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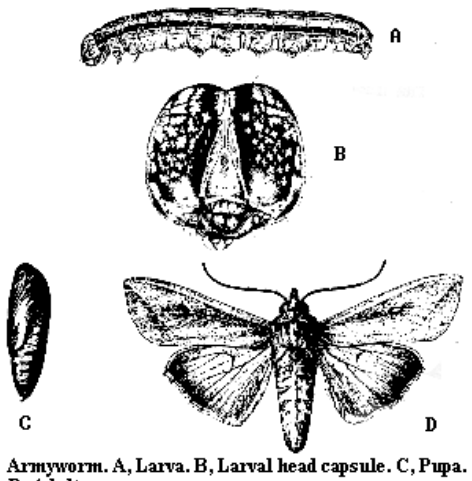

Armyworm. A, Larva. B, Larval head capsule. C, Pupa. D, Adult.

INSIDE

Armyworms: The Next Generation

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

The recent outbreak of the "common" or "true" **armyworm**, *Pseudaletia unipuncta*, in turfgrass areas throughout much of the Northeast has led to a general panic and often unnecessary insecticide applications. So here are a few clarifications (for more background information on armyworm biology and control see my article in the 6/28/01 issue).

1. Preventative applications simply don't work against **armyworms**. There is no point in applying insecticides unless the armyworms are present. The caterpillars have to eat the treated grass foliage and stems or have to be hit directly by the spray if they are to be killed. The target zone for armyworm treatments, the grass leaves and stems, is so exposed that the active ingredient will be broken down (sunlight, high temperatures, volatilization) within days without any residual effect. Not only is time and money spent on such preventative applications wasted, the insecticides will very effectively "control" any predatory or parasitic insects, thus leveling the way for the next generation of armyworms and other insect pests.

2. If you have noticed unusual numbers of uniformly pale-brown to grayish-brown moths with a distinct white spot in the center of each forewing (wingspan 1.5") and dirty white to light gray-brown hindwings, these are the adult **armyworms** that have survived the onslaught of insecticides thrown at their siblings. The moths become active at dusk, feed on flower nectar, and are attracted to light. But don't try to spray the moths. While each female moth can lay thousands of eggs we cannot predict where they are going to lay their eggs because they are good flyers.

3. There will be a next generation of **armyworms** (the 3rd annual brood) but we simply can't fore tell if it will be as damaging as the last generation. The 3rd generation is probably already hatching or even in the early caterpillar stages right around now. So, keep your eyes open and survey for any signs of infestation to catch potential outbreaks before extensive damage can occur. Armyworms are easy to control by spot treating on an as needed basis. The best give-away for an infestation is unusually large numbers of birds feeding in a turf area. If this is observed or if turf areas don't look right, get on your hands and knees and check for typical signs of infestation: skeletonized or chewed leaves, piles of frass, or the caterpillars themselves. And don't panic over the odd caterpillar you find. Make sure it actually is an armyworm (when

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ARMYWORMS FROM PAGE 1

small: pale green and crawling by looping like an inchworm; when large: grayish to greenish with a pale-orange stripe along each body side and head honeycombed with dark lines) and continue checking to see if there are more. Armyworms are true to their name, typically occurring in large numbers.

4. **Armyworms** cannot survive the cold New Jersey winters. The moths migrate every year to New Jersey from southern latitudes by hitchhiking on large storm systems. While the first moths typically arrive in New Jersey around April, we have no way of telling if their offspring will reach damaging levels again in 2002. This year's outbreaks are extremely unusual and will in all likelihood not be repeated for years to come. But it can't hurt to stay alert and remember any lessons learned this year.

5. Finally, some additions to my recommendations on insecticides for **armyworm** control. As I said before, maximize the intake of pesticide residues from the grass by the nocturnally feeding larvae by using liquid applications, applying late in the day, and withholding irrigation and mowing for at least 24 hours after application. Almost any surface insecticide will provide good control of armyworms. Pyrethroid (e.g., Talstar, Tempo, Deltagard, Battle, Scimitar, Astro) are generally considered first choice for armyworm control because they act quicker and have less toxicological problems than carbamates (e.g., Sevin) or organophosphates (e.g., Dursban, Diazinon, Oftanol, Dylox). Entomopathogenic nematodes (products containing *Steinernema carpocapsae* or *Heterorhabditis bacteriophora*), Mach2, and Conserve SC are products with minimal impact on predators and parasites of armyworms and other turf insect pests. They can control armyworms very effectively but work relatively slow. They can be used when the armyworms are still small, but may be too slow to stop damage by an army of large caterpillars invading your lawn from the outside. ❑

