RUTGERS COOPERATIVE EXTENSION AT THE NEW JERSEY AGRICULTURAL EXPERIMENT STATION

PLANT & PEST ADVISORY

LANDSCAPE, NURSERY & TURF EDITION $1.50 JUNE 26, 2003

INSIDE

Diseases of Ornamental Plants

Ann B. Gould, Ph.D., Specialist in Plant Pathology

Warm, wet weather during the summer months can be very conducive to **root rot**, **crown rot**, and **dieback** of many nursery and landscape plants. These diseases are caused by species of the water mold fungus *Phytophthora*, a pathogen that is found worldwide and affects a variety of field, fruit, vegetable, forest tree seedling, and ornamental crops.

Among the several species of *Phytophthora* associated with nursery crops in New Jersey, the two most common are *P. cinnamomi* and *P. cactorum*. Of the two, *P. cinnamomi* is the most prevalent and causes a root and crown rot that is troublesome in nearly 1000 host plants. Look for this disease over the coming weeks in hosts such as arborvitae, blueberry, camellia, chamaecyparis, daphne, dogwood, forsythia, Frasier fir, heath, heather, hemlock, Japanese holly, juniper, kalmia, pieris, pine, pittosporum, stewartia, white pine, and yew. *P. cactorum* affects only the foliage and causes a dieback that may affect a few leaves and stems or may rapidly kill an entire plant. Phytophthora dieback is not as common as root and crown rot but can be devastating when foliage remains wet during warm weather.

Phytophthora Root and Crown Rot

Phytophthora root and crown rot in ornamental nursery crops is a problem common to New Jersey growers in the summer when temperatures are warm and container stock remains wet or does not drain properly for extended periods. Growers must take care not to over water as compensation for very warm temperatures.

Symptoms

P. cinnamomi is a soilborne fungus that attacks the roots of susceptible plants. In the early stages of infection, plants become stunted and turn a dull-yellow color. Affected leaves wilt, rolling inward along the major vein axis as they droop. Frequently, plants wilt during the heat of the day and recover at night. Under more severe conditions shoot tips and major branches die, leading to eventual death of the plant. The root systems of plants infected by *P. cinnamomi* turn dark brown, become brittle, and die. Dark, reddish-brown to brown streaks typically extend up into the wood just beneath the bark at the soil-line, a symptom that is diagnostic for the identification of this disease.

Disease development

P. cinnamomi survives within infected root and crown tissue and in host debris. When soil moisture is high, the fungus produces fruiting

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structures called sporangia that release zoospores. These motile spores, attracted by root exudates to healthy roots, germinate on root surfaces and invade root tissues. The infection spreads, and affected root cells die. Once a substantial portion of the root system is killed, foliar symptoms develop.

Phytophthora Dieback

P. cactorum causes an aerial blight that occurs when foliar plant parts have contact with water that contains fungal spores. Common sources of fungal inoculum include spores splashed from soil or container surfaces or contaminated overhead irrigation water.

Symptoms

Phytophthora dieback is first evident as small, water-soaked regions on expanding leaves and stems. Within 48 hours, affected regions turn necrotic and the entire leaf blade dies. The fungus moves into the stem, and if weather remains warm and wet, the pathogen quickly blights the stem. Small plants may be killed within 7 days of initial infection; in larger plants, dieback may be limited to the current season's growth.

Disease development

Sporangia or zoospores that splash onto leaf surfaces require a thin film of water overnight to initiate infections. Once lesions develop, more spores are formed on tissue surfaces that are dispersed to nearby foliage or plants, quickly spreading the disease.

Impact of Moisture and Temperature on Disease Development

Phytophthora diseases are favored by high moisture. Root and crown rot can be severe when plants are grown in wet, poorly drained soils or mixes. Production and dispersal of sporangia and zoospores are enhanced in water-saturated soil. It takes only a few days for roots to become infected and new spores to be produced, so the disease can increase dramatically if infested soil becomes water-logged. Phytophthora dieback is also favored by moisture; water is essential for splashing fungal spores from contaminated soil or nursery beds to foliage. In addition, continuous, overnight leaf wetness is necessary for the infection process to occur.

High temperatures (75 to 80°F) also favor disease development. The minimum and maximum temperatures at which *P. cinnamomi* will grow and reproduce are 40 to 60°F and 85 to 95°F, respectively. The temperature of container media during the growing season is frequently higher than that of surrounding soil. Field grown stock, therefore, may not exhibit symptoms of the disease, even in the presence of the fungal pathogen. Furthermore, container stock infected by the fungus at low temperatures early in the growing season may not develop obvious symptoms of the disease until media temperatures increase later in the summer or plants are subjected to environmental stresses. *P. cactorum* prefers warm, but not hot, summer weather and is most common when frequent thunderstorms are followed by cloudy, humid weather.

