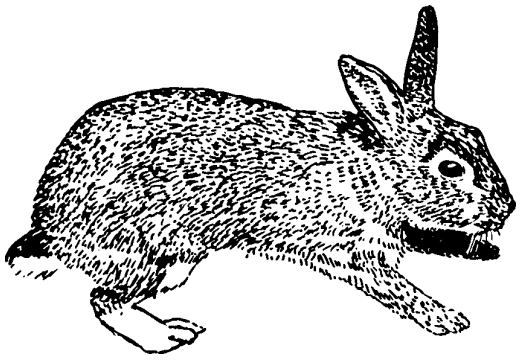
RUTGERS COOPERATIVE EXTENSION AT THE NEW JERSEY AGRICULTURAL EXPERIMENT STATION

PLANT & PEST ADVISORY

LANDSCAPE, NURSERY & TURF EDITION $1.50 AUGUST 26, 1999



SPECIAL DROUGHT ISSUE

Drought May Bring Unexpected Dinner Guests: Wildlife in the Home Landscape

Madeline Flahive DiNardo, Union County Program Associate in Agriculture, and Nick Polanin, Somerset County Agriculture Agent

The drought may not be the only stress facing landscape plants. The dry weather conditions throughout the region will inevitably force wildlife to search beyond their normal range for available food sources, or to expand their feeding to plant material otherwise left undamaged.

Several factors compound this fall and winter's expected increase in plant damage and loss due to wildlife activity. First, successive mild winters with plentiful foliage and little predation have resulted in greater than normal wildlife populations. Secondly, animals that were predominantly migratory, i.e. Canada geese, have reverted to a more resident population, spending their entire life cycle out of the normal migratory cycle. The increased demand for food and suitable habitat, along with the negative effects of the drought, will put tremendous pressure on maintaining or protecting home landscapes from wildlife damage throughout the coming months.

There are several techniques, such as installing barriers or using repellants, that the landscape manager or homeowner can use to prevent or minimize damage to plantings. Recognizing wildlife damage can help determine which techniques should be employed. Identifying tracks or the scat (droppings) left by the animal is one method of recognizing the culprit. Field guides will often include drawings of tracks and droppings. Another way to determine what kind of animal is feeding is to examine the damage to the plant.

✔ **Roots:** Voles cause damage to tree roots, particularly the stripping and girdling of roots. Flowers and turf grass can be uprooted by the activity of moles burrowing underground, or from skunks digging in search of grubs.

✔ **Bark:** There are several animals that will debark the trunks of young or thin barked trees, including rabbits, voles, squirrels, and deer. Male deer, or bucks, have a "velvet layer" on their antlers that they rub off by vigorously scraping their "rack" against trees during their fall breeding season. Deer prefer to rub their antlers on smooth barked trees, such as young willows, green ash, plum or cherry. The damage from antler rubbing will usually be confined to the trunk area up to a height of three feet.

SEE WILDLIFE ON PAGE 2

WILDLIFE FROM PAGE 1

Smaller animals can de-bark trees in search of moisture and food, most notably in the fall or winter months when other food sources are scarce. Vole damage can be recognized by random gnaw marks that are only 3/8 inch long and 1/16 of an inch deep. Rabbits will make larger gnaw marks. Squirrels will strip bark off younger trees, leaving bark fragments behind.

One simple method to prevent trunk damage to vulnerable plant material during the winter months is to move existing mulch 2 to 3 inches from the base of the trunk. If organic mulch is left in direct contact with the trunk, and was misapplied in excess of 2 to 3 inches in depth, it may be easier for small animals to burrow in the mulch mound for a winter habitat. Once established, they can chew away the bark without the landscape manager or homeowner seeing any visible damage until the damage is too severe for the tree to properly thrive in the landscape.

Stone or other inorganic mulches will be unsuitable habitats for these animals. Installing 1/4-inch mesh hardware cloth, plastic cylinders, or other trunk wraps can protect trees. If voles are causing damage, the barrier should be buried 6 inches into the ground. The protective wrap should not rub against the tree and should be able to expand as the tree grows to prevent additional damage to the bark. Thin barked trees in the landscape will require attention throughout their life, while thick or rough barked trees can withstand some trunk damage from wildlife once they have passed the vulnerable stage of early development.

