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

General
Algae, anthracnose, brown patch, dollar spot, copper spot, Pythium blight, rust and slime mold are all prevalent on susceptible turf at this time. Although red thread and leaf spot were very active on landscape turf this spring, these diseases have become much less common as the hot, humid weather developed in June. Refer to recent issues of this newsletter for complete disease control information regarding these and other turfgrass diseases.

Anthracnose
Anthracnose, caused by the fungus Colletotrichum cereale (formerly C. graminicola) continues to intensify on many annual bluegrass greens in the region due to the continuing heat stress. Expect to see increased disease severity if the hot, humid weather continues in July and August. The fungus typically attacks turf growing under low fertility and/or heat or drought stress. Low cutting height and extensive seedhead production can weaken turf and enhance disease development. To identify this disease in the field, look for small black fruiting bodies with protruding black spines.

To control anthracnose, increase turf vigor with frequent, light applications of nitrogen (0.1 - 0.2 lb N every one to two weeks), raise the cutting height (> 0.125 inches whenever possible), provide adequate irrigation, and maintain acceptable ball-roll distances (i.e., putting speed) through increased mowing frequency and/or rolling. Additional control can be obtained with preventive applications of Banner, chlorothalonil, Compass, ConSyst, Disarm, Eagle, Endorse, Headway, Heritage, Insignia, Spectro, Tartan, thiophanate-methyl, Torque, Tourney, Triton, Trinity or Velista. Recent research conducted at Rutgers has shown that Chipco Signature, Medallion, the phosphites, and Chipco 26GT can also effectively suppress anthracnose when used in tank mixtures with any of the previously mentioned fungicides. In areas with a prior history of this disease, apply fungicides on a preventive basis for best results. Tank mix or alternate fungicides with different modes of action every 14 days when conditions are conducive for disease development to improve fungicide efficacy and reduce the potential for resistance. Since Prostar may enhance the severity of this disease, restrict the use of this fungicide to sites that do not exhibit symptoms of anthracnose.

See Turf Diseases on page 2
**Turf Diseases from page 1**

**Brown Patch**
This disease, caused by the fungus *Rhizoctonia solani*, continues to be troublesome on golf and landscape turf. To reduce the incidence and severity of **brown patch**, avoid applying too much nitrogen (e.g., not more than 1/2 lb N/1000 sq. ft / application) during hot, humid weather, irrigate between midnight and 8 AM to minimize the leaf wetness period, and spray turf now with Banner (preventive only), Chipco 26GT, chlorothalonil, Compass, ConSyst, Disarm, Endorse, Headway, Heritage, Insignia, mancozeb, Medallion, ProStar, Spectro, Tartan, thiophanate-methyl, Torque, Tourney, Triton, Trinity or Velista and repeat per manufacturer’s recommendations.

**Copper Spot**
We are starting to see copper spot on creeping and velvet bentgrass over the past few days. This disease, caused by the fungus *Gloeocercospora sorghi*, appears as small, salmon to copper-colored, circular patches that range from 1-3 inches in diameter. Except for the distinctive color, copper spot could be mistaken for dollar spot on affected bentgrass playing surfaces. Although this disease was very common prior to the 1980s, the frequent use of the DMI fungicides to control dollar spot on golf course turf dramatically reduced its occurrence over the last three decades. However, with the recent trend limiting DMI applications during the warm/hot summer months and the use of Carbosimide fungicides such as boscalid (which can enhance the severity of copper spot), we have seen a resurgence of this disease on some courses during the last five to six years. Like dollar spot, the incidence of copper spot can be reduced by maintaining adequate fertility, avoiding drought stress, and minimizing the leaf wetness period. Maintain pH between 6 and 7 to reduce disease severity. DMI fungicides are very efficacious for copper spot even at low label rates, as are the strobilurin, benzimidazole, and nitrile (chlorothalonil) fungicides.

