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Take-all Patch Disease: An increasing problem of bentgrass

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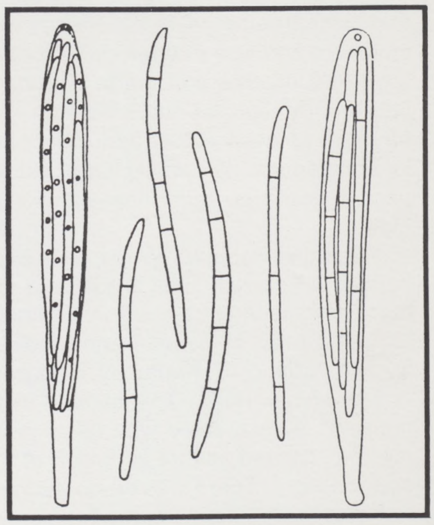
Circular Pattern of Injury on Bentgrass Agrostis from Gaeumannomyces graminis and commonly referred to as *Takeall.*

Grasses throughout the world are common hosts to fungi in the genus Gaeumannomyces. These root-infecting pathogens, formerly included in the genus Ophiobolus, damage cereal crops and some turfs to incite symptoms commonly referred to as "take-all" diseases. In turf, Agrostis species are particularly susceptible and the variety of the fungus found on oats, G. graminis var. avenae, is primarily encountered as the causal agent of take-all patch on bentgrass turf.

Affected turf dies in roughly circular areas a few centimeters wide initially, increasing to a meter or more in diameter in the course of one or several growing seasons. The patches may form a shallow depression in turf with a heavy thatch. Infected plants at the advancing margins of patches become yellowed or frequently red to bronzed in appearance, later turning tan to brown and bleaching as they die. The plants have little root hold as the fungus progressively invades roots, crowns, and stem bases. Dark colored, stranded, runner hyphae may be seen investing these plant organs, often forming dense aggregations or 'mats' of mycelium between the leaf sheaths. Black, flask shaped fruiting bodies (perithecia), just visible to the naked eye, are borne between the leaf sheaths and stem bases of infected plants, their long necks often protruding through the sheaths. In mixed grass stands, the susceptible bentgrasses are killed out leaving behind the other sward components. Disease patches in pure stands of bentgrass become colonized by volunteer species, commonly Poa annua and broad-leaved weeds.

First reports of the disease on bentgrass turf were made in Holland during the early 1930's. Twenty years later widespread damage by take-all patch was documented in Britain and since the 1950's it has been recognized as an increasing problem in several other European countries and in Australasia. Take-all patch disease was confirmed for the first time in North America during 1960 in the Pacific northwest. It now rates second in importance to Fusarium patch as a disease problem on bentgrass turf in western Washington and is common in coastal British Columbia.

The first authentic record of take-all patch for the eastern part of the continent was reported in Rhode Island in 1975. Since then, numerous outbreaks have been confirmed from New England and the mid-Atlantic states. Recent reports indicate the increasing occurrence of take-all patch in the midwestern states of the U.S. and in the eastern and central Canadian provinces. Isolates of the causal agent from turf throughout North America in most cases conform closely to the description of G. graminis var. avenae and bentgrasses, predominantly under golf course management, are the common host. Other grasses may support infection by the fungus but rarely are damaged severely.



Spore sac and spores of Gaeumannomyces graminis, a root infecting fungus.

The conditions particularly favoring the disease involve soils with high surface moisture and surface pH values of 6.5 and above. Cool to warm wet weather is conducive to growth of the fungus, but symptoms, first apparent in spring and fall, may be more noticeable as hot, dry conditions further stress the infected plants. Recently, limed or newly established turfs are most vulnerable. This is especially true for the latter where bentgrass turf is established on fumigated sites or on land recently cleared from forest.

Thus, take-all patch, for reasons which at the moment are at best speculative, appears to be an increasing problem for turf managers and they

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Sensitivity of Turfgrass Root Systems

While turf has seen the introduction of some very valuable chemicals, research showing their effects on the grass plant has been very limited. The phenoxy herbicide, 2,4-D, has been in use approximately 40 years. At first, it was commonly said to have no effects on the turfgrass plant. Yet some early observations showed this was not true. Several years ago, GREEN WORLD published pictures of what the phenoxy herbicide can do to the anatomy of the bentgrass root. Close observation has shown 2,4-D may cause additional stress at various seasons. Some growers became painfully aware of calcium arsenate effects on turfgrass roots. In **Weed Science**, 1967, 15:128-130, New Jersey published results of preemerge herbicide inhibition on Merion Kentucky rooting. This with other results and observations have convinced us that most preemerge herbicides are root inhibitors and can interfere with rooting for 3 to 6 months and more. We have little information on turf inhibition with fungicides, insecticides, and other similar compounds. We would hope and expect it would be less than with herbicides.

Recently, Schmidt, White, and Bingham of VPI published an article on a root measuring technique used in determining the effects of benefin and triadimefon on rooting of Kentucky bluegrass and bermudagrass. The benefin treatment, as we expected with other preemerges, caused severe inhibition of turf sod rooting. There was some suggestion that triadimefon aided turf roots.

Turf pesticides need more study on their effects on roots, survival of the desired species and their effects on disease and insect antagonists. For some types of turf, we should know the effect of turf chemicals on earthworms.

Without more research, leave check strips (untreated) on appropriate occasions. In the case of root inhibition, the turfgrasses will often show stress in very hot or dry weather.