Management of Phytophthora Diseases

Phytophthora can be very difficult to eradicate once established. Successful disease management, therefore, requires an approach that utilizes preventive cultural practices. For Phytophthora root and crown rot:

- Use only pathogen-free stock. Purchase only healthy, vigorous stock, and inspect these plants carefully for signs of disease. Imported stock should be segregated in the nursery for several months to be sure the plants are free of disease. Propagate only from cuttings taken from disease-free mother plants.
- Plant only in pathogen-free soil or potting mix. Since Phytophthora root and crown rot is easily spread through the movement of infested soil, all potting mix components should be steam-pasteurized before use. Once pasteurized, mix components should not come into contact with fresh soil or plant debris. In the propagation house, containers should be new or surface-sterilized before use. All propagation tools, benches, and beds should also be surface-sterilized. In field sites with a history of this disease, an appropriate chemical fumigant should be applied before planting.
- Select well-drained potting mixes and field sites. Phytophthora root rot tends to be more severe in container plants than in the field because over-watering is a frequent problem and mix temperatures tend to be higher. The disease can also be a problem when soil, peat moss, or sawdust is used as the sole component of the container mix. A mix high in sawdust is more conducive to disease development because drainage is poorer. A good potting medium should generally contain 20 to 25% air-filled pore space. When used as a potting mix amendment, composted hardwood bark releases inhibitors that suppress disease development.
- To prevent the dispersal of spores of *P. cinnamomi* through splashing in the nursery, place container plants on a well-drained base, such as three to four inches of gravel. Container beds should be graded to allow water to drain away from the pots and prevent puddling. In the field, select planting sites that are most appropriate for vigorous growth.
- Maintain plant vigor. Maintain proper levels of soil nutrients, moisture, and soil pH. Avoid over-watering and cultural practices that promote overly succulent growth, such as heavy fertilization, over-crowding, and low light. Succulent plants and those under stress are more susceptible to disease.
- Utilize disease resistant plants and cultivars when possible. Many well-known azalea and rhododendron hybrids are very susceptible to Phytophthora root rot. Under severe environmental stress, however, even tolerant cultivars may succumb to this disease.
- Apply an appropriate fungicide when necessary. Fungicides such as Banrot, etridiazole, fosetyl-Al, mefenoxam, metalaxyl, or propamocarb-HCl are useful when applied as a preventive drench per manufacturer's recommendations. Once plants become infected, fungicides may arrest further infection but do not kill the fungi within infected roots and soil. Although fungicides are useful for disease control, they cannot replace good cultural practices.

Management of Phytophthora dieback benefits from those measures used to control Phytophthora root and crown rot. Of primary importance is to prevent puddling of water during irrigation to prevent spores from splashing to foliage. Good ground covers in the container area are also helpful. In addition, avoid excessive use of fertilizers, and do not use irrigation water contaminated with fungal spores. ❑

Plant Diagnostic Lab Highlights

Richard J. Buckley, Laboratory Coordinator

Turf

I started the last newsletter this same way but, believe it or not, as late as last Friday, we had a sample diagnosed as **pink snow mold**. Funny thing, we also had two samples of **yellow patch**. Seeing the temperature rise into the 90's this week should mean the last hurrah for the winter turf diseases. How about some summer disease? **Brown patch** was active on the Rutgers Turf Farm, particularly in the colonial bentgrasses. We have not seen **brown patch** samples in the laboratory yet, but expect to see the disease on samples of susceptible ryegrasses and tall fescues soon. There was also quite a bit of **dollar spot** in the bentgrass on the farm that is maintained at fairway cutting heights. **Dollar spot** samples were submitted from golf greens in Atlantic and Somerset Counties, and the laboratory staff has been fielding quite a few calls concerning **dollar spot** from golf courses and residential clients alike. Seems the fungus that causes **dollar spot,** *Sclerotinia homoeocarpa***,** likes the weather too! Turf samples diagnosed with **anthracnose** are being submitted with increasing frequency. **Anthracnose** was diagnosed on golf turf (*Poa annua*) from Virginia, New York, Pennsylvania, and Monmouth County in New Jersey. On landscape turf, **red thread** is still active.

Ornamentals

Shade tree anthracnose, once again, was the disease most identified this period. Sounds like last newsletter too! Samples of oak from Union County, sycamore from Atlantic County, and dogwood from Somerset County were diagnosed with the disease since the last newsletter. One thing to note, there seems to be some confusion over **anthracnose** in oak and our old favorite **bacterial leaf scorch**. **Oak anthracnose** may cause scorch-like symptoms that might mimic those caused by **bacterial leaf scorch**. One would see them now. **Bacterial leaf scorch** rarely causes any visible symptom expression before mid-August. In fact, we normally cannot even detect the bacterium that causes leaf scorch in the trees until the symptoms appear. We assume that the organism needs time to build-up in the xylem, and clog things up before the leaves scorch. If you see scorching now it is likely that the tree has **anthracnose**. Save your **bacterial leaf scorch** testing dollars for late-summer. **Juniper tip blight** is also quite active at this time. Both fungi that cause **juniper tip blight** - *Kabatina* and *Phomopsis* - were identified on the various samples. **Diplodia tip blight**, which is caused by the fungus *Sphaeropsis sapinea*, was evident on pine samples from Atlantic and Bergen Counties. Other diseases of note include: **Dutch elm disease** from two Mercer County elms; **apple scab** on a Union County dogwood; **leaf and flower gall**, caused by the fungus *Exobasidium*, on an azalea from Somerset County; and **leaf blight**, caused by *Phyllosticta hamamaelidis*, on a witch hazel sample that was also from Somerset County. ❑

