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WATCH FOR

ARMYWORM FLIGHT BEGINS
By Doug Johnson

Flight of adult armyworm moths has begun in Kentucky. We have capture armyworm moths in the Princeton trap for the previous three weeks and for two weeks in the Lexington trap. Though the numbers are still quite low, this may be a good time to review how you can be ready for this pest if an outbreak occurs. Unless there are unusual circumstances it will be another month before the peak flight and probably a month more before the caterpillars appear. Please see the following article: "How to use the Insect Graphs from the UK-IPM Trap Lines".

HOUSEHOLD

IT'S TERMITE SEASON
By Mike Potter

Termite season has begun in Kentucky. During the next several weeks, you'll probably receive many calls from clients seeking advice on how their home or business should be treated. This column will help you answer their questions.

Q: Why be concerned about termites?
A: Termites cause billions of dollars in damage each year. They primarily feed on wood, but also damage paper, books, foam board insulation, and even swimming pool liners and filtration systems. Termites can injure living trees and shrubs, but more often are a secondary invader of woody plants already in decline. While buildings may become infested at any time, termites are of particular importance when buying or selling a home since a termite inspection is normally a condition of sale. Besides the monetary impact, thousands of winged termites emerging inside one's home are an emotionally trying experience - not to mention the thought of termites silently feasting on one's largest investment.

Q: Why are infestations often discovered during March - May?
A: Spring typically is when large numbers of winged termites, known as "swarmers," emerge inside homes. In nature, termites swarm to disperse and start new colonies. Triggered by warmer temperatures and rainfall, the winged termites emerge from the colony and fly into the air. The

swarmers then drop to the ground, shed their wings, pair off with a mate, and attempt to begin new colonies in the soil. Few swarmers emerging outdoors survive to start new colonies. Swarmers emerging indoors are incapable of eating wood, seldom survive, and are best removed with a vacuum cleaner. They do, however, indicate that an infestation is present.

Q: **How will I know if my home is infested?**
A: Discovering winged termites indoors almost always indicates an infestation warranting treatment. People often confuse winged termites with ants, which often swarm at the same time of year. Termites can be differentiated by their straight antennae, uniform waist and wings of equal size. (Ants have elbowed antennae, constricted waists, and forewings that are longer than the hind wings.) The swarmers are attracted to light and are often seen around windows and doors. Termite swarmers emerging from tree stumps, woodpiles, and other locations out in the yard are not necessarily cause for concern, and do not always mean that the house is infested. On the other hand, if winged termites are seen emerging from the base of a foundation wall or adjoining porches and patios, there's a good chance the house is infested also and treatment may be warranted.

Other signs of infestation are earthen (mud) tubes extending over foundation walls, support piers, sill plates, etc. The mud tubes are typically about the diameter of a pencil, but sometimes can be thicker. Termites construct these tubes for shelter as they travel between their underground colonies and the structure. To help determine if an infestation is active, the tubes may be broken open and checked for the presence of small, creamy-white worker termites. If a tube happens to be vacant, it does not necessarily mean that the infestation is inactive; termites often abandon sections of tube while foraging elsewhere in the structure.
Termite-damaged wood is usually hollowed out along the grain, *with bits of dried mud or soil lining the feeding galleries.* Wood damaged by moisture or other types of insects (e.g., carpenter ants) will not have this appearance. Occasionally termites bore tiny holes through plaster or drywall, accompanied by bits of soil around the margin. Rippled or sunken traces behind wall covering can also be indicative of termites tunneling underneath. Oftentimes there will be no visible indication that the home is infested. Termites are cryptic creatures and infestations can go undetected for years, hidden behind walls, floor coverings, insulation, and other obstructions. Termite feeding and damage can even progress undetected in wood that is exposed because the outer surface is usually left intact. Confirmation of infestation often requires the keen eye of an experienced termite inspector. However, even the most experienced inspector can overlook infestation or damage which is hidden.

