Nature’s Rules for Landscaping Success
Jim Willmott, Camden County Agricultural Agent

Lawns and gardens provide our most intimate experience with the natural environment. With spring in full swing, we appreciate their beauty, but it won’t be long before we are weary from fertilizing, mowing, watering and battling pests. Unfortunately our landscapes come with high economic and environmental costs. However, there is good news! Landscapes can be designed to require less maintenance and be more environmentally friendly.

The answers are evident in nature’s landscapes, which reveal principles for landscaping success. The pinelands offer a good model for natural, self-sustaining landscapes. Harsh conditions are challenging, yet a great diversity of plants and wildlife thrive. Plants grow only in sites to which they are best adapted. Waste (leaves, branches, etc.) is naturally composted into valuable organic matter that enriches soils. Our suburban landscapes violate these natural principles since plant diversity is limited and plants are located in poor sites often with soils damaged by home construction practices and even well-meaning gardeners. Finally, leaves, brush and other debris are removed from landscapes and sent to municipal composting sites.

In the past several years droughts have damaged and killed many landscape plants. Now’s a good time to consider replacements, by giving careful thought to plant selection. Remember in nature, plants grow only in compatible sites. Our plant choices often ignore site qualities and this increases maintenance needs. For example, Kentucky bluegrass lawns planted in pineland or coastal plains sites require frequent irrigation, fertilization and pesticide applications. A better alternative would be to plant a slow growing, site tolerant grass such as hard fescue. Better yet, consider alternative groundcovers including woody shrubs and herbaceous perennials.

Before planting, fully understand sites above and below ground. Note the sun, shade, soil pH, drainage and common pest troubles. Don’t forget space! Large plants are often crowded and located too close to homes, walkways, streets and beneath power lines. For any given site there are plants that will thrive and others that will not.

Attention to soil qualities is critical. First note the drainage. Is the area chronically wet or does it dry quickly after precipitation? Consider soil chemistry: How’s the pH? This measures soil acidity. While soils vary considerably, acid soils are most common in our area.

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area. How’s the nutrient content? Both pH and nutrient content can be determined by soil fertility tests available through Rutgers Cooperative Extension County offices. Finally, how’s the organic matter content? Many landscape soils, especially well drained sandy soils, benefit by adding organic matter such as sphagnum peat moss or composts. Contact local towns to inquire about availability of municipal composts.

Once site qualities are understood, select appropriate plants. Are native plants best? Sometimes, but not always! While plants may be native, highly disturbed landscape sites are not – even for native plants that are challenged by alien site conditions including alien pests! Select plants that are compatible with site qualities and seek to increase landscape diversity by choosing plants that are less common. For example, for a shady yard with well drained acidic soil, choose plants that prefer these conditions. Dogwoods and rhododendrons are appropriate, but common, so consider other species. When too many of the same plants are present, they are vulnerable to pest outbreaks. Always choose plants that have few troubles with insects, mites or diseases.

There are many good plants for various landscape sites. The following lists include excellent choices for area landscapes. Selections are less common, but many suppliers will order upon request.