✔ **Branches:** Animals cause the most noticeable damage to plants by feeding on the branches. Tree or shrub branches or herbaceous plants that have been damaged by deer browsing will have rough-shredded edges, with a square or jagged break. Deer can browse up to six feet high, and if needed, reach up to eight feet. This height of damage distinguishes deer damage from damage by other mammals. In densely populated woodlands, deer damage can be observed as a discernable line or height below which there is little remaining foliage. In the home landscape, arborvitae and yew are perennial favorites that can have a characteristic browse line below which new foliage is quickly consumed.

Rabbits will make a clean oblique knife-like cut on branches. They usually feed on branches that are 1/4 inch or less in diameter, and less than 20 inches in height from the ground. Twigs, small branches and young growth scattered about the lawn is evidence that squirrels have been causing damage in the tree canopy.

Repellents can be used to deter animals from feeding on branches. Ideally, repellents should be applied *before* feeding has begun. The type of repellent used should be alternated every few weeks so animals do not become accustomed to a particular scent or taste. There are many repellents available in today's market, from organic to synthetic, most of which will require repeated applications as climate and growing conditions dictate. Most repellents can not be used on food or forage crops. Professionals must have a DEP pesticide applicator license if they are applying repellents as a part of their business services.

Check product labels carefully for dilution rates, personal protective gear, timing and preferred application method, and any known phytotoxicity or sensitive plant material that should not be treated. Some products may require that the plant has been thoroughly watered before application, others may not be applied to plants under severe drought stress. During drought conditions, some products should not be applied with a spreader sticker. For greatest efficacy, these repellents should be applied when conditions closely follow label specifications.

There are two types of repellents: "area" and "contact". Area repellents affect the animal's sense of smell. The active ingredients of commercial repellents are often fermented egg solids, bone tar oil, or naphthalene. Soap containing a strong deodorant can also be an effective area repellent. To have any positive effect, however, soap bars would need to be distributed throughout the grounds, hanging 30 inches off the ground and spaced 20 feet apart. Other "natural" repellents include the use of garlic and some forms of urine, all of which have varying degrees of success.

"Contact" repellents affect the animal's sense of taste. Three important factors that affect the success of these repellents are weather conditions, appetite or population density, and available food supply. If food is scarce and the population density is high, as is the case this year, contact repellents may have little effect on controlling damage. Some products will have summer and winter formulations to accommodate for wet weather conditions and plant dormancy. Some common active ingredients of "contact" repellents include capsaicin, thiram, or ammonium soaps of fatty acids. "Contact" repellents are generally most effective when applied to dormant trees and shrubs.

Broadleaf evergreens, arborvitae, and yews should be of special concern when considering repellent applications. Boxwood, andromeda and other shrubs that are noted for their "resistance" to wildlife browsing should not require additional repellent applications. During the growing season, any new growth would not be protected by past applications and will require additional treatments to protect this highly desirable food source. Young trees and evergreens may need to be treated entirely, while older trees may only require applications to their terminal buds or low hanging growth.

In areas of high wildlife populations, serious consideration should be placed on utilizing landscape plants that exhibit some "natural" repellent characteristics. You may wish to consult with arboreta, garden centers, landscape specialists, or you local Cooperative Extension office for a list of "resistant" plants suitable to your area.

As wildlife venture out of their native habitat in search of additional food supplies, landscape managers and homeowners should expect some competition for their landscape plants. Protecting this investment with barriers and repellents are just two strategies we can use when unwelcome dinner guests arrive in the landscape. ❑

Heat and Drought Impacts on Landscape Evergreens

Richard Obal, Monmouth County Agricultural Agent

This year most areas of the state received little or no rain in June and July, we have had much higher temperatures than normal, and there are statewide water restrictions because of the drought emergency. But when it comes to summer drought, it seems we have short memories . A look back at New Jersey weather data indicates summer drought in 1995, 1997, and 1998, which also included one of the driest falls on record. These facts make this year's potential for extensive damage to evergreen trees and shrubs very high. Established, properly sited and maintained plantings will probably come through with only a minimal amount of injury. Newly planted, poorly sited and maintained evergreens will suffer the most. Let's look at some specific site factors that will be impacted the most by the "drought of the century".