**Powdery Mildew**
We have seen a lot of **powdery mildew** in shaded areas and on lawns with poor air circulation. Although chemical control is usually not required, present infections may be checked with Banner, Bayleton, Eagle, Headway, Heritage, Insignia, Manhandle, or Rubigan if desired.

**Pythium Blight**
*Pythium Blight* has been very active on golf and landscape turf over the past few weeks. This disease thrives in low or poorly drained areas, especially when the night time temperatures are above 70°F, so expect Pythium blight to become even more pronounced as the hot humid weather intensifies next week and continues throughout the summer. For best results, improve drainage, water in the early morning hours, avoid over-fertil-
Plant Diagnostic Laboratory Update
Richard J Buckley, Director, Plant Diagnostic Laboratory

Turfgrass

It is July and turfgrass samples are coming into the laboratory at a steady clip. Not uncommon at this time of year; the sample submissions increase daily and so do the number of phone calls and emails.

Last year at this time we were talking about adequate soil moisture, regular monsoon-type rains and moderate temperatures that were keeping the turfgrass chugging along. Our area had not had the 100°F temperatures yet and the grass looked pretty good. Quite the opposite condition this year – we’ve had some significant heat stress over the last couple weeks and are very dry. In fact, with the exception of some local thunderstorms, rainfall has been negligible in July. These conditions are always preferable to a turf manager. Dry weather means one can control the moisture, that is, if one can control the moisture. Many of our samples in the last two weeks are simply plugs from golf greens that dried down too far. For instance, last Friday (6th) the afternoon temperatures were in the upper 90°F, the wind was blowing at 9-14 mph and the relative humidity was down somewhere near 35%, so the grass was under significant evaporative stress. A lot of turf managers fell off the tightrope that day and cooked their turf. Generally what follows is panic and overwatering to try to bring it back. Almost all the samples this week were either rock hard “hockey pucks” or soaking wet “sponges.” Either way, the grass is on its way out. Interestingly enough, folks that stay dry after the stress end up with anthracnose and those that water vigorously to recover get root-pythium. It is dry, so you have control, but don’t fall into the too dry/too wet trap!

In the golf turf disease world, pythium blight was the most common disease diagnosed. Samples with pythium blight mostly came to the laboratory from golf courses to the north of us in Southeast NY. Those folks had soaking rains last weekend that might have provided the extra moisture needed to drive the disease. As is often the case with pythium blight, some golf turf managers were caught off guard and did not have adequate preventive controls in place for the time of year and the weather forecast. We’ve also had a sample or two of anthracnose and pythium root rot in the last week along with the normal lot (20 plugs) of summer patch samples.

In landscape turf, the disease of the week was brown patch. High night temperatures, regular irrigation inputs, and perennial ryegrass helped that disease along.

Ornamentals

Landscape professionals and residential clients alike have continued to submit samples of landscape plants this week. Yesterday brought us more samples of impatiens downy mildew from a landscape in Bergen County. We had a nice Dutch elm disease sample submitted from a West Chester County, NY arborist. He estimated the tree was 80 years old, but by the looks of the sample, would likely not see 81. Lastly, a Maryland nursery grower sent us the coolest, little baby bagworms all over a Leyland cypress. Feeding from early bagworm instars is superficial, almost skeletonizing the needles. The feeding causes excessive sap flow. The grower could not see the tiny baby caterpillars and could not explain why the trees were covered with sap. Of course, by the time we got the samples, the bagworms had their bags constructed and were crawling all over everything..... great fun in the lab!
Using Google to Educate Yourself about Plant Problems
Clare Liptak, Retired Somerset County Agricultural Agent

Diagnoses for plant problems can sometimes be found online using precise plant names and keywords to describe symptoms. I would suggest trying this on minor problems in the landscape you’re maintaining. But, before the damage to an important plant becomes severe, take a carefully selected specimen to the Rutgers Plant Diagnostic Lab for an accurate analysis (http://www.njaes.rutgers.edu/plantdiagnosticlab).

