Rutgers New Jersey Agricultural Experiment Station - Cooperative Extension

PLANT & PEST ADVISORY

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INSIDE

Practical Fungicide Resistance in Turf Stands - Part 2

Richard Buckley, Director Soil Testing and Plant Diagnostic Services

In the last issue, fungicide resistance was defined as a stable, inheritable adjustment by a fungal population to the toxic effects of a fungicide. We also established that the adjustment by the fungal population to the toxic effects of the fungicide does not develop spontaneously. The ability of a local fungal population to tolerate the fungicide program generally occurs after the repeated use of materials in the same chemical class over a period of time. Resistant biotypes are found in all fungal populations and are subsequently selected by the fungicide program. When the resistant biotypes come to dominate in the turf stand satisfactory disease control will no longer be provided by the fungicide. This is known as practical resistance. Practical resistance in the field can be measured in the laboratory by comparing fungal growth rates on fungicide-amended and non-amended mycological media.

Be aware that all fungicide failures are not due to practical resistance. Improper diagnosis, improper dilution rates, poor selection of materials, bad timing, tank incompatibilities, improper calibration and bad nozzle choices are just a few of the possibilities. That being said, if one experiences control failures in the field and the fungal population has been screened by a qualified laboratory and determined to be insensitive to the materials in the program, then adjustments to the fungicide program are in order. In some cases the suspect materials need to be eliminated entirely. For other materials, one could simply suspend their use for a period of time.

The duration of resistance to any fungicide depends on the biological fitness of the resistant fungal biotype. The resistant strains of the fungus selected by a fungicide program must be able to compete with the other microbes in the soil and thatch. If their competitive ability is good and they can survive in high enough populations to incite a disease outbreak, then the resistance will persist on the site. Past research on *Sclerotinia homoeocarpa*, known presently as the cause of dollar spot, indicates that resistant biotypes selected by the use of benzimidazole fungicides are good competitors and those selected by the use of sterole demethylation inhibitors are not. In practice then, we would expect to see a nearly permanent insensitivity of *Sclerotinia* to thiophan-

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ate methyl in the field and would need to eliminate that product from the current and future dollar spot control program. If propiconazole was determined to be the cause of the resistance, one would see the resistant biotypes wane over time. In this case, we could eliminate the sterole inhibitors from the program temporarily and then reintroduce them back into the program after 12 months.

Although practical resistance can be identified and remedied in any disease control program, we feel that the best approach is to manage and prevent resistance problems in the first place. An effective strategy to manage fungicide resistance involves the use of a broad range of materials in different chemical classes according to the manufacturers' label specifications.

The following is a list of suggestions for resistance management:

1. Do not use the same fungicide or fungicides in the same chemical class for more than three successive applications.
2. Do not use fungicides above or below label specified application rates.
3. Tank mix materials whenever possible. Use mixes proven to provide synergy in University trials.
4. Make applications in the proper dilution according to label specifications.
5. Make preventive applications rather than curative.
6. Make uniform applications and get good coverage. ❑

Plant Diagnostic Laboratory Update

Richard J Buckley, Laboratory Coordinator

Turfgrass

As we pass through spring, grass samples are coming into the laboratory with increasing frequency. Even as the weather warms, the real fun came because of the cold rain last week. The cool and wet weather completed the disease triangle and drove cold weather turf diseases into the lab. Turf submitted from several New Jersey, southeastern Pennsylvania and Long Island golf courses were diagnosed with **pink snow mold**, which is caused by the fungus *Microdochium nivale*. This disease also is known as **fusarium patch**. **Yellow patch**, which has its own alias – **cool season brown patch**, and is caused by *Rhizoctonia cerealis* was also diagnosed several times. Be aware that these diseases will continue to pop up during cool and wet periods into late May or even early June.

Ornamentals

Ornamental plants are also coming in with increasing frequency. All types of conifers continue to be submitted to the laboratory from local landscapes with evidence of **spruce spider mites**. Warm, dry weather will cause mite populations to increase rapidly through late-May, so be vigilant in your scouting. We don't get them, but a quick look around on any drive and you will see loads of **tent caterpillars**. We did; however, see the first **gypsy moth** larvae. These tiny critters were found hatching in Toms River exactly two weeks ago today. BT, the preferred choice for gypsy moth control, works best on early instar larvae (kill the babies). Watch the egg masses in your location and be prepared to make treatments as they hatch. Last, but never least, are the large numbers of pachysandra with **stem and leaf blight**. It warms my heart because we get a sample of pachysandra dead from this disease almost daily!