How often have we heard "the right plant for the right place"? Plants vary in their ability to withstand moisture and heat stress, and we have lists to aid us in the selection of appropriate plant material for specific site conditions. Lack of water is by far the most damaging stress that any plant can endure. This year, because of unusually high temperatures, heat tolerance of the species will be an important factor in how the plant fares in extreme drought conditions. Heat is one of the factors that increases the plant's need for water. Heat tolerant species have the ability to minimize water loss and foliar damage during extreme temperature conditions. Plants that are listed as drought tolerant may not always be highly heat tolerant, and vise versa. Spruces are generally listed as drought tolerant but blue spruce (P. pungens) is much more heat tolerant than Norway spruce (P. abies). Boxwood is a heat tolerant plant that is only moderately drought tolerant.

Excessively drained, sandy soil sites in full sun are the most prone to drought and heat injury even under normal weather conditions. Exposed, raised, or berm plantings and areas that are surrounded by pavement, sidewalks, buildings, or stone are classic hot, dry microenvironments. Even with irrigation, plants such as rhododendrons, azaleas, Japanese maples and birches may not thrive because they are not heat tolerant. Cut off the water this year and instead of having a weak, unattractive, damaged planting that is prone to winter injury and insect and disease attack, you will probably have plants that need replacement.

Evergreens that are very shallow-rooted or have restricted root areas due to poor subsurface drainage, severe soil compaction, or even improper irrigation practices (light and frequent) are also at high risk in extreme drought and heat conditions. Planting on small shallow berms or merely placing the root ball on the surface and covering it with a small amount of soil and mulch is an all too common planting practice on poor drainage sites. These plantings may be sustainable when they are small with supplemental, frequent irrigation (usually from sprinklers used to sustain the shallow rooted turf), however most evergreens will never develop an adequate root system to sustain themselves during extended heat and drought conditions.

Unfortunately, without any supplemental irrigation this extended drought will have an impact on our most drought intolerant evergreens, even under proper site and maintenance conditions. Established shade lovers (heat intolerant), like rhododendrons and azaleas, are looking bad because of the drought. Large arborvitae's, even when their surface root systems were kept well mulched, are starting to show damage in very hot sunny exposures.

Scorching, bending, and wilting of leaves and needles, branch dieback, premature needle or leaf drop, or general yellowing or browning of the whole plant from the top down are all symptoms of acute drought stress on evergreens. Well-established plants may show little damage this season but may exhibit poor, slow to develop growth next spring, especially on the upper part of the plant. Dieback due to cankers on specific branches may develop in late spring or early summer, especially on conifers. The flower bud set on broadleaf evergreens will probably be very poor next spring. In general, among the evergreens, conifers are the most tolerant and broadleaf evergreens the least tolerant of heat and drought.

Recent rains have provided some relief but the damage has already been done. If fall rains do not come (normally our wettest season), mulching and supplying supplemental irrigation would be very beneficial. For most conifers and some broadleaf evergreens, fall is the primary rooting time, provided there is adequate moisture. The dry conditions last fall, I am sure, reduced the vigor of both new and established evergreen plantings. Fertilization this fall would be of questionable benefit on drought injured evergreens. In fact, it could be detrimental because you may risk fertilizer salt burn on newly developing roots this fall. Be cautious with fertilizer! Antidesiccant sprays may be of some benefit on plantings prone to winter desiccation damage, which is form of foliar drought injury. ❑

Leaf Scorching in Shade Trees – Biotic or Abiotic?

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

Leaf scorching in landscape trees and shrubs occurs when leaves lose water faster than the roots can supply it. When moisture is lacking, the margins tend to dry out first, hence the marginal scorch pattern typically associated with stressed plants. Symptoms of scorch may become evident any time water flow is disrupted within a plant.