It’s helpful to know the categories of insect injury such as chewing, skeletonizing, boring, piercing and sucking, mining, and gall, and disease symptoms such as canker, scorch, and leaf spot.

The first I tried was “white distorted leaves birch” because early in the spring the new growth of our river birch had distorted leaves. When I unrolled the leaves I could see the aphids and the waxy exudate they produce. Google lead me to pictures and a description from Clemson University describing the river birch aphid which also produces spiny galls on witch hazel. Since the infestation on our birch was light and beneficial insects were numerous, we let it go and our tree is fine.

“False hydrangea vine leafhopper” and “Schizophragma mottled” didn’t get good results. The vine is Schizophragma hydrangeoides, a hydrangea relative and the newest mature leaves had a pattern of extreme light and dark and a few leafhoppers here and there. But this plant normally has mottled leaves so it always shows a pattern of light and dark. What further confuses things is that “mottled” is one of the scientific terms used to describe a symptom of a virus, as well as a commonly used adjective meaning spotted or blotched with different shades or colors.

“Wilt viburnum” didn’t get me the answer I was looking for. Google found lots of links to Verticillium wilt but I was looking for the fact that viburnums are important indicator plants for dry soils in the landscape, because they wilt sooner than other plants. In the links to the Verticillium wilt information, most descriptions of plant symptoms mentioned that only part of the plant was affected, while the entire plant is wilted when a lack of soil moisture is the problem. Being observant is crucial.

Finally, I googled “thread-waisted wasp storm windows,” because for many years we’ve had the tracks of the storm windows full of dead grass and cocoons but we never saw the adult bringing the grass or laying its eggs. But since I moved my desk and I look out the window when I should be working, I saw a thread-waisted wasp enter the track and come out the other end. (By the way, I got the same link to the Penn State pictures and information by googling “wasp storm window,” so you wouldn’t have had to know the thread-waisted part.) The real name of the insect is grass-carrying wasp.

Clare Liptak, is an IPM scout, horticulturist, and Certified Tree Expert #208. clare.liptak@gmail.com.

From the Turf Blog:
Hot and Dry!
James A. Murphy, Ph.D., Specialist in Turf Management

Not only has it been hot but soils are getting quite dry throughout New Jersey especially in those areas where rain showers have ‘missed’ and irrigation is not being used regularly.

If you don’t have a weather station but would like to track environmental data, you should visit the NJ Climate & Weather Network at http://climate.rutgers.edu/njwxnet/index.php.

Click on “Current Maps” under the MAPS & IMAGERY NJ Statewide heading in the menu list on the left hand side of the web page. From this page you can click through statewide maps of air and soil temperatures, soil water content, evapotranspiration and other data. This is a convenient way to get a rapid glimpse of the growing conditions throughout the state.

Hope all goes well. I have become “good friends” with the hoses and satellite controllers at the farm these days!

Sign up for Rutgers Turf Blog! Go to: http://turfblog.rutgers.edu.

Non-irrigated turf on Rutgers New Brunswick Campus going dormant.
What Mildews Affect Ornamental Plants?

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

In household terms, a “mildew” is thought of as a fungal growth on a flat surface. Mildew fungi, which include species of Aspergillus, Cladosporium, Penicillium, and Stachybotrys, use various organic materials in moist locations for food (lending that musty smell to damp basements and bathrooms).

In plant pathology terms, a mildew is defined as “a thin coating of fungal mycelial growth and spores on the surfaces of infected plant parts.” Two types of mildew are commonly associated with plant disease: powdery mildew and downy mildew. Powdery mildews are extremely common on outdoor plants this time of year. Downy mildews affect plants during cooler, moister weather; reports of this disease on outdoor plants this time of year. Downy mildews affect plants during cooler, moister weather; reports of this disease on outdoor plants this time of year.