Insect Management with Endophytic Turfgrasses

Albrecht M. Koppenhöfer, Ph.D., Specialist in Turfgrass Entomology and William A. Meyer, Ph.D., Turfgrass Breeding

Several grass species can form mutualistic relation ships with **endophytic fungi** in the genus *Neotyphodium* (perennial ryegrass, tall fescue) or *Epichloë* (fine-leaf fescues). The fungus lives intracellularly in the above ground parts of the plants and is transmitted by seed and vegetative propagation. Endophytic fungi depend on their grass host for nutrition, whereas endophyte-infected plants have been observed to have enhanced growth and vigor, germination and seed set, drought resistance, and resistance to certain pathogens and insects. Insect resistance is associated with the production of alkaloids by the endophytes that are harmless to the grass, but are deterrent or toxic to some insect pests that feed on the aboveground parts of the grass.

The effect of endophyte infection on different insect pests varies with grass species. In **tall fescue**, a grass species that is generally less susceptible to insect damage even without endophytes, endophytes have been observed to increase resistance to **fall armyworm**, **billbugs**, **sod webworm**, **leafhoppers**, and **greenbugs**. In **fine-leafed fescues**, increased resistance to the **hairy chinch bug** and **fall armyworms** has been observed. In **perennial ryegrass**, endophyte-infection generally confers resistance to **billbugs**, **sod webworms**, **hairy chinch bug**, and **greenbugs**, and partial resistance to **fall armyworms**. In contrast, root-feeding insects such as white grubs generally are not significantly affected by the presence of endophytes, probably because little of the protective alkaloids is translocated into the turfgrass roots.

The degree of protection against insects conferred by the endophytes to turfgrasses is variable because alkaloid types and levels may vary with turfgrass species and cultivar, environmental conditions (e.g. highest alkaloid concentrations in spring and in fall), soil fertility, and other parameters. In a New Jersey field study in the late 1970s, perennial ryegrass cultivars with >90% endophyte infection generally sustained only 1-5% damage by billbugs, whereas cultivars with <10% endophyte infection sustained generally >25% damage (up to 83%). But some cultivars with 100% endophyte infection sustained 25% damage and some cultivars with 0% endophyte infection sustained only 7% damage. In another study in New Jersey in the late 1980s, tall fescue infected with endophytes sustained only 1% damage by billbugs whereas endophyte-free tall fescue sustained 25% damage.

From an historical perspective in the past two National Turfgrass Variety Trials, all top performing

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perennial ryegrasses contained a high level of endophyte. The following new improved turf-type **perennial ryegrasses** performed well in New Jersey turf trials: AllStar2, Amazing, Applaud, Brightstar II, Brightstar SLT, Cabo, Charismatic, Churchill, Citation Fore, Exacta, Fiesta III, Gator III, Integra, Jet, Kokomo, Pace Setter, Palmer III, Paragon, Pizzazz, Pinnacle II, Premier II, Promise, Repell II, Seville II, Somerville, SR 4820, Stellar. Similarly, all top performing tall fescues in the National Turfgrass Evaluation Trials contained a high level of endophyte. The following improved turf-type **tall fescues** have performed well in New Jersey turf trials: Arid 3, Bingo, Biltmore, Bonsai 2000, Coyote, Crossfire II, DaVinci, Dynasty, Finesse, Finesse II, Focus, Forte, Gazelle, Justice, Masterpiece, Millennium, 2nd Millennium, Mustang 3, Plantation, Prospect, Olympic Gold, Oncue, Picasso, Rebel Exeda, Rebel Sentry, Rembrandt, Rendition, Shenandoah II, Scorpion, Sr8250, Silverstar, SR8600, Tarheel, Watchdog, Wolfpack.

Insect pests can also be suppressed in mixed stands of Kentucky bluegrass and endophytic perennial ryegrass. In recent studies in Ohio, population densities of **bluegrass billbug** and **bluegrass sod webworm** decreased significantly as the percentage of endophytic perennial ryegrass (Repell II) increased in mixed stands with Kentucky bluegrass until the proportion of endophytic perennial ryegrass reached 40%. Higher percentages of endophytic perennial ryegrass did not result in further reduction of pest populations. In the same study, another endophyte enhanced perennial ryegrass cultivar (Triple Play) did not decrease billbug populations.