Leaf scorching in plants is usually attributed to both biotic (living) and abiotic (environmental) agents. This summer, the leaves of many landscape plants in New Jersey are scorching, some due to an abiotic stress, such as drought, and some due to a biotic stress, such as a disease. Why is it important to tell the difference, and how does one do it?

Abiotic agents that can cause scorching in leaves include drought, dehydrating winds, salt, flooding, chemicals, air pollutants, toxic metals, and nutrient extremes. Scorching can also occur when plants are placed in sites where roots do not develop normally (such as in planting islands or in soils with a hard pan layer), or when roots are physically damaged (such as occurs during construction). In most cases, this type of scorching is fairly uniform around leaf edges, affects newer leaves as well as older leaves, and will appear on vast expanses of the canopy. In addition, scorch symptoms may develop soon after a known stress (such as drought or an application of de-icing salt) occurs.

On the other hand, scorching can also occur in plants affected by living or biotic agents. Organisms that can cause this symptom include fungi, bacteria, nematodes, viruses, and insects. Leaf scorching due to biotic agents is not clearly defined. The scorch symptoms on leaves are often irregular in shape, and frequently a yellow or red "band" will appear between green and scorched tissues. In addition, symptoms may appear first on the older leaves of one or more branches, and then spread to other parts of the tree.

This growing season, the leaves of many landscape plants throughout New Jersey exhibit the uniform "scorch" consistent with an abiotic stress. The current drought is the likely culprit for many trees, especially seedlings and shallow rooted and recently planted trees and shrubs that lack extensive root systems which cannot absorb water from deeper in the soil profile. (For more information on the effects of drought stress in landscape trees and shrubs, refer to the July 29th edition of this newsletter.)

Certain New Jersey landscape trees can also be affected by a disease (a biotic agent) that causes leaves to scorch and is known as **bacterial leaf scorch of shade trees** or **bacterial leaf scorch**. This disease, caused by the bacterium *Xylella fastidiosa*, occurs in regions throughout the eastern and mid-western United States. Hosts affected by *Xylella* include American elm, red, pin, and black oak, sycamore, London plane, red mulberry, and red maple. Of all the shade trees affected by *Xylella*, the hosts most familiar to landscapers throughout the southwestern counties of New Jersey are pin and red oak. This disease on oak is specifically known as **bacterial leaf scorch of oak** or **oak leaf scorch**. Although oak leaf scorch is most prevalent in certain sections of Burlington, Camden, Gloucester, and Salem Counties, its incidence appears to be increasing in Atlantic, Cumberland, Hunterdon, Mercer, Middlesex, Monmouth, and Somerset Counties.

Like leaf scorching due to other biotic agents, leaf scorch caused by *Xylella* is not clearly defined. On oaks, scorch symptoms are often irregular in shape, and frequently a dull red "band" is apparent between healthy and scorched (necrotic) tissues. These symptoms usually occur in mid- to late-summer on leaves of one or more branches in the canopy. Affected leaves may curl and drop prematurely. As the infection progresses over several years, branches die and the tree declines. Affected trees eventually decline to the point where they must be removed.

SEE SCORCHING ON PAGE 6

Leaf scorching due to abiotic agents:

- is fairly uniform around leaf margins
- affects newer as well as older leaves on a branch
- appears on vast expanses of canopy (e.g., one side of the tree or the other)
- develops soon after a known stress (such as prolonged drought or an application of de-icing salt) occurs
- can often be associated with poor sites or root injury due to construction
- often affects more than one species of plant on a landscape.

Leaf scorching due to biotic agents (particularly in the case of bacterial leaf scorch):

- is not uniform around leaf margins; often, a dull red or yellow "band" appears between green and scorched tissues
- may affect older leaves first, although sometimes affects all leaves on a branch
- appears on selected branches throughout the canopy
- may spread to new branches as time progresses, leading to tree decline
- develops in mid- to late-summer
- is host specific
- is enhanced by abiotic stresses (such as drought), other diseases, and insect problems.