### Ten Outstanding Trees for New Jersey Landscapes

<table>
<thead>
<tr>
<th>Common name (NJ natives bold type)</th>
<th>Scientific name</th>
<th>Size</th>
<th>Site</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baldcypress</td>
<td>Taxodium distichum</td>
<td>70 x 30</td>
<td>S, W, D</td>
<td>Large deciduous conifer. Adapted to wet, swampy or dry soils. Pest tolerant.</td>
</tr>
<tr>
<td>Crabapples (disease resistant only!)</td>
<td>Malus species. Recommended cultivars only!</td>
<td>20 x 20</td>
<td>S, D</td>
<td>Flowering crabapple offer good seasonal displays including red, yellow gold and orange fruit. Quality varies greatly between cultivars. Contact us for a list of recommended cultivars.</td>
</tr>
<tr>
<td>Dogwood hybrids</td>
<td>Cornus x rutgersensis</td>
<td>25 x 25</td>
<td>A, Dr, S, Sh</td>
<td>Available as cultivars ‘Aurora’ (white flowers) and ‘Stellar Pink’ (pink flowers). Resists anthracnose disease and borers that plague the common American dogwood.</td>
</tr>
<tr>
<td>Japanese tree lilac</td>
<td>Syringa reticulata</td>
<td>25 x 15</td>
<td>D, Dr, S</td>
<td>Tree and shrub forms, white flower spikes one month later than common lilac. Pest resistant. Cultivars ‘Ivory Silk’, ‘Regent’ and ‘Summer Snow’ are superior in flower production.</td>
</tr>
<tr>
<td>Katsura tree</td>
<td>Cercidiphyllum japonicum</td>
<td>40 x 25</td>
<td>S</td>
<td>Attractive seasonal foliage display. First reddish – purple, then gray-green and soft orange, spicy fragrant in fall. Highly pest tolerant.</td>
</tr>
<tr>
<td>River birch</td>
<td>Betula nigra</td>
<td>50 x 40</td>
<td>A, D, Dr, W S</td>
<td>Pest resistant alternative to white birch, but has brown flaking bark. Likes wet sites. Most trouble free birch.</td>
</tr>
<tr>
<td>Shadblow/Serviceberry</td>
<td>Amelanchier arborea</td>
<td>20 x 15</td>
<td>D, Dr, S, Sh</td>
<td>Early spring white flowers; fruit attractive to birds, excellent red-orange fall foliage.</td>
</tr>
<tr>
<td>Sourwood</td>
<td>Oxydendrum arboreum</td>
<td>25 x 20</td>
<td>A, D, S, Sh</td>
<td>Excellent yearlong interest. Drooping early summer flowers. Yellow, red and purple fall foliage.</td>
</tr>
<tr>
<td>Tupelo</td>
<td>Nyssa sylvatica</td>
<td>40 x 25</td>
<td>W, S</td>
<td>Brilliant red fall foliage.</td>
</tr>
<tr>
<td>‘Winter King’ Hawthorn</td>
<td>Crataegus viridis</td>
<td>20 x 20</td>
<td>S, D</td>
<td>Good seasonal interest. White May flowers, red berries that persist into winter. Attractive bark.</td>
</tr>
</tbody>
</table>

1 Size: mature height x width in feet
2 A = prefers acid soil, D = dry soil, Dr = reported as low risk for deer damage, E = evergreen, S = sunny, Sh = Shady, W = wet, poorly drained soil

See Tables on Next Page
## Ten Outstanding Shrubs for New Jersey Landscapes

<table>
<thead>
<tr>
<th>Common name</th>
<th>Scientific name</th>
<th>Size¹</th>
<th>Site²</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bayberry</td>
<td>Myrica pensylvanica</td>
<td>10 x 10</td>
<td>A, D, Dr, S, Sh</td>
<td>Good choice for pineland gardens can naturalize as a screen. Suitable for foundations. Flowers not showy develop into gray berries. Tough and adaptable plant good for pineland sites.</td>
</tr>
<tr>
<td>Blue mist shrub</td>
<td>Caryopteris x clandonensis</td>
<td>2 x 2</td>
<td>D, Dr, S</td>
<td>Late summer blue color. Cultivars are best: ‘Dark Knight’, ‘Longwood Blue’.</td>
</tr>
<tr>
<td>Doublefile viburnum</td>
<td>Viburnum plicatum var. tomentosum</td>
<td>8 x 10</td>
<td>Dr, S, Sh</td>
<td>Excellent season long interest. White spring flowers, followed by red to black fruit, red – purple fall foliage. ‘Shasta’ and ‘Mariesii’ excellent cultivars.</td>
</tr>
<tr>
<td>Inkberry</td>
<td>Ilex glabra</td>
<td>6 x 8</td>
<td>Dr, E, W, S, Sh</td>
<td>Good evergreen for hedge planting. Tolerates wet or dry shade. Flowers not showy, berries black.</td>
</tr>
<tr>
<td>Koreanspice viburnum</td>
<td>Viburnum carlesii</td>
<td>5 x 5</td>
<td>D, Dr, S, Sh</td>
<td>Fragrant white flowers in late April. Variable fall foliage often wine red.</td>
</tr>
<tr>
<td>Oakleaf hydrangea</td>
<td>Hydrangea quercifolia</td>
<td>5 x 7</td>
<td>D, W, S, Sh</td>
<td>White flowers late May. Red-orange fall foliage.</td>
</tr>
<tr>
<td>Redvein Enkianthus</td>
<td>Enkianthus campanulatus</td>
<td>12 x 6</td>
<td>A, D, Dr, S, Sh</td>
<td>Combines well with rhododendrons and azaleas. Drooping white to red flowers in May. Yellow, orange or red fall foliage.</td>
</tr>
<tr>
<td>Summer sweet</td>
<td>Clethra alnifolia</td>
<td>6 x 4</td>
<td>A, Dr, S, Sh, W,</td>
<td>Fragrant white flowers in summer. Cultivar ‘Rosea’ is pink. Thrives in shady, wet sites. Yellow-gold fall color.</td>
</tr>
<tr>
<td>Virginia sweetspire</td>
<td>Itea virginica</td>
<td>4 x 5</td>
<td>D, S, Sh</td>
<td>Great season long interest. Fragrant, white flower spikes in June. Red, sometimes brilliant, fall foliage. ‘Henry’s Garnet’ is the best cultivar.</td>
</tr>
<tr>
<td>Winterberry</td>
<td>Ilex verticillata</td>
<td>8 x 5</td>
<td>A, W, S, Sh</td>
<td>Outstanding display of red berries that. Persist into winter and attractive to birds. Tolerates swampy areas. Need male plant(s) for pollination and berries.</td>
</tr>
</tbody>
</table>

