Kansas Insect Newsletter

For Agribusinesses, Applicators, Consultants and Extension Personnel

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Cereal Aphids in Wheat

The past few weeks have been characterized by chilly overnight weather across much of central and western Kansas. Cold temperatures affect the development of cereal aphid populations in various ways. Like all insects, the growth and reproduction of aphids is slowed at lower temperatures, but they are quite able to survive short periods at temperatures close to freezing. On the other hand, the beneficial insects that we rely on for biological control of aphids can be more adversely affected. Their eggs are quite susceptible to even short periods of frost, and their active life stages require warmer temperatures to forage than their aphid prey require to grow and reproduce. However, the wheat's response to cold can also tip the balance for or against economic losses. After dormancy is broken, much of wheat's ability to tolerate aphid feeding is associated with the plant's ability to grow faster than the aphids. Persistent cold weather can significantly slow plant growth and thus permit aphid populations a longer period to feed and damage the crop.

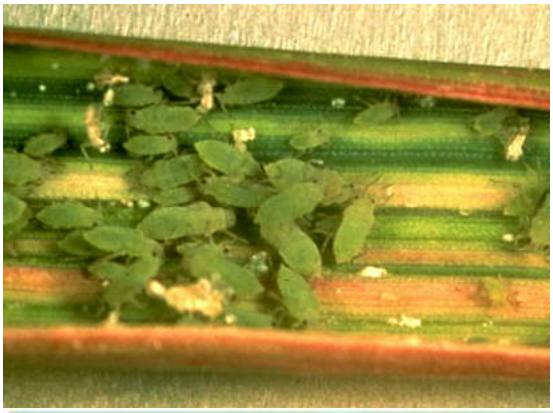
Another important variable to consider is the condition of the wheat. Wet conditions last fall resulted in a lot of late-planted wheat that is likely in poorer condition than early planted fields and thus less able to tolerate significant aphid feeding. As we approach boot stage in many areas, it will be easier to see which fields are developmentally delayed and thus most at risk of aphid damage. Such fields should be scouted for aphids without delay, paying attention also to the presence of lady beetles and lacewings that will be feeding on them. If aphids are abundant and lady beetles are scarce, refer to the wheat management guide for economic thresholds and treatment options, keeping in mind that mixed infestations (e.g. bird cherry-oat aphid and greenbug together) will cause additive damage.

http://www.ksre.ksu.edu/library/ENTML2/MF745.PDF

Greenbug

Bird cherry-oat aphid

Russian wheat aphid



J.P. Michaud

Get Those Caterpillar Pests When They Are Young: How To Effectively Use *Bacillus thuringiensis* spp. *kurstaki*

There are a number of caterpillar pests that are now present, and more to come that feed on landscape and garden plants. One approach to dealing with young caterpillar pests is to apply sprays of products that contain the active ingredient, *Bacillus thuringiensis* spp. *kurstaki* (Btk), which is commercially available under various trade names including Dipel and Thuricide. Btk is a soil-borne bacterium that is widely used to control or suppress populations of many caterpillar pests that feed on plant leaves such as bagworm, webworms, tobacco budworm, imported cabbageworm, cabbage looper, diamondback moth, and tomato hornworm. However, Btk is

not effective against caterpillars that feed in twigs or wood (wood-boring caterpillars). Btk is a stomach poison and needs to be ingested in order to be active. This means that thorough coverage of all plant parts is essential when using any Btk products so that the target caterpillar will encounter and consume the bacteria. Once the bacteria are consumed, it produces an endotoxin crystal that attacks the mid-gut membrane and creates pores, causing leakage and swelling. The swelling continues until cells burst, which allows the gut contents to leak into the insects's blood (hemolymph), disrupting the blood pH and resulting in paralysis. As such, caterpillars stop feeding within 48 hours and die after 2 to 3 days. Only caterpillars are susceptible to Btk because they have alkaline gut pH that is greater than 7. It is important to understand the following characteristics of Btk products in order to maximize their effectiveness in controlling or suppressing populations of caterpillar pests on ornamental plants and vegetables.