Q: **Can I treat the house myself?**
A: Ridding a home of termites requires special skills. Knowledge of building construction is needed to identify the critical areas where termites are likely to enter. Many of these potential points of entry are hidden and difficult to access. Termite control also utilizes specialized equipment such as masonry drills, pumps, large-capacity tanks, and soil treatment rods. A typical treatment may involve hundreds of gallons of a liquid pesticide, known as a termiticide, injected into the ground alongside the foundation, beneath concrete slabs, and within foundation walls. In short, termite treatment is a job for professionals. A possible exception would be if a mailbox post, sandbox or other small wooden object not attached to the house was infested. "Do-it-yourself" termite baits (see bait comments below) sold at retail stores or bought over the internet will seldom eradicate an existing termite problem.

Q: **How do I choose a pest control company? Why is there such variance in price?**
A: These are complex questions. The company should be licensed by the Kentucky Department of Agriculture. Membership in the Kentucky Pest Control Association and/or National Pest Management Association suggest the company is an established firm with access to technical and training information needed to do the job correctly. As with any service company, references are invaluable. Consider calling at least 2-3 companies. Requesting inspections and estimates from more than one company will help verify the existence of a termite problem and allow you to compare services. Companies offer different types of treatment methods and warranties. If termites happen to return, most will retreat the affected areas at no additional charge. A smaller percentage of firms also will repair damage occurring subsequent

to their treatment, although dating onset of termite damage is a hard thing to determine. In some cases, no warranty will be offered if wells, cisterns, sub-slab heating ducts, drainage systems, or inaccessible crawl spaces make it impossible to treat in accordance with industry standards.

Take your time when selecting a company. Termites damage wood slowly; the amount of damage caused by taking an additional day, week, or month to make an informed decision is insignificant. Avoid firms that try to pressure you into signing a contract immediately with "specials" or scare tactics. The overall quality of a termite job depends less on the sales person than on the technician who does the work. A safe and effective treatment requires an experienced technician, not someone who was hired a few weeks ago.

Q: Does the entire house need to be treated... or can they "spot treat" areas where I see termites?
A: Subterranean termite colonies may contain hundreds of thousands of individuals foraging in many different directions. For the homeowner, localized or "spot" treatments are generally a gamble except in cases of retreatment. Most reputable pest control firms will not warranty spot treatments, since it=s likely that termites will eventually find other points of entry into the structure.

Some companies may offer to do a so-called "perimeter" treatment using one of the non-repellent liquid termiticides (e.g., Termidor or Premise). Typically this will involve a thorough application around the entire outside foundation wall of the building, and spot-treating any infested or high-risk interior areas. If the homeowner is considering such a treatment, they should inquire whether it will be accompanied by a service agreement in case termites return. (Service renewal agreements usually state that if termites return, the company will return and retreat the affected areas at no additional charge provided the renewal agreement is maintained.) Purchasing any treatment approach is a bit of a gamble, unless the offer is accompanied by an ongoing service agreement.

Q: How long will the treatment last?
A: All liquid termiticides are supposed to control termites for at least five years when applied according to label directions. The *actual* length of control on a given structure will depend on such factors as thoroughness of the application, environmental conditions, and density of termites in the area. Should termites persist a year after treatment, it is usually because they have exploited an untreated gap in the chemical barrier.

Q: Will the chemicals harm my family or pets?
A: Termiticides are tested extensively for adverse effects on health. Before a product can be used, numerous studies are conducted by the manufacturer and independently evaluated by the U.S. Environmental Protection Agency. Based on the current body of knowledge, registered termiticides pose no significant hazard to humans, pets or the environment when applied according to label directions. Despite the negligible health risk from a properly performed termite treatment, people with lingering concerns should consult their physician. Most of the newer liquid products have essentially no odor. Clients who are still apprehensive may want to consider having their home treated with baits.

Q: Have I been "cheated" if termites continue to infest my house after treatment?
A: Not necessarily. Unlike other services such as plumbing or electrical work, termite control involves living creatures. The best treatments performed by knowledgeable firms may fail at times, when termites find their way through tiny, untreated gaps in the soil. While the *intent* is to establish a continuous, impenetrable chemical barrier, this is all but impossible to achieve in actual practice. In the case of baits, it may take several months for termites to initially find the bait stations in the soil, and several months more to achieve control. The key is to hire a reputable pest control firm employing experienced, conscientious technicians. Companies will return and retreat affected area(s) at no additional charge provided the service agreement is purchased and maintained.