Endophyte-infected seed should be stored under cold (32-40°F) and dry conditions because endophyte viability in seed declines rapidly under warm, humid conditions. The seed should be planted as soon as possible to guarantee high endophyte infection levels after establishment. The use of endophyte-enhanced turfgrasses is a useful tool in the management of surface-feeding insects and can significantly reduce the need for insecticide applications. ❑

Ants in Turfgrass: Beneficial, Nuisance, or Pest?

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

Several species of ants commonly inhabit home lawns, golf courses and other turf areas. Generally, ants are beneficial insects that scavenge or prey on eggs, larvae, and adults of many turfgrass insect pests, and help suppress pest outbreaks. Fortunately, fire ants and harvester ants, which can inflict painful stings, do not occur in New Jersey and surrounding areas. Several species, however, can become a nuisance when they nest in turfgrass and construct small volcano-shaped mounds around the openings of their underground nest. On home lawns and in similar turfgrass settings, ants rarely cause serious damage. But on the short grass of golf course greens, tees, and fairways, their mounds dull mower blades and can smother the surrounding short grass.

Adult ants have a constricted waist, elbowed antennae, may be winged or wingless, and can be black, brown, red, or light tan, and typically range in length from 1/16″ to 3/8″. When swarming, winged ants may be mistaken for reproductive termites. However, winged termites have a black body, a broad waist, straight, beadlike antennae, and front and back wings are of equal size and shape. In winged ants, the front wings are much larger and longer than the hind wings. Ant eggs are tiny and white or cream colored. The maggot-like ant larvae are legless with transparent white soft bodies. Ant pupae are small, translucent, with the structure of the adult ant visible but closely appressed to the body. In some species the pupa are enclosed in tough, papery, yellow to tan cocoons.

Ants live in colonies that consist of hundreds to thousands of individuals. Most of the ants are workers - sterile, wingless females that do all the work from foraging for food, construction, defending the nest, to tending to the queen and the young. Most ant species have one reproductive female, the queen, per nest, but some species can have multiple queens. The queen lays all the eggs, from which the colony reproduces. In mature colonies (2 to 3 years or older), some of the offspring develops into winged males and females. At certain times during the year (usually early spring or late summer depending on species), these winged forms leave the nest in a swarm and will mate. The males die soon afterwards while the mated females disperse. Upon finding a suitable nesting site, the young queen starts new colonies.

The most common ant on golf courses over most of the United States is the **turfgrass ant** (*Lasius neoniger*). The workers are brown and around 1/8″ long. It builds mounds 1-5″ in diameter that disturb ball roll, smother the surrounding grass, clog machinery, and dull mower blades in short-cut grass of greens, tees, and fairways. It has 1 queen per mound and swarms in late summer. Each colony has multiple subdivisions and many entrances, and the burrows are typically in the upper 1′ of the soil but may extend > 3′ deep. It feeds on dead insects, insect eggs and small insects, earthworms, and any other acceptable food. Research on golf courses has shown that it is an important predator of eggs of **white grubs** and eggs and small larvae of **sod webworms** and **black cutworms**.

The following are some ants common in lawns. The workers of the **little black ant** (*Monomorium minimum*) have soft jet-black bodies and

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measure 1/10-1/8″ in length. These ants are found primarily in soil and rotting wood, and feed on a wide variety of food sources. The workers of the **pavement ant** (*Tetramorium caespitum*) are slow, sluggish, short-legged, brownish-black and 1/12-1/4″ long. This species usually nests under pavements and foundations and feeds on a wide variety of foods including seeds, grease, and animal food. Workers of the **cornfield ant** (*Lasius alienus*) are robust, soft-bodied, light to dark brown and 1/8-1/4″ long. When crushed the body smells of formic acid. This species usually nests in open places in the soil or in rotten wood and feeds on seed and honeydew excretion from **aphids** and **mealybugs**. The workers of the **larger yellow ant** (*Acanthomyops interjectus*) are yellow and 1/10-1/8″ long. When crushed they give off a lemon-verbena odor. This species nests in soil and tends mealybugs and aphids on the roots of plants to feed on their honeydew excretions.

The key to eliminating ant colonies is to kill the queen(s). This can be best achieved with delayed action compounds formulated on baits. Foraging worker ants will pick up the baits and bring them back to the colony. The compound will spread through the nest including the queen(s) because ants share food by regurgitating it and passing it on to other colony members. Because bait effectiveness relies heavily on bait retrieval and sharing within the nest, the bait's particle size and attractants must match the foraging behavior and nutritional demands of the target species. Some species prefer protein based baits, others carbohydrate based baits. In addition, the nutritional demands can change during the season.