Plant Diagnostic Laboratory Highlights

Richard Buckley, Plant Diagnostic Laboratory Coordinator

Turfgrass

Anthracnose is still the main problem coming from the golf turf crowd at this time. The disease was identified on samples from Atlantic, Bergen, Burlington, Essex, Morris, and Ocean Counties. We also had **anthracnose** samples from Delaware, Pennsylvania, and New York. **Summer patch**, which is caused by the fungus *Magnaporthe poae*, has begun to appear on golf course turf. Samples of **summer patch** were diagnosed on golf turf from Burlington, Cape May, and Monmouth Counties, as well as from Pennsylvania and New York. Finally, we are seeing a little **Pythium blight** on fairway turf. The disease appears to have flared-up at the end of a scheduled fungicide treatment. It might be prudent to shorten up the interval a little when the disease pressure is high.

Brown patch is still the major issue in residential turf at this time. Samples of **brown patch** were submitted from Bergen, Middlesex, and Morris County landscapes. Of particular note was a sod grower who had **brown patch** problems. The grass was cut, rolled, and transported about six hours on a truck. When the turf was unrolled it was covered with the disease. We are also beginning to get samples of residential turfgrass with **chinch bug** injury. The little critters were very active in samples from Camden and Middlesex Counties.

We saved the best for last! **GRAY LEAF SPOT** was identified in perennial ryegrass from a New York City Botanical Garden. This particular garden lost acres to **armyworm**, and to add insult to injury apparently is loosing more turf to *Pyricularia grisea*, the fungus that causes **gray leaf spot**. If you're like me and enjoy some death and destruction during your garden visits, it might be worth a trip to the Bronx! We also have active **gray leaf spot** on the Rutgers Turfgrass Research Farm in North Brunswick.

Nursery

Phytophthora crown and root rot was the problem for a container grower in Morris County. **Rhizoctonia** and **Pythium crown and root rots** were identified on container grown mums from a Hunterdon County grower. **Powdery mildew** was very active on dogwood submitted from a Cape May County grower. A Cape May County grower sent portulaca that was diagnosed with **Pythium crown and root rot**.

Landscape

Insect and mite problems dominate the samples from landscape plants at this time. **White pine weevil** was identified on pine and spruce from Bergen and Cape May Counties, respectively. **Oystershell scale** was present on oak from Bergen County. **Spider mites** had a party on a viburnum from Middlesex County. They must have moved from last edition's gig in Essex! ❑

Diseases of Turfgrass

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

Bentgrass Dead Spot

This disease has recently developed 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.

Fairy Ring

This problem, caused by a group of fungi known as *basidiomycetes*, is apparent on golf greens and home lawns at this time. Symptoms typically appear as continuous or interrupted rings of dark-green turf. Mushrooms, which are often associated with **fairy rings,** usually develop only in the mid-spring and fall months. Although chemicals have been relatively ineffective against these fungi in the past, Prostar 70W (4.5 oz/1000 ft^2) and Heritage 50WG (0.4 oz/1000 ft^2) have recently shown promise in university tests. Both materials should be applied in large volumes of water (10 to 50 gal H_20/ 1000 ft^2) or watered in immediately after application (approximately ¼ inch of H_20). Aerification prior to treatment may aid in control. Repeat applications every 28 days, as needed. Maintain adequate fertility and soil moisture to mask symptom expression.

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 patches. 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°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 three-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 50WG (0.2 to 0.4 oz/ 1000 ft^2) and 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.

Pythium Blight

Pythium blight has been quite active on golf and landscape turf during the past few days. Since pythium thrives in low or poorly drained areas, especially when the night temperatures are above 70°F, we should see a lot more of this disease as the "hot muggy" weather continues this summer. For best results, improve drainage, water in the early morning hours, avoid over fertilization, and apply Aliette, Banol, Heritage, Koban, Prodigy, Quell, Subdue MAXX, or Terrazole, according to the manufacturer's recommendations.

