RUTGERS COOPERATIVE EXTENSION AT THE NEW JERSEY AGRICULTURAL EXPERIMENT STATION

PLANT & PEST ADVISORY

LANDSCAPE, NURSERY & TURF EDITION $1.50 JULY 24, 2003

INSIDE

Ornamental IPM Notes

Steven K. Rettke, Ornamental IPM Program Associate

✔ **Desirable IPM Insecticides:** There are several characteristics that ideal IPM insecticides should offer. In reality, it is rare for a particular insecticide to possess all of these characteristics. Nevertheless, appropriate IPM insecticides should still be able to satisfy at least some of the following: 1) It should be as specific as possible for the target pest. 2) It should give adequate control. 3) It should be short lived. 4) It should not eliminate the presence of beneficials for more than a day. 5) It should be low risk to plants, applicators, and the environment. 6) It should be economical.

✔ **Euonymus Scale (1150-1388 GDD = 2nd generation crawlers):** Check plants now using a hand lens to see the tiny yellow/orange crawlers. Some of the early hatching crawlers have already settled and inserted their mouthparts, although the cool spring weather may have delayed egg hatch this year. Later hatching crawlers may not be active until later in the month. Monitor with double-sided tape or sticky traps before treating. Horticultural oils and insecticidal soaps are very effective against crawlers and recently settled nymphs. The nymphs typically do not produce a waxy cover that is thick enough to repel insecticides until 2 to 3 weeks after hatch. Prune out branches that are heavily infested. Continue monitoring and treat at peak crawler emergence.

✔ **Scales and Biological Controls:** It is generally understood that wasp parasitoids are capable of providing effective biological controls for reducing scale pest populations. Research has shown this to be particularly true for the suppression of armored scale insects. The larvae of parasitoids feed on the adult scales beneath their protective waxy cover. It is impractical in the field to monitor for the level of suppression by turning over the coves and examining individual insects with a hand-lens. A more effective method is to observe characteristic circular holes in the scale covers that are created by emerging adult wasps. There is usually only one exit hole per scale cover. If irregular or jagged holes are noticed in scale covers, then lady beetle predators were probably present.

When inspecting scale infestations, if a large number of scale covers are seen having circular exit holes, then it is recommended that insecticide sprays not be made. The conservative use of control sprays is especially suggested if scale population densities are low and no plant symptoms are evident. Numerous studies have indicated that the random

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or non-timed spraying of various insecticides against armored scale populations in the field is often counterproductive. Many times scale populations can be successfully suppressed by wasp parasitoids, but this ability is compromised when sprays are applied. All too often, improperly applied insecticides destroy beneficial parasitoids, have little impact on the scale pest populations, and actually may cause scale populations to increase.

✔ **Do Not Forget that the Field Staff is the Best Guarantee for a Successful IPM Program**: A knowledgeable field staff is the most important resource. It would be a mistake to not involve field staff in program design and adaptation, since they can be a major source of innovative control strategies. The field personnel should be allowed to make as many decisions concerning IPM procedures and implementation as their abilities permit. Do not force field personnel to delay actions by waiting to receive a review or approval by a non-field oversight board or manager. Such administrative systems can reduce the strength of an IPM program by interfering with or delaying required timely control actions. The only time such a system may be necessary is when the field staff is still developing experience and decision-making skills. On site decisions by knowledgeable IPM scouts will usually give the best results.

✔ **Oak Spider Mites:** The infestation and damage levels by most of our "warm season" spider mites do not appear to be as severe as they have been in recent years. The relatively rainy weather we have been experiencing this season have reduced the populations of such mites as the oak spider mite. When monitoring, look for the characteristic bronze discoloration on the upper leaf surfaces of mostly red oak group species (can also occasionally be found feeding on birch, chestnut, beech, elm and hickory). Eggs are generally deposited on upper leaf surfaces, along the midvein. Multiple generations occur with peak populations in mid to late summer. After egg hatch in the late spring (e.g., June), controls should be applied before large populations build-up by mid-summer. Overwintering eggs can be controlled with dormant horticultural oil. Elongated silk webbing may protect overwintering egg masses during very heavy infestations. Areas of the trunk and branches can have the appearance of rusty fiberglass. This silk webbing may be difficult to penetrate with horticultural oils.