If only few mounds are present, products formulated on baits are most effective and should be applied to the area surrounding the mounds. Compounds based on baits include abamectin B_1 [Advance Granular Ant Bait (soybean oil and corn grit carrier), Advance Granular Carpenter Ant Bait (soybean oil and corn grit carrier plus meat meal and sugar) and hydramethylnon [Maxforce Professional Insect Control Ant Killer Granular Bait (granular protein carrier)]. Against the turfgrass ant, the carpenter ant bait appears to be the most effective followed by Maxforce. However, on putting greens Maxforce is less visible because of its smaller particle size and darker color.

If there are numerous colonies, it may be more practical to make broadcast applications over the infested area. While baits can also be applied broadcast, their efficacy appears to be lower with this approach, and the cost of the application may become too high. Non-bait based insecticides labeled for ant control include bifenthrin (Talstar), carbaryl (Sevin), cyfluthrin (Tempo), diazinon (Diazinon), deltamethrin (Deltagard), lambda-cyhalothrin (Battle, Scimitar), or permethrin (Astro). However, the efficacy of these applications is very low and variable, and ant colonies rebound quickly because the queen(s) are usually not eliminated.

Research has shown that in broadcast application, fipronil is more effective and persistent with a smaller negative impact on beneficial insects than the above listed insecticides. But at this time there is no product registered for ant control in the northern states. Firestar Fire Ant Bait contains fipronil, has no state restrictions, and is labeled for fire ant and turfgrass ant (*Lasius neoniger*) control, but is not particularly effective against the latter.

Granular insecticides (but not baits!) need to be activated and moved in the soil with some irrigation. Liquid applications require enough spray volume (or post-treatment irrigation) to thoroughly wet the soil surface. Early spring treatments seem to work best, probably because the colonies are weakened following overwintering and newly started colonies are still very small. For all products, repeated applications at monthly intervals may be necessary in widespread or difficult situations.

Because most ants are beneficial predators, controlling them in turf is not recommended unless their nests occur on golf putting greens or other sensitive areas. ❑

Weather Summary for the Week Ending 8 am Monday 6/23/ 3

	RAINFALL			TEMPERATURE				GDD BASE50		MON
WEATHER STATIONS	WEEK	TOTAL	DEP	MX	MN	AVG	DEP	TOT	DEP	%FC
BELVIDERE BRIDGE	4.68	22.12	7.77	79	49	63.	-6	669	-63	100
CANOE BROOK	2.32	22.74	7.25	77	49	63.	-6	689	-9	98
CHARLOTTEBURG	2.84	23.69	8.09	76	42	61.	-5	436	-101	98
FLEMINGTON	3.23	20.70	5.93	79	46	63.	-7	653	-73	98
LONG VALLEY	2.44	18.58	2.75	70	48	59.	-8	415	-179	98
NEWTON	4.60	19.69	5.66	76	47	61.	-7	567	-42	100
FREEHOLD	2.17	18.89	4.35	73	49	63.	-8	727	-86	98
LONG BRANCH	2.16	20.34	5.69	69	54	61.	-9	594	-153	96
NEW BRUNSWICK	2.58	20.83	6.62	76	48	63.	-9	680	-181	99
TOMS RIVER	2.42	18.72	4.27	73	48	62.	-8	693	-48	97
TRENTON	2.55	18.42	5.21	76	49	63.	-9	674	-237	95
CAPE MAY COURT HOUSE	1.69	15.33	2.51	74	55	64.	-7	657	-162	73
DOWNSTOWN	2.56	18.11	5.03	76	46	64.	-8	752	-180	95
GLASSBORO	2.25	19.13	5.00	79	52	66.	-6	832	-79	94
HAMMONTON	2.06	15.65	1.90	76	48	64.	-8	792	-111	94
POMONA	1.78	16.50	3.97	72	47	63.	-8	680	-145	91
SEABROOK	2.64	17.71	5.23	78	50	66.	-6	865	-73	91
ATLANTIC CITY MARINA	missing									
SOUTH HARRISON	2.40	18.92	5.79	77	50	65	NA	825	NA	NA

WES KLINE — GDD BASE 40 PINEY HOLLOW Last Week 233 (Ending 6/16/03) This Week 166 (Ending 6/23/03)

Diseases of Turfgrass

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

Brown Patch

This disease, caused by the fungus *Rhizoctonia solani*, continues to be reported on tees, greens, and home lawns due to the hot, 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 Chipco 26GT, chlorothalonil, Compass, ConSyst, Curalan, Eagle, Heritage, mancozeb, Medallion, Prostar, thiophanate-methyl, or Touche per manufacturer's recommendations.