Q: Which treatment methods and products are most effective?
A: Another challenging question. There are two general categories of termite treatment, liquids and baits. Soil-applied liquid termiticides have been around for decades. Their purpose is to provide a long-lasting chemical barrier that excludes termites

in the ground from entering buildings. In most cases, termites in the structure die off as well since they cannot return to the soil. Most former products were repellent rather than lethal to termites foraging in the soil. Newer materials such as Termidor® (fipronil), Premise® (imidacloprid) and Phantom® (chlorfenapyr) are non-repellent, and termites tunneling into the treatment zone are killed. Overall, the non-repellent products are proving to be much more reliable in their ability to resolve problems in the first attempt. All registered termiticides (both repellent and non-repellent) can be effective, however, and homeowners should not base their purchasing decision on product alone.

The other broad treatment category is baiting. Termite baits consist of paper, cardboard, or other "termite-friendly" food, combined with a slow-acting substance lethal to termites. The baits are installed below ground out in the yard in cylindrical plastic stations. Others are sometimes placed indoors over active termite mud tubes. Foraging termites consume the bait and share it with their nest mates, resulting in a gradual decline in termite numbers. On some properties, baits may constitute the only form of treatment; on others, they may be combined with liquid applications to areas where termites are observed. Several baiting systems are available, including Sentricon®, Exterra™, FirstLine ®, Advance™, and Subterfuge®.

Termite baiting is a *very* complex subject. A detailed discussion of the considerations in having your home treated with baits versus liquids is provided in entomology extension publications, *Entfact-639: Termite Baits: A Guide for Homeowners.* (All four of our termite-related Entfacts are posted on the entomology department website). No matter which method or product is selected, it's important to have an experienced technician, backed by a responsible pest control firm.

FRUIT

BROOD XIV + 1 YEAR = WOOLLY APPLE APHIDS

By Ric Bessin

The periodical cicada brood XIV is gone but not forgotten. I have already received some reports this spring of woolly apple aphids infesting the cicada egg-laying wounds on apple trees. This is a common occurrence in apple trees the year after a periodical cicada emergence. Woolly apple aphid is not controlled with many common used orchard insecticides as growers often need to include materials specifically in their sprays to control this pest. Woolly apple aphid is a serious pest of apples, particularly young trees. Colonies form at wound sites on trunks, limbs, and twigs, where they feed on tender bark. Besides cicada egg-laying wounds, pruning and hail damage can create the wound sites for attack by this pest. As populations grow, aphids are commonly found on water sprouts in the center of the tree. The tree will begin to swell and form galls at the feeding sites.

The woolly apple aphid differs from other apple aphids in appearance, life cycle, and the type of damage inflicted. A colony appears as a cottony mass generally clustered in wounds and pruning scars on the trunk and branches of the tree. The aphids themselves are purplish in color surrounded by white, cottony secretions. Woolly apple aphid is a sucking insect pest that weakens the tree by feeding on limbs and roots. Long strands of white wax are produced that help to protect the colony of purple aphids from predators and pesticide sprays.

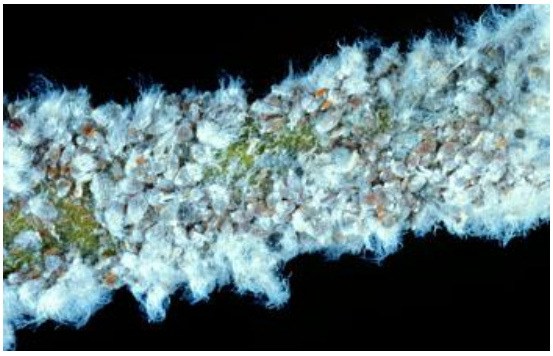
Woolly apple aphid colony on a branch

As the number of aphids on the above ground portion of the tree increase, many work their way down to the roots and trunk below ground surface. It is the feeding on the roots that produces the greatest damage. Mature trees usually suffer little damage from the root infestations, but the root infestations are very damaging to young trees. Control of these aphids is very difficult when they attack the roots. Yellowish foliage is a sign that woolly apple aphid may be infesting roots. The root

systems of nursery stock can be damaged, ad severe root infestations can stunt or kill young trees. Infested trees often have short fibrous roots, which predisposes them to being easily uprooted. Swollen galls also form on roots; galls increase in size from year to year and are sites where fungi can attack. Aphid feeding on the root systems also disrupts the nutrient balance of root tissue, which can affect growth of other parts of the tree. Trees can have above-ground infestations of woolly apple aphid but no root infestations. Rootstocks vary in susceptibility to woolly apple aphid and susceptible rootstocks will form galls around the infestation sites. Use M111 or M106 if woolly apple aphid is a serious problem. Rootstocks appearing more susceptible to woolly apple aphid infestation include B9, M9, and M26.

