UNIVERSITY OF ILLINOIS EXTENSION
# HOME, YARD & GARDEN PEST NEWSLETTER
College of Agricultural, Consumer and Environmental Sciences, University of Illinois at Urbana-Champaign
Illinois Natural History Survey, Champaign

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### Upcoming Seminar: "Proper Tree Trimming and Pruning"

On September 27, 2001, Pro Hort and the Illinois Nurserymen's Association (INA) will sponsor a seminar entitled "Pruning Trees for Safety, Health, and Aesthetics to Reduce Liability, Reduce Cost, and Improve Tree Quality." The seminar will be at Camp Wokanda in Peoria.

Ed Gilman of the University of Florida will present information on proper pruning of trees to create safer, healthier, and aesthetically pleasing trees while reducing liability and cost. The seminar is designed for arborists; urban foresters; and landscape and tree personnel employed by municipalities, schools, golf courses, park districts, and cemeteries and as consultants.

Cost is $50 for employees of INA member companies or $95 for nonmembers. Continuing education units have been approved for ISA (6 CEUs) and ICN Pro (1 CEU). The registration deadline is September 19, 2001. For more information, or to register, call (309)682-6684 or write to Pro Hort, 1717 S. 5th Street, Springfield, IL 62703.

## INSECTS

### White Grubs

Adult masked chafers (annual white grubs) emerged in high numbers in central Illinois during the third week of July. They typically begin emerging in central Illinois on July 2 or 3, but this year the first beetle was not reported until July 5. Very few were seen after that for a week or more; however, the recent emergence has made up for that. A similar pattern is being seen in other areas of the state.

One question is: Why are they so late? We must assume that the 3 weeks or so of cooler weather, sometimes called elderberry winter, that we had in late May and early June slowed their development. We had very warm weather in April that pushed many spring-occurring insects forward in their development, which was balanced by the colder May weather so that by mid-June, insect occurrence seemed to be about the same as normal.

In the previous 35 years or so that Roscoe Randell and I have been watching grub emergence, adult masked chafer emergence has deviated more than a few days in only three of those years. In all 3 years, the weather warmed early and stayed warm, resulting in adult emergence 2 to 3 weeks early. In most springs, early warm weather is typically balanced by late cooler weather; early cold weather is typically balanced by later hot weather.

This year, the temperatures in the 70s and 80s that we experienced in April must not have affected the masked chafer grubs. At that time of year, the larvae are deep in the soil, and the soil may not have warmed that deeply. White grubs move upward when the soil temperature around them reaches at least 50°F. Although we had soil temperatures at 4- and 8-inch depths of at least 50° in April, it must not have warmed deeply enough to trigger grub movement. Remember that the winter of 2000–2001 had normal temperature ranges. That is, it was colder than it has been for several years. These cold winter temperatures would have driven the grubs deeper than in previous years.

Thus, an explanation is that the masked chafer grubs were not affected by the April warmth but were up in the surface soil and affected by the May cool weather. This probably caused the late emergence. So why were the Japanese beetle adults only 3 days late in emerging this year? Why weren't they later? Japanese beetle larvae spend the winter within 11 inches of the soil surface–much more shallowly than masked chafers. The development of the Japanese beetle white grubs probably was sped up by the April warmth and then slowed down by the May cool temperatures. They probably canceled each other out so that the adult beetles emerged very close to the normal time.

The second question is: What does this mean for control of annual white grubs this year? Masked chafer adults do not feed, so they emerge, mate, lay eggs, and die all in about 2 weeks. Thus, egg-laying

should continue until about the end of July. White grub eggs take 2 weeks to hatch, so they should hatch by the third week of August instead of the typical first week of August. Damage should also appear from masked chafer grubs about 2 weeks later, so it shouldn't happen until early September.

However, in areas with Japanese beetles, their larvae will hatch on a more normal schedule: that is, hatch by the first week of August, with associated damage by mid-August. Typically, both species hatch at about the same time, cause first damage at about the same time, and can be controlled with one insecticide application.