Nursery and greenhouse

Samples of rose from a central Jersey grower were submitted with **downy mildew**. Downey mildew of rose is a disease that will rapidly infect a rose crop during cool (50°F, overcast, and damp weather). In this case, a rather large crop was a total loss. Timely fungicide treatments will prevent the disease. ❑

Landscape IPM Pest Notes

Steven K. Rettke, Ornamental IPM Program Associate

✔ **SOUTHERN RED MITES** (246-363 GDD): This cool season mite is active in the spring and fall. Bright red colored eggs overwinter on the undersides of leaves of many plants, including firethorn, rose, azalea, rhododendron and viburnum. They are often most commonly found on *Ilex* (Holly) leaves, especially the species *Ilex convexa* (Japanese Holly). During light infestations, most of the active southern red mites, along with their bronzed stippling damage will be concentrated along the midrib on the lower leaf surface. With heavier populations, the mites and the stippling damage can be found on both sides of the foliage. Lower leaf surfaces often appear dusty, because of the eggshells and cast skins. Native predators can be effective, and this pest is often kept in check except under outbreak conditions. When overwintering eggs are numerous, the undersides of the leaves can be treated with horticultural oil (achieving good coverage may prove difficult, especially with the convex leaves of *Ilex convexa*). In heavy infestations, the use of a residual miticide may be necessary. Control them early and preferably with a miticide with ovicidal activity (kills eggs), such as hexythiazox (Hexygon) or horticultural oil. Other miticides such as abamectin (Avid) and fluvalinate (Mavrik) are labeled, but close attention and frequent monitoring visits are required since eggs are not killed, and at least two sprays are required.

✔ **PINE NEEDLE SCALE** (298-448 GDD = 1st generation): This armored scale insect is a common pest of pines, especially Scotch pine, mugo pine, Austrian pine and red pine, and occasionally on white pine, Norway and Colorado spruce. White oystershell shaped adult female covers are 1/8 inch and found only on needles. A long egg laying/crawler emergence period occurs from mid/late May to mid-June, with a second generation in July (1290-1917 GDD). When the pink crawlers settle, they turn in color to yellowish tan, lose their legs, and never move again. The crawler stage and early settling periods are the ideal time to control them with insecticidal soap or 2% horticultural oil (i.e., these materials also minimize harm to beneficial insects present). Research in Ohio showed that oil provided better control than did Orthene or Sevin. Control with these products will be good up until the time the crawlers begin to show some "white" or protective wax around the edges. In order to limit impact on beneficials, avoid broad-spectrum insecticides unless absolutely necessary.

✔ **GOUTY OAK GALLS** are woody galls up to 2" long, formed on the branches of many oaks. Large galls may girdle branches and cause significant dieback. They are caused by female wasps emerging from old galls in late May. They lay eggs in oak leaves; the hatched larvae feed and cause a blister-like gall to form along the leaf vein. In July, adults emerge again and lay eggs in twigs. The familiar woody galls will grow on these twigs over a period of 2 to 3 years.

Although pruning out galls is the only recommended control, realistically it is not very effective, since it is hard to get rid of all the overwintering galls in the area. Contact insecticides will kill emerging adults, yet timing and coverage is difficult, so overall control is often minimal. Since most wasp attacks are at the tips of trees, leaf expansion makes it difficult to provide an effective pesticide residue. Research has shown that injections or soil applications with systemics are ineffective. Such treatments apparently do not get into the gall to kill the wasp before adults emerge by the end of the month.

✔ **HONEYDEW AND SOOTY MOLD**: Most landscapers are very 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 or oil to the tank to dislodge the honeydew and sooty mold.

✔ **PINE BARK ADELGIDS**: These common aphid-like insects form a white, cottony coating on the bark of white pine and Scots pine. Eggs laid in May will hatch next month and settle on the bark, branches and new pine candles. Damage is usually cosmetic (sometimes high populations can kill small branches), yet customers may react negatively to their presence. Reduce the first generation of adelgids with a strong blast of water, horticultural oil, or insecticidal soap.