✔ **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, birch, 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. The 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.

✔ **Fall Webworm (1266-1795 GDD = 2nd generation hatch):** A late season pest of mostly visual concern. This caterpillar feeds within silken webs encircling branches, twigs, and leaves. They only feed inside the web, that they enlarge as they grow. Larvae may feed for a few weeks before webs become apparent. The webs become most obvious near the end of larvae feeding periods. The second generation is developing now. The first generation in June is usually relatively small, while the second generation may sometimes have outbreak populations. More than 100 species of trees may be attacked, including mulberry, ash, elm, linden, sweetgum, willow, walnut, hickory, oak, apple, and other fruit trees. Prune out nests (pole pruners can be useful). The early instars are vulnerable to sprays of *Bacillus thuringiensis*, horticultural oils and insecticidal soaps. These control materials will also have limited impacts upon the many effective parasitoids and predators.

✔ **Correction of White Pine Weevil Injury:** Damage from feeding weevil larvae has been evident for the past few weeks on Eastern white pine, Norway spruce, Colorado spruce, and occasionally Douglas fir. The larvae have been feeding within the terminal leaders since mid to late April. When the terminal leader is heavily infested, larvae feed side by side in a ring encircling the stem. Typically by this time of year the terminal leader has become stunted and wilted. It is too late in the season to save the leader and it should be pruned out.

To re-establish a new leader and retain the desirable Christmas tree shape the following procedure is suggested: 1) Remove the dead or dying portion of the terminal leader. Also, remember that the larvae fed primarily in the terminal growth that expanded during the 2002 spring growth. Therefore, the leader growth from both last year and this year may need to be removed if the infestation was severe. 2) Then all but one of the whorls of side branches that grew in 2002 will need to be removed. Some nursery and Christmas tree farms have reported good results with retaining the one side lateral branch that grows on the north side of the tree. This north lateral branch will have the natural tendency to grow upward and reach toward the southern sun.

✔ **Reducing Mulch Nuisance Problems Before They Start:** Undesirable nuisance fungi can occur when different types of mulches or composts are used under certain conditions. Some of the more common examples of these nuisance fungi include the shotgun artillery fungus (*Sphaerobolus*), slime molds, stinkhorns, bird's nest fungi, and a number of plant pathogens.

Applying water to dry mulch or compost materials as they are placed in the landscape can prevent many of the

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Diseases of Turfgrass

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

Bentgrass Dead Spot

This disease has been troublesome on sand-based greens and tees in the Mid-Atlantic Region in the past and may reappear again soon if the current weather persists. 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 have provided the most effective control of bentgrass dead spot in tests conducted by Rutgers faculty.

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., Insignia and Honor) 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.

Gray Leaf Spot

Gray leaf spot caused by the fungus *Pyricularia grisea*, should develop in the tri-state area soon. This disease has devastated perennial ryegrass and tall fescue plantings throughout the Mid-Atlantic States in the past. Symptoms start as tiny, brown leaf and stem lesions within a 1 to 2 inch patch. 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 diameter) areas of blighted turf. Extensive foliar blighting may occur during warm (75-85^{0}F days and 60-75^o F nights), wet weather. Newly established seedlings are more susceptible to infection than mature plantings. When conditions are conducive to disease development, the pathogen produces abundant one to two-celled, pear-shaped spores (conidia). For best results, avoid high rates of nitrogen during July and August and avoid 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 Compass, ConSyst, Heritage, Spectro, thiophanate-methyl, and Zyban were most effective when applied on a preventive basis every 14 to 28 days beginning in mid-July. Chlorothalonil (e.g., Daconil) and the DMI (sterol-inhibiting) fungicides, such as propiconazole (e.g., Banner), may provide effective control when disease pressure is moderate.

Pythium Blight

Pythium blight continues to be reported on golf and landscape turf. Since **pythium** thrives in low or poorly drained areas, especially when the night temperatures are above 68^{0}F, we should see more of this disease as the "hot muggy" weather continues this summer. For best results, improve drainage, water in the morning hours, avoid over fertilization, and apply Banol, Chipco Signature, Heritage, Koban, Magellan, mancozeb, Prodigy, Quell, Subdue MAXX, or Terrazole, according to the manufacturer's recommendations.