People who apply imidacloprid (Merit) or halofenozide (Mach 2) by the end of July should get control of both species with one application because both of these insecticides last for several months. Lawns and other turf areas that are not as heavily irrigated, that are usually scouted in early August, and then treated with trichlorfon (Dylox or Proxol) if numbers are high are not so easily handled. If Japanese beetle grub numbers are high enough in early August to treat, the trichlorfon will be gone by mid-August when the masked chafers hatch. Those areas will need to be scouted again in the third week of August for masked chafers. This year may be one when areas that are not heavily irrigated should be treated by the end of July with Merit or Mach 2 to avoid the problem. Another possibility is to apply diazinon (to home lawns only) or bendiocarb (Turcam) if needed in early August because either lasts a month and controls both the earlier Japanese beetle grubs and the later-hatching masked chafers. Some of you may still have some Turcam sitting around for just this type of need. *(Phil Nixon)*

## Twospotted Spider Mite

The high temperatures, humidity, and low rainfall generally experienced throughout many regions of Illinois over the past weeks has created conditions conducive for outbreaks of twospotted spider mite, *Tetranychus urticae*. Under moist conditions, when rainfall is sufficient, spider mites are generally not a problem because naturally occurring fungi keep the populations in check. However, under conditions of low rainfall, the natural fungi populations decline, allowing spider mite populations to increase.

Twospotted spider mites are considered warm-season mites because they are primarily active during late spring through early fall. Summer temperatures allow spider mites to overwhelm the populations of beneficial insects and mites that are able to control them at moderate temperatures.

Twospotted spider mites feed on a wide range of trees and shrubs, including ash, azalea, black locust, elm, euonymus, maple, poplar, redbud, and rose. They also feed on many herbaceous annuals and perennials. Twospotted spider mites are green to greenish yellow, with two lateral dark spots that are visible when the mite is viewed from above. The twospotted spider mite can be found on all areas of plants but is often more numerous on older leaves. These mites spin fine silk, which is sometimes seen between leaves and between petiole and stem. However, rainfall easily washes this webbing away.

Twospotted spider mites primarily feed on leaf undersides, removing chlorophyll (green pigment) from individual plant cells with their styletlike mouthparts. They generally feed near the leaf midrib and veins. The leaves appear stippled with small silvery gray to yellowish speckles. Heavily infested leaves turn brown and eventually fall off.

Warm and dry conditions favor rapid spider mite development and increased feeding and reproduction. The life cycle from egg to adult can occur in 5 days at 75°F. Females, which don't have to mate to reproduce, live 2 to 4 weeks and can lay 100 to 300 eggs. Twospotted spider mites spend the winter in protected places, such as weeds, in ground litter, or in debris. They do not overwinter on plants, which means that applications of dormant oil sprays are not effective.

Management of twospotted spider mite involves maintaining plant health, sanitation, and/or the use of pest-control materials. Avoiding plant stress through proper watering and fertility minimizes potential problems with spider mites. For example, lack of sufficient moisture or overfertilizing plants, especially with nitrogen-based fertilizers, results in higher spider mite populations. Monitor for spider mites by knocking them off plant parts (that is, branches) onto a sheet of white paper, where they can be seen more easily. Plant-feeding spider mites produce a green streak when crushed, whereas predatory mites produce a red streak when crushed. A hard spray of water can be used to dislodge spider-mite eggs and live spider mites. Removing plant debris and weeds eliminates overwintering sites for spider mites. In addition, many weeds, especially broadleaves, serve as a host for spider mites.

