition to fungicide treatment, other factors such as mowing, surface water accumulation, time of day for irrigation, topdressing, and cultivation may affect Pythium blight occurrence.

To Our Advertisers

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Many thanks to our past and present advertisers.

Southern Blight

(Sclerotium rolfsii)

For those persons who feel growing turf is simple, a review of only one area of concern, disease developments, is enough to refute such thoughts. The following comments excerpted from the May 1982 issue of *Grounds Maintenance* should give us more thought on warm-weather diseases.

Leon Lucas, North Carolina State University:

"Southern blight on bluegrass appears first as small, circular dead areas that usually appear during hot and humid weather in midsummer. Some green grass often remains in the center of the spots, resulting in a frogeye appearance. The grass may continue to die at the edge of the spots and some spots may enlarge to three feet in diameter.

When the disease is most actively spreading, masses of coarse white mycelium may be seen growing on debris on the soil surface and on the dying grass at the edge of the spots. Sometimes small, round white-to-brown seed-like structures called *sclerotia* are produced by the fungus and can be seen on the dead grass or on the soil surface. The mycelium is not visible in dry weather, and sclerotia are difficult to find following periods of dry weather and later in the fall.

The symptoms described above are similar to those of *Fusarium* blight, in fact, in North Carolina this disease was initially diagnosed as *Fusarium* blight. The distribution of the disease throughout the United States is not known, but it should be considered as a possible cause wherever bluegrass is dying in hot weather, particularly in the southern range of the adaptation of bluegrass.

This disease has been difficult to control with most fungicides that have been used regularly on turfgrasses. On an experimental basis, excellent control has been obtained recently in North Carolina on a severely affected bluegrass turf with one application of a high rate of the new fungicide Bayleton. Additional experiments are planned.—."

Comments by Zamir K. Punja, University of California (Davis) and Tom Unruh, Del Paso Country Club

"Since its first appearance on golf greens in California in 1977, *Sclerotium rolfsii* blight, or southern blight, has been observed on 12 golf courses in Northern and Southern California.

The fungus *S. rolfsii* is soil-borne and has an extremely wide host range that encompasses more than 500 species of plants.

On golf greens, the disease becomes apparent in the early spring (approximately the second or third week in May) as yellowish crescent-shaped or circular rings with apparently healthy-looking grass in the center. The diseased portions enlarge to produce nearly circular brown spots with green centers. The rate at which they enlarge is dependent primarily upon temperature. Spots initiated later in the summer, however, may not always have a green center. The diseased areas may vary from 8 to 36 inches in diameter and may occur on the aprons, roughs and fairways as well as on the greens.

Experimental trials in 1980 and 1981, on the practice putting green at Del Paso Country Club, suggested that the following fungicides, applied every two weeks starting in early May, would provide effective control of this disease: PCNB, Vitavax, Botran — Acti-dione, and Captan. Following each fungicide application, the material was watered into the thatch, where the sclerotia are normally found. This procedure also prevented phytotoxicity."

Experts who have studied fine turf and turf failure often have difficulty sorting out the complexities of turf disease. For example, one of the author's asked why this disease seems to have appeared so suddenly. Possibly this disease has been around for years. Is this truly a new disease, or have we called it by another name? Perhaps the identity of Southern blight is less clear in our region than in warmer latitudes because of our shorter season."

Protecting a Great Resource - Our Soil

We are proud that turfgrasses have a dual role in protecting soil that is vital for food and the environment as well, but as citizens who know something about soil conservation, do we think of saving this great resource on farms and other areas? The loss of good agricultural soils to erosion and developers is staggering. As turf growers we realize that erosion is slight where there is a good turf cover and that grass improves the soil. The loss of good agricultural soil cannot be corrected in a few generations, if ever.

The following comments from an article by Fred Gratto, Superintendent of Parks in Muscatine, Iowa, may help our awareness and encourage our support for all types of soil conservation.

"In the United States, an area equal to the size of Delaware is paved each year.

The tallgrass prairie once covered 400,000 square miles in the plains of North America. Today, less than one percent remains.

Florida, New Hampshire and Rhode Island will lose nearly all of their remaining prime farmland in the next 20 years if current development trends go unchecked.

Iowa loses nine tons of topsoil per acre to wind and water erosion each year."

If a man does not have an ideal, then he becomes a mean, base and sordid creature, no matter how successful.

Theodore Roosevelt

Can You Tell The Difference?

Big-Eyed Bug
Geocoris sp.

CHINCH BUG **Predator**

1
Immature

2
Immature

3
Adult

4
Adult

Chinch Bugs

These insects have similar size, movement and appearance. The big-eyed bug is a chinchbug predator. Look carefully at any populations before you treat for this pest either this month or next year.

Lou V

The worst crime against working people is a company which fails to operate at a profit.