Turf Field Day

The **Landscape Turf Research Field Day** will be August 1, 2001 at the Plant Science Research Farm in Adelphia, NJ. The **Golf Turf Research Field Day** will be held on August 2, 2001 at the Turf Research Farm (Ryder's Lane) in North Brunswick, NJ. Recertification credits will be available at the conclusion of each program. Call Marlene @ (732) 932-9400 Ext. 339 for further information or directions. ❑

Vascular Wilt Diseases of Shade Trees, Part IV: Bacterial Leaf Scorch of Shade Trees

Ann Brooks Gould, Ph.D., Plant Pathology

Bacterial leaf scorch, a bacterial disease that occurs on oaks in New Jersey, is discussed in the fourth and final article of this four part series on vascular wilt diseases.

Introduction

Leaf scorching in landscape trees and shrubs occurs when leaves lose water faster than the roots can supply it. When moisture is lacking, the margins tend to dry out first, hence the marginal scorch pattern typically associated with stressed plants. Symptoms of scorch may become evident any time water flow is disrupted within a plant.

Leaf scorching in plants is usually attributed to both biotic (living) and abiotic (environmental) agents. Abiotic (or environmental) agents that can cause scorching in leaves include drought, dehydrating winds, salt, flooding, chemicals, air pollutants, toxic metals, and nutrient extremes. Scorching can also occur when plants are placed in sites where roots do not develop normally (such as in planting islands or in soils with a hard pan layer), or when roots are physically damaged (such as occurs during construction). In most cases, this type of scorching is fairly uniform around leaf edges, affects newer leaves as well as older leaves, and will appear on vast expanses of the canopy. In addition, scorch symptoms may develop soon after a known stress (such as drought or an application of de-icing salt) occurs.

On the other hand, scorching can also occur in plants affected by living or biotic agents. Organisms that can cause this symptom include fungi, bacteria, nematodes, viruses, and insects. Leaf scorching due to biotic agents is not clearly defined. The scorch symptoms on leaves are often irregular in shape, and frequently a yellow or red "band" will appear between green and scorched tissues. In addition, symptoms may appear first on the older leaves of one or more branches, and then spread to other parts of the tree.

Certain New Jersey landscape trees are affected by a disease (a biotic agent) that causes leaves to scorch and is known as **bacterial leaf scorch of shade trees** or **bacterial leaf scorch**. This disease, caused by the bacterium *Xylella fastidiosa*, occurs in regions throughout the eastern, southeastern, and mid-western United States. Tree hosts affected by *Xylella* include American elm, red and pin oak, sycamore, London plane, red mulberry, and red maple. *Xylella* also causes diseases in grapes, peaches, plums, citrus, almonds, periwinkle, and ragweed. In addition, the bacterium infects a wide variety of other plants (alternative hosts), many of them weeds, without causing visible symptoms of disease.

Of all the shade trees affected by *Xylella*, the hosts most familiar to landscapers throughout the southwestern counties of New Jersey are pin and red oak. This disease on oak is specifically known as **bacterial leaf scorch of oak** or **oak leaf scorch**. Thus far, pin and red oaks are the species primarily affected by this disease in New Jersey; incidence on other shade trees and other species of oak is rare. Refer to Table 1 for a list of oaks that have been identified with this disease in different parts of the United States.

At this time, oak leaf scorch is most prevalent in certain sections of Burlington, Camden, Gloucester, and Salem Counties. For example, the disease affects 20% of approximately 1000 trees in Moorestown, NJ (C. Pfleider, Department of Parks and Shade Trees, *personal communication*). The incidence of this disease is increasing in other parts of the State, however; small populations of diseased trees have been identified in most counties in New Jersey.

Symptoms

Like leaf scorching due to other biotic agents, leaf scorch caused by *Xylella* is not clearly defined and is easily confused with scorching due to other causes. On oaks, scorch symptoms are often irregular in shape, and frequently a dull red "band" is apparent between healthy and scorched (necrotic) tissues. These symptoms usually occur in mid- to late-summer on leaves of one or more branches in the canopy. Affected leaves may curl and drop prematurely. 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. The process of tree decline may occur quickly or slowly depending on the tree or the environment.

Disease Development

Xylella lives and multiplies within the xylem (or water conducting) vessels of infected plants, thus its classification as a vascular wilt. The bacterium induces moisture stress in the tree by inducing the production of gums that block xylem vessels.