Pest-control materials recommended for managing spider mites outdoors include abamectin (Avid), bifenthrin (Talstar), dicofol (Kelthane), hexythiazox

(Hexygon), insecticidal soap, and summer oil. Be sure to concentrate sprays on leaf undersides. Avid has translaminar properties, which means the active ingredient penetrates the leaf surface and resides in leaf tissues—killing spider mites that are feeding on the underside of leaves. As a result, coverage of leaf undersides is less critical. Hexygon primarily kills the egg and nymphal stages of twospotted spider mites, with no activity on adults. Avoid the use of organophosphate-based insecticides (that is, Orthene, Malathion, Dursban, and Diazinon) because these materials tend to stimulate female spider mite reproduction. Make spray applications before spider mite populations are high and aesthetic injury is visible. It is important to note that many of these pest-control materials are also harmful to beneficial insects and mites that naturally feed on spider mites, making continual use of these materials necessary once applications are started. *(Raymond Cloyd)*

### Sod Webworm

With the warm, dry weather pattern of the last few weeks, keep an eye on unwatered turf for sod webworm attack. There are several generations of sod webworm per year; so any time that the conditions are right during the growing season, damage may occur. Sod webworm larvae are naturally controlled by disease caused by microsporidia. These fungus relatives do better in moist conditions, so sod webworm caterpillars are usually killed in irrigated turf and also in unwatered turf if rains are timely. When rains become infrequent and unwatered turf goes dormant, sod webworm commonly becomes a problem.

Watch for large numbers of starlings, cowbirds, red-winged blackbirds, robins, and other insectivorous birds feeding on turf for several days straight. They may be feeding on sod webworm larvae. Early webworm damage appears as indistinct brown areas in well-drained, sunny locations. Close examination reveals that many of the grass blades are gone, allowing the thatch to show. Frequently, there will be small, roundish balls of green webworm feces at the base of the turf.

You can use a disclosing agent to reveal the larvae as well. Mix 1 teaspoon of 5% pyrethrin or 1 tablespoon of dishwashing detergent in a gallon of water. Apply the mixture with a watering can or other application device to 1 square foot of turf. The slender sod webworm caterpillars with brown spots should come out onto the turf surface within 2 to 3 minutes of the application. Full-grown larvae are about 1 inch long. Two or more larvae per square foot are enough to cause damage.

Once identified, the larvae are easily controlled with spinosad (Conserve), carbaryl (Sevin), diazinon, and many other insecticides. Apply as a spray and allow to dry on the foliage. If a granular formulation is used, apply less than 1/4 inch of irrigation to activate the insecticide but not wash it down into the root zone. *(Phil Nixon)*

## WEEDS

### Controlling Creeping Charlie

So creeping Charlie has aggressively crept into your lawn or landscape and is threatening to take over the entire neighborhood? Your plants are being crowded and smothered by it. It has gone too far. This means war upon his “kingdom.” What do you do?

Well, first of all, you need to be sure that King Charlie is who he says he is because proper weed ID is essential to good weed control. Creeping Charlie or ground ivy *(Glechoma hederacea)* is a perennial weed that spreads by seeds, rhizomes, and creeping stems that root at the nodes. The leaves are round or kidney-shaped, bright green, hairy, and opposite with scalloped leaf edges. The flowers are small, purplish blue, and funnel-shaped. It is a type of mint, so it has square (four-sided) stems; and when the plant is crushed, a strong mintlike odor is emitted.

If indeed you have creeping Charlie, you now need to ask yourself what is so appealing about this location, besides the fact that your garden is truly lovely? Chances are, it has the right conditions for optimum growth—shade, good fertility, and plenty of moisture. Life is even easier for creeping Charlie if there is no competition from other plants. You need to realize that this weed is persistent and may keep returning to the same area as long as conditions are favorable. No fear, maybe you can adjust the conditions. If possible, improve soil drainage or water less frequently. If the area is bare soil, it’s a good idea to plant something that competes well with weeds. Choose plants that are also well suited for these growing conditions, such as vinca, English ivy, pachysandra, or hosta. If the area is struggling turf, adjust your cultural practices to improve turf health and density (that is, increase mowing height to 3 inches or more, fertilize and overseed in the fall, water properly, etc.). Proper turfgrass selection is also essential for obtaining thick,

healthy turf. Finally, shady areas may be brightened with a little pruning. Be aware that although shade is preferred, creeping Charlie has been known to move into full-sun areas.

