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INSECTS

Spruce Spider Mite

As temperatures decline over the state, spruce spider mite starts its second cycle of activity. Spruce spider mite, *Oligonychus ununguis*, is a cool-season mite, in contrast to two-spotted spider mite, *Tetranychus urticae*, a warm-season mite. Spruce spider mite feeds mainly on conifers such as arborvitae, Douglas fir, hemlock, juniper, spruce, and some pines. They use their piercing-sucking mouthparts to remove plant fluids and chlorophyll (green pigment). Injured foliage generally appears bronze to brownish.

Adult mites are oval-shaped and about 1/60 inch long. They are black or tan, whereas the nymphs are light gray-green in color. The round, brown eggs are laid under bud scales or in the axils of needles. Female mites lay the overwintering eggs on plants from September through November. These eggs hatch into nymphs during spring. Spruce spider mite has two major periods of activity: The first is from April through mid-May, although they are usually present into June in northern Illinois; the second is from late September through mid-October. It generally takes spruce spider mite 3 to 6 days to go from egg to nymph. All motile or active stages feed mainly on needles, preferring older ones. There can be three generations per year in parts of Illinois.

Spruce spider mite presence can be verified by knocking them off branches onto a white sheet of paper, where they are easily seen. They produce a green streak when crushed, whereas red streaks indicate predatory mites.

Managing spruce spider mite involves proper cultural practices (such as watering, fertility, and mulching) to minimize stress, and using pest-control materials. Pest-control materials that may be used to manage spruce spider mite include bifenthrin (Talstar), dicofol (Kelthane), dimethoate (Cygon), hexythiazox (Hexygon), summer oil, or insecticidal soap. Because these materials work only by contact activity, it is important to get thorough coverage. Hexygon is an ovicide/miticide with primary activity

on mite eggs. Improper use of any of these materials can lead to mite outbreaks because most of these pest-control materials may kill the mite's natural enemies. If feasible, use a hard stream of water to remove mites from plants, as this approach is less harmful to natural enemies. Be careful when using summer oils on blue-needled conifers, as they may cause discoloration.
(Raymond Cloyd)

White Pine Sawfly

White pine sawfly, *Neodiprion pinetum*, has been noticed feeding on white pine, *Pinus strobus*, in northwestern Illinois. Although it feeds mainly on white pine, it also attacks red, Mugo, and other short-needled pines. White pine sawfly feeds from July through September and if left unchecked can cause severe damage to pines.

Adult sawflies are broad-bodied, with a thick abdomen, and have membranous wings. Females are larger and more robust than males. Sawfly females have a sawlike ovipositor, which they use to create slits or cuts in plant tissue. Eggs are then inserted into these slits, generally located on the edge of needles. A female can lay up to 100 eggs during her lifetime. The females don't need to mate to produce eggs; however, unfertilized eggs produce only males, whereas fertilized eggs produce both males and females.

Eggs hatch into larvae that are 1/4 to 1/2 inch long. The larvae are yellow- to cream-colored and have a deep black head. Four longitudinal rows of black spots run the length of the body, and a posterior black spot is at the end of the abdomen. Larvae feed gregariously on both the old and new foliage of pines. First-instar sawfly larvae generally consume only the outer part of a needle; later instars eat the entire needle. The heaviest feeding activity occurs in summer through early fall (July through September). Sawfly larvae initially resemble the caterpillars of moths and butterflies. However, sawfly larvae have more than five pairs of prolegs on the abdomen, which lacks the hooked spines (crochets) typical of caterpillars. Caterpillars have between two to five pairs of prolegs.

White pine sawfly spends the winter as a prepupa, a stage between larva and pupa, in a cocoon that is generally located on the ground underneath host trees. Pupation is completed in spring, and adults emerge several weeks later. One generation is typical in Illinois, as most of the white pine sawfly problems occur in the northwest portion of the state.