Pythium Blight

With the recent return to hot, humid weather, **pythium blight** has been reported on golf turf. Pythium thrives in low or poorly drained areas, especially when the night temperatures are above 68 to 70^{0}F. For best results, improve drainage, water in the early morning hours (midnight to 8 am), avoid over-fertilization, and apply Alude, Banol, Chipco Signature, Heritage, Koban, Magellan, mancozeb, Prodigy, Quell, Subdue MAXX, Terraneb SP, or Terrazole, according to the manufacturer's recommendations. Caution: Koban and Terrazole can be phytotoxic during hot weather, so follow label directions carefully and experiment on a small area of turf before large scale use.

Slime Mold

Although slime mold is not actually a disease, inquiries have been received recently about the appearance of tan to black colored clumps 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 and is easily removed with light pressure. Leaf tissue underneath these clumps is green and healthy. Upon close examination, these mysterious structures are actually clumps of the common **slime mold** fungus *Fuligo*. Fuligo is not injurious to plants and will soon disappear on its own. However, it can be easily dis-persed with a rake or steady stream of water if desired. No fungicides are recommended. ❑

Ornamental IPM Pest Notes

Steven K. Rettke, Ornamental IPM Program Associate

✔ **IPM Scouting Fundamentals:** Some points to consider for improving routine monitoring effectiveness: (1) – Make it a common practice to reverse directions each time you visit a specific property. It is surprising what may be observed when scouting in one direction that is completely overlooked when moving in the opposite direction. (2) – Scouting the same property at different times of the day can uncover possible problems that may be less obvious during a certain time of day. Shadows and sunlight angles change throughout the day that can mask or enhance plant symptoms or signs. (3) – Scouting during overcast days will typically provide ideal visual conditions. The subtle color variations of plant foliage are best observed without the sharp contrasting shadows from bright sunlight.

✔ **Aphid Predators:** Foliar predators of aphids, such as ladybeetles and big-eyed bugs, cause aphids to drop off plants as a self-defense mechanism. Researchers in Wisconsin showed that up to 60% of aphids will tuck their legs and drop to the ground within 1 hour of exposure to ladybeetles. Meanwhile, there are ground predators of aphids just waiting for a snack, including carabid ground beetles, spiders, ants, and tiger beetles. This combination effect of predators in different habitats is synergistic. Without the foliar predators causing aphids to drop, the ground predators ate few aphids. Alternatively, when foliar predators were present, ground predators ate many aphids. An experiment caging predators and aphids showed a 50% control of aphids with only ground predators, 75% control with only foliar predators, and almost 100% control with both. *(Reference: Losey J., IPM Pract. Sept. 97)*

✔ **Honeydew and Sooty Mold:** Most landscapers are familiar with the honeydew created by the feeding from **aphids**, **soft scales**, **whiteflies** and **mealybugs** and the associated black sooty mold that follows soon afterward. Incompletely digested plant fluids (honeydew) are shiny, sticky, and loaded with sugary carbohydrates. This food source becomes an irresistible attractant to an assortment of ants, bees and other stinging and biting insects. When the infestations are light and sprays are required, apply horticultural oils or insecticidal soaps. In heavy infestations, spray a residual insecticide, adding soap to the tank to dislodge the honeydew and sooty mold.

✔ **Andromeda Lacebugs:** Foliar symptoms caused from this familiar landscape pest are apparent on the new leaves of infested andromeda shrubs. This host specific pest overwinters as eggs inserted into the lower leaf veins. The other lacebug species with evergreen hosts also overwinter as eggs (e.g., azalea & rhododendron lacebugs). Lacebugs with deciduous hosts overwinter as adults (e.g., oak & hawthorn lacebugs). Adult lacebugs that overwinter as eggs have rectangular shaped wings with squared-off wing corners. Alternatively, adult lacebugs with deciduous hosts have oval-shaped wings with rounded corners.

It is useful to remember that the eggs of andromeda lacebugs typically hatch at least a week or two earlier than the other evergreen host species (e.g., azalea lacebug). Attempts to control eggs with dormant horticultural oils are futile since most of the eggs are not exposed. However, with good coverage, horticultural oils can successfully suppress lacebug nymphs and adults to a lesser degree. Insecticidal soaps are exceptionally fast-acting insecticides and can also be very effective if proper coverage is achieved. If infestations of the andromeda lacebug or any of the other species become a perennial problem, then

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Merit (imidacloprid) may be the product of choice. Field studies and observations have shown that soil injections of this material can maintain effective controls for at least 1 or 2 years. Therefore it is probably unnecessary to apply Merit every year as a preventative.

✔ **Two-Spotted Spider Mite (Resistance Management):** With the sudden onset of hot and dry weather the build-up of two-spotted spider mites will soon become apparent on burning bush, rose, forsythia, and many perennial plants. This mite species probably produces the greatest amount of silk webbing compared to any of the other landscape mites. However, it would be a mistake to wait until webbing becomes obvious before any action is taken. Usually by late May to early June the ***overwintering adults*** begin to move upward from the underlying duff onto their host plant (remember that a dormant oil spray will ***not*** effectively impact the concealed adults if applied during the late winter or early spring periods). This year, the abnormally cool and rainy spring weather has combined to delay the development of two-spotted spider mites. This species performs best in hot and dry environments. When daily high temperatures routinely exceed 85°F, the **spruce spider mites** shut down their activity while the 2-spotted spider mites greatly accelerate their development.