Powdery mildew

Powdery mildew is a “summer season” disease that tends to affect outdoor plants after the growing season has begun. This disease is probably the most commonly recognized disease of ornamental plants in the nursery and landscape, affecting more than 7000 plants worldwide. Of the 300 or more different fungi that cause powdery mildew diseases, species of Blumeria, Erysiphe, Golovinomyces, Leveillula, Phyllactinia, and Podosphaera are most common.

Powdery mildew fungi obtain food from living plant cells through a specialized, nutrient-absorbing structure called a haustorium. The haustorium forms within the cells of the host plant epidermis; nutrients move from this structure through hyphae that connect to the plant surface, where the “powdery” growth is evident. The relationship between fungus and host plant is pretty sophisticated; the fungus gets the nutrition it needs from the host, but the host is not usually seriously harmed. Most powdery mildew species are host-specific; development of powdery mildew on one species will not necessarily lead to disease on other hosts nearby.

Disease development. Look for powdery mildews in the landscape during the late spring to early fall months. The disease most commonly appears as a white to tan superficial growth on the surface of affected leaves and other aerial tissues. Powdery mats of fungal mycelia produce conidia (asexual spores) that are carried by the wind to susceptible host tissue the entire growing season. Young plants and tissues are often more susceptible to this disease; 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 may be reduced. Leaves may be stunted, curled, or twisted; in highly susceptible plants, new growth, flowers, and buds can be destroyed.

Powdery mildew fungi overwinter in a characteristic fruiting structure called a chasmothecium (formerly, cleistothecium) that is the result of a sexual reproductive process. Chasmothecia are dark, tiny spheres (about the size of coarse ground pepper) that can often be seen on infected tissues later in the growing season. During the spring of the following year, these fruiting structures release spores (called ascospores) that start the infection cycle for the new season. In warmer climates or in greenhouses, the formation of chasmothecia may not be observed; 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, new mycelium and spores are produced within 4 to 6 days. Although the development of powdery mildew is most rapid during periods of warm weather (80oF day/60oF night), damage due to the disease can be actually more severe at cooler temperatures (70oF day/50oF 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. In the spring, rake old leaves and prune shoots (during dry weather) infected the previous growing season to

### Common hosts of powdery mildew

<table>
<thead>
<tr>
<th>Common hosts of powdery mildew</th>
<th>Common hosts of powdery mildew</th>
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<tbody>
<tr>
<td>apple and crabapple</td>
<td>cotoneaster</td>
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<td>azalea and rhododendron</td>
<td>horse chestnut</td>
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<tr>
<td>ash</td>
<td>hydrangea snowball</td>
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<tr>
<td>basswood</td>
<td>kalanchoe</td>
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<tr>
<td>beech</td>
<td>Kalmia</td>
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<tr>
<td>barberry</td>
<td>leucothoe</td>
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<td>birch</td>
<td>ligustrum</td>
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<tr>
<td>blueberry</td>
<td>lilac</td>
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<td>buckeye</td>
<td>magnolia</td>
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<td>catalpa</td>
<td>maple</td>
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<tr>
<td>Chinese photinia</td>
<td>monarda</td>
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<td>chrysanthemum</td>
<td>oak</td>
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<td></td>
<td>phlox</td>
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<tr>
<td>Prunus (apricot, cherry,</td>
<td>sycamore</td>
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<tr>
<td>peach, pear, plum)</td>
<td>tulip tree</td>
</tr>
<tr>
<td>peony</td>
<td>Vaccinium</td>
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<tr>
<td>poplar</td>
<td>viburnum</td>
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<td>privet</td>
<td>walnut</td>
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<tr>
<td>pyracantha</td>
<td>wintercreeper</td>
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<tr>
<td>Rieger begonia</td>
<td>willow</td>
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<tr>
<td>rose</td>
<td>wisteria</td>
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<tr>
<td>serviceberry</td>
<td>zinnia</td>
</tr>
<tr>
<td>spiraea</td>
<td>smoke-tree</td>
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<tr>
<td>spirea</td>
<td>snapdragon</td>
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See Powdery Mildew on page 6
reduce inoculum. Water plants during droughty periods. Practices that promote succulent growth, including pruning and nitrogen fertilizing, should be avoided during the summer on susceptible hosts. Purchase disease-free plants, and use cultivars resistant to this disease whenever possible.