White pine sawfly can be managed with pest-control materials such as acephate (Orthene), azadirachtin (Azatin/Ornazin), carbaryl (Sevin), chlorpyrifos (Dursban), and spinosad (Conserve). Spray applications should be made when larvae are small and feeding on needles. The microbial insecticide, *Bacillus thuringiensis* var. *kurstaki* (Dipel, Thuricide, and Javelin), that is used for controlling caterpillars, does not work on sawflies because sawflies are closely related to wasps and ants. *Btk* is effective against only the larvae of moths and butterflies. (Raymond Cloyd)

West Nile Virus

A virus new to this part of the world has found its way to Illinois. West Nile virus (WNV) has been detected in dead crows in Cook and DuPage counties. Although both sites are in northeastern Illinois, a case was also detected in a horse near Lexington, Kentucky, in late August. It has been found in 21 states, the District of Columbia, and Ontario province in Canada since detected in New York in 1999. Its original home is portions of Africa, Asia, and the Middle East. This virus is transmitted through mosquito bites to humans, birds, horses, and other mammals. It can be fatal to humans, crows, blue jays, hawks, falcons, and horses.

Various mosquitoes are capable of transmitting WNV, but *Culex* species are most commonly involved. The northern house mosquito, *Culex pipiens*, is the most common human-biting member of that group. This mosquito is a small, medium brown, quiet biter that is most common in Illinois from mid-June through the rest of the summer and fall. A quiet biter means that it lands softly on the skin and the bite is painless enough in many people that they do not notice it. It may not buzz around your ear; and if it does, the hum of its wings is not very loud. It is usually not present in large numbers, but a few are present in most areas almost daily.

Culex are container-breeding mosquitoes. Several black eggs are laid in a mass about 1/8 inch across that floats on the water surface. The water typically has a large amount of decaying organic matter in it, frequently giving the water a dark color and putrid

smell. Eggs are laid on water that has collected in tree cavities, clogged gutters, old tires, pet water dishes, birdbaths, wading pools, old tin cans, and any other structure lying around that holds water after a rain. The eggs hatch into legless, slender, wriggling, whitish larvae that feed on fine debris and tiny organisms in the water. The larvae hang down from the water surface with a posterior tube sticking up through the water surface to collect air. Full-grown larvae, about 1/4 inch long, transform into aquatic, comma-shaped, tumbling, nonfeeding pupae. Adult mosquitoes emerge from the pupae and stand on the water surface before flying off in search of food. Both male and female adult mosquitoes feed on flower nectar, but females require a high-protein blood meal to produce a large number of fertile eggs.

The northern house mosquito does not fly far from where it grows up. You are likely to be bitten by northern house mosquitoes that grew up on your property or elsewhere in your neighborhood. By keeping gutters clean of fallen leaves, removing old tires and other water-collecting debris, stocking water lily ponds with goldfish or minnows, and emptying and cleaning wading pools, birdbaths, and pet water bowls weekly, you can greatly reduce the number of these mosquitoes in your yard.

This mosquito mainly bites at dawn and in the evening, so restrict your outdoor activities at those times. Wear a hat, long-sleeved shirt, long pants, shoes, and socks to reduce the amount of exposed skin. If you are outdoors when mosquitoes are biting, apply an insect repellent containing DEET. Although fine for skin application, DEET should not be ingested. For young children who are unable to understand that they shouldn't lick the material off their hands or arms, use another product such as repellents advertised for child use or other repellents that don't contain DEET. Although less effective, they should be less toxic if ingested.

The northern house mosquito feeds on birds as well as mammals. A female mosquito obtains WNV particles while feeding on an infected bird. The virus particles are injected by the infected mosquito into the blood of another bird, human, horse, or other mammal at a later feeding, thus transmitting the virus. Because birds are very mobile, the virus has been spreading quickly across the country.

Most people who become infected have no symptoms, but some may become ill 3 to 15 days after being bitten. Typical symptoms are a fever and headache. In some, particularly elderly people, WNV can cause serious disease that includes muscle weak-

ness, inflammation of the brain (encephalitis), stiff neck, stupor, disorientation, tremors, convulsions, paralysis, coma, or death.

Horses infected with WNV can also experience brain inflammation and die. Vaccinations available for horses for encephalitic diseases do not protect against WNV. Dogs, cats, and other mammals can also get WNV; but as with humans and horses, most make a full recovery.