Specific recommendations are:

- use the minimal rates of phenoxy compounds on bentgrass turf (1/2 pound 2,4-D plus 3/16 to 1/4 pound dicamba per acre is usually adequate)
- be very cautious with the minimum rate of the more severe root-inhibiting preemerge where overseeding may be required at most any season such as tees and athletic fields. ❑ REE

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Hollow and Solid Tine Cultivation

Considerable interest in solid tine cultivation for greens magagement exists because it eliminates much of the cleanup time required for removal of cores created by hollow tine equipment. Research on the effects of core cultivation on the physical characterisitcs of turf soils is limited. However, Murphy and Rieke[1] recently presented the following information on the effects of hollow and solid tine cultivation on soil underlying a creeping bentgrass putting green.

The influence of soil compaction and soil moisture content during cultivation with hollow and solid tines was evaluated over three years. Cultivation treatments on a modified loamy sand soil were applied with a vertical operating tine unit at two compaction and two soil moisture levels. As expected, compaction resulted in pronounced detrimental effects on soil structure and root growth. Cultivation with either tine increaed the percentage of pores drained between 0 and 0.01 bars of suction with hollow tine cultivation being more effective in increasing porosity in this range. However, cultivation in noncompacted soil resulted in lowering the percentage of pores drained between 0.01 and 0.10 bars of suction. Water movement through noncompacted soils dropped dramatically with cultivation by either method. Initially, solid tine cultivation was more effective in reducing surface soil strength than hollow tine cultivation, however, this effect was reversed within 2 years. Cultivation decreased surface rooting in noncompacted soil but had no influence on rooting in compacted soil in the fall of the second year. In an unpublished study (1951), Engel observed indications of reduced rooting and water penetration from trufgrass cultivation of noncompacted soil. The work of Murphy and Rieke demonstrates the potential for additional compaction problems caused by inappropriate cultivation techniques.

Research suggests turf cultivation to create voids offers the most promise where an impermeable surface layer exists in the upper soil profile. There are other reasons for cultivation such as thatch control. Additional research is needed on cultivation and "core vs. tine." Turfgrass managers should keep in mind that core cultivation is no sustitute for mangement which discourages soil compaction such as sound irrigation management, proper soil drainage, and where possible, traffic control. ❑

RHW and **REE**

Keeping Up on Herbicide Names

WHIP should be registered in time for the 1987 season. This product from Hoechst-Roussel Agrivet Company is for use on rice and soybeans. It's one of the new annual and perennial grass herbicides and should fit in very well with the rest of them. The WHIP contains the same active ingredient as that present in ACCLAIM, registered for use in crabgrass control in turf areas.

—**Weed Notes**, Dec 1986

A 2,4-D Substitute??

And here comes our first 2,4-D-less turf herbicide. It contains the dimethylamine sals of MCPA, MCPP, and 2,4-DP. This combination is being marketed by the Riverdate Chemical Company out of Chicago Heights, Illinois. MCPA has been around for many, many years. Primary use has been for broadlead weed control in small grains.

—from **Weed Notes**, Dec 1986 by Rutgers - NJ Cooperative Extention

[Ed. Note: *What will be gained with this treatment that will apply a large total of phenoxys to turf when the sister phenoxy, 2,4-D, at 1/2 pound plus dicamba at 1/4 pound per acre offers equivalent if not safer weed control? The "good old boy" 2,4-D herbicide has rare potential and is still in first place for dandelions (turf's No. 1 weed).*]

People who buy books on good lawn care become good weeders.

—Fred Allen

[1] Murphy, J.A. and Rieke, P.E. 1986. Hollow and solid tine coring effects on a creeping bentgrass green. Agronomy Abstracts. ASA, Madison, WI, p. 137.

I am not a politician and my habits are good.

—Artemus Ward

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should be on the alert for any occurrence of symptoms. Early diagnosis and the rapid implementation of control measures are needed to minimize losses from this potentially destructive disease. However, only moderate benefit can be expected from currently available turf fungicides. In recent field trials, phenyl mercury acetate (PMA) continued as the most effective chemical control agent, but some jurisdictions preclude mercury fungicide use on turf or limit them to snow mold control. New fungicides are being tested and biological control strategies are being explored but management practices aimed at moderating high surface pH and promoting recovery growth with a balanced nutrient program afford the only practical means at present for reducing the damage caused by this disease. ❑

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Old Green Plants

Scientists report microscopic fossils had diversified and become established 3.5 billion years ago. Paleobiologist J. William Schopf of UCLA has reported evidence that green cyanobacteria emerged and began contributing oxygen through photosynthesis to the atmosphere 700 million years earlier. As compared with modern mankind's existence, it seems organisms of that era took a long time to develop and do their thing. After all, nothing was in a hurry in those days. John Hayes, an Indiana University Geologist-Chemist cautioned the new fossils look like cyanobacteria, but this is not definitve proof. ❑ **REE**

Statesman: "A political leader regarded as a disinterested promoter of public good."
—American Heritage Dictionary

The Pimentel Report

As we mentioned in the PANJ Newletter, Harold Collins, of the Natiohnal Agricultural Aviation Association (NAAA), has written a critique of this report in the Agricultural Aviation Magazine for November/December 1986. Harold, in conjunction with professionals from universities, private industries and the government, has critiqued the article thoroughly. The problem results from UPI reporting that more than 99% of pesticides miss the target and insecticides miss the mark 99.9% of the time. Not only was the article misquoted, but the article itself contains many factual misstatements. Harold's concern, of course, is that the article not be used as a refernce educators and students. It was published in **Bioscience**, Volume 36, Number 2.

As an example of the misstatement, Pimentel claims that there are about 200 fatalities annually caused by pesticides. No government agency nor the State of California could even come close to that figure. In California, they have reported 85 pesticide fatalities from 1965 through 1985 for an average fo 4+ per year. Figures at the national level indicate 37 fatalities per year attributed to pesticides, fertilizers and plant food between 1969 and 1978. ❑