### Ten Outstanding Groundcovers for New Jersey Landscapes

<table>
<thead>
<tr>
<th>Common name</th>
<th>Scientific name</th>
<th>Size¹</th>
<th>Site²</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ajuga</td>
<td>Ajuga reptans</td>
<td>6” x 2’</td>
<td>D, Dr, S, Sh</td>
<td>Cultivars with attractive colors burgundy, red, orange often variegated. Tolerates poor soil and shade.</td>
</tr>
<tr>
<td>Barrenwort</td>
<td>Epimedium spp.</td>
<td>1 x 1</td>
<td>Sh, Dr</td>
<td>Excellent groundcover under trees. Crimson flowers in spring. Spreads slowly.</td>
</tr>
<tr>
<td>Bearberry</td>
<td>Arctostaphylos uva-ursi</td>
<td>1 x 4</td>
<td>A, D, Dr, E, S, Sh</td>
<td>Excellent groundcover. Drought tolerant. Tolerates pineland soils well. White spring bloom red berries attractive to birds.</td>
</tr>
<tr>
<td>Ferns</td>
<td>Various species</td>
<td>Up to 10’A, Dr, Sh</td>
<td>Height depends on species. Good in moist shade.</td>
<td></td>
</tr>
<tr>
<td>Hard Fescue cultivars</td>
<td>Festuca longifolia</td>
<td>Mow to 3 inches</td>
<td>D, S, Sh</td>
<td>Forms excellent low maintenance turf for lawns. Use in seed blends or mixes with chewings fescue. Tolerant of acid, but not persistently wet soil.</td>
</tr>
<tr>
<td>Hosta</td>
<td>Various species</td>
<td>Up to 2’ tall</td>
<td>S, Sh</td>
<td>Excellent groundcover except where deer are numerous.</td>
</tr>
<tr>
<td>Lily turf</td>
<td>Liriope muscari</td>
<td>1 x 2</td>
<td>D, E, S, Sh</td>
<td>Forms thick dense cover. Purple lilac flower spikes in late summer. Good in moist or dry shade.</td>
</tr>
<tr>
<td>Plumbago plumbaginoides</td>
<td>Ceratostigma</td>
<td>1 x 1</td>
<td>D, Dr, S, Sh</td>
<td>Herbaceous perennial. Does not tolerate soggy soils or competition with tree roots. Blue flowers late summer to fall.</td>
</tr>
<tr>
<td>Siberian spruce</td>
<td>Microbiota decussata</td>
<td>1 x 5</td>
<td>D, E, S, Sh</td>
<td>One of few evergreens that tolerates shade. Good ground cover. Sometimes turns burgundy in fall.</td>
</tr>
<tr>
<td>Turf type tall fescue</td>
<td>Festuca aurundinacea</td>
<td>Mow to 3 inches</td>
<td>D, S, Sh</td>
<td>Use in blends or mixes for lawns. Efficient water use once established. Tolerates partial shade and foot traffic better than hard or chewings fescues.</td>
</tr>
</tbody>
</table>