Additional information on West Nile Virus is on the Illinois Department of Public Health Web site at <http://www.idph.state.il.us/envhealth/wnvnews.htm>. Information on mosquito control is available from the University of Illinois Extension at <http://www.ipm.uiuc.edu/publications/infosheets/105mosquito/cmm.html>. (Phil Nixon)

PLANT DISEASES

Mulching to Maim or Maintain Plants?

Because many plant samples show decline and death from effects of deep planting, we discussed proper planting depth in issues 13 and 14 of this newsletter. Adding too much mulch around the base of a tree or shrub can have the same effect as planting too deeply. The mulch can actually kill the plant it is intended to help, essentially smothering it with kindness.

A mulch is a material that is applied to the surface of the soil around a plant to maintain favorable soil conditions. We generally suggest using an organic mulch such as compost, leaves, bark, various hulls or shells, and pine needles. You can find out more about specific materials at the University of Illinois Extension Web site <http://www.extension.uiuc.edu/IPLANT/>. Inorganic mulches, such as stone or brick chips, are materials that do not decompose. Inorganic mulches often serve a purpose in design but are usually more expensive, do not improve the soil, and can be costly to remove if a design change is desired.

Mulch helps to insulate the soil. Certainly the soil becomes hot or cold with time anyway, but mulch helps make this change more gradual. We all know too well that sudden temperature drops can be extremely damaging to trees and shrubs, predisposing them to infection by canker fungi and other pathogens such as *Verticillium*. Mulch also has been shown to keep soil temperatures as much as 10° cooler in the summer.

The National Arbor Day Foundation recommends removing grass in the area to be mulched and mulching an area from 3 to 10 feet in diameter around a tree, depending on the tree size. You may see differ-

ences in depth recommendations, but we tend to advise 2 to 4 inches of mulch. If you add more mulch—thinking that more is better—you may be causing other problems. Roots need oxygen to grow. If soil is always saturated with moisture, roots begin to decline. In a wet season, planting beds with very thick mulch do not dry out. This is especially important on clay soils or in newer subdivisions where soil is compacted or has poor drainage. White pine is a good example of how too little or too much mulch can be a problem. We have been seeing white pine problems for over 20 years in Illinois. They do not grow well in alkaline, clay, poorly drained, hot soils. Because we tend to plant them as windbreaks or in exposed sites, we make many mistakes right from the planting date. White pines benefit greatly from mulch, especially due to the advantage of insulating roots from high soil temperatures and maintaining soil moisture. If mulch is used at an excessive depth, however, roots are stressed, and wet conditions promote a root rot called *Phytophthora*.

The most important message concerning mulching is to keep the mulch away from the tree trunk by at least 4 inches. Physical contact with the tree is not lethal. Problems occur when the mulch is several inches thick against the trunk. This collar area of the tree needs air exchange. Moisture held up against the trunk prevents this and results in tree decline. In addition, the mulch may serve as an overwintering site for rodents, while the bark of the trunk provides a good food source.

The Plant Clinic frequently fields questions on mushrooms or fungi growing in mulch, especially bark mulches. These fungi are not harmful to plants. They are growing in the mulch because it is an organic source of nutrients. The fungi also must have moisture to grow. In dry spells, we tend to water our planting beds, so we see these fungi all summer long, rain or no rain. I am not advocating that you remove the mulch nor that you stop watering your plants. Don't look at the fungicide shelf as a solution to mushrooms in your compost. Most fungicides won't have any effect on these mushrooms. Instead, get out the rake and mix up the bark mulch. This helps it dry out and keep mushrooms under control. (Nancy Pataky)

Tomatoes: Planning for 2002

It's never too early to begin planning next year's garden. What worked well this year? What problems did you encounter? Which varieties will you choose for next year? Here, I'll point out some common

diseases of tomato and discuss some key management issues. Now is a good time to evaluate your tomato varieties for diseases and begin planning for next year.