Selectivity. In contrast to conventional insecticides such as acephate (Orthene), carbaryl (Sevin), and pyrethroid insecticides (e.g., bifenthrin, cyfluthrin, esfenvalerate, lambda-cyhalothrin, and gamma-cyhalothrin), Btk products don't have a broad-spectrum of activity. They only kill caterpillars. As such, they generally have minimal direct impact on non-target organisms or natural enemies (e.g., parasitoids and predators), which results in fewer problems associated with increased insect or mite pest populations due to secondary pest outbreak or target pest resurgence when broad-spectrum insecticides/miticides are applied. Btk products have no activity on piercing-sucking insects and mites such as aphids, whiteflies, and spider mites. An alternative pesticide (insecticide or miticide) must be used if piercing-sucking insect or mite pests are causing problems.

Timing of Application. Products containing Btk as the active ingredient must be applied when caterpillars are young because of their small size; the caterpillars don't have to consume as much plant material before the bacteria is effective. They will also be killed before they cause severe plant damage and before reaching the reproductive phase. If Btk is applied too late, caterpillars have to consume much more plant material containing the bacteria in order for the active ingredient to be effective. This may result in plant damage because it takes longer to kill the caterpillar pest. In addition, the caterpillar may switch from the growing phase to the reproductive phase before actually consuming enough of the bacteria. Under this condition, less material will be consumed and there is a higher probability of adult survival, which means a new generation of caterpillars will be produced.

Residual Activity. Btk products don't last long in the environment because they are subject to degradation when exposed to sunlight (ultraviolet light) and removal by rainfall. As such, repeat applications are typically required.

Speed of Activity. Btk products are slower-acting than most conventional insecticides and so they must be applied before caterpillar pest populations reach damaging levels.

Safety. The mode of action of Btk is specific for caterpillars. There are no direct and indirect effects on humans or mammals.

Storage Life. Products with Btk as the active ingredient must be stored at temperatures between 50ºF and 60ºF to prolong their shelf life. Avoid exposing products to extremes in cold (<40ºF) or warm (>80ºF) temperatures, which may cause fragmentation of the bacteria.

Water Quality. Alkaline water (pH >7) may reduce the effectiveness of the toxin, so the spray solution must be adjusted to a pH of 6.0 to 6.5.

Products containing Btk may be useful in controlling or suppressing caterpillar pest populations on ornamental plants (trees and shrubs), herbaceous annuals and perennials, and vegetables and fruits; however, it is important to understand their benefits and limitations so as to use them effectively.

Raymond Cloyd

Winter Grain Mites in Wheat

Dr. Erick DeWolf, Extension Plant Pathologist, reports infestations of winter grain mites on small plots in Marion and Riley Counties. Winter grain mites are generally cool weather pests and thus are not usually active this time of year in wheat. These mite populations probably will not affect the wheat this time of year as the wheat is at, or even past, the flag leaf stage in much of the state and the growing conditions are good. Therefore, wheat can withstand large populations of these pests with no effect on yield. Warmer temperatures and heavy rains will reduce mite populations on the plants.

Jeff Whitworth *Holly Davis*

"Who'd a thunk it?" What????? ---- Carpenterworms

I have operated blacklight traps for 30+ years in Kansas. And I have had cooperators in the four corners of the state and many points in between. I have sorted through thousands of samples, and carpenterworm moths have been recovered year after year after year…… The moths themselves are large very distinctive. Additionally,

the females are very different in appearance from the males (Figures 1 and 2). While both are large, they are seldom detected because when resting, their wings are folded over their backs, and their mottled appearance of their front wings helps them to blend in against the bark of the tree.