Plant Diagnostic Laboratory Highlights

Richard Buckley, Laboratory Coordinator

Turfgrass

Nothing like a couple rainstorms and some cooler temperatures to slow down life in a plant diagnostic laboratory. It almost feels like vacation in here as the turf begins to recover outside. At this point many turf managers have turned their attention to renovation projects. The optimists among us see the inevitable death of the *Poa annua* on their golf courses as an opportunity to establish some improved bentgrass cultivars on some of the tougher sites. The extreme conditions this year certainly exposed many of the problems on our golf courses. Now is a good time to evaluate things and begin preparations for the next tough summer.

Some disease problems are still coming into the laboratory. The most common diagnosis has been **anthracnose**. With each **anthracnose** diagnosis, there were several extenuating circumstances that increased the impact of the disease on the site. **Compaction**, **anaerobiosis**, **black layer**, **trees and shade**, **low mowing**, **traffic**, and **dry spots** are just some of the problems identified as contributing stress factors. These conditions must be identified and fixed before the disease can be adequately controlled with fungicides. Trees often decline due to multiple or unidentifiable reasons. Sometimes we can point to a single stress – like drought or construction – that starts a cascade of events leading to the ultimate demise of the tree. On the way down, borers, cankers, and other opportunists take advantage of the weak plant and speed its decline. It is the same with turf, but it just goes a little faster. This season the heat of July 6th might have been the single stress factor that led to the decline of your *Poa annua*. The **anthracnose** is just along for the ride and no amount of fungicide is going to save it. If you hung on to your turf this long, you did well!

The latest hysteria among golf turf managers is **bacterial wilt**. This poorly defined disease is caused by the bacterium *Xanthomonas campestris*. It invades the vascular system of the plant causing a wilt and rapid decline of the turf. Pathovars (host specific strains) of the bacterium are described for bentgrass and annual bluegrass. For annual bluegrass there is a commercially available herbicide formulation. From here, it does not seem likely that **bacterial wilt** is causing any problems. We recognize that bacteria may be evident in slides of diseased grass plants, but generally dismiss it as a by-product of normal senescence. Bacteria are here to rot dead stuff and it is not suprising that we encounter them during the diagnostic process. At the very least, we do not fully understand the significance of the bacteria we do see. What is lacking in most reports of **bacterial wilt** is solid proof that *Xanthomonas campestris* was present in the plant. It is impossible to identify a bacterium from a slide, like we do with fungi, and presumptuous to diagnose the disease in that manner. Because bacteria are common in dying plant tissue, we must go a step further. The pathologist should isolate the organism from the plant. This is absolutely necessary for even a tentative identification of the bacterium. In a perfect world, we would take this organism, accurately identify it, and then kill some healthy plants with it. On several occasions our laboratory has attempted to do that with no success. We consistently isolate rot organisms, not *Xanthomonas campestris*. Methodology may be a problem, but we seem to handle pathovars of *Xanthomonas campestris* that infect tomato or pumpkin just fine. The condition of the sample may also be a problem, but it is tough to get turf that is actively dying. We are currently working with some suspect plant material and hope for success (I like new or rare diseases as much as anybody does!) Most of the samples we see have a myriad of other problems that could easily explain the turf decline (see anthracnose above). Until those problems are adequately addressed, it is hard to call a turf decline **bacterial wilt** simply based on the presence of some bacteria in a slide of rotten grass. We must remain skeptical until someone can work out a sound diagnostic technique.

Landscape

Most samples of landscape plants submitted to the laboratory at this time are showing evidence of heat and drought stress. Tip and edge scorch, needle twisting, wilt, leaf and needle drop, and early fall color are just some of the ways plants respond in the short term to drought stress. Plants on poor sites exhibit the most serious symptom expression. New transplants are also having a tough time. Remember that the effect of the drought has long term consequences. Be alert to cankers, borer invasion, and the attack by other opportunists. ❑

Editor's Note: This is the last biweekly issue of the Landscape, Nursery & Turf edition of the Plant & Pest Advisory for the '99 season. The remaining monthly issues will be published in September, October, and November.