Early blight: The most characteristic symptom is brown spots on the older leaves. The circular to angular spots enlarge until they are about 1/4 to 1/2 inch in diameter and soon develop dark, concentric rings or ridges, giving a targetlike appearance. The fungus may also cause depressed but similar lesions around the stem end and shoulder of tomato fruit. Fruit lesions are often covered with a dark brown, velvety layer of spores.

Septoria leaf blight: Although the disease can appear on tomato leaf petioles, stems, blossoms, and flower stalks, it is most commonly found on the lower leaves. Symptoms first appear as tiny, water-soaked areas, but soon enlarge to form circular or angular lesions about 1/8 to 1/4 inch in diameter. Mature lesions have a dark margin with a grayish white center that contains tiny, black fruiting (spore-producing) bodies. Heavily diseased leaves turn yellow, wither, and drop off in large numbers, starting at the base of the plant.

Bacterial spot and speck: Bacterial leaf spot appears as small (1/8-inch diameter), water-soaked, translucent lesions that later turn brownish black and may have a yellow halo. The lesions are somewhat irregular and appear greasy on the upper leaf surface, with a translucent center and a black margin. The centers of the lesions dry out and frequently tear. Only a few spots may cause a leaflet to turn yellow, wither, and drop prematurely. Spots on green fruit first appear as small, black, raised pimples surrounded by a narrow, water-soaked border. As they age, spots are slightly raised, superficial, and up to 1/3 inch in diameter, with lobed margins and water-soaked borders. Eventually the raised center sinks, forming a brownish black crater that usually does not penetrate the seed cavity. Foliar symptoms of bacterial speck are virtually identical to those of bacterial spot but can be differentiated by the symptoms on immature fruit. With bacterial speck, fruit symptoms appear as black, slightly sunken stippling, which eventually result in lesions less than 1/16 inch in diameter. With both diseases, only immature fruit are infected.

Fusarium wilt: Symptoms on mature plants generally appear between blossoming and fruit maturation. The first symptoms include yellowing of the older leaves (usually beginning on one shoot or on one side of the plant), which progresses until most foliage becomes yellow and wilts during the hottest part of the day. Eventually, the plant collapses and dies. Besides these symptoms, the fungus also causes

the vascular system to turn dark, chocolate brown, beginning below the soil-line and extending for some distance up the main stem. This discoloration is especially evident where the leaf petiole joins the stem.

Verticillium wilt: Often the first symptoms are mild wilting during the day. As the disease advances, lesions develop along the edges and between the veins of lower leaflets. Unlike the targetlike early blight lesions, lesions due to *Verticillium* wilt are V-shaped and may be either tan or brown, with diffuse yellow borders. Wilt symptoms can easily be confused with *Fusarium* wilt and drought. Like *Fusarium* wilt, the symptoms are caused by the soil-borne fungus invading and plugging the vascular system. However, vascular discoloration due to the *Verticillium* wilt pathogen is typically lighter tan than *Fusarium* wilt.

Viral diseases: A wide range of viruses has been identified in Illinois, including tobacco mosaic virus (TMV), cucumber mosaic virus (CMV), and tobacco etch virus (TEV). Symptoms vary, depending on which virus or viruses are involved. In general, you should suspect viral infection when you observe the following symptoms: light and dark green mottled areas on the leaves, puckered leaves, rough or wrinkled (rugose) leaves, improper unfolding of leaves, extremely distorted leaves, bunched shoot growth, mottled or warty fruit, and overall stunted plant growth.

Management suggestions

Plant resistance is a simple and inexpensive way to manage certain diseases. Many varieties are available with resistance to one or more diseases. When purchasing tomato varieties, go armed with the knowledge of which diseases have caused problems in your garden and select varieties with the appropriate resistance code (for example, V = *Verticillium* wilt; F1 = *Fusarium* wilt (race 1); F2 = *Fusarium* wilt (race 2); N = Nematodes; T = Tobacco mosaic virus; St = *Stemphyllium* (gray leaf spot); A = *Alternaria* stem canker; L = *Septoria* leaf spot). Keep in mind that even resistant plants may still succumb to disease if stressed or if disease pressure is very high. Consult page 119 of the *Home, Yard, and Garden Pest Guide* (University of Illinois Extension circular 1374) for a list of varieties with resistance to one or more diseases.

