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White Grubs

Be alert for white grub damage over the next couple of months. Damage will appear as wilting, browning turf that is easily pulled back due to the grubs eating off the roots. Although damage is most likely in untreated, irrigated turf, every year there are cases of damage in non-irrigated turf. Frequently, this is limited to only one part of the lawn or other turf area, so treating the entire lawn is not necessary.

In non-irrigated turf, pay particularly attention to areas near small trees that have been irrigated. Generally, adults of Japanese beetle and masked chafers do not lay eggs under trees, but the irrigated grass near small trees with little canopy would have been attractive this year during the drought.

Infested areas can be treated with trichlorfon (Dylox) or chlorantroniliprole (Acelepryn) as both will kill the grubs in just a few days. Other insecticides are also effective, but live grubs will be found by curious homeowners. (*Phil Nixon*)

Zimmerman Pine Moth

This is the time of year to spray the trunks and major branches with bifenthrin (Onyx), cyfluthrin (Tempo), permethrin (Astro), or other labeled insecticide to control Zimmerman pine moth. The moths have been laying eggs in the southern two-thirds of Illinois and are about to emerge in northern Illinois.

After a couple of weeks, larvae hatch from the eggs to spend several weeks crawling around on the trunk and major branches before finding an overwintering site. During this time, they are very susceptible to an insecticide residue on the bark. Scotch, Austrian, and red pines are the most commonly attacked trees. Spraying can be confined to the lower ten to twelve feet of pines under eight inches in diameter as this moth rarely attacks higher in the tree. It also is not a trunk problem on larger trees, although scaffold branches can be attacked. (*Phil Nixon*)

Neonicotinoids and Bee Reduction

There is worldwide concern about the loss of pollinators during the last few years. Colony Collapse Disorder (CCD) in honey bees has been present since at least 2006 in which large numbers of bees abandoned their hives. There has been a large decline in bumble bees noticed in California and elsewhere with a possibility of the extinction of one or more species.

These reductions appear to be caused by a variety of stresses making the bees

less capable of fending off diseases and other factors. Insecticides have always been a suspected culprit in these declines with neonicotinoids being of prime concern. Some neonicotinoids have widespread use and their systemic activity within the plant can result in their presence in pollen and nectar.

One neonicotinoid, imidacloprid, has been heavily implicated. It is known that imidacloprid is incorporated into the pollen and nectar of some plants, but not others. A French study several years ago found that honey bees exposed to sublethal dosages of imidacloprid frequently were unable to find their way back to their colony. Although successfully repeated at least once in Europe, similar studies in the U.S. were unable to repeat these results, making the research suspect. Clothianidin, another neonicotinoid, has also been implicated in bee losses.

Honey bees do not return to their hives for a number of reasons. Obviously, those who are caught and eaten by predators do not return to their hives. However, individuals that have diseases or parasites will leave the hive and not return. This behavior reduces the likelihood of the disease or parasite spreading through and eliminating the hive. It also makes it difficult to locate the involved bees and determine the cause of the abandonment.

Two new studies in Europe published in the digital version of the journal Science in March 2012 produce additional concern about neonicotinoid insecticides and bees. The journal Science is one of the most highly regarded journals in the world. These two studies utilized high quality methodology and analysis, making them more likely to be repeatable.

One study addresses imidacloprid and bumblebees in Great Britain ("Neonicotinoid Pesticide Reduces Bumble Bee Colony Growth and Queen Production." By Penelope R. Whitehorn, Stephanie O'Connor, Felix L. Wackers, Dave Goulson. Science, Vol. 335 No. 6076, March 30, 2012). Pollen and sugar water containing a nonfatal dose of imidacloprid was fed to 50 bumblebee colonies, Bombus terrestris, for two weeks. They were then released to forage outdoors. At the end of the season, the colonies were 8-12% smaller than the 25 control colonies that were not fed any imidacloprid.

The colonies receiving the imidacloprid produced, on average, about two queens per colony. The untreated colonies averaged 14 queens per colony. Bumblebees produce annual colonies, the workers and original queen die at the end of the growing season. New colonies are started each year by overwintering queens produced the previous year. Many overwintering queens die during the winter and also in the early spring when they are starting their new colonies. Mortality due to disease, predation from mammals and birds, and starvation from insufficient pollen and nectar sources are common. A reduction in queen production translates into a reduction in potential colonies the following year.

Previous laboratory and field studies have not shown a reduction in bumblebee queen production. The hypothesis is that neonicotinoids may affect bees' memory. It is postulated that foraging bees exposed to neonicotinoids

forget how to get back to their colonies. Even a relatively small percentage increase in bees not returning to the colony may result in a reduction of available food to develop new queens.

The other research study was conducted in France ("A Common Pesticide Decreases Foraging Success and Survival in Honey Bees." By Mickaël Henry, Maxime Beguin, Fabrice Requier, Orianne Rollin, Jean-François Odoux, Pierrick Aupinel, Jean Aptel, Sylvie Tchamitchian, Axel Decourtye. Science, Vol. 335 No. 6076, March 30, 2012). In this study, 600 honey bees were fitted with electronic identifiers that allowed them to be counted electronically when they returned to the hive. The bees were fed a mixture of sugar water containing low doses of thiamethoxam, another neonicotinoid insecticide. The doses used were determined to be similar to those that the bees would be exposed to in nature.