The bacterium is carried from tree to tree (or vectored) by xylem-feeding insects such as **sharpshooter leafhoppers** and **treehoppers**. These insects subsist on the fluid within xylem vessels and pick up bacteria when feeding on infected trees. When an insect carrying the bacterium subsequently feeds on a healthy tree, the new tree becomes infected. Once an adult insect acquires the bacterium, it can continue to infect trees throughout the remainder of the insect's life. The particular species of insects that spread *Xylella* to oaks and other shade trees is currently unknown.

Diagnosis

Xylella was not recognized as a pathogen of landscape trees until the early 1980s, and its symptoms are very similar to those caused by other agents. It is not

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surprising, therefore, that the disease is frequently misdiagnosed. When trees are suspected of being infected with the leaf scorch bacterium, it is best to submit a small branch specimen (pencil-width in diameter), with scorched leaves attached, to the Rutgers Plant Diagnostic Laboratory for analysis. Diagnosticians will identify this disease by looking for the bacterium in xylem fluid or through the use of selective antibody techniques. Proper sampling is necessary for an accurate diagnosis; the best samples have leaves that are symptomatic for the disease.

Management

Residents in New Jersey should be on the look out for oak leaf scorch from late August until mid-October. 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 drought, enhance the development of bacterial leaf scorch. This disease may also predispose infected trees to other disease and insect problems. Branches and infected trees in a severe state of decline should be routinely removed, as they are potential hazards. Expensive tree injections reduce symptom development, but do not cure the disease and must be repeated.

As stated above, definitive diagnosis for bacterial leaf scorch requires a special laboratory test. 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.

Table 1. Oaks affected by oak leaf scorch.[1]

Black oak	New Jersey[2]
Bluejack oak	Florida
Bur oak	Kentucky
Chestnut oak	Tennessee
Laurel oak	Florida
Live oak	Alabama
Northern red oak	Kentucky, Tennessee, mid-Atlantic, and northeastern states
Pin oak	Kentucky, Tennessee, and northeastern states
Post oak	Tennessee, New Jersey
Scarlet oak	Tennessee, northeastern and Mid-Atlantic States
Shingle oak	Pennsylvania
Shumard oak	Alabama, Pennsylvania
Southern red oak	Florida
Swamp white oak	Tennessee, New Jersey[2]
Turkey oak	Florida
Water	Florida, Tennessee
White	Tennessee
Willow	Tennessee

[1]Source: Sherald, J. L. 2001. Xylella fastidiosa, a bacterial pathogen of landscape plants. In: Shade Tree Wilt Diseases. C. Ash, ed. APS Press, Minnesota.

[2]Buckley, R. J., Rutgers Plant Diagnostic Laboratory, personal communication. ❑

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). ❑

Pest Notes

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

JUNIPER WEBWORM (1645-1917 GDD): This web-making caterpillar spins silk to fasten together the needles and twigs of juniper. The black-headed, brown-striped caterpillar is well hidden within the webs. They initially mine within the foliage, but then completely consume needles when larger. Symptoms first appear similar to spider mite damage since needles are yellowing, but webbed needles will brown and die. Pull apart needles, paying close attention to the densest part of the plant, and look for the silk webbing, caterpillars, and also frass. Prune out small infestations. A systemic spray of Orthene will offer good control, but sprays of residual insecticides still must penetrate the dense webbing. Dursban, Mavrik, Tempo 2, Conserve, Diazinon are labeled for treatment in late July/early August. "Savin" juniper and "Pfitzer" juniper are reported to be resistant.

X'WHITE WAXY LADY BEETLES: Occasionally during monitoring observations, white, waxy, mealybug-like creatures may be noticed. The typical response is to assume they are insect pests that require controls. Do not jump to quick conclusions! Chances are good that these are beneficial lady beetles, and they are providing free pest control. Some Chilocorus species (twice-stabbed lady beetle) larvae can occasionally form white, waxy filaments around its body, which make them less recognizable to many landscapers. These "disguised" lady beetles seem to most commonly be found feeding on soft scales/eggs, such as magnolia/tulip-tree scales and cottony camellia scales. If not needlessly destroyed by pesticides, they can often be seen voraciously consuming many of these "bad guys." Learn what these disguised lady beetle larvae look like. Don't destroy them when they are trying to help.