During the summer, repeated woolly apple aphids generations of wingless individuals are produced. In the fall, winged individuals are produced which fly to search for elms on which to lay overwintering eggs, while some wingless forms may remain on both above and below ground parts of the apple tree throughout the winter.

Woolly apple aphid colonies produce honeydew, which results in development of black sooty mold. The wax and the honeydew are bothersome to pickers when it brushes off the tree and onto clothing of pickers.



A colony with the wax removed showing live aphids

It is relatively easy to find where the colonies have formed. When monitoring for woolly apple aphid, examine four pruning scars on each of 5 scaffold limbs per tree. Carefully examine woolly apple aphid colonies to determine if live aphids are present. Predators, such as lady beetles, Syrphid fly larvae, and lacewing larvae can completely destroy the colony, but the waxy residue will remain. When examining colonies, blow hard on the branch to remove the waxy filaments to reveal live aphids. Treatments for woolly apple aphid are recommended when 10% of the pruning/egg laying scars are infested with live colonies. There are few insecticides specifically labeled for control of woolly apple aphid. Diazinon (commercial use only), endosulfan, Admire and Movento are recommended for control of above-ground infestations. There is some information indicating that Movento applied to the foliage will move systemically to other portions of the tree.

SHADE & ORNAMENTAL

WOODY PLANT HEALTH & SPRINGTIME MAINTENANCE PRACTICES

By John Hartman

There are many landscape maintenance activities occurring in the spring which can affect the health of trees and shrubs in the landscape. Landscapers and homeowners can learn to use a holistic maintenance approach such as Integrated Pest Management (IPM) or Plant Health Care to avoid potential disease problems. By working out in advance the potential consequences of poor plant maintenance practices, landscape plant health and longevity can be enhanced. The following are timely and helpful suggestions for enhancing the health of landscape plants.

Choose the right location for plants in the landscape. Too often, perfectly good plants are located in sites that favor disease outbreaks. An important IPM concept is to choose plants that will grow well in a particular landscape site, or to modify the site so that the plants will grow at their best. Plants that must struggle to overcome the effects of a poor growing location are usually the most vulnerable to diseases.

Figure 4

For example, Rhododendrons and azaleas require well-drained acid soil. If the soil is poorly drained, they are vulnerable to Phytophthora root rot, and if the soil is too sweet, they will turn yellow from iron deficiency (Figure 1). If the landscape bed is not naturally suitable, one needs to create well-drained beds with acid soil for them. The same is true for white pines. They can grow well in some Kentucky locations, but they, too need acid and sandy soil. If the roots are not provided with these good conditions, expect white pine decline to gradually take out the trees. On the other hand, Taxus also needs a well drained soil to avoid Phytophthora root rot (Figure 2), but it will perform poorly in acid soil.

If landscape plants such as crabapples, dogwoods, roses, and other plants prone to leaf diseases are planted in shady locations or if they are planted so densely that good air movement and ventilation are not possible, the planting site has been poorly selected. In such cases, one should expect outbreaks of diseases such as scab, black spot (Figure 3) or powdery mildew when susceptible cultivars are planted to shady sites.

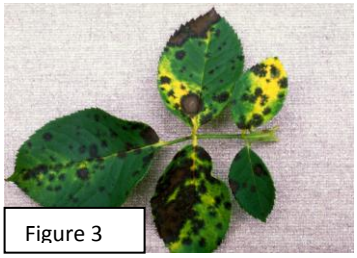


Figure 3

<u>Choose disease-resistant plants for the landscape</u>. Where it is available, disease resistance is a most efficient means of plant disease control. When it comes to fighting diseases of landscape plants, it sometimes pays to know the name of the cultivar and how it is likely to respond to diseases that are common here.