✔ **BIRCH LEAF MINER** (156-290 GDD): Black, 1/8th inch adults are active now, hovering around the newly emerged foliage and laying eggs. Yellow sticky traps can be placed in the tree canopy to monitor for the presence of adults. Early larval feeding damage appears as small, off-color patches in the leaf. Larvae will feed by mining between the leaf epidermis layers for only ten to 14 days or so, before dropping to the ground to pupate. Be sure to check for larval activity, since spraying leaves with nothing inside is a waste of time and material. Monitor for active larvae within leaves by holding the leaf up to light. There will be an almost clear spot surrounded by a darker green area where the larvae are feeding. Heavy infestations may cause entire trees to appear brown and scorched, as mined tissue dies. Control larvae when eggs are first laid (when early damage is first noticed) with a systemic (acephate [Orthene]).

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Imidichloprid (Merit) will work well, but needs some lead-time. The use of granular or drench applications will require at least 30 days or longer to move throughout the tree canopy.

✔ **AZALEA LACE BUG:** Adults will become active by mid-late May, feeding and laying eggs on the underside of azalea foliage. Leaves appear stippled and off-colored. Look for black fecal spots on the underside of foliage or for the lacy winged adults. Spiny black nymphs will also be noticeable by the end of the month. Azaleas planted in full sun and under drought stress exhibit the worst damage. Control with acephate (Orthene) when active life stages are first seen. Note that while insecticidal soap has offered good (>85%) control, obtaining contact with lace bugs on the underside of foliage may prove daunting on small plants. Field studies have shown that Imidichloprid (Merit) will provide excellent control for at least a full calendar season. Hence, it may be unnecessary to apply Merit to the same plant every year.

✔ **EASTERN TENT CATERPILLAR** (90-190 GDD): Webs have been expanding in the crotches of crabapple, wild cherry, hawthorn, etc., since the last week or two of April. Newly hatched caterpillars feed on foliage, expanding the nest/tent as they grow. Caterpillars are black and hairy, with a white stripe running down their back. Now is the time to control them: prune/rub out webs (don't use flaming torches; prune early in the morning/late afternoon or during rainy days when caterpillars are inside), or spray with B.t. (*Bacillus thuringensis*)(Spray adjacent foliage, since B.t. must be ingested). Once larvae get large, they leave the tent to feed at night and hide during the day. Penetrate the nest and control with carbaryl (Sevin), Conserve, Confirm or one of the pyrethroids.

✔ **LILAC BORER** (200-299): This clearwing moth borer is active now or soon will be. Look for wilting and dieback of branches, bark cracking, and exit holes in large stems. Pheromone traps are excellent to monitor for the presence of this pest. Once the first male moth is captured (one inch long wasp-like adult with brownish black front wings/body and pointed tail), wait a week then apply permethrin (Astro) to the stems. Note that the lilac borer prefers to lay eggs on older trunks/stems. Therefore, an effective control is to prune out any stem larger than two inches in diameter. If there are many such trunks/stems, plan on a three-year pruning schedule to remove them all (and encourage younger shoots to establish). This type of pruning increases the flowering of the lilac and so has several benefits (including non-chemical control). Lilac borer may also attack ash trees.

✔ **RHODODENDRON TIP MIDGE** (192-363 GDD): This fly lays eggs in young, emerging leaves. Feeding by maggots causes the margins of new foliage to roll inward and become cupped, twisted and deformed. Infested foliage sometimes turns brown and is stunted. The control window for this pest is very narrow. Controlling the first generation with acephate (Orthene) during the growth flush should prevent additional generations and future damage.

✔ **EUROPEAN PINE SAWFLIES** (35 – 135 GDD = Egg hatch): The most common on pines are the European pine sawfly (EPS) and the redheaded pine sawfly (RPS). They commonly attack the two-needle pines (mugo pine, Scotch pine, and Japanese black pine). EPS overwinters as eggs in the needles, while RPS overwinters as pupae. EPS have been active for at least a week in many areas, so monitor for the young larvae feeding on the needles. RPS will be active later in May since it must emerge as an adult and then lay eggs. When sawfly larvae are young, their mouthparts are small so they cannot initially eat the entire needle. Partial eating of the needles results in the remaining part turning brown and curling (appearing straw-like). This appearance provides a very effective monitoring tool, particularly on larger trees. The brown curled needles are easy to spot from a distance and indicate the presence of a population of sawflies feeding near that spot. Remember, sawfly larvae are not true caterpillars so B.t. (*Bacillus thuringensis*) will not control them. A 1% oil drench will control young larvae. The uses of Conserve, Orthene, Tempo 2, or Mavrik are some choices for the control of older larvae.