¹ Size: mature height x width in feet
²A= prefers acid soil, D = dry soil, Dr = reported as low risk for deer damage, E = evergreen, S = sunny, Sh = Shady, W= wet, poorly drained soil
Impact of Environmental Conditions on Plant Health, Part II – Moisture Extremes
Clare S. Liptak, Senior Program Coordinator, RCE Resource Center and Ann B. Gould, Ph.D., Plant Pathology

Of all the environmental factors that affect plant health, extremes in soil moisture can have the greatest impact. In 1999, New Jersey landscapes were subject to both severe drought as well as excessive soil moisture brought on by Hurricane Floyd. In Part II of this series, the impact of soil moisture on plant vigor is discussed.

Drought Stress

Drought stress occurs when plants lose more water from the foliage than can be taken up by the roots. All trees and shrubs in New Jersey landscapes can be affected by moisture deficits, and it can take 5 to 10 years for a plant to recover from the impact of a severe drought. Drought-stressed trees lose foliage, grow slowly, and become more susceptible to attack by insects and diseases and to injury by severe winter weather. This is especially true of younger trees. A severe drought may kill trees. In New Jersey, drought periods occurred in 1983 and late in the summer of 1988, 1995, 1997, 1998, and 1999.

Causes: Native plants in a given area are adapted to variations in water supply and show symptoms of drought stress only under unusually dry conditions. Planted trees and shrubs, however, can be more susceptible to water deficit. Water deficit is a normal phenomenon that occurs in plants during the daytime when loss of water from the leaves exceeds water uptake in the roots. This deficit is made up at night and during periods of rain or dew formation. Under dry soil conditions, however, roots fail to extract as much water as has been lost, and physiological stress develops. Under severe drought stress, tissues lose turgor, degenerate, and die.

Water deficit may also occur in dormant plants (especially evergreens) during warm weather in winter or early spring when water evaporates from leaves and stems while the soil is cold or frozen. Roots extract insufficient water from cold soil and none from frozen soil. This is called winter desiccation. Drought stress also predisposes plants to sun scald, frost cracks, winter burn, and dieback.

Plants vary in ability to tolerate moisture stress. Seedlings are very susceptible to drought stress because their root systems are shallow and underdeveloped. Newly transplanted trees are similarly affected because they have lost many absorbing roots during the transplant process. In some situations, highly porous rooting media present within the root ball dries rapidly, so that water shortage occurs even though surrounding soil may contain sufficient water.

Symptoms: Plants affected by drought stress cope with the moisture deficit in various ways. Stomates may close to prevent moisture loss from leaves, and photosynthesis may slow or cease, resulting in the development of yellow leaf color. Green leaves, stems, roots, and fruit may shrink, and shrunken sapwood may develop radial cracks. Roots in drying soil become less permeable to water, and root tips may be damaged by drying.

Leaves on drought-stressed plant material may droop, wilt, curl, turn yellow, turn brown at the tips and margins, or drop prematurely. Older leaves usually succumb first. Severe water deficit in pines causes needles to lose turgor and droop near the needle base. Needles then fade and turn brown or remain green and permanently bent. Symptoms may not appear until a year or more after trees have been stressed by drought. Dead tree tops, shortened needles, and sparse foliage indicate a general decline in vigor that becomes evident in the years following severe drought stress.

Monitoring and management: When faced with a drought situation, keep the following points in mind:
- Inspect stressed trees of all ages for injury by invading pests during and after periods of drought.
- Control weeds and grasses in and around stock to reduce competition for water during dry periods.
- If drought persists, irrigate to replace soil moisture in the root zone. This is especially important for young and newly transplanted trees.
- Remove all dead trees as soon as possible; they may harbor bark beetles.
- Do not plant shallow-rooted species in areas of low rainfall or on drought-prone sites.
- Increase moisture retention in dry, sandy, or gravelly soils, add organic matter when planting. Application of mulch (no more than 3 inches) reduces soil moisture loss and soil temperature.
- To help alleviate winter injury, make sure plants go into the cold winter months with adequate soil moisture. For example, broadleaf evergreens growing in planting sites with adequate soil moisture in the fall will be better able to withstand drying winter winds without desiccation. Such plants should be watered again during periods in the winter when the soil is not frozen.
- Certain diseases and insects commonly occur on plants stressed by drought. During the next few years, expect to see problems such as canker, Armillaria root rot, dogwood anthracnose, Verticillium wilt, pine wilt nematode, and borer develop in the landscape.