Now that you've done your homework and you are familiar with your new neighbor, Charlie, how do you go about evicting him? Hand-pulling seems to work well as a quick, short-term fix. Be sure to remove uprooted plants to prevent re-rooting. Unfortunately, the extensive root system of rhizomes is very difficult to completely remove by hand-pulling. This means the wrath of creeping Charlie soon returns!

You may have heard that 20-Mule Team Borax (yes, the laundry soap) can be used to control creeping Charlie. Sodium tetraborate (borax) is a naturally occuring mineral, and they sell it at your local market. This sounds simple, but is it really a good idea? Borax has its advantages, but they seem to be outweighed by the disadvantages. Limited research has shown inconsistent results. Studies at Iowa State University (ISU) showed that Borax reduced a creeping Charlie infestation in turfgrass, but results were weather-dependent. Studies in Wisconsin, however, showed Borax was not an effective control of this weed due to soil conditions. ISU studies also found that borax can injure turf and other plants as well, causing stunting and yellowing.

There is little room for error with borax applications: Too little results in poor control, and too much results in injury to surrounding plants. Yet, there are a variety of "recipes" out there depending on who you ask—all of them swearing that you must follow the recipe exactly.

How does borax work? It contains boron, which plants need in minute quantities for healthy growth. However, larger quantities can have a toxic effect. Creeping Charlie happens to be extremely sensitive to boron. If boron quantities are sufficient, any vegetation can be killed. However, the availability of boron in the soil depends on soil type and pH. These factors affect the outcome of applying borax, as in the Wisconsin trials. No recipes I've found mention these important factors. Another problem with using borax is that boron does not break down or dissipate as conventional weed killers do, so repeated or excessive applications can result in bare areas where no vegetation can grow. This does not make for a lovely garden!

One final reason not to use borax is that it is not a registered pesticide. If you've heard of using vinegar for weed control, the same applies here. Although borax may sound like a "natural" weed-control method, it is important to remember that it may still be harmful to children and pets. Mixtures should be kept out of their reach. Registered pesticides have been studied extensively and come with labels that tell you how to protect yourself and others. The borax box tells you how to wash your clothes.

What is a better method of control for creeping Charlie? A postemgence broadleaf weed killer containing salt of dicamba (3,6-dichloro-o-anisic acid) is your best bet. Check the ingredient list on the label to see if it contains this active ingredient. Often it is found in combination products (Trimec, Three Way Lawn Weed Killer, etc.) and is mixed with weed killers, 2,4-D (2,4-dichlorophenoxyacetic acid) and mecoprop or MCPP (2-(2-methyl-4-chlorophenoxy) propionic acid). Products containing triclopyr or 2,4-DP may also provide decent control. Another option is Confront (triclopyr + clopyralid), which has also shown effective control but must be applied by professional applicators. Preemergence products do not control creeping Charlie.

Now I didn't mean to get your hopes up. Realize that these specific herbicides cannot be used in every situation or area such as vegetable or flower gardens as many broadleaf plants are very susceptible to these herbicides. If even a small amount drifts onto certain plants, severe injury can result. It's enough to make your rose's leaves curl! Literally. In these areas, hand-pulling or hoeing is your best bet. It is helpful to keep borders clean so you can easily see and control invading weeds. These herbicides can, however, be used on turf; but you will want to consult the product label first. With any pesticide, always read and follow label directions. The label is your best source of application information.

Herbicide applications work best when weeds are actively growing. Timing is important as well. Mid- to late autumn is an excellent time to apply herbicides to creeping Charlie and other perennial broadleaf weeds like dandelion. During October and November, Charlie is busy preparing for winter by sending food reserves down to his roots. A herbicide that moves within a plant moves down to the roots as well. This is just where we want it to be! For best results, a second application should be applied 3 to 4 weeks later.

If Charlie rears his ugly head again in the spring, spray him again. In fact, wait until he is blooming, as he is very susceptible to herbicides at that time (April to June). Again, a second application may be necessary.