Samuel Gompers

When Are Chemicals Dangerous?

Known by the media name of Agent Orange, it has caused unease, if not fear among the public, yet perhaps we need to take a closer look at this chemical.

A Harvard scientist has calculated that a person spraying 2,4,5-T with a backpack sprayer 85 days a year for 30 years has one chance in 2½ million of developing a tumor. However, if that person drinks one can of beer daily, his or her chances of developing cancer are 25 times greater than exposure to 2,4,5-T; the risk increases by 3,000 times as much if he or she smokes cigarettes. Similarly, other everyday practices have been shown to be much greater health risks than this herbicide.

In 1979, when I served on the silvex study team, two members of the group reported that 25 or 30 years earlier they frequently used 2,4,5-T for brush control. During the process their clothing had become saturated with the spray, but they felt their health had not been adversely affected. These episodes took place before dioxin was known to be an impurity and therefore was not controlled during 2,4,5-T production. The safety tests of that era indicated the phenoxies were not dangerous.

As recent as a year ago, this nation spent millions of dollars burying silvex and 2,4,D. In addition to the outlay of money, there is a likelihood that these herbicides may seep out of the pit killing plants in some future generation. I hope that our government will find the wisdom to assure safe handling of truly dangerous chemicals rather than waste dollars on such things as the silvex-2,4,5-T fiasco.

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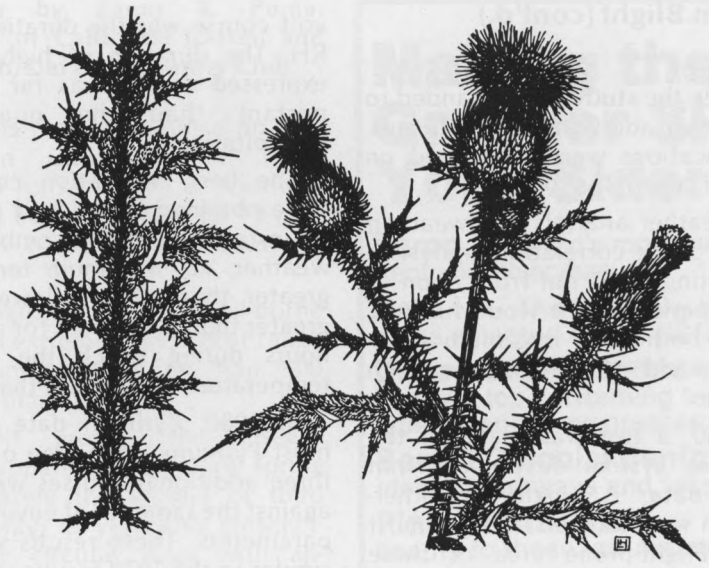
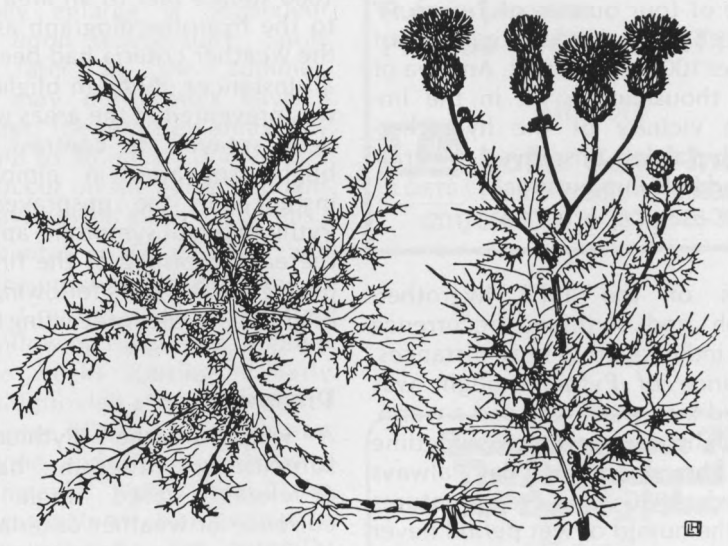
Success is never found.
Failure is never fatal.
Courage is the only thing.

Winston Churchill



BULL THISTLE



CANADA THISTLE

Benefits From Mowing

It seems fashionable for some to let areas grow naturally rather than "indulge" with turf. This is O.K. if the desire is to return the area to woodland. Before woodland develops, the site abounds with brambles and other vegetation. The drawing identifies one of the unwanted plants that has become more common. Currently we are observing a "blizzard" of seed from thistle. In the future, we will be plagued with more of this pest in landscape beds. it is expensive and no fun to eradicate. In some of our high cut, low maintenance turf areas, thistles will persist, but an occasional well-timed mowing will prevent seed set. At one time it was illegal and unneighborly to let such noxious weeks survive and spread. Yes, mowing does more than make the area look attractive.

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