See Problems on Page 5
**Excessive Soil Moisture**

Even when soils contain sufficient water for plant growth, the volume of soil in which the roots are growing is still 25% air. When the root zone is flooded (as in May, 1998 when parts of New Jersey had 13 days of rain), the air spaces fill up with water. The normal life processes of healthy roots stop in the absence of air, and the roots begin to rot. Trees that can tolerate flooding for a few days with no adverse effects are flood plain plants such as sycamore, elm, sweet gum, and red maple. For most plants, however, root systems injured by waterlogged soils will cease to function. Since they can’t deliver water to the branches and leaves, drought symptoms develop in the upper portions of the plant. Even after the soil drains, a plant that survived flooding may die due to drought stress because the injured, diminished root system can’t supply the top growth with enough water.

In general, most deciduous plants tolerate flooding better than most evergreens. Also, dormant plants can tolerate flooding better than those in active growth, in part because roots in cold soil need less oxygen.

**Proper Watering Practices:** New Jersey lawns, gardens, and landscapes need 1 to 1-1/2 inches of rainfall or water from irrigation each week to maintain healthy growth. In planting beds and gardens, soaker hoses or drip irrigation systems will conserve water and keep plant foliage dry, which reduces problems with fungus diseases such as powdery mildew. The irrigation water should be applied slowly enough so that it sinks into the soil, rather than running off.

Even mature shade trees need watering during a drought. Shade trees have root systems shaped like a pancake, with the great majority of roots within 10 to 18 inches of the soil surface. (Only nut trees that are growing naturally in landscapes or wooded areas will have taproot systems. As these trees age, their taproots become less important and lateral roots become a more important part of the tree’s root system.) Shade trees can be watered with deep root feeders or with soaker hoses placed on the soil surface. The hoses should be laid in concentric circles around the tree at the dripline or even farther from the trunk. The irrigation of mature shade trees should continue until the soil under the dripline is moistened at least 12 inches below the surface. It takes a long time to water large trees with soaker hoses, although the total amount of water used is smaller than if the tree was watered with a lawn sprinkler. Soaker hoses will be even more efficient if they are spread on the soil surface and then covered with a layer of mulch.

**Use of Mulch:** Mulches conserve moisture and prevent weed growth. Compared to the temperature of bare soil exposed to full sun on a hot summer day, mulches reduce soil temperatures as much as 10 degrees, thereby permitting continued root growth during warm periods. A mulch layer should be 2 or 3 inches thick and should not be placed against the trunk where it could rot the bark and eventually cause the death of the tree.

For more information on moisture use in landscapes, refer to the following Rutgers Cooperative Extension fact sheets:

- [FS595 Low Water Use Landscaping](https://www.rce.cornell.edu/fs595)
- [FS596 Principles of Low Water Use Landscaping I: Water Only When and Where Needed](https://www.rce.cornell.edu/fs596)
- [FS597 Principles of Low Water Use Landscaping II: Improve Your Soil](https://www.rce.cornell.edu/fs597)
- [FS598 Principles of Low Water Use Landscaping III: Low Water Demanding Plants](https://www.rce.cornell.edu/fs598)
- [FS599 Principles of Low Water Use Landscaping IV: Apply Mulches](https://www.rce.cornell.edu/fs599)
- [E080 Landscaping for Water Conservation ($2.00)](https://www.rce.cornell.edu/e080)

Fact sheets and bulletins on this and related topics can be obtained from your Rutgers Cooperative Extension County Agricultural Office, or by contacting the Publications Distribution Center, Cook College, Rutgers University, 57 Dudley Road, New Brunswick, NJ 08901. Also, write to Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20250 and request a list of available publications on home gardening.
exhibit a purple to pale-yellow cast. Since infection occurs below ground, mycelia does not develop on the foliage. To control, improve drainage and treat affected areas now with a contact Pythium fungicide (i.e., Koban, mancozeb, or Terrazole), and overseed to fill in severely damaged areas. For best results, repeat fungicide treatments in five to seven days with a systemic pythium fungicide (i.e., Aliette, Banol, Heritage, Prodigy, Quell or Subdue MAXX) and then reapply again in October to prevent reinfection.