✔ **FLETCHER SCALES ON YEW (*TAXUS*)**: This soft scale is now laying eggs that will hatch in June. Monitor for hemispherical, 1/8 inch, yellow-brown adult scales. Also, look for dieback damage and needle yellowing. Small shrubs may be killed. Immature scales grow quickly and produce much honeydew, which results in foliage becoming covered with sooty mold. The crawlers are easy to control with one spray of 1% oil or soap. ❑

Diseases of Turfgrass

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

Aschochyta leaf blight

Leaf blight, caused by the fungus *Ascochyta*, often appears on Kentucky bluegrass plantings during cool, wet weather in mid-to-late-May. Turf that has a thick thatch layer (2 to 3 inches) is most susceptible to attack. Upon close inspection, both healthy and diseased leaves are evident within blighted areas. Infected blades typically appear white from the leaf "tip down". Under certain conditions, lesions may extend all the way down to the leaf sheath. As lesions age, prominent black pycnidia (fruiting bodies) develop along the bleached portion of affected tissue. Unlike anthracnose fruiting bodies, these structures lack visible black spines. During moist conditions, spores are released and infect healthy turf. Since *Ascochyta* enters grass through wounds, infection is most common just after the grass is mowed. For best results, avoid frequent mowing, mow when the turf canopy is dry, raise the height of cut, use a "sharp mower blade" to avoid excessive leaf shredding, water as deeply and infrequently as possible without causing moisture stress, water in the early morning hours, avoid excessive applications of nitrogen, and remove excess thatch. Control of this disease was recently added to the 3336 (thiophanate-methyl) label; however, fungicides are rarely warranted since affected turf typically recovers with proper maintenance and warmer weather.

Leaf Spot and Melting-Out

This disease, caused by the fungus *Drechslera poae,* is starting to develop on susceptible Kentucky bluegrass lawns throughout the State. To prevent severe damage from the melting-out phase of this disease during the next six weeks, avoid heavy applications of nitrogen in the spring (especially quick-release formulations such as urea or ammonium nitrate), maintain the cutting height at or above 2 to 2-1/2 inches, remove excess thatch, and apply Armada, Compass, Headway, Heritage, Insignia, mancozeb, Medallion, or Tartan, now per manufacturer's recommendations. Avoid the use of certain acropetal penetrant fungicides (e.g., benzimidazoles) this spring in areas with a history of **leaf spot** and **melting-out**, since these fungicides may intensify symptom expression.

Red Thread

We should start to see the development of **Red Thread,** caused by the fungus *Laetisaria fuciformis*, on susceptible turf during the next few weeks. Outbreaks were delayed due to the dry weather in March and April, but the disease should become more prevalent in early-May because of the recent heavy rainfall. Infections are characterized by the appearance of short red threads (1/16-1/4 inch long) emerging from tan-colored leaf blades. Affected patches are typically pink in color and range from 1 to 6 inches in diameter. Although perennial ryegrass and fine fescue are most susceptible, Kentucky bluegrass, velvet bentgrass and tall fescue may also be affected. **Red thread** is typically found on "hungry" (low fertility) turf during cool, wet weather. Well-fertilized turf, however, may also be attacked. To obtain optimum disease control, maintain adequate fertility levels, avoid drought stress and excessive thatch, and apply Armada, Banner, Bayleton, Chipco 26GT*, Compass, Curalan*, Eagle, Endorse, Headway, Heritage, Insignia, Pro-Star, Rubigan, Tartan, Trinity or Touche per manufacturer's recommendations (*not for use on residential properties).