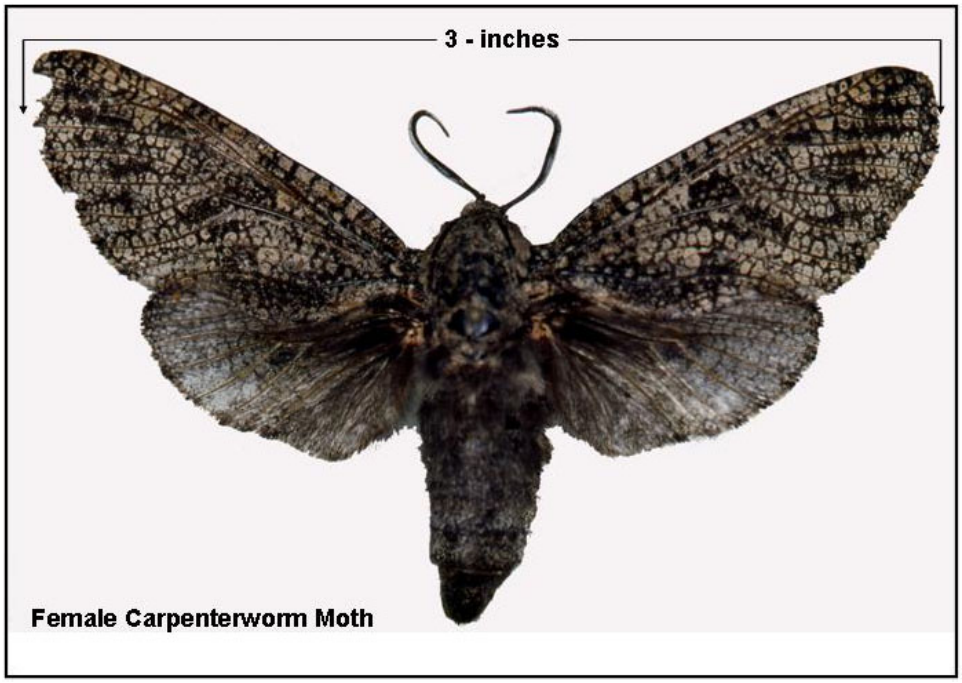


Figure 1

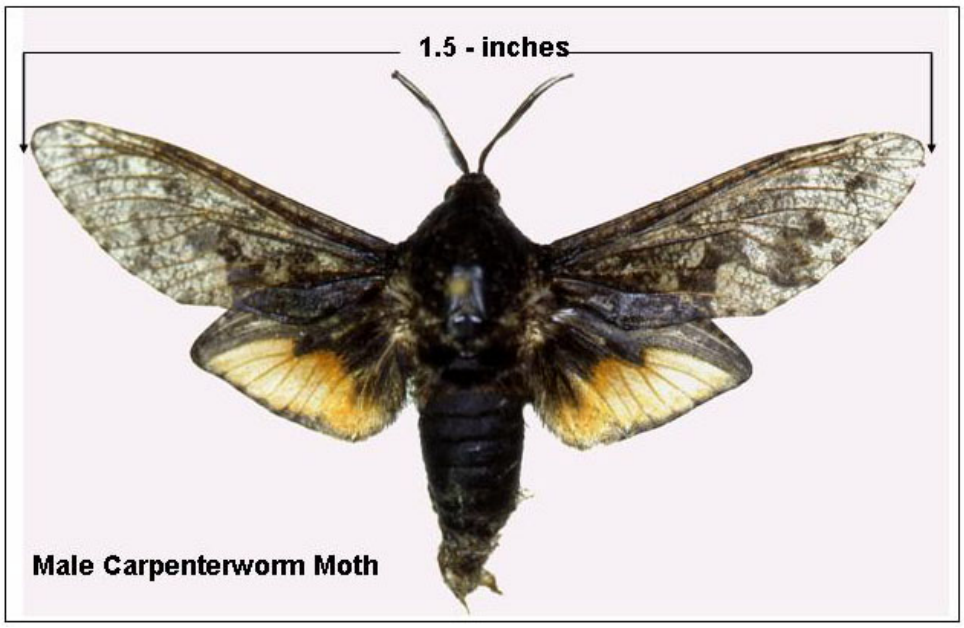


Figure 2

So why address carpenterworm at this time? Why not in past Issues of the Kansas Insect Newsletters? Because, they have not been very newsworthy. But just this past week, there have been 2 inquires with regard to this insect: Barber and Finney counties. I have never personally been "on site" to observe carpenterworms and their damage. So I won't pretend to play "expert". But I can at least provide some useful information as regards this insect.