ELM LEAF BEETLE attacks elm (particularly Siberian) and Zelkova. Chinese elms are fairly resistant. Adults are 3", yellow with three black stripes. They are actively feeding on foliage, with ragged holes left in their wake. Females can lay up to 800 eggs each, in clusters of 5-25 on the underside of leaves. Hatched larvae are tan to black, soft-bodied, with a series of black spots down their backs. Larvae feed on the lower leaf surface, producing characteristic skeletonization damage from feeding between the veins. Trees appear scorched and leaves may curl and drop prematurely. Larvae migrate down the tree to pupate in the soil and debris beneath the tree. A second generation, active in late July, will attack trees that refoliate from first generation injury back in May. However, a California study suggests monitoring for eggs before treating. If 30% of branch samples per tree have egg masses, then a spray should be applied for the second generation. Control eggs or newly hatched larvae with horticultural oil. Small larvae can also be controlled with M-Trak (a form of Bt that controls beetle larvae). Some recommendations suggest an 8-10 ft. trunk (bark) treatment with Sevin, to control larvae as they migrate down the trunk to pupate.

SAPSUCKERS: The characteristic straight rows of holes from the pecking of yellow-belly sapsuckers are a curiosity to many. The birds are not searching for the larvae of boring insects as often erroneously assumed. Actually they eat the live inner bark (phloem) of the trees as well as any insects that are attracted to the resulting wounded areas & sap flow that their pecking creates. Unless the holes are close enough together to cause girdling of stems or branches, the trees are usually not adversely affected. Once birds have identified a suitable tree, they return year after year.

MID-SEASON LEAF DROP: When the leaves of large shade trees drop during mid-season it typically causes alarm to concerned homeowners/clients. With the ground littered with spent foliage, the conclusion often is that "their favorite shade tree is dying." Linden and Sycamore trees are often most susceptible to mid-season leaf drop. In a majority of cases, this is a normal physiological growth habit for these species. Linden and sycamore trees commonly drop foliage in mid-season in order to reduce leaf surface area and subsequent water loss. This leaf shedding ability is especially important during typical summer droughts or when water availability in soils is limited. Neither tree health nor tree growth is usually affected.

GIRDLING ROOTS: Many tree species can develop potentially life threatening girdling roots, but maple species are notorious for developing them. As offending girdling roots expand in diameter and press against the also expanding central stem, an inevitable slow decline of the tree begins. When two roots grow together or when two branches grow together they have the ability to graft and share conducting tissues. However, root and stem tissues cannot graft together and detrimental effects occur when they expand into one another.

Typically the growth of the crown declines, leaves display early fall colors, and twig/branch dieback becomes progressively pronounced. A common symptom that can be observed easily from a distance is when the tree trunk goes straight into the ground with no visible root flare. With valuable trees, the excavation and removal of offending roots may be considered. This management strategy is only suggested if the tree decline is not too advanced and no more than a couple major girdling roots are involved. One of the primary causes of girdling roots is when new transplants are planted too deep. The casual observation in wooded and forested areas indicates that girdling roots are very rare at these sites.

WHITE PINE WEEVIL: Damage from these weevil larvae has been evident for the past couple of weeks on

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Greenhouse Fungi Health Threat

Gretchen Kuldau and Gary Moorman, Department of Plant Pathology, Penn State University

For a few years we've known that peat moss can contain fungi such as *Sporothrix* that invade open wounds on workers hands and cause infections. Now, another fungus that poses a threat to worker health has been found in the greenhouse industry and in a garden center, *Stachybotrys chartarum* (pronounced: stack-ee-bot-tris). Some isolates of this fungus produce toxins absorbed in the lungs but superficial contact with the fungus can also produce dermatitis.

Stachybotrys was recently observed growing on the surface of pots made of recycled paper in which plants had been growing for several weeks. The fungus thrives on moist cellulose. It is thought that this is an isolated incident but one worthy of your attention because of the seriousness of the health threat to both workers and consumers. No symptoms were associated with the contaminated pots that were recently identified. *Stachybotrys* is a common soil fungus and probably colonized the pots in the greenhouse after they were moistened.

Stachybotrys appears as a heavy black patch of mold on the surface of the paper or wood. The patch will often have a sooty appearance and may be white at the margins. When wet it may look somewhat shiny or slightly slimy, dry areas will be less shiny.