Stripe Smut

This disease, caused by the fungus *Ustilago striiformis*, will soon appear in susceptible Kentucky bluegrass plantings. To identify **stripe smut** in the field, look for thick masses of black spores protruding through "shredded" leaf blades. Although fungicides are most effective when applied once in mid-October, present infections can be controlled with two applications (14 days apart) of a penetrant fungicide such as Armada, Banner, Bayleton, Eagle, Rubigan, Tartan, or thiophanate-methyl. Follow label directions carefully for best results.

Take-All Patch

Take-all patch, caused by the root and crown infecting fungus *Gaeumannomyces graminis* var. *avenae,* has started to develop on golf course turf. Although infection takes place during cool, wet weather in the fall, winter and spring, symptoms are most striking in April and May after periods of stress. Infected grass first appears bronzed to reddish-brown and then fades to a dull brown color. Patches are usually circular, range in size from several inches to two feet or more in diameter, and may exhibit a bronzed colored outer ring when active. The centers of patches are frequently colonized by bluegrass (*Poa* spp.), fescue (*Festuca* spp.) or weeds. Upon close examination, decaying roots and leaf sheaths appear black and dark strands of mycelium often develop parallel to the root axes. The disease is enhanced by poorly drained, light textured soils and high soil pH. For best results, use acidifying fertilizers during cool-weather to lower soil pH (e.g., between 5.5 and 6.0) and apply Banner, Bayleton, Headway, Heritage, Insignia, Trinity, or Rubigan now and repeat in 4 weeks. Apply manganese (2 Lb Mn/A as a "foliar spray"), if soils are deficient in this nutrient, to reduce disease severity.

Turf Field Day

Mark your calendars now for this year's Rutgers Turfgrass Research Field Days which will be held on Tuesday, July 29, 2008 (Golf and Fine Turf Research Field Day at Horticultural Farm II, New Brunswick, NJ) and Wednesday, July 30, 2008 (Landscape Turf Research Field Day at the Adelphia Research Farm, Freehold, NJ). Additional registration information and directions to each location can be obtained in the near future at http://www.njturf.org/. ❑