Building Soil Quality to Reduce Drought Stress

Joseph R. Heckman, Ph.D., Soil Fertility

The amount of drought stress exhibited by crops is not entirely due to lack of rainfall. The degree of wilting or leaf rolling expressed over a field during a drought is often a reflection of differences in soil type and soil quality. Symptoms of drought stress are partly related to soil properties that influence the ability of soils to absorb rainfall, store water, and deliver it to the growing crop. Soils that are sandy or shallow are inherently drought prone whereas deep loamy soils are better able to sustain crops through a drought. Soil physical properties such as texture cannot be easily changed, but soil quality can nearly always be improved with good soil management. Soil quality (sometimes referred to as soil health) is the capacity of a soil to function as medium for plant growth.

Attention to the soil management practices listed below can lead to enhanced soil quality and enable crops to better withstand drought.

1. Adopting cultural practices that build and maintain soil organic matter content are key to building soil quality. Things you can do to increase soil organic matter content:

- Grow sod crops in rotation with grain crops
- Grow cover crops. Refer to Rutgers Cooperative Extension Fact Sheet FS 849 "Cover Crops and Green Manure Crops, Benefits, Selection and Use."
- Add organic matter to soil in the form of livestock manures, municipal shade tree leaves, and compost.
- Control erosion. Soil erosion must be controlled to keep top soil rich in organic matter in place. Leave crop residues on the soil surface to control erosion.

2. Soil fertility impacts plant water relations. Things you can do:

- Maintain soil pH in the desired range for the crops being grown. Allowing soil acidity to develop to the point where root growth is inhibited limits the volume of soil that can be explored for moisture. A regular soil testing and liming program helps to ensure that roots will be able to explore the entire soil profile for available water.
- Potassium nutrition is closely linked to plant water relations. Optimum levels of potassium supplied in the soil improve crop tolerance to drought stress.

3. Soil compaction destroys good soil structure and restricts root growth. Things you can do to avoid or correct problems related to soil compaction:

- Avoid driving farm equipment over wet soils. On dairy farms, running a manure spreader over wet soil often is a cause of soil compaction. Keep manure in storage until soil conditions are favorable.
- Avoid tillage operations when soils are too wet.
- Examine soil profiles for hard layers that are restricting root growth. Perform deep tillage with a subsoiler to break up a hard pan. The soil must be sufficiently dry for the subsoiling operation to cause shattering of the compacted layer.
- Leave crop residues on the soil surface to encourage earthworm activity. Earthworm channels improve rainwater infiltration and root development.

Droughts occur for varied durations during most growing seasons. Through good soil management practices, growers can help sustain crop growth during periods of low rainfall. ❑

SCORCHING FROM PAGE 4

Residents in New Jersey should be on the lookout for oak leaf scorch. Since there is no cure for this disease, proper management strategy includes the maintenance of tree vigor for as long as possible. Other diseases, insects, and environmental stresses, including the current drought, enhance the development of bacterial leaf scorch. This disease may also predispose infected trees to other disease and insect problems. Branches that have died due to this disease should be routinely removed. Infected trees that are in a severe state of decline should also be removed. Definitive diagnosis for bacterial leaf scorch requires a special laboratory test. For more information on oak leaf scorch, refer to the Rutgers Cooperative Extension fact sheet FS875. This fact sheet is available through your local County Extension office and can also be found on the Rutgers Cooperative Extension web site at *http://www.rce.rutgers.edu/ag/agplantscrops/fs875.pdf.*

In summary, leaf scorch in landscape trees and shrubs can be due to a wide variety of agents. The cause of the scorch determines how the plants should be cared for. Keep the following tips in mind when trying to discern the difference between the abiotic and biotic causes of leaf scorch. If unsure about your diagnosis, contact your local County Agricultural Agent. ❑

Considerations for Trees and Shrubs in Drought-Stressed Landscapes

Jim Willmott, Camden County Agricultural Agent

Drought conditions in 1999 have been the most severe in over 100 years. Troubles for landscape trees and shrubs didn't just begin - they started several years ago. While there have been numerous fatalities, many specimens have endured in a debilitated state. Landscapes throughout New Jersey are in need of both plant replacement and therapy for weakened specimen plants. Plant health care practitioners should act now to promote healthy landscape plantings in the future.