Before you spray, check weather conditions. Best results are achieved when temperatures are in the mid 60s to low 80s and there is no rain for 24 hours following application. Don't spray when conditions are too windy (to avoid injuring desirable plants with herbicide drift). If the area is turf, don't mow for a few days before and after application. Also, check the label before reseeding to see if there is a waiting period.

Good luck with your war on Charlie! He is a very difficult weed to control. You may decide to make peace and be neighbors with Charlie. You could have worse neighbors. *(Michelle Wiesbrook)*

# PLANT DISEASES

## Proper Planting Depth Clarification

In the previous issue of this newsletter, we discussed the proper planting depth for trees and shrubs. Based on feedback from two well-respected arborists, I would like to clarify a statement in that article. Although I would prefer to get things right the first time, it was gratifying to know that people are reading this newsletter.

The major cause of tree death in maintained landscapes may well be too deep or improper planting. I know many arborists who maintain this opinion. One extra bit of information that needs to be mentioned is that the reason trees die from deep planting is that moist soil or mulch around the base of the tree just above the root/trunk junction (the collar) does not allow gas exchange and the phloem cells die. Root physiology allows roots to survive underground, but trunk tissue needs oxygen and carbon dioxide exchange to occur more freely than in roots. The death of phloem cells sets up a series of events leading to dieback, decline, and ultimately death of the tree. We'll talk about mulching woes in a future issue. For now, I want to concentrate on determining the proper depth to plant the tree.

I made a statement that all woody plant material should be planted at the same level as it was growing in the nursery. The assumption was that nursery stock is all at the proper level. I am now a believer that that is not always the case. Now, all of you nursery growers do not need to get up in arms against me either. Most of you are doing a fine, conscientious job, but just in case, read on.

In many nurseries, the cultivation practices around trees actually throw soil up around the trunk of the plant. This approach may be fairly well intended because often the nurseries are trying to avoid using herbicides. The problem is that when the crew comes through to prepare the plant for shipping, the soil is not removed. The tree is sold with the assumption that the ball is the correct planting depth. So how do we know what planting level is correct?

The root collar of the tree is the area just above the junction of the roots with the trunk. The collar is a few inches of the trunk all the way around the tree. The trunk should show a slight flare (widening) at the collar. The collar must not be buried with soil or mulch. When you plant a new tree or shrub, locate the main root/trunk junction first. The first root should be buried just below the soil line. When you get your tree or shrub for planting, loosen the burlap or root ball covering and carefully probe near the trunk to find the first large root. You may find that you need to remove some soil (sometimes several inches) from the top of the root ball before figuring the depth of the hole and placing the plant. Do this carefully so as not to injure the trunk or the roots. Hopefully, this simple process will provide you with years of healthy trees. *(Nancy Pataky)*

## Sphaeropsis is Back!

Many of us fight this chronic fungal disease of pines. *Sphaeropsis* causes tips of branches to die. The needles in the terminal 8 inches or so of the stem are entirely brown. Often, there are large, sappy cankers on the stems that may girdle and kill tissue beyond the canker. The canker phase can be particularly damaging to plant growth and to tree aesthetics. We discussed the disease in issue no. 1 of this newsletter. At that time, we were looking at last year's infection and damage visible in the spring. The fungus infects new needles in the spring and early summer, so recommendations were made in issue no. 1 to help prevent problems again this year.

Now we are seeing this year's new infections on the current season's growth. Look for brown needles at the tips of branches. At the base of these needles, you will see black, pinhead-sized fruiting bodies of the fungus. Pull needles out of the basal sheath and look for fruiting bodies at the base of the needles. If the weather has been particularly dry, the fruiting bodies may not be seen easily. Place some needles in a plastic bag with a wet paper towel, seal it up with a twist-tie, and examine the needles the next day. The fruiting bodies should be visible after 24 hours in this humidity chamber. The needle blight phase of this

disease is most intense in years with a lengthy cool, wet spring.