Compounds labeled for powdery mildew control include azoxystrobin, chlorothalonil, copper (ammonium complex, basic copper sulfate, cuprous oxide, hydroxide, octanoate, oxychloride, pentahydrate, salts), fenamidone, fenhexamid, fludioxonil, fluoxastrobin, imazalil, kresoxim-methyl, lime sulfur, myclobutanil, phosphorous acids, piperlin, polyoxin D, propiconazole, pyraclostrobin, sulfur, tebuconazole, thiophanate-methyl, triadimefon, trifloxystrobin, triflumizole, ziram, and the combination products boscalid + pyraclostrobin, chlorothalonil + propiconazole, chlorothalonil + thiophanate-methyl, copper hydroxide + copper oxychloride, cyprodinil + fludioxonil, iprodione + thiophanate-methyl, phosphorous acids + sulfur, and triadimefon + trifloxystrobin. Biorational products labeled for powdery mildew management include aliphatic petroleum solvents, oils (essential, neem, soybean), disinfestants (Consan Triple Action, Zerotol), potassium bicarbonate, potassium silicate, and insecticidal soap. Biological controls include strains of Bacillus pumilus, Bacillus subtilis, Streptomyces lydicus.

Most of these compounds are applied at the first sign of disease; however, consult the label for timing, rates, and appropriate hosts.

**Downy mildew**

Downy mildews are caused by fungal relatives called Oomycetes. These fungal-like organisms, troublesome in during cooler, moister weather, attack tender, above-ground plant parts, dispersing rapidly in films of water. In susceptible ornamental plants, downy mildews are most often caused by species of Peronospora, although species of Plasmopara, Pseudoperonospora, Sclerospora, and Bremia also cause this disease. Downy mildew is especially common on roses, all of which are susceptible to varying degree.

### Common hosts of downy mildew

<table>
<thead>
<tr>
<th>African daisy</th>
<th>coneflower</th>
<th>obedient plant</th>
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<tbody>
<tr>
<td>Alyssum</td>
<td>coreopsis</td>
<td>ornamental pepper</td>
<td>sundrop</td>
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<tr>
<td>bellflower</td>
<td>delphinium</td>
<td>paper daisy</td>
<td>sunflower</td>
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<tr>
<td>bluebells</td>
<td>dill daisy</td>
<td>poppy</td>
<td>sweet woodruff</td>
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<tr>
<td>buttercup</td>
<td>forget-me-not</td>
<td>primrose</td>
<td>veronica</td>
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<tr>
<td>butterfly bush</td>
<td>Geranium spp. (not florist’s)</td>
<td>rockcress</td>
<td>Viola (true violet and pansy)</td>
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<tr>
<td>campion</td>
<td>giant hyssop</td>
<td>rose</td>
<td>windflower</td>
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<tr>
<td>candytuft</td>
<td>impatien</td>
<td>rosemary</td>
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<tr>
<td>Centaurea</td>
<td>lamium</td>
<td>salvia</td>
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<tr>
<td>Cissus</td>
<td>lianthes</td>
<td>Siberian bugloss</td>
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<tr>
<td>coleus</td>
<td>monkey flower</td>
<td>snap dragon</td>
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</table>

**Disease development.** Symptoms of downy mildew most often appear on the upper leaf surface as a patchy yellow, purple, or brown discoloration bound by leaf veins. Affected leaves may defoliate prematurely, and stunting may also occur in some species, such as snapdragon, and in seedlings and bulb crops. To see why the disease is called “downy mildew,” turn the leaf over. Evidence on the lower leaf surface (best to use a hand lens) are the characteristic downy tufts of white to purple/grey fungal growth. This growth consists of spores (called sporangia or conidia) that are easily dislodged and disseminated by wind and splashing water. Symptoms of downy mildew may be sometimes confused with those caused by foliar nematodes.