During the summer months, two-spotted spider mites will typically undergo 10 to 15 generations per year (the spruce spider mite usually has between 7 to 10 generations per year). Miticide resistance management is particularly important because of the large number of generations that two-spotted spider mites experience. If the same class of miticide with a similar mode of action is used continuously over a period of time at the same location, then resistance to that material will eventually occur. There will always be a small percentage of a given population of mites that have a natural genetic resistance to a specific miticide. For example, they may be able to metabolize the active ingredient or produce enzymes that can rapidly destroy the active ingredient. Or perhaps some individuals can development exoskeletons that can effectively block/repel the penetration of the active ingredient.

When the same materials with similar modes of action are used repeatedly at a particular site, then the percentage of the mite population having this unique resistance ability will increase with each generation. Therefore it is especially important to routinely throw "genetic curveballs" when attempting to manage two-spotted spider mite infestations. As a general rule-of-thumb, a good resistance management practice is to rotate to a new class of miticide having a different mode of action after every 2 to 3 applications. Many insecticides/miticides now have resistance management requirements stated on the label. These requirements need to be understood and followed.

✔ **Predaceous Mites:** Be on the lookout for beneficial mites that can commonly be found in and amongst **two-spotted spider mite** populations. These "good" mites naturally keep the "bad" two-spotted mites under control. Common predaceous mites are in the family *Phytoseiidae*. Phytoseiid mites lay their eggs singly in spider mite populations on the bottom surface of leaves along the veins. Their eggs are about the same size as spider mite eggs. All stages of Phytoseiid mites are oval and shiny-white to tan in color. These adult predacious mites can be distinguished from adult spider mites by their shiny, unspotted pear shape with hairs that are less noticeable than spider mites. On a beating tray, they also move *much faster* than spider mites.

During a lifetime, a predaceous mite can consume an average of 20 pest mites, with some species consuming more than 100 each. Adult females lay about 60 eggs over several days, and even more if a greater number of prey mites are present. Mated females overwinter in deep bark crevices. *(Reference: Davidson, J.; Landscape IPM Guidelines for Trees & Shrubs, UMd. Bull. 350)*

✔ **Black Vine Weevils (Optimizing Treatments):** Many landscape managers consistently state that attempting to manage the black vine weevil is one of the most problematic pests they encounter. These leaf notching weevils feed on many kinds of ornamental plants including yews, rhododendrons, azaleas, laurels, leucothoe, forsythia, euonymus, hollies, viburnum, most deciduous and evergreen shrubs, ground covers and many kinds of perennials and annuals. Adults chew "C" notches in the margins of foliage. These notches tend to be fairly small (1/4") and distinct. BVW adults have long curved snouts and are black in color. The adults are most active at night and are seldom visible during the day. Weevil larvae feed on the roots and crowns of plants. The larvae are white legless "C" shaped grubs with red/brown heads. They can be very difficult to find when digging under a host plant. Feeding damage by larvae may cause reduction in plant health, branch dieback, wilting and sometimes death.

Probably the greatest reason landscapers struggle to control this pest is caused from poor timing of foliar sprays. Ideally the foliar sprays are applied to reduce the aesthetic injury caused by adults and subsequently prevent large populations of larvae from developing. To optimize treatments it is important to understand that adults emerge to feed on leaves usually around late May to early June. The all female adult population requires a feeding period of between 3 to 4 weeks before they are capable of laying eggs to start a new generation. The first eggs are usually laid when growing-degree-day (GDD) numbers reach 1000 (around late June to mid July). Ideally, pesticides should be applied prior to 1000 GDD. After this point, adults begin laying eggs for the next generation. The best treatment window is therefore this period of time between the first feeding adults and the 3 weeks that follow. One of the most successful management strategies has been to apply the 1st treatment when the first adults are observed and to follow-up with a 2nd treatment 3-weeks later. Synthetic pyrethroids such as Talstar (bifenthrin), Tempo (cyfluthrin), Astro (permethrin), & Scimitar (lambda-cyhalothrin) provide controls of leaf

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feeding adults and have relatively long residuals.

Larvae may be killed with drenches of beneficial nematodes or Talstar (bifenthrin) during the summer and early autumn. Formulations of Talstar may provide season-long control when incorporated into potting mixes for container plants. The effectiveness of soil drenches in landscape situations is questionable.

