

PLANT & PEST ADVISORY

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Sphaerobolus stellatus, The Artillery Fungus

Ann Brooks Gould, Ph.D., Plant Pathology, Richard J. Buckley, Plant Diagnostic Laboratory Coordinator, and Clare S. Liptak, Senior Program Coordinator, RCE Resource Center

Introduction

Nursery growers, landscape professionals, and home gardeners are often confused by small, brown or black spots splattered on the sides of buildings, downspouts, windows, cars, plant leaves, or any other object in the vicinity of a mulched landscape planting. When cut, these tiny, globular spots are white or cream-colored in the center. Efforts to remove them from buildings or other surfaces are often futile. Severe scrubbing often only removes paint or damages the finish on cars.

In many cases, "spotting" can be attributed to scale insects, flyspeck, or other insect excrement. In this case, however, the spots are actually masses of mature spores, called peridioles, produced by the fungus called *Sphaerobolus stellatus*. These peridioles are forcibly ejected from reproductive structures, or fruiting bodies, of the fungus. The word *Sphaerobolus* means "sphere thrower" in Latin, and the tiny fungus is commonly known as the "artillery fungus."

Distribution

Sphaerobolus is distributed in most temperate climates throughout the world. The fungus grows on manure, rotting wood, or other organic matter, and is often found on tanbark and wood chips in mulched foundation plantings. It is most prolific in open areas that are not too shady. The fungus also requires adequate moisture to complete its life cycle. Fungal populations tend to be higher in areas that have a north-west exposure. Occasionally, this fungus is found indoors associated with mulched potted plants, and in the greenhouse on old wooden benches or other rotting wood.

Life History

Sphaerobolus fruiting bodies, approximately 2 mm in diameter, appear in large numbers on rotting wood as spherical, white or yellow globes that resemble tiny puffballs. The production of fruiting bodies is favored at temperatures between 50 and 60°F. Upon maturation, the fungal fruiting structure splits radially from the top, forming 4 to 8 teeth around a cup-like structure. A single peridiole, which is 1 mm in diam-

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eter, is produced inside and sits in liquid at the bottom of the cup. Several hours later the cup is violently turned inside out, catapulting the peridiole into the air. These spores can travel as far as 20 feet at 1/10,000 horsepower.

Sphaerobolus is strongly phototropic and will shoot its peridioles toward the strongest source of light, which can be any reflective surface such as the siding on a building or the bumper of a car. In nature, phototropism helps the fungus to disperse. By shooting its spores toward a light source, the fungus avoids obstacles such as leaves and stems of plants and helps to ensure the longest possible flight. Peridioles are highly adhesive and will stick to anything. They will also stick to plant material that may eventually be eaten by a herbivore and disseminated with the animal's feces.

Management

Sphaerobolus grows anywhere rotting wood products are found. In situations where the aesthetic value of objects surrounding a mulched landscape bed is concerned, an alternate form of mulch should be considered. The rotting wood should be removed and replaced with stones or other material. Existing mulch can be raked periodically or covered with fresh mulch each year to inhibit the production of fruiting bodies. These measures, however, only temporarily reduce populations of the fungus and do not eliminate the problem.

Scraping peridioles from surfaces is a daunting project. Not only are they hard to remove, but in doing so, spores are often liberated and re-inoculate the planting bed. There are no fungicides currently labeled for control of this fungus. □

Update on Oak Leaf Scorch

Ann Brooks Gould, Ph.D., Plant Pathology

Samples of oak trees affected by oak leaf scorch, caused by the bacterium *Xylella fastidiosa*, have been sent to the Rutgers Plant Diagnostic Laboratory from all over the state. This disease, which in the past has been found mostly in the southern counties that border Pennsylvania, has become more prevalent in Cumberland, Atlantic, Mercer, Monmouth, Middlesex, and Somerset Counties. More trees have been diagnosed with this disease than ever before.

In oaks, leaf scorching caused by *Xylella* is not clearly defined. The scorch symptoms are irregular in shape and appear as small to large blotches of dead tissue on the leaves. Often a yellow or dull red "band" is apparent between healthy and scorched (necrotic) tissues. Affected leaves may curl and drop prematurely. Symptom development begins in mid- to late-summer and continues through the fall. As the infection progresses over several years, branches die and the tree declines. Affected trees eventually decline to the point where they must be removed.

