RUTGERS COOPERATIVE EXTENSION AT THE NEW JERSEY AGRICULTURAL EXPERIMENT STATION

PLANT & PEST ADVISORY

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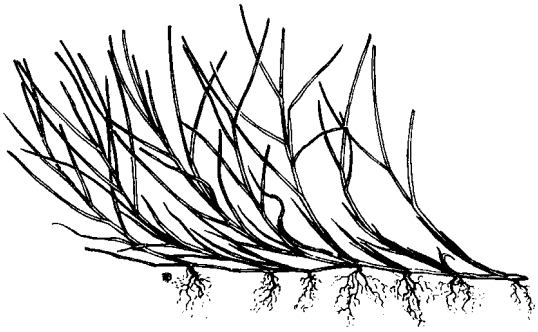

INSIDE

Diseases of Turfgrass

Bruce B. Clarke, Ph.D., Turfgrass Pathology

Bentgrass Dead Spot

This disease has become troublesome on sand-based greens and tees in the Mid-Atlantic Region. The causal agent, *Ophiosphaerella agrostis,* induces small reddish-brown spots 0.5 to 1 inch in diameter. Spots usually do not coalesce and only enlarge to 4 inches in diameter. Affected areas eventually fade to a light tan color. Initially, symptoms may be confused with **dollar spot, copper spot, black cutworm** injury and golf ball injury. However, upon close inspection, black flask-shaped fruiting bodies (*pseudothecia*) can be found embedded in necrotic leaf and stem tissue. Active patches often have a half inch bronzed outer margin. Foliar mycelium is not apparent in the field.

The disease has been identified on numerous bentgrass cultivars and is most serious on high sand content greens and tees. To date, all reports have come from recently established sites (one to six years old). Outbreaks have not been observed on fairways. Environmental conditions that appear to enhance disease development include hot, dry weather. The disease also appears to be more common in sunny locations than in shaded areas. Although little is known about chemical control, benzimidazole (e.g., Cleary 3336 50W), dithiocarbamate (e.g., Fore Rainshield 80W), nitrile (e.g., Daconil Ultrex 82.5SDG), phenylpyrrole (e.g., Medallion 50WG) and phosphonate (e.g., Chipco Aliette Signature 80WG) chemical classes provided the most effective control of **bentgrass dead spot** in a test conducted by Rutgers faculty last year.

Of the sterol-inhibiting fungicides, only propiconazole (e.g., Banner MAXX 1.3 MC) adequately controlled the disease, whereas myclobutanil (e.g., Eagle 40W) and triadimefon (e.g., Bayleton 50W) proved ineffective at the rates tested. Similarly, two experimental strobilurin fungicides (e.g., BAS 500 and 505) consistently suppressed the disease, while the strobilurins trifloxystrobin (e.g., Compass 50WG) and azoxystrobin (e.g., Heritage 50WG) provided poor to fair control of bentgrass dead spot. Carboximide (e.g., Prostar 70W) and phenylamide (e.g., Subdue MAXX 2MC) fungicides and a strain of *Bacillus* subtilis (e.g., Companion I) did not control bentgrass dead spot, compared to untreated turf. Research is currently underway to evaluate turf recovery and germination after damaged areas are reseeded.

SEE TURF DISEASES ON PAGE 2

Rutgers Plant Diagnostic Laboratory

The Plant Diagnostic Laboratory and Nematode Detection Service is a diagnostic service available to the residents of the State of New Jersey. The mission of the Plant Diagnostic Laboratory is to cooperate with Rutgers Cooperative Extension personnel to provide the residents of New Jersey with accurate and timely diagnoses of plant problems. There is a fee for this service.

The laboratory was established in 1991 on the Cook College campus of Rutgers, The State University of New Jersey.

- ❖ Diagnostic Services
- ❖ Disease and Insect Pest Diagnosis
- ❖ Plant and Weed Identification
- ❖ Insect Identification
- ❖ Nematode Assays
- ❖ Screening for Acremonium Endophytes
- ❖ Benzimidazole Fungicide Resistance Screening
- ❖ Other Services Available by Contract

Fees

All In-State Samples (except fine turf) ... $20
In-State Fine Turf $50
All Out-of-State Samples $75
Other Services Negotiable

For sample submission instructions and forms, visit our web site at: http://www.rce.rutgers.edu/plantdiagnosticlab/submissions.html

Forms may also be obtained from your local county Rutgers Cooperative Extension office or via fax request (732/932-1270). ❑

TURF DISEASES FROM PAGE 1

Brown Patch

This disease, caused by the fungus *Rhizoctonia solani,* developed extensively (since August 12) on tees, greens, and home lawns due to the warm, humid weather. To reduce the incidence and severity of **brown patch,** avoid nitrogen applications during hot weather, irrigate between midnight and 8 a.m. to reduce the period of leaf wetness, and spray turf with Banner, Chipco 26GT, Chlorostar, Cleary 3336, Compass, ConSyst, Curalan, Daconil, Eagle, Fungo, Heritage, mancozeb, Manicure, Medallion, Prostar, Spectro, Thalonil, or Touche per manufacturer's recommendations.