Beneficial nematodes can be very effective against the larvae of black vine weevil. The use of beneficial nematodes has proven most successful in well-irrigated soil such as nursery containers. They don't seem to be effective in hot planter boxes with sporadic irrigation or in heavy clay soils. *(Reference: BUG BULLETIN, 6/22/98)*

✔ **Roundheaded Appletree Borer (802-1029 GDD = Egg Laying):** The larval stage of this long-horned boring beetle does the damage. The adults are (1/2") and bullet-shaped, with alternating brown and white stripes running the length of the body. It is most often found on crabapples, but can be found on other trees as well. It prefers a weakened or stressed tree, often from drought or improper planting. The best defense against this pest is to keep the tree as stress free as possible and growing vigorously. If symptoms are seen this summer (i.e., bark cracking, ¼" round exit holes, frass sawdust like material and weeping from the base of the trunk), then apply Astro (permethrin) to the trunk during June into early July (Astro has approximately a 2 week residual on bark). With a well-timed application, only a single treatment may be required. Effective controls become questionable once larvae are inside of the tree.

✔ **Grub Predictions for the Summer:** There is no hard and fast rule to predict annual grub population trends. A rule of thumb to consider: If August/September are dryer than normal, turf damage from grubs tends to be high. This is because grubs are feeding on turf roots during a period of reduced water uptake by the plant. This exaggerates symptoms of dry weather stress, so small numbers of feeding grubs tend to cause noticeable damage. On the flip side, if August/September are wetter than normal, the turfgrass uptakes ample water in spite of moderate grub feeding. High numbers of grubs therefore may not cause noticeable damage. The smart IPM manager uses these predictions when preparing management strategies: Use a threshold of 6-8 grubs per square foot before applying a treatment; or irrigate the site more often to try to mask damage (especially if late in the season). Since preventative treatments are required when treating with Merit (imidacloprid) it is especially important to know site-specific histories in order to reduce unnecessary treatments.

✔ **Chinch Bugs (1903-2160 GDD = 50% of 2nd Generation at 2nd Instar Stage):** The naturally occurring fungus called *Beauvaria bassiana* has probably done an excellent job of suppressing the 1st generation of chinch bugs this year, because of the extensive rainfall we had throughout the state during the spring. The *Beauvaria* fungus, however, cannot often be counted on to provide adequate suppression against the 2nd generation of chinch bugs when the hot, dry conditions become prevalent. Therefore, chemical control options may be required against the 2nd generation in August or September.

Chinch bug populations usually thrive in drought-stressed turf with a thick thatch layer. These conditions are common with turf growing in more sandy type soils. The sandy soils not only encourage the dry environments that this pest prefers, but also promotes faster thatch build-up. This occurs because sandy soils have less organic matter and hence, fewer microorganisms available to decompose thatch.

If chinch bug population densities can be maintained below 15-20 insects per square foot, pesticides can often be curtailed. Learn to recognize and distinguish big-eyed bug predators from chinch bug pests. Water the turf during drought periods, since this pest thrives in dry conditions. Use cultivars containing endophytes when over-seeding or renovating damaged areas.

✔ **Bluegrass Sod Webworm (1250-1920 GDD = 1st Larvae):** The flying, buff-colored adult moths are most visible near turf at twilight. The adults are ½ to 3/4 inch in size and have a snout "nose." The adults are easily disturbed by walking over the turf and will fly upward a short distance before settling back into the grass. Peak populations of the egg-laying adults can occur from late June to late August.

Damage occurs from the night feeding larvae. They are very small (1/8 inch long) at first, but are up to 1 inch when fully grown. The color pattern of the sod webworm larvae varies with the species, but most are grayish or brownish, with dark spots along the body. Symptoms start as small yellow or brown patches in turf. As the caterpillars feed and grow, the patches gradually increase in size. Affected areas recover slowly, and lawns often become weedy. Damaged areas are usually most severe under droughty conditions, especially in sunny areas with steep slopes and dry banks.

Monitor the edges of damaged patches for small green pellets, indicating signs of larval excrement. A closer examination may reveal the actual silk-lined tunnels of the caterpillar. An "irritating drench" of 1 oz. Dish detergent in 2 gallons of water applied to a 2'X2' area can force the sod webworms to surface where they can be counted. If more than 4 to 6 are found per square foot, the amount of damage may become significant. Sevin, Tempo, and Mavrik are some of the controls labeled. Apply these materials late in the day for best results.

Note that sod webworms are typically the most heavily parasitized of the major turf insect pests. Many predators naturally keep populations in check. Do not make treatments unless it becomes justified. *(Reference: Turf IPM Facts; UMass Extension 1996)*

✔ **Green June Beetle:** The primary damage done to turf by this pest is ***not*** by feeding, but from the tunneling activities of the larvae. Look for damaged turf with small mounds of soil that look like anthills. Larvae feed on animal manure and decaying organic matter near the soil surface. Feeding and activity takes place mostly at ***night***. Green June Beetles overwinter as large white grubs (up to 2" long). Larval activity starts in early spring and continues into May. Adults emerge in June and feed on fruit before laying eggs. Control smaller larvae later in the summer if they become damaging. ❑

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