Any wet cellulose-containing product is a candidate for invasion by this fungus. For example, if cardboard boxes are stored where they get wet and remain moist, the fungus may grow on them. If newspaper is used to cover flats of young plants to shade them or just stacked somewhere until thrown out, the fungus could begin to grow if the paper is kept moist. If wood or drywall materials in the greenhouse are wet from condensation, misting, or continuous contact with wet soil, what you think is just an unsightly mold could be *Stachybotrys*.

Exposure to *Stachybotrys* can result in adverse effects on health. Skin contact can cause a painful dermatitis. Inhalation of spores may result in a burning sensation in the nose and throat, bloody nose, eye irritation, tightness in the chest, cough, fever, headache and fatigue. It is not currently known how many spores must be inhaled for these symptoms to occur. Immune-compromised individuals (e.g. persons with HIV/AIDS, those undergoing chemotherapy treatment, and pregnant women) as well as the young and the elderly will likely be more susceptible to the effects of the fungus.

Management

If you find black fungal growth on wood or paper products, keep the material moist because the *Stachybotrys* spores will stay on that wet material. If you let the material dry, the spores become airborne. Wear gloves and protective clothing while removing the wet materials. If the material is already dry, wear a respirator to avoid breathing the spores. . A dust mask is not sufficient protection. Put the contaminated material in a plastic bag or other container that can be closed and dispose of it.

It may be possible to treat problem areas in order to reduce the amount of fungus present. Surfaces that are contaminated with *Stachybotrys* can be disinfected using a household bleach solution (1/4 cup of bleach per gallon of water). The solution should be applied using a hand-pumped garden sprayer. Thoroughly wet the surface but avoid excessive runoff. The treated surface should be allowed to dry for 6 to 8 hours. If the fungus appears to be growing back, a stronger bleach solution can be tried (1/2 gallon of bleach in 5 gallons of water.

Keep paper and wood products dry and, if possible, off the ground away from direct contact with moist soil.

If recycled paper pots are being used in plant production, train all workers to watch for black patches of fungal growth on the pot surfaces. Dispose of pots with black fungus promptly as noted above.

Do not grow plants in recycled paper pots on the floor in direct contact with moist soil. Raise them off the soil on inverted plastic flats or place them on benches so that the surfaces of the pots dry and do not stay saturated with moisture.

Submitted by Ann Brooks Gould, Ph.D., Plant Pathology. ❑

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Eastern white pine, Norway and Colorado spruce, and occasionally Douglas fir. The larvae have been feeding within the terminal leaders since mid to late April. When the terminal is heavily infested, larvae feed side by side in a ring encircling the stem. Most of the larvae reach maturity by mid July and pupate. Adults emerge 10 to 14 days later through small holes at the base of the infested terminal. Time is rapidly running out to remove the damaged terminal before the adults emerge (some of the earlier pupated weevils may have already emerged). Only one generation is produced per year. Adults spend the winter in the leaf litter under or near host trees. Chemical sprays are not effective against the emerging adults. Targeted sprays to the terminals can be effective against the feeding adults as they fly or crawl to the leaders during March and April. Most feeding by adults is done within 10 inches of the top terminal buds.

PEACHTREE BORERS: The egg-laying adults have one of the longest flight periods of all the clearwing moth borers (June into September). Peachtree borers most commonly attack trees or shrubs within the genus Prunus. Japanese flowering cherry, cherry laurel, and purpleleaf sand cherry are the preferred landscape hosts. There is one generation per year, and the larvae overwinter in tunnels in wood or under bark. The relatively large larvae can reach 1-¼ inches in length and will often kill smaller trees within 2 years. Larger caliper trees will typically decline more slowly, displaying symptoms such as branch dieback within the canopy and gummosis (with frass) at the root/crown area near the soil line. Inspect under the mulch that may be piled up against the trunk for signs or symptoms of borers: cracked bark, exit holes, pupal skins, gummosis and frass. Likewise, do not apply mulch against Prunus stems/trunks since this attracts egg laying peachtree borers. Chlorpyrifos (Dursban) and pyrethroids (Astro) can be applied as a preventative treatment to the root-crown and lower trunk areas of the bark. Since egg laying can occur throughout the summer, several applications may be necessary starting in June. Entomopathogenic nematodes sprayed as a curative treatment on cherry laurel have proven somewhat effective. ❑

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