Gray Leaf Spot

Gray leaf spot has redeveloped recently on perennial ryegrass in the Mid-Atlantic States. Symptoms start as tiny brown leaf and stem lesions covering 1 to 2 inch spots. In severe cases, the leaves curl and lesions may extend the entire width of the blade. As the disease progresses, patches coalesce into large (one to two feet) areas of blighted turf. Extensive foliar blighting may occur during warm (75-85^{0}F), wet weather. Newly established seedlings are more susceptible to infection than mature plantings. When conditions are conducive to infection, the causal agent (*Pyricularia grisea)* produces abundant one to two-celled, pear-shaped spores (conidia). For best results, avoid high rates of nitrogen during July and August and extended periods of leaf wetness (i.e., water in the early morning hours). Fungicide studies conducted in New Jersey, Georgia, Maryland, and Kentucky have shown that Heritage (0.2 to 0.4 oz/1000 ft^2) and thiophanate-methyl (e.g., Cleary 3336 50W 6 to 8 oz/1000 ft^2) were most effective when applied on a preventive basis every 14 to 28 days beginning in mid to late-July. Chlorothalonil (e.g., Daconil) and the DMI (sterol-inhibiting) fungicides, such as Banner, (propiconazole) have also provided effective control when disease pressure was moderate. Combination products containing chlorothalonil and thiophanate-methyl (e.g., ConSyst and Spectro) have also performed well in field trials.

Slime Mold

Although not actually a disease, inquiries continue to be received about the appearance of tan to black colored material on turf, flowerbeds, and home gardens. In many cases, this material has been reported to occur virtually overnight on plant stems, grass blades, soil mounds, or other vertical objects. Upon close examination, these mysterious structures have been identified as clumps of the common **slime mold** fungus *Fuligo.* Fuligo is not injurious to plants and will soon disappear on its own. It can be easily dispersed with a rake or steady stream of water, if desired. No fungicides are recommended.

Stem and Crown Rust

Both of these diseases are evident on susceptible Kentucky bluegrass and perennial ryegrass cultivars, respectively, at this time. As rust intensifies, the turf prematurely yellows and orange pustules called uredia (reproductive structures) appear on affected blades. To control both **stem and crown rust,** maintain adequate fertility and soil moisture and apply Banner, Bayleton, Chlorostar, Daconil, Eagle, Heritage, mancozeb, Manicure, or Thalonil per manufacturer's recommendations. ❑

Plant Diagnostic Laboratory Highlights

Richard Buckley, Plant Diagnostic Laboratory Coordinator

Turfgrass

We had the heat! We had the rain! Now I am up to my neck in dead stuff! The last six or seven days were the busiest of the season. Summer turf diseases were out in full force. **Pythium blight** was very common in the laboratory just after the heat broke with the heavy rains. One golf course superintendent said that it was easy to tell what was treated and what wasn't as there was **Pythium** in all of the grass that was skipped or not sprayed. Samples with **Pythium blight** or **root-infecting Pythium** were diagnosed in golf turf from Florida, Georgia, Virginia, West Virginia, Tennessee, New York, Connecticut, and from Morris (several) and Gloucester Counties in New Jersey. **Anthracnose** continues to be a major concern among golf turf managers. Samples with **anthracnose** were submitted from Tennessee, Pennsylvania, New York, North Carolina, and from Morris, Middlesex, and Monmouth Counties in New Jersey. **Summer patch** is also active at this time. We often have a **summer patch** rush at this time of year because the mid-July preventive fungicide treatments run out. Even though it is not written in the official prevention program (three applications in May, June, and July), we have long been an advocate of a fourth fungicide treatment for **summer patch** in mid-August because of our experience with these late season flare-ups. The most interesting thing this period has been the **Brown patch**. We have been under incredible **brown patch** pressure for at least two weeks. Even today the night temperatures remain solidly above 60°F with 90%+ relative humidity. The disease is just raging. You should see the turf plots here on the farm – wow! Samples of **brown patch** were submitted on golf turf (mostly ryegrass fairways) from Bergen, Monmouth, Morris, and Middlesex Counties as well as from Connecticut and New York. We also had a beautiful case from the Rutgers football field. We can't get through a newsletter at this time of year without mentioning **gray leaf spot**. One more sample was confirmed this week from the field. That makes two for the year. Hardly an epidemic, but we still have a month or so to go.