**Red Thread**

This disease, caused by the fungus *Laetisaria fuciformis*, is prevalent on sensitive turf at this time. Infections are characterized by the appearance of short red threads (1/16-1/4” 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, bluegrass, velvet bentgrass, Bermudagrass, 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 Banner, Bayleton, Chipco 26019, Compass, Curalan, Eagle, Heritage, Prostar, Rubigan, Sentinel, Touche, or Vorlan per manufacturer’s recommendations.

**Stripe smut**

This has been an excellent year for stripe smut, caused by the fungus *Ustilago striiformis*, in Kentucky bluegrass plantings. To identify this disease in the field, look for clumps of black spores protruding through “shredded” leaf blades. Although fungicides are most effective when applied once in mid-October, present infections can be controlled now with the application of a systemic fungicide such as Banner, Bayleton, Cleary 3336, Eagle, Fungo, Rubigan, or Sentinel. Follow label directions carefully for best results.

**Turf Field Days**

Mark your calendars now for this year’s Rutgers Turfgrass Research Field Days. The Landscape Turf Research Field Day has been set for August 2, 2000 at the Turf Research Farm (Ryders Lane) in North Brunswick, NJ. Registration will begin at 8:00 AM. Guided field tours will commence at 9:00 AM and will conclude at 3:30 PM, “rain or shine”. The Golf Turf Research Field Day will also be held at the Turf Research Farm (Ryders Lane) in North Brunswick, NJ. This event will occur on August 3, 2000 at 12:30 PM (registration); field tours will run from 1:30 to 5:00 PM. The registration cost for each day is $20 ($30 with lunch on August 2). Recertification credits will be available at the conclusion of each program. Call (732) 932-9400 Ext. 339 for further information.

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**Plant Diagnostic Laboratory Highlights**

*Richard Buckley, Plant Diagnostic Laboratory Coordinator*

**Turfgrass**

*Yellow Patch* (a.k.a.: *cool-season brown patch*), caused by the fungus *Rhizoctonia cerealis*, has been common on golf turf in late-April. The cool, damp conditions we experienced in the region favors disease activity. The fungus attacks the leaves and causes yellow or bronze rings of blighted turf. The crowns are not killed, so the turf recovers easily when favorable growing conditions return. The disease was identified on turf submitted from golf courses in Atlantic, Bergen, and Camden Counties, and on samples from golf courses in Virginia and West Virginia. Another winter disease, *pink snow mold* (a.k.a.: *fusarium patch*) has also been very active during the period. The fungus that causes *pink snow mold*, *Microdochium nivale*, is a prolific spore producer. The spores are easily spread with mowers, which can result in streaky bronze areas of blighted turf. These atypical symptoms may make the disease difficult to recognize in the field. *Pink snow mold* was diagnosed on turfgrass from Morris and Ocean Counties, and from a West Virginian golf course.

*Take-all* is beginning to be a concern for local superintendents. To date, the disease has been diagnosed on golf turf from Virginia and Southern-Delaware, but not in New Jersey. A golf course just north of Philadelphia submitted samples of Bentgrass this week with *take-all*, so local superintendents should begin to see it in the next couple of weeks. *Fairy ring* was active on golf greens from Connecticut. In landscape turf, *leaf spot and melting out*, caused by *Drechslera poae* was identified on a sample of Kentucky bluegrass from Connecticut.