Given the extent of plant loss, we now have a great opportunity to increase the quality of landscape plantings. Give careful consideration to plant replacement. Professionals must put the right plants in the right sites! Start with site analysis and then select compatible plants. Be sure to maximize plant diversity - a feature of natural ecosystems that is often limited in landscapes. Always select pest tolerant plants and avoid those with frequent pest troubles. Finally, assume leadership when customers request inappropriate plants! Professionals should be prepared to offer good alternatives that will satisfy a customer's ornamental desires.

Beyond plant replacement, what can be done to help surviving ornamentals? Begin by considering basic plant physiology. Under ideal conditions, ornamentals produce and utilitize carbohydrates for growth. As the growing season ends, perennial plants store carbohydrates for the future. Drought conditions limit carbohydrate production and predispose plants to a sequence of maladies that can lead to decline and death.

Woody ornamental specimens not irrigated over the past few seasons and those in poor sites are at greatest risk. Some species will be affected more than others including European white birch, flowering dogwood, rhododendrons and azaleas, Colorado spruce, hemlock and white pine. Taking the right actions now and in 2000 will improve the prognosis for struggling trees and shrubs. So what can be done?

Regard each plant as a unique case. The first step involves careful observation of plants and microenvironments. Management inputs should seek to restore health and vigor. Options include irrigation, fertilization, soil aeration, pruning and protection from pests including insects, mites, pathogens and wildlife.

Drought afflicted trees and shrubs should be identified and irrigated as needed, but be sure not to violate irrigation restrictions and regulations. Give priority to recent transplants and established plants that show symptoms of leaf scorch, defoliation, early fall coloration and dieback. Target irrigation so water infiltrates the rootzone. This requires appropriate frequency and delivery rates. Amounts will vary depending on many factors. The only way to be sure of adequate soil moisture is to monitor water infiltration by using a soil core sampling device or a hand trowel.

Next, consider fertilization. Base applications on the results of soil tests. Most soils provide adequate nutrition for mature trees and shrubs. However, nitrogen may be lacking. Be careful with timing and rates. Too much nitrogen – especially in soluble forms - stimulates "soft" growth that promotes populations of certain sucking pests including adelgids, aphids, lacebugs and mites. Soluble nitrogen may also promote infectious disease problems such as fireblight. Fertilize woody plants with products high in slow release nitrogen in either natural or synthetic forms. Sandy soils, in the coastal plains, are often deficient in other nutrients including potassium and phosphorous. Generally, fertilizers should be applied in late fall or spring. Finally, adjust pH according to plant species preferences.

Most landscape managers associate aeration exclusively with turf, but it can also benefit woody plants - especially those in heavy, compaction prone soils. Roots need oxygen! Mechanical core aerators are effective, but be careful to avoid large surface roots that may be injured or even break aerator tines. Target areas away from trunks where smaller "feeder" roots are developing. Mulching is also important for limiting surface compaction and it conserves soil moisture and minimizes weeds.

Prune to remove diseased, damaged and dead wood. For most plant species it is best to avoid pruning in late summer and fall. Spring and early summer is best since physiology favors wound compartmentalization ("healing"). For drought-weakened specimens, don't worry about sacrificing spring flowers. While spring pruning will remove blooms from plants such as lilacs, it may be necessary to address the greater issue of plant rejuvenation. Always prune correctly. Avoid shearing! Thin and gradually remove the oldest wood. Afterwards, irrigate (if weather doesn't cooperate) to promote recovery.

Finally, limit pest damage to drought-weakened specimens. Give them priority when monitoring. Pests, including diseases, are most serious on stressed plants. If problems are detected, be sure to implement a comprehensive management strategy. While pesticides may first be needed to reduce pest populations, be sure to follow up with good cultural practices.