This year symptoms of oak leaf scorch are still fairly visible in southern parts of the State, and may be easily confused with those caused by environmental stresses, such as moisture extremes or poor site conditions. The trick is to examine trees for irregular leaf scorch on branches scattered about the canopy in no defined pattern. Visible diagnosis of this disease is difficult, and definitive diagnosis for bacterial leaf scorch requires a special laboratory test. If in doubt, submit a sample to the Rutgers Plant Diagnostic Laboratory. For a submission form call the lab at 732-932-9140 or check the web at <http://www.rce.rutgers.edu/plantdiagnosticlab/index.html> or call RCE's faxback system at 732-932-6767 and request document 3603.

Since there is no cure for this disease, proper management strategy includes the maintenance of tree vigor for as long as possible. Other diseases, insects, and environmental stresses, including last year's drought, enhance the development of bacterial leaf scorch. This disease may also predispose infected trees to other disease and insect problems. Branches that have died due to this disease should be routinely removed. Infected trees that are in a severe state of decline should also be removed.

For more information on oak leaf scorch, refer to the Rutgers Cooperative Extension fact sheet FS875. This fact sheet is available through your local County Extension office and can also be found on the Rutgers Cooperative Extension web site under agriculture publications at <http://www.rce.rutgers.edu/pubs/ag/plantscience/pdfs/fs875.pdf>. □

Plant Diagnostic Laboratory Highlights

Richard Buckley, Plant Diagnostic Laboratory
Coordinator

Turfgrass

Since our last report on September 7th, **Gray leaf spot** was quite active. **Gray leaf spot** was confirmed on many samples of perennial ryegrass from golf course fairway and rough areas. Samples were submitted from New Jersey and the mid-Atlantic/Northeast region. This year the disease appeared to cause little damage on most sites. There were a few cases with significant injury, but the severe damage occurred primarily on golf turf without the fungicide inputs of some of the higher profile courses. It appears that much of the damage we have seen in past years was avoided with timely fungicide treatments. This season also brought several samples of **gray leaf spot** on samples from residential lawns. We had turf from a Delaware sod grower and from a park as well. It is not surprising that the disease is starting to be a problem in the lawn and landscape turf. The best solution on these sites may simply be to renovate with an improved Kentucky bluegrass cultivar.

Anthracnose basal crown rot is active at this time. Samples are being submitted from golf turf in Burlington, Cape May, Warren, Ocean Counties in New Jersey, and from golf courses in West Virginia, Pennsylvania, and New York.

Bentgrass dead spot, caused by the newly described fungus *Ophiosphaerella agrostis*, was confirmed on more golf greens last month. The disease, which mimics dollar spot, cutworm, or ball marks, seems to be active over a wide range of temperatures; however, most of the samples come to the laboratory during the heat of the summer. Active **dead spot** exhibits a bronze discoloration around the dead spot. When we first saw the disease in this laboratory, we thought that it might be copper spot because of the bronze color. Once the turf dies in the spot, it takes several months for them to recover. **Dead spot** is found on new greens construction with a high sand content root zone mix. It has been identified on several bentgrass cultivars and on *Poa trivialis* and bermudagrass. If you have "uncontrollable" dollar spot or ball marks that never heal, you may have **dead spot**.

Landscape

Bacterial or oak leaf scorch, caused by the xylem limited bacterium *Xylella fastidiosa*, was confirmed in pin, red, black, and shingle oaks from Mercer, Middlesex, Monmouth, Salem, and Gloucester Counties. Several more samples are sitting in the laboratory at this time waiting for testing. Now is the best time to test for **bacterial leaf scorch** because the concentration of the

bacterium is highest in the tree in late summer, which enhances our ability to detect the pathogen. Look for trees with marginal leaf scorch on one or more branches in the canopy. This year it is easy to pick out infected trees in the fall – they are the ones with premature color or scorch. If other abiotic sources of stress are ruled out the tree should be tested. The Plant Diagnostic Laboratory uses a selective antibody technique and can offer the results in 24 hours. Refer to Rutgers Cooperative Extension Fact Sheet FS875 for a complete discussion of the disease (see previous article on Oak Leaf Scorch on page 2).