**Landscape**

A severe infestation of the *juniper tipminer*, *Argyresthea freyella*, was identified in samples from a juniper hedgerow from Atlantic County. *Juniper tip blight* was active on juniper samples from Sussex County. *White pine weevil* larvae were identified in the leader of a white pine sample submitted by an Atlantic County arborist. A white pine sample from Mercer County was extensively colonized by *pine bark beetles*. *Crown gall* was identified on euonymus samples from Union County. Cotoneaster and azalea from the same site were disease free. Ivy samples with dieback and leaf spot were diagnosed with *anthracnose*. Injury from *diplocodia tip blight* was evident on Austrian pine branches from an

See Lab Highlights on page 8
Rhododendrons and azaleas are two of the most important woody ornamental crops in New Jersey. In most cases, disease management includes a combination of sound cultural practices and the appropriate use of fungicides. Listed below are a few rhododendron and azalea diseases that commonly occur in New Jersey landscapes and nurseries.

**NOTE:** Discoloration of blooms has been noted on certain varieties when copper, chlorothalonil, or mancozeb is applied during flowering. Check for phytotoxicity before large-scale use of copper or mancozeb fungicides; to prevent residues on commercial plants, do not spray just before selling season.

**Ovulinia Petal Blight**

Petal blight of azalea and rhododendron is troublesome now in New Jersey landscapes. To manage this disease, maintain plant vigor and remove dead trusses and fallen petals as soon after bloom as possible. Mist plants with captan, chlorothalonil, mancozeb, maneb, myclobutanil, PCNB, thiophanate-methyl, thiophanate-methyl plus chlorothalonil, thiophanate-methyl plus mancozeb, triadimefon, vinclozolin (commercial greenhouse and nursery use only), or Ziram from the time flowers begin to show color until flowering has ceased. Repeat as per label recommendations. For more discussion on this disease, refer to the April 20, 2000 issue of this newsletter.

**Powdery Mildew**

Both azaleas (especially deciduous) and rhododendrons are commonly affected by powdery mildew. Powdery mildew first appears on newly developing leaves as white, “powdery” spots that coalesce to cover both the upper and lower leaf surfaces. Severely infected plants may appear malformed and stunted. Young plants and tissues are most susceptible to powdery mildew, especially those plants grown in heavy shade. The fungus that causes this disease spends the winter in dormant buds and in resting structures (called cleistothecia) in diseased leaves. 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).

To manage powdery mildew, inspect incoming stock for signs of disease, practice sanitation, reduce humidity in greenhouses, and utilize resistant varieties if possible. Compounds labeled for powdery mildew control include AQ10 (Ampelomyces quisqualis), azoxystrobin, copper, hydrogen dioxide, myclobutanil, paraffinic oil (outdoors only), potassium bicarbonate, propiconazole, thiophanate-methyl, thiophanate-methyl plus chlorothalonil, thiophanate-methyl plus iprodione, triadimefon, triflumizole (enclosed structures only), or triforine. Consult the fungicide label for timing and rates.

**Phytophthora Root and Crown Rot**

*Phytophthora cinnamomi*, the causal agent of Phytophthora root and crown rot, affects a wide variety of nursery crops including azalea and rhododendron, aucuba, camellia, dogwood, false cypress, hemlock, Japanese holly, juniper, pieris, white pine, and yew. This soil-borne fungus attacks the roots of susceptible plants, resulting in root rot and death. Affected plants become yellow and stunted and will eventually wilt and die. A cut made into the stem of an infected plant at the soil-line will reveal a red-brown discoloration of the wood just beneath the bark. Plants in low, wet, or poorly drained soils are susceptible to this disease. Phytophthora root and crown rot is managed through the use of good sanitation practices during propagation and production. In pot culture, plant only in well-drained, soilless media, preferably amended with composted hardwood bark. Bark improves drainage and releases compounds that are antagonistic to the fungus. Ensure proper drainage, prevent over-watering, and plant resistant cultivars when possible. Fungicides such as Banrot, etridiazole, fosetyl-Al, mfenoxam, metalaxyl, or propamocarb-HCl may be applied as a preventive drench per manufacturer’s recommendations. **NOTE:** to minimize potential injury to azaleas, do not apply repeat soil applications of 1.25 fl oz/100 gal mfenoxam closer than every 3 months and do not exceed a total of 2.5 fl oz in 6 months. Use lower rates for the variety Coral Bell.

**Leaf and Flower Gall**

Also known as “pinkster” gall, this disease can cause considerable damage to landscape and greenhouse plants under very humid conditions. Symptoms appear as succulent thickenings on leaves, flower buds, and shoots that are green or pink in color. Affected tissue eventually turns brown, shrinks, and hardens.