For example, flowering crabapple is a popular small tree for residential landscapes. With flowers, foliage and fruit, it can be attractive in all seasons, especially during bloom. Unfortunately, it can be detrimental to the beauty of the landscape when it is diseased. Flowering crabapple can be plagued with scab (Figure 4), fire blight (Figure 5), cedar-apple rust, and powdery mildew. These diseases can cause spotted, wilted leaves, rotted fruit, and premature leaf fall. These diseases can be avoided by planting cultivars that are disease-resistant. Disease-resistant flowering crabapples such as 'Prairiefire', 'Mary Potter', and 'Harvest Gold' have been developed and are on the market; lists are available at the local Cooperative Extension Office.

Figure 5

There are other tree and shrub diseases for which disease resistant types are available. For example, there are elm cultivars resistant to Dutch elm disease, roses resistant to black spot, rhododendrons resistant to Phytophthora wilt, tip blight resistant junipers, rust resistant hawthorns, fire blight resistant cotoneasters, and the list goes on. To obtain and plant a disease-resistant type requires knowing the name of the cultivar and buying it from a reliable nursery. In addition, there are lists of tree and shrub species (not just cultivars) that are not susceptible to Verticillium wilt or crown gall. Incorporating disease resistance into the garden is good integrated pest management strategy.

<u>How a tree or shrub is planted often affects its health</u>. When trees and shrubs decline in the landscape, the cause is often thought to be one of the pathogenic fungi or bacteria seen growing in branch and twig cankers. But when one of these pathogens is observed, is it necessarily the cause of the plant's demise? This opens up many questions for the diagnostician. Did the tree decline due to lack of space for the roots to grow? Was the planting hole properly dug to be much wider than the size of the root ball? At planting, it is best to

use the same soil that came out of the hole to backfill around the root ball. Was the soil that was put back into the hole the same as the original soil dug out? Did root rot occur because the planting hole was poorly drained?

Did anyone observe girdling at the base of the tree? The strangling effect of girdling roots or twine would stress the tree and invite opportunistic pathogens. If the tree or shrub was removed from the container, were encircling roots detected? Were they cut or removed before planting? What about the twine at the base of the trunk used to hold the burlap wrap in place? Was it removed and was the burlap peeled back from the top and sides of the root ball at planting? Did anyone notice that the twine was plastic? If left in place, the plant would soon be strangled.

Trees often decline because the tree was planted too deep (Figure 6). When the tree was planted, were flaring buttress roots at the base of the trunk observed? Was the soil from the nursery brushed back to expose the buttress root flare at the top of the root ball? Was the tree set so deep that the root flare was covered? Newly planted trees and shrubs, with their recent root pruning, are certainly growing under drought conditions. Many canker-causing fungi develop only when plants are drought stressed. What caused the drought? Was the root ball kept moist before planting? Was the area over the root ball watered frequently after planting? Was mulch used around the base of the tree to keep the root ball moist? Were wire label fasteners removed (Figure 7)? The answers to these kinds of questions illustrate the importance of using good planting techniques to avoid tree and shrub diseases.


Figure 6


Figure 7

Thus, to maintain long-term tree and shrub health in the landscape, make good decisions now. Choose the right location for new plants in the landscape, choose disease-resistant plants, and plant trees and shrubs properly in order to start them off right and to assure that they will have good health for a long time.

Figure Legends:
Figure 1. Iron deficiency chlorosis of Rhododendron.
Figure 2. Taxus Phytophthora root rot in a landscape.
Figure 3. Rose black spot disease.
Figure 4. Flowering crabapple defoliated by scab disease.
Figure 5. Fire blight "shepherds crook" symptom.
Figure 6. Tree planted too deep.
Figure 7. Girdling wire on honey locust.

SPECIAL TOPICS

HOW TO USE THE INSECT GRAPHS FROM THE UK-IPM TRAP LINES

By Doug Johnson & Patty Lucas

You may watch the seasonal progress of moth populations for six pests (armyworm, black cutworm, corn earworm, European corn borer, fall armyworm and southwestern corn borer) at two locations (Princeton, Caldwell Co. & Lexington, Fayette Co. KY). Traps are set the first week in March annually, and the numbers of captured moths are counted each Friday in the season. Data are normally posted on Friday afternoon on the IPM web pages (see below) and in the next available Kentucky Pest News (KPN) usually published each Tuesday afternoon.