Several insect pests were identified on woody ornamental plants from New Jersey landscapes. **Terrapin scale** was identified on silver maple from Somerset County. **Tuliptree scale** was on tuliptree samples from Monmouth County. **Euonymus scale** covered a sample of euonymus from Somerset County. **Globose scale** was quite active on a purple plum branch from a Middlesex County landscape. **Hemlock scale** was found on Colorado blue spruce from Morris County and **pine oystershell scale** was causing dieback in a Japanese black pine sample from Atlantic County. Seems our local scale insects are a bit busy!

Disease problems of note include: **juniper tip blight** on juniper from Hunterdon County, **Cytospora canker** on Japanese red maple samples from Monmouth and Gloucester Counties, **Botryosphaeria canker** on rhododendron from Union County, and **Nectria canker** on maple from Morris. An ash from Hunterdon County had **Fusicoccum canker** and **Diplodia tip blight** (secondary to stress) was identified on a Douglas fir from Hunterdon County. Canker fungi and tip blighters are a bit busy themselves!

Finally, back to the insects. **European pine shoot moth** larvae were identified in the tips of mugo pine from a Mercer County landscape. Samples of white pine were submitted from sites in Union and Bergen Counties with injury that was caused by **white pine weevils**. **Northern cedar bark beetles** caused the death of a line of arborvitae on a Middlesex County site. These trees began to show evidence of decline during the summer and went down hill fast. The trees were loaded with bark beetles. The **northern cedar bark beetle** is an occasional pest of stressed trees. It is an incredibly small critter that makes exit holes the size of pinpricks. The holes were so small that we almost overlooked them. □

Pest Notes

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

As we enter the fall months and then the winter dormant season, there are a significant number of potential pests of ornamentals that require monitoring. Pest populations left unchecked this time of year will often become more serious next year. These problems are often especially pronounced on evergreen shrubs and conifers. Therefore, this autumn do not make the mistake of thinking that landscape problems can be forgotten about until next spring. A little vigilance now can go a long way toward reducing future problems. In the following section, we'll review some of the major pest problems that require monitoring and possible management actions during the late fall months.

✓ **Defoliators: Gypsy Moths, Eastern Tent Caterpillars and Fall Cankerworms** all have overwintering egg masses on twigs, branches, and/or trunks. Mechanically remove eggs or prune out twigs with attached egg masses.

✓ **Leafminers: Arborvitae, Boxwood and Holly Leafminers** all overwinter as live larvae within foliage tissue. Yellow or white lines or blotches indicate their presence in evergreen leaves. Inspect mines for live larvae and physically remove infested leaves when populations are small. Heavily infested plants can be noted in your records and scheduled for treatment next season.

✓ **Spider Mites: Spruce mites and Southern red mites** are the common cool season mites that increase their activity during the fall months. Their peak populations occur during October and November. Generally by December, all overwintering eggs have been laid on leaves, needles and twigs. With magnification, the clear or reddish-orange bubble-shaped eggs can be observed. Horticultural oils can be very effective at suppressing both eggs and active adults.

✓ **Redheaded Pine Sawfly:** These wasp larvae will be active into late

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Diseases of Turfgrass

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

Pink Snow Mold

This disease, caused by the fungus *Microdochium nivale* (*Fusarium nivale*), should develop soon on greens and tees. Apply Banner, Chipco 26GT, Cleary 3336, Compass, ConSyst, Curalan, Daconil, Defend, Eagle, Fungo, Heritage, Spectro, Thalonil, Touche, or Vorlan to prevent snow mold from developing or to arrest current infections. For best results, apply any of these fungicides (or PCNB) in early to mid-October and then repeat in late-January if the snow cover recedes. Do not reapply PCNB after January 15 due to the possibility of phytotoxicity during warm weather next spring. In addition, avoid excessive nitrogen applications prior to dormancy in the fall.

Stripe Smut

This disease, caused by the fungus *Ustilago striiformis*, will soon be apparent on sensitive Kentucky bluegrass varieties. Symptoms typically appear as long black streaks (striations) between the veins of infected blades. These areas eventually rupture, releasing abundant black smut spores. Research at Rutgers has shown that one well-timed application of a systemic fungicide in early to mid-October offers excellent control and is far superior to multiple applications in the spring (mid-May). For best results, apply Banner, Bayleton, Cleary 3336, Eagle, Fungo, Rubigan or Sentinel, now per manufacturer's recommendations.