Yellow Ring

This disease, caused by the fungus *Trechispora alnicola*, is evident on Kentucky bluegrass lawns and sod fields at this time. Patches are 1 to 2 feet in diameter. Affected areas consist of green grass surrounded by 2 to 3 inch diameter yellow rings. Upon close inspection of the thatch, a dense mat of white mycelium is often apparent. Infected turf rarely dies and rings do not always reappear the following year. Symptoms are most apparent during cloudy weather between May and October. The fungus is primarily a saprophyte which colonizes organic matter in the thatch. Since the damage caused by this fungus is cosmetic and the turf recovers during cool weather in the fall and spring, control is rarely warranted. In areas where symptom expression cannot be tolerated, turf managers should dethatch affected areas. No chemicals are currently labeled for the control of this disease.

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Turf Field Day

Mark your calendars now for this year's turf research field days. The **Rutgers Landscape Turf Research Field Day** has been set for July 30, 2003 at the Plant Science Research Farm in Adelphia, N.J. Registration will begin at 8:00 AM. Guided tours will commence at 9:00 AM and will conclude at 3:30 PM, "rain or shine." The **Rutgers Golf Turf Research Field Day** will be held on July 31, 2003 at the Turf Research Farm (Ryders Lane) in New Brunswick, N.J. This event starts at 8:30 AM (registration); field tours will run from 9:30 AM to 2:30 PM, "rain or shine." The cost of registration for each day will be $35 (including lunch). Recertification credits will be available at the conclusion of each program. Call Marlene at (732) 932-9400 Ext. 339 for further information or directions. ❑

MULCH PROBLEMS FROM PAGE 2

fungal nuisance problems. It is important to soak all mulches immediately after they have been applied. The water content of mulch should exceed 40% by total weight. The high-moisture organic matter is rapidly colonized by beneficial bacteria/fungi within the first few days and enables them to compete with the nuisance fungi.

To avoid nuisance fungi, sour mulches with pH levels below 5.2 should not be applied within the landscape. The low pH and resulting fungal problems are usually prevented if the wood and bark products are nitrified (i.e., addition of 1 lb. of an accessible N source per cubic yard of mulch) and composted. If composting fresh woody products is not feasible, then coarse particles greater then ¾ inches should be applied. The larger diameter mulches will less likely create problems if they are not applied to a depth greater than two inches. Finally, fluffing the mulch up at least twice a year may help by disrupting the formation of spores. *Reference: OSU Extension Fact Sheet, "Control of Nuisance & Detrimental Molds in Mulches & Composts."* ❑

Powdery Mildew in the Nursery and Landscape

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

Summer is the time for **powdery mildew**, one of the most common diseases of ornamental plants in the nursery and landscape. Powdery mildew is caused by 300 different fungi and the disease occurs on over 7000 flowering plants worldwide. Some of the more common woody hosts of this disease are listed in Table 1. Note that gymnosperms are not affected by this disease.

Table 1. Some ornamental plants susceptible to powdery mildew

apple, crabapple	ligustrum
azalea, rhododendron	lilac
ash	*Lonicera*
basswood	lilac
beech	magnolia
Berberis	maple
birch	monarda
blueberry	oak
buckeye	phlox
catalpa	*Prunus* (peach, plum, cherry, apricot)
Chinese photinia	pear
chrysanthemum	poplar
cotoneaster	privet
crapemyrtle	pyracantha
dahlia	Reiger begonia
delphinium	roses
elm	serviceberry
eucalyptus	spirea
euonymus	smoke-tree
flowering dogwood	snapdragon
gardenia	sycamore
hawthorn	tulip tree
holly	*Vaccinium*
honeysuckle	viburnum
horse chestnut	walnut
hydrangea snowball	wintercreeper
kalanchoe	willow
Kalmia	wisteria
leucothoe	zinnia

The powdery mildew species most troublesome to North American flowering plants include *Erysiphe, Microsphaera, Phyllactinia, Podosphaera, Sphaerotheca, and Uncinula*. Since most of these species are host-specific, development of powdery mildew on one species will not necessarily lead to disease on other hosts nearby[1].