Diseases of Ornamentals

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

Fungicides for ornamental disease control: common names and trade names

Common name	Trade names	REI	Application interval[1]
azoxystrobin	Heritage, Quadris	4 h	7–28 d
calcium polysulfide	Lime–Sulfur Solution	48 h	10–15 d
captan	Captan, Captec	4 d	7–14 d
chlorothalonil	Applause, Bravo, Chloronil, Chlorothalonil (various labels), Chlorostar, Countdown, Daconil, Echo, Ensign, Equus, Exotherm Termil, Mainsail, Manicure, Pegasus	12 h	7–14 d conifers 1–8 wk
copper hydroxide[2]	3 LB Copper Flowable Fungicide, Champ Dry Prill, Champ Formula 2, Champion, CuPRO 2005 T/N/O, Kentan, Kocide, KOP–Hydroxide, Nordox, Nu–Cop, Stretch	24 h	7–14 d conifers 2–4 wk
copper hydroxide + copper oxychloride[2]	Badge	24 h	7–14 d
copper, metallic[2]	Copper–Count–N	12 h	7–14 d
copper oxychloride[2]	COC, C–O–C–S	24 h	7–10 d
copper salts of fatty and rosin acids[2]	Camelot	12 h	7–14 d
copper sulfate[2]	Copper Sulfate Crystals, Cuprofix Ultra, Disperss, Phyton 27, Triangle Brand Copper Sulfate Instant Powder	12–24 h	7–10 d Douglas fir 3–4 wk
cyazofamid	Segway	12 h	14–28 d
dicloran	Botran	12 h	5–14 d
dimethomorph	Stature	12 h	10–28 d
etridiazole	Terrazole, Truban	12 h	4–12 wk seeding side dress
fenamidone	FenStop	12 h	28 d
fenarimol	Rubigan A.S.	12 h	7–28 d
fenhexamid	Decree	12 h	7–14 d
ferbam	Ferbam Granuflo	24 h	7–14 d
fludioxonil	Medallion	12 h	7–14 d
flutolanil	Contrast, ProStar	12 h	14–28 d
fosetyl–Al	Aliette WDG, Avalon, Flanker, Fosetyl–Al	12 h	7–30 d
iprodione	18 Plus 2F, 26GT 2EC, 26/36 Fungicide, Chipco 26019 50W, Ipro 2SE, Iprodione F–Pro, Iprodione Pro, OHP Chipco 26019 N/G, Raven	12–48 h	7–14 d
kresoxim–methyl	Cygnus 50WG	12 h	7–14 d
mancozeb	4 Flowable Mancozeb, Dithane, Fore, Mancozeb DG T&O, Manzate Pro–Stick, Penncozeb, Protect	24 h	7–14 d blossoms 2–3 times weekly
maneb	Maneb	24 h	7–14 d
mefenoxam	Mefenoxam, Subdue	up to 48 h	1–4 mo
myclobutanil	Eagle, Hoist, Nova, Systhane	24 h	10–14 d conifers 2–3 wk
oxytetracycline	Mycoject	none	systemic fungicide
PCNB	Par–Flo, Revere, Terraclor	12 h	soil treatment, or once in 4–6 wk
phosphite	Alude, ArborFos, Fosphite, Fungi–Phite, Magellan, Phostrol, Resyst, Topaz, Vital	4 h	7–30 d systemic fungicide
piperalin	Pipron	12 h	see label
propamocarb	Banol	24 h	3–6 wk (at potting)
propiconazole	Alamo, Banner, Banner Maxx, Kestrel, ProPensity, Propiconazole, Savvi, Spectator	24 h	1–8 wk tree injection
streptomycin	Ag Streptomycin, Agri–mycin 17, Bac–Master, Farmsaver Agricultural Streptomycin, Firewall	12 h	4–7 d
sulfur, dusting[3]	Dusting Sulfur, Kumulus DF, Special Electric, Thioben 90, Yellow Jacket Special Dusting Sulfur	24 h	5–10 d
sulfur, elemental[3]	Sulfur 90W	24 h	5–6 d
sulfur, flowable[3]	Suffa, Sulfur, THAT Flowable Sulfur, Thiolux Jet	24 h	5–10 d
sulfur, wettable[3]	80% Thiosperse, Microsperse Wettable Sulfur, Micro Sulf, Microthiol Disperss, Spray Sulfur, Wettable Sulfur, Yellow Jacket Wettable Dusting Sulfur II	24 h	5–10 d
tebuconazole	Tebuject	none	systemic
thiabendazole	Arbotect 20–S, Mertect 340–F	none, or 12 h	trunk injection bulb and corm dip
thiophanate–methyl	3336, AllBan Flo, Fungo, OHP 6672, Systec 1998, T–Bird, T–Methyl, T–Storm, Tee–Off, TM, Topsin, Thiophanate Methyl, Transom	12 h	7–28 d, pre–plant dip, Rhabdocline 4 wk
triadimefon	Bayleton, Strike	12 h	7–21 d
trifloxystrobin	Compass	12 h	7–28 d
triflumizole	Terraguard	12 h	7–28 d
ziram	Ziram	48 h	7–10 d

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Combination Products from page 6

Combination Products			
chlorothalonil + fenarimol	TwoSome	dry	7–14 d
chlorothalonil + thiophanate–methyl	ConSyst, Peregrine, Prominence, Spectro, TM + CTN E–Pro, TM/C	12–48 h	conifers 3–4 wk 7–28 d
debacarb + abamectin	Abasol	none	systemic
debacarb + carbendazim	Fungisol	none	systemic
debacarb + imidacloprid	Imisol	none	systemic
fludioxonil + mefenoxam	Hurricane	48 h	21–28 d
flutolanil + thiophanate–methyl	SysStar	12 h	10–14 d
mancozeb + copper hydroxide	Junction	24 h	7–14 d
mancozeb + thiophanate–methyl	Zyban	24 h	4–14 d
thiophanate–methyl + etridiazole	Banrot	12 h	soil treatment 4–12 wk
thiophanate–methyl + iprodione	Dovetail, TM + IP E–Pro	24 h	10–28 d
triadimefon + trifloxystrobin	Armada	12 h	14–28 d
Biorational and Biological Control Products			
Bacillus pumilis	Sonata	4 h	7–14 d
Bacillus subtilis	Cease, Rhapsody	4 h	7 d
borax	TriCon	12 h	7–10 d
Coniothyrium minitans	Contans	4 h	preplant treatment
essential oils (rosemary, clove, and thyme)	Sporan (supplementary label)	none	7–14 d
Gliocladium virens	SoilGard	none	medium/soil treatment
hydrogen dioxide	ZeroTol	none	7 d
insecticidal soap	M–Pede	12 h	7–10 d
neem oil	Triact, Trilogy	4 h	7–14 d
paraffinic oil	JMS Stylet–Oil	4 h	7–14 d
potassium bicarbonate	Armicarb, Kaligreen, MilStop	4 h	7–14 d
Streptomyces griseoviridies	Mycostop	4 h	2–6 wk
Trichoderma harzianum	PlantShield, RootShield	none	medium/soil treatment