As with any fungal canker, Sphaeropsis canker infections are related to stress. In fact, drought-stressed trees have been shown to be more susceptible to this disease. Watering your pines in times of extended drought stress is one of the most critical actions you can take to avoid this disease. Most cankers are problems on injured trees as well. The sudden temperature drop last December caused some plant injury and may have predisposed pines to this canker disease. In Illinois, Sphaeropsis blight is found most frequently on Scotch and Austrian pines. It may also occur on red pine, mugo pine, Ponderosa pine, eastern white pine, Douglas-fir, true fir, or spruce. Refer to issue no. 1 for management options, and mark your calendar now to remember when to treat.

For more on Sphaeropsis blight, consult *Report on Plant Disease (RPD)* no. 625, "Sphaeropsis Blight or Diplodia Tipblight of Pines," available on the VISTA Web site at http://www.ag.uiuc.edu/~vista/horticul.htm or in your local Extension offices. *(Nancy Pataky)*

## Powdery Mildew Weather

The six common genera of powdery mildew fungi in the Midwest all prefer warm, humid days. The spores germinate on foliage when the relative humidity is 23% to 99%, but not in free moisture (rain). Based on weather this past week, powdery mildew ought to be thriving soon. We discussed powdery mildew briefly in issue no. 10 of this newsletter in the article on dogwood powdery mildew. Powdery mildew is a common fungal disease problem on many perennials as well as annuals, shrubs, and even trees and turf. The most common hosts in Illinois seem to be lilac, zinnia, phlox, and rose; but certainly, other species are affected. There are many different types of powdery mildew fungi; and most are very host specific. For that reason, we will probably never see an epidemic of this disease in Illinois. Still, on one plant, the disease may spread very quickly, especially in humid weather. Despite the fact that this disease does not kill plants, if your zinnias, roses, or other plants are infected, that may be a major aesthetic concern to you.

Symptoms of powdery mildew include a white mildew type of growth on the leaves, shoots, buds, flowers, or stems. This mildew is composed of threadlike mycelium and asexual spores of the fungus. The spores can be blown to other plant parts and cause further infection. New growth is particularly sensitive. The disease is very obvious and often unsightly. Occasionally, infected foliage exhibits a purple cast rather than a white color as is true of infected apple or crabapple foliage.

To avoid problems with powdery mildew, provide conditions for adequate air flow in the planting. This may mean that plants need to be thinned or pruned to allow better air movement. Use recommended mature plant spacings when establishing new plants. Because the pathogen thrives in humid conditions, water the plants early in the day to promote rapid drying. Avoid syringing foliage, and try to water the soil rather than the foliage.

Resistant varieties are the easiest means of disease control. If you have had problems with powdery mildew in the past, look through garden catalogues for varieties with resistance to this disease pathogen. Ask for similar information at nurseries. The Internet is also a good reference for such information. Try searching under the host name and the disease name. For example, the Chicago Botanic Garden has a list of 10 Monarda cultivars resistant to powdery mildew.

Fungicides can be used to control powdery mildew. Scout for the appearance of the disease, and then treat the plants according to label directions. Often damage is minor, and this is not necessary; but watch plants that have had a history of problems. Consult the *2001 Commercial Landscape and Turfgrass Pest Management Handbook* or the *Home, Yard, and Garden Pest Guide* for a list of registered fungicides by host and by disease. These manuals are available in your local Extension offices or by calling (800)345-6087. *Report on Plant Disease* no. 617, "Powdery Mildews of Ornamentals" is available at http://www.ag.uiuc.edu/~vista/horticul.htm or in Extension offices and provides detailed information about powdery mildew. *(Nancy Pataky)*

## Chlorosis of Woody Plants

Chlorosis is another word for yellowing. Generally with chlorosis of trees, we see yellowing of the foliage, with veins that remain green. If that chlorosis is due to a lack of iron, we call it iron chlorosis. Erroneously, iron chlorosis and chlorosis have become synonymous with too many gardeners. Many Illinois cases may also involve manganese deficiency. As a general rule, iron chlorosis usually causes symptoms most intensely on the newest leaves. Manganese chlorosis symptoms appear on older leaves first.