Foliar diseases such as early blight tend to be more problematic where plants are stressed, as from poor fertility, drought, insect damage, or heavy fruit. Proper sunlight, fertility, and irrigation go a long way toward promoting healthy plants. If you find you need

to apply a pesticide, consult page 121 of the *Home, Yard, and Garden Pest Guide* and follow the product label carefully.

No pesticides are available to control Fusarium wilt, Verticillium wilt, or viral diseases, so it is important to discourage these diseases from building up and becoming a problem. Your garden may be small, but do your best to practice crop rotation. In other words, don't plant tomatoes in the same area year after year. When planning your rotation, keep in mind that Verticillium wilt is also a disease of plants closely related to tomato (such as potato and pepper).

Because many foliar diseases begin on the lower, shaded leaves, remove them preventively to reduce early infection. Should individual plants become heavily diseased and unthrifty during the season, remove them to avoid disease buildup (for soilborne diseases such as Verticillium wilt or Fusarium wilt) or spread. For the same reasons, remove and dispose of the leaves, stems, and large roots in the fall.

For more information about tomato culture and pest management, consider the following sources: *Vegetable Gardening for the Midwest* (University of Illinois Extension Circular 1331); Urban Programs Resource Network—Tomato, <http://www.urbanext.uiuc.edu/veggies/tomato1.html>; *Report on Plant Disease (RPD)* fact sheets, <http://www.ag.uiuc.edu/~vista/rpd.html>. These and other publications are available through your local University of Illinois Extension office. (Bruce Paulsrud)

EQUIPMENT

Granular Spreader Calibration for Lawn Care

A fall application of fertilizer can improve a lawn's appearance and health in the coming year. If the lawn has problem winter annuals or certain perennials, the right granular herbicide can control them while they are susceptible seedlings and reduce the weeds next spring. Whatever the reason for fall spreading, or whenever you are spreading, your money goes farther if you get an accurate, uniform application.

Accurate spreader rates

Sometimes, a lawn-care product has directions for the more common brands of lawn spreaders. Instructions might include what setting to use for a certain rate of product. However, the setting should be verified. Your spreader may not be listed; then you must determine what setting is needed.

The easiest way to check the application rate of a spreader is to apply a weighed amount of product to a

known area. For drop spreaders, use 1,000 square feet; for rotary spreaders, use a larger area, about 5,000 square feet. Spread the product on the area and weigh what's left. The amount you applied is the difference. Some drop spreaders may come with a pan to collect the product while calibrating the spreader. This is convenient because then you won't spread the wrong amount of product on the lawn while you're calibrating the equipment.

If you want to avoid spreading anything until your spreader is calibrated properly, the spreader can be raised on blocks, and the wheels turned. Of course, if you have a rotary spreader, disconnect the spinner drive mechanism so you don't scatter the product. It would be messy but, worse than that, it could be unsafe. If the wheels are turned at the right speed (the speed they would turn when really spreading) for the correct number of turns, you can collect the granules in a container, weigh them, and reuse them when spreading on the lawn. The formula for the number of turns for the wheels (to simulate 1,000 square feet) is

$$45,860 \div (\text{wheel diameter in inches} \times \text{swath width in inches}) = \text{number of wheel turns}$$

So the process is to collect the product while turning the wheels the right number of turns; then weigh the product to see if the output is right. For adjustment, open or close the metering slide as needed and try it again until the spreader output is set right.

Uniform spreader patterns

A drop spreader is usually more precise and has a more uniform application pattern than a rotary spreader. Rotary spreaders cover a wide swath and thus cover a given area more quickly, but they can be less precise in uniformity and distribution. The first two steps to a good application are simple: (1) read and follow the spreader instructions, and (2) read and follow the product label.

Drop spreaders drop the product straight down. The pattern ends abruptly at the end of the spreader; so for a uniform application, be careful not to leave a gap between spreader swaths. Likewise, be careful not to overlap swaths when applying the full rate, or the overlapped strips get a double rate. Simple maintenance helps keep a drop-spreader pattern uniform. Keep all metering holes clean and unplugged, and keep rust or flaked paint from choking down the metering holes.