Symptoms

As the name suggests, powdery mildew appears as a white to tan superficial growth on the surface of affected leaves and other aerial tissues. Signs of the fungus can first appear as individual spots that coalesce to cover the entire tissue surface. This fungal growth (called a mycelium) produces asexual spores (or conidia) on stalks that permit air currents to pick up the spores and distribute them to other susceptible

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plants. Young plants and tissues are often more susceptible to this disease.

Powdery mildew fungi are **obligate biotrophs**. In other words, they must obtain all their food from other living organisms. Powdery mildew fungi obtain nutrients by sending a specialized absorbing structure called a **haustorium** into the cells of the host plant epidermis. Although the fungus does not directly kill the cells it invades, infection does result in a reduction of photosynthesis and an increase in water loss. As a result, the growth rate and aesthetic value of infected plants is reduced. Leaves may be stunted, curled, or twisted, and the new growth, flowers, and buds of highly susceptible plants can be destroyed.

Disease Cycle

Look for powdery mildew disease in the Northeast during the late spring to early fall months. Powdery mats of fungal mycelia develop on susceptible tissues all growing season, and conidia produced by the fungus are carried by the wind to new hosts. Powdery mildew fungi can overwinter in a characteristic fruiting structure (called a **cleistothecium**) that is the result of a sexual reproductive process. Cleistothecia are dark, tiny spheres that can often be seen on infected tissues later in the growing season. During the spring of the following year, these cleistothecia release spores (called ascospores) that start the infection cycle anew. In warmer climates or in greenhouses, the formation of cleistothecia is never observed, and the disease may persist all year as mycelia and conidia. In other cases, the fungus may enter buds and survive the winter there.

Powdery mildew conidia germinate and penetrate host tissues in about 6 hours, and under favorable conditions, the mycelium develops and new spores are produced within 4 to 6 days. Unlike most fungi, the penetration process can occur in the absence of free water, and high humidity does not necessarily promote disease development. Indeed, in many cases, frequent periods of leaf wetness can reduce the severity of this disease. Although the development of powdery mildew is most rapid during periods of warm weather (80°F day/60°F night), damage due to the disease can be actually more severe at cooler temperatures (70°F day/50°F night).

Management

To manage powdery mildew in ornamental plantings, improve air movement around plants through proper spacing and weed control, and increase the amount of sunlight that reaches foliage. Rake old leaves and prune shoots infected the previous growing season to reduce inoculum. Practices that promote succulent growth, including pruning and nitrogen fertilizing, should be avoided on susceptible hosts. Cultivars of crabapple, dogwood, lilac, and crape myrtle resistant to this disease are available and should be planted whenever possible. Rhododendrons that are very susceptible to powdery mildew include Elizabeth, Virginia Richards, Unique, and the Loderi group; many deciduous azaleas are susceptible as well. Plants that are less susceptible include Nova Zembla, Palestrina, and Vulcan.[2]

Since powdery mildew fungi are associated with the surface of leaves, they are easier to manage with fungicides than other foliar diseases. Compounds labeled for powdery mildew control include AQ10 (*Ampelomyces quisqualis*), azoxystrobin, copper (hydroxide, metallic, salts, sulfate), fenarimol (field and landscape only), hydrogen dioxide, Junction, kresoxim-methyl, Manhandle, myclobutanil, neem oil, paraffinic oil, piperalin (enclosed structures only), potassium bicarbonate, propiconazole (outdoor use only), Spectro, sulfur (dusting, elemental, flowable, wettable), SysStar, thiophanate-methyl, trifloxystrobin, triadimefon, triflumizole, ziram, and Zyban. Most of these compounds are applied at the first sign of disease; however, consult the label for timing, rates, and appropriate hosts.

[1]*D. Michael Benson. 2001. Powdery Mildew. Pages 57-58 in: Diseases of Woody Ornamentals and Trees in Nurseries. R. K. Jones and D. Michael Benson, eds. APS Press, St. Paul, MN.*

[2]*Robson, M. Powdery mildew on ornamentals and vegetables. ProIPM, The Green Gardening Program, WSU Cooperative Extension.* ❑