Greenhouse

A Cumberland County grower submitted several samples of iris with **foliar nematodes**. A conifer seedling nursery was having problems with **Phytophthora root and crown rot** and **Fusarium blight**. **Pythium crown and root rot** was identified on snapdragon seedlings that were sent from a Bergen County grower. A New York State grower sent tree peony with **anthracnose** and **Botrytis blight**.

Landscape

This week was leaf disease week in the laboratory. **Fabreae leaf spot** of pear, caused by the fungus *Entomosporium* was identified on an ornamental pear from a Monmouth County landscape. **Cherry leaf spot**, caused by *Phloeosporella padi*, was found on cherry that was also from a Monmouth County landscape. An Atlantic County arborist sent several white oaks with nice **oak anthracnose**. We had a Douglas fir from Hunterdon County with the remnants of a spring **Rhadbocline needlecast** problem. The recent heat finally got the infected needles to drop. This tree is in trouble for next spring. Speaking of Douglas fir, we have had a rush on trees with needle browning and drop. The samples have come from Christmas tree fields in south Jersey and landscapes in central and north Jersey. The symptoms are generally confined to the southwest side and are obviously *abiotic* in nature. We think that the initial injury may have been due to **winter winds and sun**. The recent **heat and drought** simply pushed the weaker needles off the trees. Most of the trees still had green buds, so we suspect that they will survive and might even fill back in over a couple of seasons.

Finally, we must address **bacterial leaf scorch**, or **oak leaf scorch** as we so fondly call it in New Jersey. This disease has come on in a big way over the last two weeks. I have been watching several trees over the summer that developed spectacular scorching last week. Dr. Jim Laschomb (entomology) and Dr. Ann Gould (plant pathology) are researching the disease and brought in 17 trees from the Princeton/Trenton area that tested positive for the presence of the bacterium that causes the disease. All of the trees were red oak, except for one pin oak (red oak group). We tested several sycamore samples and some white oak with scorch at the same time and got negative results. The state forester will be conducting a survey of oaks this fall with the hopes of tracking the spread of the disease and determining the severity of the problem in the state. The Plant Diagnostic Laboratory will be running the testing protocol for this survey during the next several weeks. In light of this, if you have trees that you think have **bacterial leaf scorch** and want to get in the survey, we will discount our normal submission fee to encourage your participation. For this fall only*, bacterial leaf scorch testing will be $15!* ❑

Milky Disease for Japanese Beetle Grub Control

Albrecht M. Koppenhöfer, Ph.D., Turfgrass Entomology

Milky disease is a fatal disease of **white grubs** caused by the spore-forming bacterium *Paenibacillus* (formerly *Bacillus*) *popilliae*. Many different species of white grubs are affected by milky disease, however, each by a different strain that is more or less specific to that grub species. The disease does not affect any other organisms.

The milky disease spores occur naturally in the soil where they remain viable for many years. The infection process is started when spores are ingested along with soil as white grubs feed on plant roots. The spores germinate in the grub's midgut, and the bacteria penetrate through the midgut wall into the grub's body cavity, where they multiply and eventually sporulate. The high concentration of spores during the final stages of infection gives the grub's body fluid the milky-white color. Milky disease is inevitably fatal. When the infected grub dies, typically after several weeks or even months, several billion spores may be released into the soil from the disintegrating cadaver.

Products containing milky disease spores have been marketed for **Japanese beetle** grub suppression for many years under the trade names Doom and Japidemic (Fairfax Biological Laboratories, both products no longer available) and Milky Spore (St. Gabriel Laboratories). The formulations are made by grinding diseased Japanese beetle grubs and mixing with talc. A product supposed to contain milky diseased spores produced on artificial media (Grub Attack, produced by Reuter and later Ringer) was available from 1985 to 1991. Production was stopped when it became apparent that the spores contained in Grub Attack where not milky disease spores and completely ineffective.

Products made from infected grubs are expensive because the grubs have to be field-collected and infected in the laboratory. Until an effective in-vitro production method has been developed, milky disease can only be used as an inoculative agent. The formulations are applied by placing a level teaspoonful every 4 ft in a grid pattern (10 lb/acre). At this rate, the products cost from $30 for 2,500 ft^2 to $300 for 1 acre. The spores are leached into the root-zone with irrigation and rainwater. Only directly under the application spot, spore concentrations in the soil can be high enough to cause infections of Japanese beetle grubs feeding in that spot. The grub gets infected and dies, releasing billions of new spores into the soil. Under the right conditions, the disease can thus spread through an entire lawn.