Where Are These Graphs? To see these graphs go the IPM web pages at: (http://www.uky.edu/Ag/IPM/ipm.htm). Under the heading, "2009 Insect Trap Count Graphs", select the insect of your choice, by clicking on the name. These graphs have not yet been updated from the

2008 season so this would be a good time to review what the graphs look like and what they tell you. Patty will state putting the 2009 data up well before anything of importance happens.

What do These Graphs Look Like? The insect weekly capture number is plotted on a graph with the vertical axis representing the number of moths captured and the horizontal axis illustrates the capture date. On each graph you may see up to three lines. The green line represents the current year and a data point will be added each week. The blue line is a rolling five year average that does not include an outbreak year. The red line (if we have available data) is the moth population in a year where we have demonstrative data that fields required treatment. We refer to this as an outbreak year. We have a much more robust data set for Princeton (14 yrs) than we do for Lexington (2 yrs.).

What Do These Graphs Tell Me? We believe that these graphs can provide you with a sense of relative risk. The red line tells you what the population looked like in a year when treatments were warranted for some fields. The blue line shows you what the population looks like in years where there is little chance of needing pest control (Data from outbreak years are removed from this data set.) So, these two lines provide a sense of high and low risk for the insect. The green line then tells you what is going on in the current year.
These graphs illustrate the insect's population using the adult moths. But, the damage is done by the juvenile caterpillars. How does the adult flight connect to the damaging stage? Because insect development is so closely tied with temperature, we can predict the time interval between when the moths fly and when the caterpillars will appear. This is done by adding up heat units over time. These heat units are simply the temperature, above a base (with many moths this base temperature is 50^{o}F) for a day. We refer to the heat units as degree-days. Through experimentation we can approximate how many heat units or degree-days will occur between stages in an insect's life cycle. In this case we are looking for the time between the adult moth flight and the caterpillar occurrence.

What Will These Graphs & The Temperature Model **NOT** Tell Me? This system will not provide absolutes. All models have an associated error, and we have a once per week sampling so we will never be able to get closer than a week when predicting events. This will not tell you what will happen in any given field. It will not tell you if an outbreak will occur. They only provide a measure of risk, (based on our historic knowledge of the insect population size) and a time window (based on the degree-day model) in which events will occur (e.g. caterpillar feeding). You must scout your fields to determine if the pest is present and if it is present in sufficient numbers to warrant control.

How Can I Use This Information? Most of the time you will be taking a very brief look at the graphs. You will be looking for two items: 1.) when the counts start to increase and 2.) how large the counts get relative the "average" and "outbreak" lines. If the moth population size approaches the level of an "outbreak" year, we will begin making predictions of when the caterpillar (damaging stage) offspring of these moths will appear. These projections will be placed in the Kentucky Pest News.
This system is not an absolute predictor in any sense. It will however, provide you with a sense of relative risk, and a time window in which to concentrate your scouting efforts. Certainly this will allow your more efficient use of your time if nothing else.

DIAGNOSTIC LAB HIGHLIGHTS

By Julie Beale and Paul Bachi

PDDL samples in March have included a number of diseases on greenhouse ornamentals, vegetables and herbs: Rhizoctonia damping-off on angelonia and coleus; Pythium root rot on petunia; Phytophthora stem rot on *Sempervivum* ("hens and chickens"); Pythium root rot and Sclerotinia stem rot on tomato; and Rhizoctonia stem rot on mint. Fusarium dry rot and Phoma tuber rot have been diagnosed on stored potatoes.

In the landscape, Cytospora canker has been seen on spruce. Landscape evergreens such as arborvitae, taxus, cherrylaurel, holly and magnolia have been submitted with symptoms of winter drying.

INSECT TRAP COUNT

By Patty Lucas

Date	Armyworm		Black cutworm	
	Princeton	Lexington	Princeton	Lexington
March 2 – 6	2	0	0	0
March 6 – 13	22	0	0	0
March 13 – 20	38	3	1	0

Graphs of current insect trap counts will soon be available on the IPM web site at - http://www.uky.edu/Ag/IPM/ipm.htm.
Trap counts for Fulton County will soon be available at http://ces2.ca.uky.edu/fulton/InsectTraps

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