Downy mildews develop on susceptible crops during cool (58 to 72°F), fairly humid (> 95% RH) conditions when spores from previously infected tissue are splashed or blown by air currents to colonize new sites. As infection progresses, symptoms develop, and the downy tufts of spores associated with leaf lesions may appear on the lower leaf surface. Fungal development ceases for most downy mildews when weather becomes dry and warmer than 80°F for 24 hours. In the absence of susceptible plant tissue, downy mildew pathogens in cold climates survive in plant debris, soil, or weeds.

Watch closely for symptoms in susceptible crops during periods of cool, humid weather. When you see foliage that is discolored, turn the leaves over to check for mites or downy mildew sporulation. Symptoms of this disease can be confused with other fungal (such as Botrytis blight and powdery mildew) or bacterial diseases, foliar nematode, or some nutritional deficiencies. To distinguish these diseases, look for signs (fungal growth, bacterial streaming, or the bodies of nematodes).

To manage downy mildew, first “manage the moisture”: space plants to ensure good air circulation and rapid drying of foliage after irrigation. Avoid overhead irrigation when the weather is generally cool. In greenhouses, reduce relative humidity to less than 85% by, again, properly spacing plants, and use horizontal air flow fans to improve air circulation throughout the house.
**Downy Mildew from Page 6**

House. Fill the house with warmer, drier air by venting and heating two or three times per hour at dawn and at dusk.

Practice good sanitation techniques. Discard all diseased plants as well as plant debris that may harbor spores, and control weeds that may be another source of downy mildew inoculum.

Protect susceptible crops during cool, wet weather with preventive fungicides. Active ingredients labeled for control of this disease on one or more ornamental crops include azoxystrobin, copper (ammonium complex, basic copper sulfate, cuprous oxide, hydroxide, octanoate, oxchloride, pentahydrate, salts), cyazofamid, dimethomorph, fenamidone, fludioxonil (use caution), fluopicolide, fluoxastrobin, fosetyl-Al, imazalil, kresoxim-methyl, mancozeb, mandipropamid, mfenox-am, phosphorous acids, polyoxin D, pyraclostrobin, trifloxystrobin, and the combination products boscalid + pyraclostrobin, chlorothalonil + thiophanate-methyl, copper hydroxide + copper oxychloride, copper hydroxide + mancozeb, and triadimefon + trifloxystrobin. Biorational products labeled for downy mildew management include oils (essential, neem, soybean), disinfectants (Consan Triple Action, Zeroto), and potassium bicarbonate. Biological controls include strains of *Bacillus subtilis* and *Streptomyces lydicus*. Consult label for timing and rates.

**Note:** To reduce the possibility of the development of fungal resistance to some of the newer systemic fungicides with single or few modes of action, rotate these chemicals with protectants such as mancozeb. Avoid the sole use of any fungicide for extended periods of time when other reliable products are available, and refer to label for timing, host plants, and rates.

1http://www.apsnet.org/edcenter/illglossary/Pages/default.aspx

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**NJ Direct Marketing Association Meeting**

You are invited to the NJ Direct Marketing Association’s Meeting on **Tuesday, July 24, 2012 at 6:00 p.m. at Giamarese Farm, 155 Fresh Ponds Road, East Brunswick, NJ.**

*In Cooperation with Rutgers NJAES Cooperative Extension*

**Agenda**

Farm Tour  
Update from the Agritourism Working Group  
Update on web presence and statewide marketing and promotion efforts  
Brief Association Meeting  

We look forward to seeing you at the meeting.

Please **R.S.V.P. by July 17th** to Carol Richiusa, Rutgers Cooperative Extension of Middlesex County Secretary at 732-398-5262 or email carol.richiusa@co.middlesex.nj.us.

Hope to see you there!
Pesticide User Responsibility: Use pesticides safely and follow instructions on labels. The pesticide user is responsible 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.

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