Take-all patch

This disease, caused by the root and crown infecting fungus *Gaeumannomyces graminis* var. *avenae*, may develop on bentgrass greens and fairways during the next few weeks. Although this disease is most prevalent from April through June, late-summer and fall outbreaks are not uncommon. Infection takes place during cool, wet weather and symptoms are most striking after stress. Infected grass first appears bronze to reddish-brown in color and then fades to a dull brown. Patches are usually circular or ring-shaped and range in size from several inches to two feet or more in diameter. The centers of affected turf are frequently colonized by bluegrass (*Poa* spp.), fescue (*Festuca* spp.), or weed species. Upon close examination, decaying roots and leaf sheaths appear black and dark strands of mycelium often develop parallel to the root axes. The disease is enhanced by poorly drained, light textured, and high pH soils. Although take-all is difficult to control, best results have been achieved through the use of acidifying fertilizers during cool weather (e.g., ammonium sulfate) and preventive applications of Banner, Bayleton, Heritage, or Rubigan in October, November, and April. If the disease has been particularly severe, fungicides should be reapplied twice next spring at 21 to 28-day intervals beginning in early April. Chemicals should be applied in 4 gal water/1000 sq ft or irrigated into the root zone (1/8 to 1/4" of water) for maximum effectiveness. Wherever practical, overseed infested areas with less susceptible grasses such as fine fescue, Kentucky bluegrass, or perennial ryegrass to mask symptom expression. Maintain soil pH at approximately 6.0.

Turf Expo

This year's Turf Expo will be held at the Trump Taj Mahal Casino/Resort on December 11-14, 2000. This is an excellent opportunity to receive the latest turf management information from nationally renowned speakers. For additional information, please contact Bea Devine (732) 821-7134. □

Poinsettia Production Meeting

October 24, 2000

8:30 AM - 4:30 PM

Mercer County Cooperative Extension Office
Trenton, NJ

The Poinsettia Production Meeting will feature educational presentations including new trends and cultivars, pest management update, effective cultural practices and production economics. A tour of Holland Greenhouses in Hightstown, NJ will highlight the day.

Pesticide License Recertification Credits will be available.

There is a fee of \$20.00 to cover the cost of food, beverages and materials.

Pre-registration is required by October 18.

For a registration form or further information, contact Annette F. Capp, Agriculture Program Associate at Rutgers Cooperative Extension of Mercer County at 609-989-6830.

New Jersey Growers' Irrigation Log Book Available

Rutgers Cooperative Extension (RCE) has developed a convenient pocket-sized New Jersey Growers' Irrigation Log Book. In addition to the log section, the book contains examples, tips on irrigation methods, conversions and resources for further information. The log book is free and available from your RCE County Office.

For growers who prefer to keep records on a full page format, log forms on 8 1/2 X 11 paper can be obtained from your County Agent.

The purpose in creating this practical record keeping booklet is to assist growers in complying with the New Jersey Department of Environmental Protection (DEP) Agricultural Irrigation Certification record keeping requirements. Voluntary reporting will help keep the growers' certifications free and reduce the need for further DEP regulation.

Rutgers Snyder Research & Extension Farm sustainable agriculture education funds paid for the publication costs for these guides. □

Cranberry Fruit Available as Soil Amendment/Compost Material

Saratha Kumudini, Ph.D., Plant Physiology

Due to the recent marketing order on cranberry fruit, a number of cranberry growers are looking for non-food uses for their product. Cranberry pressed fruit has previously been used on corn and soybean farms as a soil amendment with success. The high carbon to nitrogen ratio of these fruits make them best suited for fall application (see Table 1 below).

Cranberry fruit has also been used as animal feed. Research from the 1970's showed dairy cattle fed well on cranberry corn mixtures of up to 30% cranberry. The acidity of the fruit should aid in fermentation processes.

Cranberry pressed fruit has also been used in composting by researchers at Cornell University. The C:N ratio of fresh cranberry fruit maybe as high as 80:1 while the pressed fruit is approximately 30:1. The fresh fruit has a moisture concentration of 85% and pH of 2.5 to 3.