To manage leaf and flower gall, reduce humidity, avoid excessive leaf moisture, improve aeration through increased spacing, and pick off newly formed galls before they turn white. Apply copper or triadimefon at budbreak and repeat at intervals specified on label.

**Azalea Rust**

Rust diseases are unique because the fungi that cause them often require more than one host plant to

*See Rust on Page 8*
survive. Azalea rust, caused by the fungus *Pucciniastrum*, affects both *Rhododendron* spp. and hemlocks (*Tsuga canadensis*). Rust first appears on rhododendron and azalea in late summer as small, yellow, circular spots on the upper leaf surface. By early fall, the fungus produces an abundance of bright, orange-colored pustules (uredia) on the lower surface of affected leaves. These spores are airborne and spread to hemlock, where the fungus overwinters and causes a rust disease of this host the following spring. Rust spores produced on hemlock are blown back to azalea and rhododendron in midsummer and the disease cycle begins anew.

In areas where rust is troublesome, avoid planting azaleas near hemlocks, maintain plant vigor, use good sanitation practices (i.e., remove infected leaves), reduce humidity, improve aeration, avoid excessive leaf moisture, and utilize resistant cultivars when possible. Apply flutolanil or mancozeb per manufacturer’s recommendations from mid-August through September.

**Botryosphaeria and Phomopsis Dieback**

Dieback, or death of branches from the tips toward the branch base, is seldom observed in container-grown plants in nurseries, but occurs commonly in old stock plants and in field-grown plants. Leaves on branches affected by dieback will droop, curl downward parallel to the midrib, become dull green, and then turn brown. Frequently, only a single branch or stem on a plant is affected. Early in the infection process, the wood beneath the bark becomes discolored. The fungi that cause dieback, *Botryosphaeria* and *Phomopsis*, are weak pathogens and enter tissue primarily through wounds. Dieback is most common on plants suffering from drought stress, mechanical injury, winter injury, or from other diseases and insect pests.

Management of dieback includes a combination of practices. All dying branches should be removed well below discolored wood during dry weather, and pruning tools should be surface sterilized between cuts. Unnecessary wounds, winter injury, and other environmental stresses should be avoided. Fungicides such as mancozeb, chlorothalonil, or vinclozolin that are recommended for control of other azalea diseases may also provide some protection from dieback.

**Botrytis leaf blight**

This disease is often a problem on older senescent leaves or on tissue injured by mechanical damage or environmental stress. Although the fungus *Botrytis* is considered a weak, secondary parasite, it can cause considerable damage to flowers and leaves during extended periods of wet, humid weather. Infected leaves exhibit alternating zones of light and dark-colored tissue. Under periods of high humidity, abundant, gray-colored spores are produced. These spores are readily transmitted to new susceptible tissue by wind, air currents, or by splashing water. Under favorable environmental conditions, Botrytis leaf blight can be troublesome in overwintering houses and can develop on cuttings during propagation in the spring.

*Botrytis* does not normally invade healthy plant tissue and prefers to colonize dead or dying plant tissue. The best management strategy, therefore, involves the improvement of plant vigor and removal of dead and dying plant material. When possible, avoid excessive leaf wetness, reduce humidity, and increase aeration through proper plant spacing. Fungicides such as azoxystrobin, chlorothalonil, copper, fludioxonil (enclosed structures only), iprodione, Phyton 27, and thiophanate-methyl, thiophanate-methyl plus chlorothalonil, thiophanate-methyl plus iprodione, trifloxystrobin, or vinclozolin (commercial greenhouse and nursery use only) may be applied on a preventive basis per manufacturer’s recommendations. ☑

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**Lab Highlights from Page 6**

arborist in Morris County. The same arborist brought red maple branches with *cytospora canker* to the laboratory and yellow wood with *shot hole borer* injury.

**Greenhouse**

Fertility problems are always a major concern for our greenhouse clientele. This period, New Guinea impatiens submitted to the laboratory exhibited stunting after they were transplanted into baskets. According to Dr. George Wulster, RCE Floriculture Specialist, the growth of some of the older cultivars can stall after transplanting under high fertility programs. Simply holding back the nutrition with a few clear irrigations should “jump-start” the crop. ☑
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