Found throughout the United States and into southern Canada, a single generation may be completed in a single year in the deep south, whereas in northern areas, 4 years may be required to complete its life cycle. While the developmental cycle has not been documented for Kansas (at least that I am aware of), certainly 2 years would seem plausible. A single moth may deposit 200 to 1,000 ---- either singularly or in groups ---- in the cracks and crevices of bark, under moss and lichens, or in wound areas. Newly emerged pinkish-colored larvae are 6 mm long, and immediately bore into (predominately) tree trunks, and prefer the sapwood and heartwood for their development. Once inside their host, galleries make an abrupt turn and become vertical, eventually extending up to 12-inches in length... Carpenterworms continually enlarge their galleries to accommodate their ever increasing size (galleries may be ¾-inch in diameter).

Carpenterworms are fastidious, maintaining clean galleries by pushing their frass and "sawdust"/excelsior towards and through an opening to the outside of their tree host. Mostly pinkish in earlier developmental stages (Figure 3),

Figure 3

larvae take on a greenish-white hue as they near the end of their larval stage. Mature larvae are huge ---- thick in diameter and 3 inches long. They move towards their "exit hole" and then pupate just behind the gallery opening to the outside.

The abdominal segments of the pupa are "ringed" with spines. As the period for moth emergence approaches, the abdomen wiggles, and with the aid of the spines "digging in", the front end of the pupa is pushed out of the tree. Thus protruding, the soon-to-emerge moth emerges in the open air where its wings unfurl and harden. (Although not a carpenterworm pupa, Figure 4 provides a picture of an armed/spined pupa and an empty extruded pupal case).