The bees were then released up to one kilometer (0.6 miles) from the hive. The bees were released in areas where they had been previously as well as in areas that were new to them. Only about one-half of the bees dosed with thiamethoxam returned to the hive compared with those that did not receive any insecticide. This translates into less food, pollen and nectar, coming back to the hives resulting in weaker hives.

One concern is that the insecticide doses were administered all at once rather than smaller doses repeated throughout the day as is more likely in nature.

The source for much of the above was obtained from news articles posted on The Xerces Society web site. The Xerces Society is a nonprofit organization that protects wildlife through the conservation of invertebrates and their habitat. Those articles can be found on The Xerces Society web site at http://www.xerces.org/.

Although these two studies appear to indicate that neonicotinoid insecticides might be responsible for pollinator reductions, there are other research studies that indicate the opposite. Additional research has pointed at one or more other factors. Insecticide use may be one of the stresses causing colony collapse disorder and other pollinator reductions, but these reductions are apparently due to a number of factors. (*Phil Nixon*)

Bur Oak Blight

The U of I Plant Cinic confirmed its first sample of Bur Oak Blight (BOB). The infected tree is located in Lake County, IL. Bur Oak Blight is a fungal disease caused by a newly described pathogen, *Tubakia iowensis*. Several species of *Tubakia* are known to infect Bur oak (*Quercus macrocarpa*), however, *T. iowensis* is the only species known to cause severe leaf blight. The variety *Quercus macrocarpa* has been reported to be especially susceptible to the disease.

Symptoms

Bur Oak Blight is a fungal leaf disease with the earliest symptoms appearing in June. The pathogen over-winters as pustules on diseased leaf petioles that remained attached from the previous growing season. In the spring, fungal

spores are produced and released from the pustules coinciding with bur oak leaf development and expansion. Heavy rainfall has been reported to be an important factor with spore production and dissemination. The primary infection occurs before the leaves are fully developed. However, there is a latent period between infection and when the first symptoms appear in June.

Initially, infections may be limited to the lower braches. Symptoms intensify from year to year and progress from the lower branches to the entire crown. In June, the first symptoms appear as purple-brown spots on the underside leaf veins. In July, the lesions expand, and purplish necrotic veins become noticeable on the upper leaf surface as well. As the veins are killed, wedge shaped necrotic areas appear on the leaf blade. Coalescing lesions may cause the leaves to die. Severely infected trees may have significant leaf mortality or leaves with scorched appearance. Many, but not all, leaves killed by BOB remain attached to the tree into the winter, well after healthy bur oaks have dropped their leaves.

Diseased leaf retention is currently one of the best ways to identify this disease in the field. Look for leaves and petioles attached from the previous growing season. Infected petioles will have black pustules or scars from previously attached pustules. The other species of *Tubakia*, that infect bur oak, are not known to infect petioles or cause petiole blight.

Several successive years of severe infection and defoliation have been reported to kill trees. Some of the reported trees died as a result of secondary invaders such as the two-lined chestnut borer. Trees infected with BOB appear to have increased susceptibility to these secondary invaders.

Management Strategies

- If you suspect a BOB infection, have the disease diagnosis confirmed by a laboratory. The leaf blight and scorching symptoms of BOB can be confused with oak wilt and oak anthracnose symptoms. Disease confirmation is important for providing disease control strategies recommendations. Disease samples can be submitted to the University of Illinois Plant Clinic. Information on general sample submission can be found on the plant clinic website (http://web.extension.illinois.edu/plantclinic/). A $15 fee will cover diagnostic services for the sample.

  For Bur Oak Blight sampling, collect branches and twigs with symptomatic and healthy leaves. Be sure to include branches with petioles from previous growing season still attached (See Image 4 for example)
- Raking diseased leaves may have little effect on controlling the disease. The primary infection occurs from the abundant spores produced from diseased petioles that remain attached to the tree.
- Boosting tree vigor may help the tree to limit and prevent secondary invaders. Pruning and removing branch dieback has been suggested to help reduce borer populations
- For high value trees, Iowa State University found trunk injections of propiconazole to be effective at

controlling the disease. Applications require specialized equipment and will need to be made by a certified professional.

- Injections should be made in late May or early June just after the leaves have fully expanded
- The recommended application rate is 8-10 mls per 1"DBH. Higher applications rates reportedly resulted in phytotoxicity to leaves. The rate will also need to be adjusted if the tree has significant branch dieback in the canopy.
- One application should last several years. Iowa State currently recommends repeat application only after a severe outbreak re-occurs.

References and Further Reading

US Forest Service Pest Alert: Bur Oak Blight (http://na.fs.fed.us/pubs/palerts/bur_oak_blight/bob_print.pdf)

Published Research Article-- Harrington T, McNew D, Hye Young Y. Bur oak blight, a new disease on Quercus macrocarpa caused by Tubakia iowensis sp. nov. Mycologia January 2012;104(1):79-92.

(*Travis Cleveland*)