Research in the 1940's and 1950's indicated that optimal conditions for milky disease establishment comprise soil temperatures of at least 70°F for several months per year and high larval densities (at least 30/ft^2). Under these conditions and over a period of 1-3 years, milky disease can establish and thereafter provide lasting control in a release site. However, overall results have been highly variable with no dose response and a generally weak pattern of establishment. In New Jersey and neighboring areas, **Japanese beetle** populations have dramatically declined over the last 10 years and white grub populations increasingly consist of other species, especially the **oriental beetle**. Since the commercially available strain of milky disease is ineffective against white grubs other than the Japanese beetle, applicators who are interested in using milky disease products should first make sure that their grubs are actually Japanese beetle grubs.

In summary, application of milky disease products to turf areas should only be considered if (1) high populations of Japanese beetle grubs (and not just any white grub!) are present to allow for multiplication and spread of the disease and (2) the lawn can tolerate these high initial white grub populations or potential damage can be tolerated during the 1-3 years that the disease requires to establish. ❑

Conversion Factors for Soil Test Laboratory Reports

Joseph R. Heckman, Ph.D., Soil Fertility, and Jean Riling, Research Assistant

Soil test laboratories use several different units of measurement and chemical expressions for nutrients when reporting the results of a soil test. Depending on which lab you use, it may report the levels of nutrients in either pounds per acre (lbs/acre) or in parts per million (ppm). In addition, nutrients such as phosphorus, potassium, magnesium, and calcium may be reported either as elements (P, K, Mg, Ca) or in the form of oxides (P_2O_5, K_2O, MgO, CaO). When comparing the test results from several laboratories or consulting tables of nutrient sufficiency (such as Rutgers Cooperative Extension Factsheet FS719, Soil Fertility Test Interpretation - Phosphorus, Potassium, Magnesium, and Calcium), conversion factors (Table 1) are helpful for converting between the various methods of reporting.

For example, 25 ppm phosphorus (P) is equal to 50 pounds P per acre [25 ppm P x 0.5 = 50 lbs/acre P], which is also equivalent to 114.5 pounds P_2O_5 per acre [50 lbs/acre P x 2.29 = 114.5 lbs/acre P_2O_5].

Note, however, that soil test levels expressed as pounds per acre should be interpreted only as an index of nutrient availability and not literally as being equivalent to actual pounds of available nutrients per acre. In addition, while it is possible to convert between the different units of measurement and chemical expressions used by testing labs, it would be incorrect to draw comparisons between the different soil tests, such at the Mehlich-I and the Mehlich-III tests, as each uses different chemicals and procedures to extract nutrients. The results from different labs are comparable only when they are using the same soil test method.

Table 1. Conversion table. Multiply the initial form by the multiplication factor to obtain the final form.

Initial Form	x Multiplication Factor	= Final Form
Units of Measurement[1]		
lbs/acre	0.5	ppm
ppm	2.0	lbs/acre
Nutrients		
P_2O_5	0.44	P
K_2O	0.83	K
MgO	0.60	Mg
CaO	0.71	Ca
P	2.29	P_2O_5
K	1.20	K_2O
Mg	1.67	MgO
Ca	1.40	CaO

[1] When depth of soil sample = 6 inches

Reference.

Heckman, J.R. 1998. Soil Fertility Test Interpretation - Phosphorus, Potassium, Magnesium, and Calcium. Rutgers Cooperative Extension. FS719. ❑

Of Interest

Deborah Smith-Fiola, Ocean County Agricultural Agent, and Steven Rettke, Program Associate in IPM

Are Bradford Pears Over-planted?

The Callery Pear cultivar 'Bradford' has been widely used because of its spring flowers and tolerance of poor urban sites. However, it has severe branch splitting due to poor branch attachment and narrow branch angles, resulting in branches breaking off of large trees, and susceptibility to storm damage. A recent parking lot study from Rutgers evaluated 5 cultivars of Callery pear to be used as substitutes for 'Bradford.' Results after 4 years showed that the cultivar 'Aristocrat' was the only tree to display branch angle attachments at maturity that could resist storm damage. 'Aristocrat' occasionally suffered frost damage to flowers, had a lower, broader crown, and a deep purple-red fall color. 'Chanticleer' grew the fastest but had narrow branch angles. 'Redspire' also had fairly narrow branch angles, with intermediate, open growth. 'Capital' and 'Whitehouse' were both dense, upright, and heavy blooming.

Customer Landscape Preferences

A recently published research project looked at how much value consumers place on a good landscape. Results showed that plant size was the most important factor in the perceived value of a landscape. Increasing from the smallest to largest size plant during installation increased perceived value by 5%. Design sophistication was almost as important as size. Upgrading from a traditional foundation planting to include multiple bed and curved bed lines increased perceived home value by 4.5%. The relative value of plant material selected was the least important. (ref: Hardy et al., J. Env. Hort. 18(4): Dec. 00). ❑

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