[1] Represents a range of application intervals for all crops labeled. See individual labels for specific hosts, timing, and rates.
[2] Check for phytotoxicity before large-scale use of copper fungicides; to prevent residues on many plants, avoid use of copper compounds just before selling season.
[3] DO NOT apply sulfur over 90°F, in full sun, or 3 weeks after an oil spray.
For more information, refer to RCE publication E036, 2008 Pest Control Recommendations for Shade Tree and Nursery Crops, http://njaes.rutgers.edu/pubs/pesticidesfomj/

Weekly Weather Summary

Keith Arnesen, Ph.D., Agricultural Meteorologist

Temperatures averaged much above normal in the north and above normal central and south, averaging 58 degrees north 57 degrees central and 59 degrees south. Extremes were 81 degrees at Belvidere and Hammonton on the 25th, and 39 degrees at Charlotteburg on the 23rd. Weekly rainfall averaged 0.24 inches north, 0.24 inches central, and 0.19 inches south. The heaviest 24 hour total reported was 0.31 inches at Flemington on the 27th to 28th. Estimated soil moisture, in percent of field capacity, this past week averaged 81 percent north, 75 percent central and 68 percent south. Four inch soil temperatures averaged 59 degrees north, 57 degrees central and 59 degrees south.

Weather Summary for the Week Ending 8 am Monday 4/28/ 8

	RAINFALL			TEMPERATURE				GDD BASE50		MON
WEATHER STATIONS	WEEK	TOTAL	DEP	MX	MN	AVG	DEP	TOT	DEP	%FC
BELVIDERE BRIDGE	.21	7.51	-.02	81	42	59.	5	147	121	75
CANOE BROOK	.40	6.90	-1.40	80	40	58.	5	133	115	87
CHARLOTTEBURG	.10	8.28	.13	76	39	57.	6	128	126	75
FLEMINGTON	.38	7.38	-.57	79	41	58.	4	146	124	86
NEWTON	.10	7.19	-.06	78	45	60.	8	191	184	75
FREEHOLD	.23	4.73	-3.15	78	44	58.	3	141	101	77
LONG BRANCH	.21	6.12	-2.04	75	44	54.	0	82	52	75
NEW BRUNSWICK	.60	5.54	-2.02	79	45	58.	2	132	76	92
TOMS RIVER	.01	6.10	-1.87	77	43	56.	1	135	101	61
TRENTON	.14	5.75	-1.40	79	45	60.	3	189	119	62
CAPE MAY COURT HOUSE	.27	4.49	-2.45	77	47	58.	2	153	96	73
DOWNSTOWN	.08	5.55	-1.61	80	42	59.	2	194	120	63
GLASSBORO	.22	4.54	-3.00	79	47	62.	5	221	151	64
HAMMONTON	.08	4.94	-2.38	81	44	59.	3	206	141	59
POMONA	.28	5.95	-1.07	80	44	58.	3	180	136	70
SEABROOK	missing									
SOUTH HARRISON	.32	5.48	-2.23	78	46	60	NA	210	NA	NA

WES KLINE -- GDD BASE 40 PINEY HOLLOW LAST WEEK 108 (Ending 4/21/08) THIS WEEK 135 (Ending 4/28/08)

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Pesticide User Responsibility: Use pesticides safely and follow instructions on labels. The pesticide user is reponsible for proper use, storage and disposal, residues on crops, and damage caused by drift. For specific labels, special local-needs label 24(c) registration, or section 18 exemption, contact RCE in your County.

Use of Trade Names: No discrimination or endorsement is intended in the use of trade names in this publication. In some instances a compound may be sold under different trade names and may vary as to label clearances.

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