Plant Diagnostic Laboratory Highlights

Richard J. Buckley, Laboratory Coordinator

Turf

Anthracnose is the disease of the week for golf turf in July. The disease is quite active on annual bluegrass putting greens at this time. We assume that the truly summer-like weather of early and mid-July is taking its toll on overall turfgrass health. The result, of course, of the summer stress is naturally anthracnose. Anthracnose, in one form or another, either **leaf blight** or **crown rot**, was identified on putting green samples from golf courses in Burlington, Somerset, Camden, Morris, Middlesex, Atlantic, and Cape May Counties in New Jersey. We also saw the disease on plugs sent from Pennsylvania, New York, Connecticut, Virginia, West Virginia, Idaho, and Illinois. Another summer disease, **summer patch**, has also been a frequent submission. We normally experience a rush of summer patch just after July 4 and this year was no exception. The disease is most severe after a wet spring, which is exactly what we had. Summer patch was diagnosed on submissions from Union, Monmouth, Burlington, and Somerset Counties in New Jersey as well as on several plugs from New York. In mid-summer, we can't forget the classics – **brown patch** and **pythium blight**. Brown patch is active all over the place, but we have only seen a couple samples from residential lawns in the laboratory. Pythium blight was diagnosed on two golf samples, one from Cape May County and another from Maryland.

Landscape

A **leaf spot** disease on maple, which is caused by the fungus *Cristulariella depraedens*, was submitted to the laboratory from residential clients in Warren and Morris counties. The fungus causes a typical rounded spot that will grow, coalesce with another spot, and eventually blight entire leaves. Defoliation is probable to some degree. The blighted leaves are tan, but have an unusual "greenish" tinge to them. At any rate, control is not recommended at this time. Treatments should have started at budbreak to be effective. If the tree defoliates once or even twice, it should not matter much to the overall tree health. The real danger is continuous defoliation and the impact of external stresses, like drought and winter injury. Other diseases of note include: **shade tree anthracnose** on plane tree and oak sample, and a couple **Dutch elm disease** samples from the Princeton area. ❑

Weekly Weather Summary

Keith Arnesen, Ph.D., Agricultural Meteorologist

Weather Summary for the Week Ending 8 am Monday 7/21/ 3

	RAINFALL			TEMPERATURE				GDD BASE50		MON
WEATHER STATIONS	WEEK	TOTAL	DEP	MX	MN	AVG	DEP	TOT	DEP	%FC
BELVIDERE BRIDGE	.41	22.91	4.73	92	55	73.	0	1376	70	58
CANOE BROOK	.26	23.75	4.48	89	56	73.	-1	1416	106	66
CHARLOTTEBURG	.17	24.02	4.57	86	50	68.	-3	1039	-25	52
FLEMINGTON	.12	21.70	3.10	87	53	71.	-3	1327	-25	64
LONG VALLEY	.55	19.26	-.65	80	56	67.	-5	984	-158	66
NEWTON	.21	20.31	2.56	87	55	70.	-2	1218	50	60
FREEHOLD	.40	20.58	2.49	87	57	73.	-2	1455	-2	71
LONG BRANCH	1.02	22.06	4.05	87	53	71.	-4	1325	-55	68
NEW BRUNSWICK	.95	22.12	4.18	90	57	73.	-3	1408	-131	75
TOMS RIVER	.89	21.71	3.31	88	59	72.	-2	1427	39	66
TRENTON	.70	19.59	2.52	89	58	73.	-3	1388	-213	55
CAPE MAY COURT HOUSE	1.13	18.66	2.68	88	62	73.	-3	1387	-94	57
DOWNSTOWN	.33	20.82	4.10	88	58	73.	-3	1480	-134	53
GLASSBORO	.17	21.14	3.39	89	61	75.	-1	1596	3	40
HAMMONTON	.42	18.50	.83	89	61	74.	-2	1556	-32	50
POMONA	.69	19.66	3.73	89	61	73.	-2	1427	-48	48
SEABROOK	.09	21.72	5.56	90	61	75.	-1	1638	17	52
*ATLANTIC CITY MARINA	.70	18.95	3.69	84	65	73.	-2	1403	11	48
SOUTH HARRISON	.26	20.61	2.69	89	61	74	NA	1576	NA	NA

WES KLINE — GDD BASE 40 PINEY HOLLOW Last Week 251 (Ending 7/14/03) This Week 233 (Ending 7/21/03)

* VALUES FOR ATLANTIC CITY MARINA ESTIMATED FOR THE PAST SEVERAL WEEKS. DATA FOR THE PAST WEEK IS NOW ACTUAL.

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