Anyone interested in using cranberry fruit for composting or as a soil amendment may contact:

Brenda Conner
American Cranberry Growers Association
1 Pasadena Rd.
Browns Mills, NJ 08015
Tel: (609)893-0969
Mobile: (609)364-0921
Fax: (609)893-2316
E-mail: brendac@bellatlantic.net

Table 1: Nutrient composition of cranberry fruit (fresh weight basis)

Components	Application at 1 Ton/acre (20 barrels/acre) lbs/acre	Application at 20 Ton/acre (400 barrels/acre) lbs/acre	Application at 60 Tons/acre (1,200 barrels/acre) lbs/acre
Nitrogen (N)	1.50	30	90
Phosphorous (P)	0.14	2.8	8.4
Potassium (K)	2.00	40	120

October on 2 & 3 needle pines (mugo, Scots, Japanese, black). Larvae feed in groups on individual branches and may cause defoliation. Prune out clusters of small caterpillars or drench with soap. Orthene also works well.

✓ **Bagworms:** Obviously any type of spray applied in the fall or winter would be a terrible waste of time. Overwintering eggs are contained within the dead female bags. Most of the bags containing eggs are often located on the upper portions of infested trees or shrubs. With this higher elevation, it is theorized that a certain percentage of a recently hatched population can more effectively be transported by the wind to new hosts. Remove individual bags by hand when populations are low and the upper portions of the plant can be reached. Otherwise, indicate in your records that sprays may be required during late spring or early summer when the young larvae hatch and begin feeding.

✓ **Adelgids: The Eastern Spruce Gall, Cooley Spruce Gall and Hemlock Woolly Adelgids** all overwinter as immature females and are vulnerable to control treatments during the late months of the year. The products of choice are horticultural oils or soaps when good coverage can be achieved. Remember to target sprays onto only the most recent growth or terminal twigs and buds. It is only on these locations where the above-mentioned adelgids overwinter.

✓ **Borers: Dogwood and Rhododendron Borers** are the larvae of clearwing moths and produce pencil sized holes with fresh, light colored sawdust (frass). Fresh borer holes on the bark indicates active larvae and these can be treated with entomopathogenic nematodes if the weather is not below freezing. Infested plant material can also be pruned out. Residual chemical sprays on the bark are of no value at this time of year.

✓ **Soft Scales:** Tuliptree, Magnolia, Fletcher, Calico, Lecanium, Cottony Maple and Cottony Camellia are all examples of **soft scales** which overwinter as nymphs on twigs or branches of mostly deciduous trees and shrubs. Before leaves drop in the fall, scale crawlers move back from the leaves to the bark where they will spend the remaining part of their life cycles. Late winter dormant oils are particularly effective against soft scales. Monitor for their presence before spraying by investigating further when the black sooty mold on needles, twigs or branches are first observed. Close inspection is often required since many overwintering soft scales are difficult to see translucent nymphs. Avoid cover sprays in order to conserve beneficials, because predators and parasitoids can often effectively control soft scale populations if unnecessary sprays do not destroy them.

✓ **Armored Scales:** Euonymus, Elongate Hemlock, Pine Needle, Juniper, White Prunicola, Maskell, Obscure, and Oyster Shell are all examples of **armored scales** which should be monitored for during the fall and winter periods. Look for the hard, gray scale covers of the

overwintering adult females on twigs, branches and trunks. Dormant oil control sprays can be helpful, but are not as effective with armored as compared to soft scales. When infestations are very high, the scale populations may be lightly brushed from the trunk and branches or simply pruned out.

✓ **Lacebug:** Those species of lacebugs with evergreen hosts will overwinter in the egg stage. Lacebugs with deciduous hosts, on the other hand, will overwinter as adults in protected areas. Attempting to control overwintering adults with oils would probably be unsuccessful, and therefore is not recommended. The **azalea and andromeda lacebugs**, for example, will insert their eggs within or near the undersides of the leaf mid-vein. These flask-shaped eggs are only partially imbedded in the leaf tissue. The exposed eggs are at least somewhat susceptible to horticultural oil sprays, if good coverage is achieved. Even with excellent coverage, however, a significant percentage of the eggs may still hatch next spring. The time spent in the late fall or early spring to apply oil to these overwintering eggs may or may not be worth the effort. Perhaps some experimentation on a few of your sites might prove interesting.

✓ **Halloween Lady Beetles, a/k/a Harmonia:** These beneficial insects can be a nuisance this time of year. The lady beetles are often orange in color, with or without many spots. They tend to congregate in huge numbers on homes with southern exposures, and then move inside to overwinter. Since this is a beneficial insect, sprays are not recommended. A new light trap developed by USDA scientists has been developed for indoors, to trap them and release them outdoors. Information is available via H & T Alternative Controls, 877/967-6777. □

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