Drought conditions will continue to challenge plant health care specialists in 2000 and beyond. Decisions regarding treatments will be critical and mistakes will be amplified. Hopefully you are up to the challenge! ❑

Landscaping for the '90's IPM Symposium

Thursday, December 2, 1999
Ramada Inn, Toms River
Corner of Rt. 70 and Rt. 9

Wednesday, December 1, 1999
North Jersey location (see below)

Featuring:

- Dr. Casey Sclar, Longwood Gardens
- Scott Aker, US Arboretum, Cost Analysis of the US Arboretum Program

Additional Topics:

- Who's Buying IPM: Finding and Keeping Customers Willing to Pay for Your Services
- The Rutgers Cooperative Extension Landscape IPM Program
- Perennials to Plant to Attract Beneficials
- Equipment and Formulation Advances to Reduce Applicator Exposure
- Nematode QC
- Rutgers Turfgrass Research Review

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Contact: Deborah Smith Fiola, Agricultural Agent, RCE of Ocean County, (732)-349-1250, e-mail: smithfiola@aesop.rutgers.edu.

Call Joel Flagler, Agricultural Agent, RCE of Bergen County for N. Jersey location, (201) 599-6162.

Diseases of Turfgrass

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

General

Gray leaf spot, dollar spot, anthracnose, fairy ring, summer patch, **rust**, and **yellow ring** are quite apparent on turf throughout the State at this time. Please refer to recent issues of this newsletter for complete disease control information.

Fairy Ring

This problem, caused by a group of fungi known as **basidiomycetes**, is starting to show up on golf greens and home lawns at this time. Symptoms typically appear as continuous or interrupted rings of dark-green turf. Mushrooms, which are often associated with fairy rings, usually develop only in the mid-spring and fall months. Although chemicals have been relatively ineffective against these fungi in the past, Prostar 50W (6 oz/1000 ft^2) and Heritage 50WG (0.4 oz/1000 ft^2) have recently shown promise in university tests. Both materials should be applied in large volumes of water (10 to 50 gal H_20/1000 ft^2) or watered in immediately after application (approximately ¼ inch of H_20). Aerification prior to treatment may aid in control. Repeat applications, as needed, every 28 days. Maintain adequate fertility and soil moisture to mask symptom expression.

Stem and Crown Rust

These diseases are very evident on susceptible Kentucky bluegrass and perennial ryegrass cultivars, respectively, at this time. As **rust** intensifies, the turf prematurely yellows and orange pustules called uredia (reproductive structures) appear on affected blades. To control both stem and crown rust, maintain adequate fertility and apply Banner, Bayleton, Daconil, Eagle, mancozeb, Manicure, Sentinel, or Thalonil per manufacturer's recommendations

Take-all patch

This disease, caused by the root and crown infecting fungus *Gaeumannomyces graminis* var. avenae, is likely to develop on **bentgrass** greens and fairways during the next few weeks. Although this disease is most prevalent April through June, late-summer and fall outbreaks are not uncommon. Infection takes place during cool, wet weather and symptoms are most striking after stress. Infected grass first appears bronze to reddish-brown in color and then fades to a dull brown. Patches are usually circular or ring-shaped and range in size from several inches to two feet or more in diameter. The centers of affected turf are frequently colonized by bluegrass (*Poa* spp.), fescue (*Festuca* spp.), or weed species. 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, and high pH soils. Although **take-all** is difficult to control, best results have been achieved through the use of acidifying fertilizers (e.g., ammonium sulfate) and preventive applications of Banner, Bayleton, Heritage, or Rubigan in October, November, and April. If the disease has been particularly severe, fungicides should be reapplied twice next spring at 21 to 28-day intervals beginning in early April. Chemicals should be irrigated into the root zone (1/8 to 1/4" of water) for maximum effectiveness. Wherever practical, overseed affected areas with less susceptible grasses such as fine fescue, Kentucky bluegrass, or perennial ryegrass to mask symptom expression. Maintain soil pH at approximately 6.0. ❑

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