Patterns for a **rotary spreader** are more difficult to assess. One method is to lay out a row of shallow

boxes (1 to 2 inches deep, like a pop or beer flat) at regular intervals, every 1 or 2 feet. Spread a pattern three times going the same direction, perpendicular over the line of boxes. Put the product caught in each box in a clear test tube, vial, or bottle; and keep the containers in the order the boxes were laid on the ground, left to right. The pattern should smoothly taper from nothing at the far left to maximum in the center and to nothing on the far right. If the pattern isn't smoothly tapered, follow the spreader manual to adjust the pattern if possible. The appropriate swath width should be to the point where the pattern is half what it is in the center. For example, if the center three or four bottles have material 2 inches deep, and the bottles at the 6-foot positions (6 feet to the left and right of the spreader centerline) have material 1 inch deep, the effective swath width is 12 feet.

Never leave a lawn-care product in an unlabeled container. Empty any container used for the pattern testing. Also, never reuse a container for anything else after it contains pesticide. Either clearly label all the boxes and jars you used during the tests and keep them locked in a safe place, or discard them in the trash.

With a little extra care, the performance of your spreader can be greatly improved. That means your lawn-care products can be applied more efficiently and therefore work better. The ultimate result is more response for your dollar and less wasted product, which is good for the lawn and the environment.

(Mark Mohr)

RESOURCES

A Wealth of Pesticide Information!

Web-based

If you are looking for a source of objective, science-based information about pesticides—written for the nonexpert—then the EXTTOXNET (EXTension TOXicology NETwork) InfoBase may be for you. For example, you can access the Pesticide Information Profiles (PIPs) for specifics on pesticides. Toxicology Information Briefs (TIBs) discuss concepts in toxicology and environmental chemistry. Other areas include: Toxicology Issues of Concern (TICs), Factsheets, News about Toxicology Issues, Newsletters, Resources for Toxicology Information, and Technical Information.

A new feature, Frequently Asked Questions (FAQs), answers questions about toxicants and the environment, how toxicants might affect you, and

how you might become aware of possible hazards around you. Topics include

- Adverse health effects and risk
- Diet and cancer
- Food safety
- Household hazardous waste
- Indoor air
- Laws and regulations
- Pesticides
- Safe drinking water
- Soil (gardening and chemicals)

EXTTOXNET (<http://ace.orst.edu/info/exttoxnet/>) is an effort of University of California–Davis, Oregon State University, Michigan State University, Cornell University, and the University of Idaho. Its purpose is to stimulate dialogue on toxicology issues, develop and make available information relevant to Extension toxicology, and facilitate the exchange of toxicology-related information.

Phone-based

National Pesticide Telecommunications Network (NPTN) is a toll-free telephone service that provides pesticide information to any caller in the United States, Puerto Rico, or the Virgin Islands. It provides objective, science-based information about a wide variety of pesticide-related subjects, including pesticide products, recognition and management of pesticide poisoning, toxicology, and environmental chemistry.

NPTN is staffed by highly qualified pesticide specialists who have the toxicology and environmental chemistry education and training needed to provide knowledgeable answers to pesticide questions. The NPTN is a source of factual chemical, health, and environmental information about more than 600 pesticide active ingredients incorporated into over 50,000 different products registered for use in the United States since 1947. NPTN can

- help callers interpret and understand toxicology and environmental chemistry information about pesticides
- supply general information on regulation of pesticides in the United States
- access over 300 pesticide resources
- access pesticide label information
- direct callers for pesticide incident investigation, emergency human and animal treatment, safety practices, cleanup and disposal, or laboratory analyses

Excluding holidays, you can call NPTN seven days a week from 8:30 a.m. to 6:30 p.m. (CST) at (800)858-7378. You can also contact NPTN by fax (541)737-0761 or by e-mail (nptn@ace.orst.edu). NPTN also has a Web site (<http://ace.orst.edu/info/nptn/index.html>) that offers objective, science-based information about pesticides. (*Bruce Paulsrud*)

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