Chlorosis is a common problem in Illinois on several tree species, including pin oak, sweetgum, maple (especially red and silver), and birch. In most cases, the soil has plenty of macro- and micronutrients for tree growth, but high-pH soils bind up the iron or manganese, making it unavailable to the roots. There is no pathogen involved in this noninfectious problem, although secondary leaf-spotting fungi often invade the weakened tissues. Soil conditions are the cause of the chlorosis.

As chlorosis intensifies, we see brown speckling of the leaves, then totally necrotic leaves, branch tip dieback, and eventually death of branches and even mature trees. The process is a slow one, taking several years before dieback occurs and branches die. Still, if this condition goes untreated, the tree declines and could eventually die. We have had a run of affected pin oaks, red maples, and birches lately at the Plant Clinic. I imagine this is a result of moisture stress, which has compounded the root-absorption problems.

Chlorosis seems to occur when roots grow into an area of high-pH soil. This area could be the foundation of a building, the area under a sidewalk, a gravel parking lot or driveway, or many naturally alkaline sites. This explains why many older trees seem to acquire this problem with age. Logically, any factor that affects root health could aggravate a nutrient-absorption problem. The past several years, we have had an abundance of rain early in the season, often in flooding quantities. Such conditions rob soil of oxygen, causing root injury and inefficient nutrient absorption. Many of the birch trees in my area have chlorosis, but this is because they are in soil that is not conducive to birch growth. Trees with chlorosis may have multiple problems, so look into other possibilities besides the chlorosis. High-pH soil conditions, location of planting, moisture extremes, drainage problems, soil type, competition, compaction, light conditions, and many other site and environmental factors stress root health and may add to the chlorosis problem.

What can be done to remedy the situation? On older trees, there may be nothing we can do to help. Prune out dead wood to avoid secondary wood rots. Try to improve drainage on the site away from the tree. Consider treating the tree for chlorosis and possibly using an acid fertilizer. It might be wise to start with a soil pH test to determine the extent of that problem. There are several types of treatment that can be used for chlorosis. These are discussed in *Report on Plant Disease (RPD)* no. 603, "Iron Chlorosis of Woody Plants: Cause and Control" or the horticulture fact sheet NC-3-80, "Iron Chlorosis of Woody Plants: Symptoms and Control." Both publications discuss manganese deficiency as well as iron deficiency. The method you choose will depend on the intensity of the problem, the age of the tree, the pH of the soil, and site restrictions.

Recently, the clinic has received several samples of red maples. Based on the maple samples that we receive at the Plant Clinic, this species seems to have more problems than the other maples. It is not unusual to see dieback and decline in red maple samples with no apparent reason for the decline. The recent samples, however, had yellow to brown interveinal tissues with poor stem growth and overall stunting. These samples were found to be free of infectious disease but were diagnosed with chlorosis due to likely manganese deficiency. The same soil conditions of high pH that inhibit iron uptake can also inhibit manganese uptake. Red maples are particularly sensitive to manganese deficiency. Refer to issue no. 9 (under pin oak problems) for more on chlorosis. Also refer to *RPD* no. 603. *(Nancy Pataky)*

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Major authors are Phil Nixon, (217)333-6650, Fredric Miller, (708)352-0109, and Raymond Cloyd, (217)244-7218, entomologists; Nancy Pataky, (217)333-0519, plant pathologist; Bruce Paulsrud, (217)244-9646, pesticide applicator training; and Tom Voigt and David Williams, (217)333-0350, horticulturists. Phil Nixon is the executive editor of the *Home, Yard, and Garden Pest Newsletter*. This newsletter is written by faculty in the Department of Natural Resources and Environmental Sciences and the Department of Crop Sciences. The newsletter is edited by Mary Overmier and proofread by Phyllis Picklesimer, Information Technology and Communication Services.

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at Urbana-Champaign
528 Bevier Hall, MC-184
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