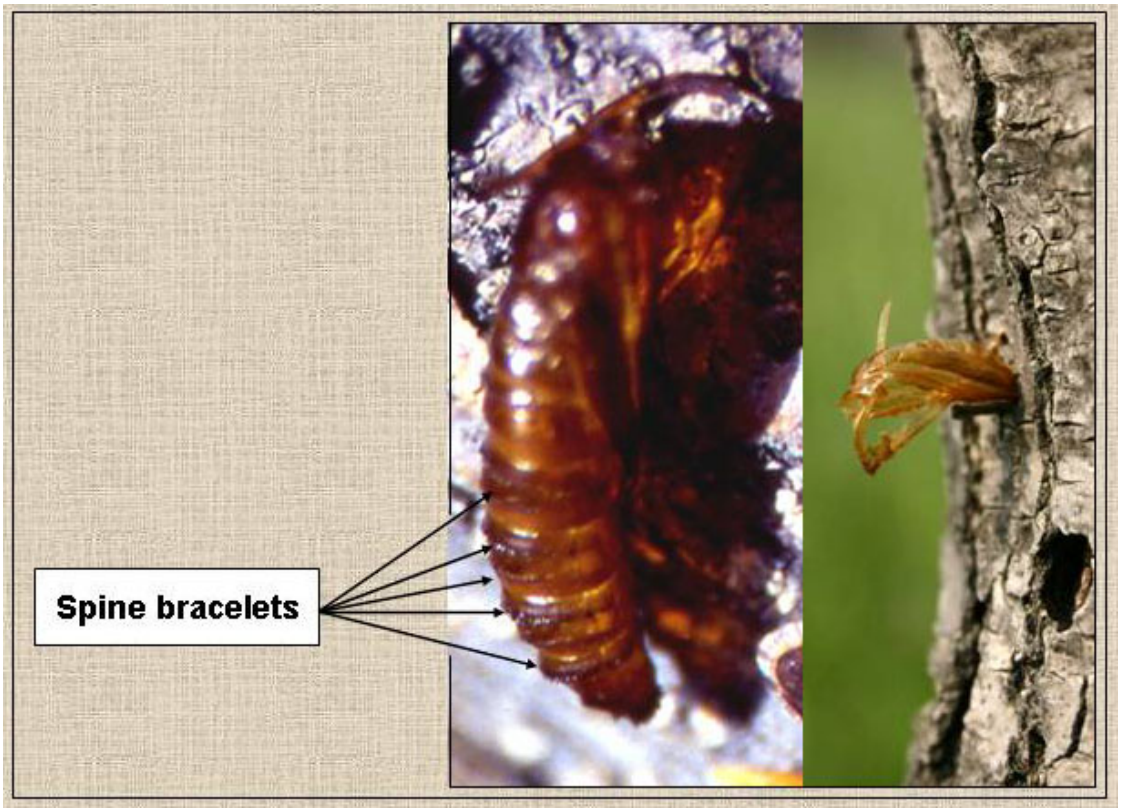


Figure 4

The current reports of carpenterworm were on were on green ash and crab apple. But carpenterworms have a wide host range including oak, maple, black locust, cottonwood, willow, ash and elm. Because the aforementioned galleries are in the sapwood and heartwood, carpenterworms seldom kill trees as might other borer species which disrupt/destroy the cambial layer and vascular elements. However, especially if attacked by numerous carpenterworms, extensive tunneling activities may structurally weaken trees making wind breakage a distinct possibility (sometimes that is the only clue revealing their presence) and damage to adjoining structures.

One of the problems with carpenterworms is the unpredictability of when and where they will occur. Another is the difficulty in detecting them in the first year of their development because the holes through which first-year larvae eliminate their frass and sawdust are small and may be hidden between the bark or concealed by moss and lichen growth. Their presence is usually given away during their second year of development when enlarged holes and expelled frass and sawdust, and stains on the bark. At this point in time, carpenterworms are well-advanced in their development, and already have caused considerable internal structural damage. Figures 5 and 6, although not carpenterworms per se, illustrate signs comparable to those for carpenterworms.

Figure 5

Figure 6

People who read this may be asking themselves whether or not carpenterworms are a significant issue to be concerned about. And for most people, the answer is, "No". But there are individuals who have experienced tree decline/breakage attributed to carpenterworms and who wish to take action. But the control of carpenterworms is not easily accomplished. First off, again, there is neither rhyme nor reason as to which trees will be attacked or when (what year) they will be attacked. But if a person is determined to treat specimen/prized trees from the "insurance" perspective, protective trunk sprays can automatically be applied at the time of greatest moth activity (beginning in May and extending into July).

IF galleries are detected, insecticides can be directed into the gallery. Or, sometimes people will use a wire probe to impale/kill the larvae. The success of this tactic is dependent on the location of the larva in the tunnel. Again, the tunnel takes an abrupt upward turn, and may impede the probing process. And in this instance, it may appease a person to know that they may have eliminated a carpenterworm, but likely this is late in the developmental stage after most of the tunneling damage has been completed.

Of good note is that after moths emerge, there is a healing process. Wound scars may remain but over a period of years become less noticeable. And if the interior structure of a tree is not greatly honeycombed, it will stand and persist for years to come.

Bob Bauernfeind

Report from the Kansas State University Insect Diagnostic Laboratory:

The following samples were submitted to the Insect Diagnostic Laboratory from April 23rd to April 29th.

April 23 2010 – Bourbon County – Termites (soldiers) in home
April 26 2010 – Phillips County – Termites swarmers in yard and ichneumonid wasp in home
April 26 2010 – Clay County – Bird mites in commercial building
April 28 2010 – Riley County – Lepidoptera eggs in home (hatched)
April 28 2010 – Saline County – American dog tick (female) on dog
April 28 2010 – Gray County – Abiotic winter damage to cedar
April 28 2010 – Saline County – Fly larvae in lavatory drain
April 29 2010 – Jefferson County – Brown recluse in home

If there are any questions regarding these samples or about the identification of any arthropod please contact the Insect Diagnostician at (785) 532-4739 or GotBugs@ksu.edu.

Holly Davis

Sincerely,

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