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Kansas Insect Newsletter

For Agribusinesses, Applicators, Consultants, and Extension Personnel

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Bagworms

Well, it is that time of year in most of Kansas, which you have been nervously anticipating—dealing with bagworms (*Thyridopteryx ephemeraeformis*). I tend to have a more positive attitude regarding bagworms and think that they give trees and shrubs a 'special appeal'—making them look like Christmas trees.

Newly hatched caterpillars are very difficult to detect because they typically blend in with plant foliage. Additionally, although we won't admit it, as we get older our eye-site tends to diminish, which also makes it difficult to detect bagworms. In the spring, caterpillars will climb to the tops of trees and "hang out" on 1 to 3-foot strands of silk. These strands will eventually get caught on wind currents and detach, becoming streamers that allow the caterpillars to remain aloft for hundreds of feet to several miles, depending on wind speed (or velocity) and the occurrence of updrafts. This process is often referred to as "ballooning." The caterpillars will float through the air until the silk catches on to an object or plant. It is important to note that caterpillars can balloon from nearby or even distant trees. Young caterpillars are small and cause only minimal damage to foliage. They feed on the epidermal and mesophyll layers, creating 'light' areas on leaves. In general, it is recommended to avoid spraying any insecticides for at least two weeks after egg hatch in order to allow adequate time for the caterpillars to complete the ballooning process, settle down, and initiate feeding. An insecticide application during this time will maximize control of bagworms resulting in higher mortality levels. A second application is typically required a week or two later.

Female bagworms still hanging on trees from last year contain from 500 to 1,000 eggs. Newly-hatched caterpillars emerge from the bottom of the bags in late May or early June, depending on geographic location. Each caterpillar creates a small silk bag, or case, covered with material from the host plant it has fed upon. Caterpillars remain in the bag for the remainder of their life. Young (early instar) caterpillars are 1/8 to 1/4-inches in length and initially feed on the epidermal tissue on one side and the mesophyll layer, causing leaves to appear white before turning brown. Young caterpillars will typically initiate feeding at the top of trees and shrubs.

The older or mature caterpillars are 3/4 to 1.0-inch long and consume entire needles or leaves, primarily stripping the branches at the top of the tree. As the caterpillars mature, and the nutrient quality of the host declines, they migrate downward feeding on lower foliage. Entire branches of conifers may die if stripped of foliage by the caterpillars. A severe bagworm infestation can completely defoliate a host plant, which may result in death of branches or the entire plant. This is especially true of evergreens, which don't normally produce a flush of new growth following defoliation by bagworms. In contrast, deciduous trees and shrubs will typically produce new growth and are thus able to survive an infestation of bagworms. In general, bagworm caterpillars feed for approximately three months. On certain host plant species, female bags are located at the top whereas male bags are distributed near the bottom of the plant canopy. This arrangement allows the females to effectively disperse pheromones, which attracts the winged males and increases the possibility for mating and fertilization of the eggs (This is "Sex In The Tree" as opposed to "Sex In The City").

In late summer (around mid to late August), caterpillars develop into a pupae stage inside the bags. Bagworms take approximately 7 to 10 days to change from a pupa to adult; however, this is dependent on temperature. The males, which are "ugly" black moths with clear wings, emerge through the bottom of the bag and disperse to mate with females. Bagworm females undergo a form of reproduction called paedogenesis. Most insects develop through complete metamorphosis (change in form) to sexual maturity (egg to adult); however, bagworm females develop mature sexual organs in the final larval instar stage. Females do not pupate; remaining in their bags and never developing into moths. Females never develop into adult moths because they lack eyes, wings, legs, and antennae (all these conditions would make it difficult to fly). Instead, the females remain inside the bag, producing eggs before dying. The eggs are the overwintering stage of this insect, and there is one generation per year in Kansas.

Handpicking and destroying bags from fall through mid-spring is very effective in removing the overwintering eggs before they hatch. Bags can be placed into a plastic container with soapy water or into a sealed Ziploc bag and then disposed of.

Insecticides recommended for control of bagworms include *Bacillus thuringiensis* subsp. *kurstaki* (Dipel or Thuricide), cyfluthrin (Tempo), trichlorfon (Dylox), and spinosad (Conserve). Insecticide applications made in mid-June through mid-July are most effective, particularly on the young caterpillars. Older caterpillars in the bags are 3/4-inches long and are more difficult to control. In addition, females tend to feed less as they prepare for reproduction, which reduces their susceptibility to insecticide sprays. The bacterium, *Bacillus thuringiensis* is very efficacious on young caterpillars; however, the material must be ingested, so thorough coverage of all plant parts is essential. Spinosad (Conserve) works by contact and ingestion, and is extremely effective in controlling bagworms. Cyfluthrin (Tempo) and trichlorfon (Dylox) are typically recommended for the larger caterpillars. Again, thorough coverage of all plant parts is essential, especially the tops of trees, where bagworms commonly initiate feeding. In order to enhance the effectiveness of an insecticide application, insecticides should be applied approximately two weeks after egg hatch. This allows the caterpillars to 'blow around,' permitting them

to complete the ballooning process. If insecticides are applied too early then a second or third application may be needed. Scouting trees and shrubs two weeks after applying an insecticide will be helpful in determining if additional bagworms have 'blown in' and allow you to evaluate the effectiveness of insecticides applications.

Raymond A. Cloyd

FMC Announces Several Label Changes.

Brigade EC will replace Capture 2EC: Brigade EC has been labeled in vegetable crops for years. FMC has decided to move all the Capture 2EC crops over to the Brigade EC label and market 1 product for all crops. Capture 2EC will still be available while inventories last for 2007, but all new product being made is being packaged as Brigade 2EC.

Capture LFR: In 2006, Capture LFR (liquid fertilizer ready) was registered for planting time use in corn. In 2007, various other vegetable crops including potatoes, dry beans, onions and numerous other crops were added to the label for planting time use to control seedling pests and they have a label a broadcast PPI application for seedling pest control in corn. In 2008 they expect to add some foliar uses to the label.

Hero 1.24 EC: Hero is a pyrethroid containing both bifenthrin and zeta-cypermethrin for corn, cotton and various vegetable crops reported to give fast control with excellent residual on a wide spectrum of pests.

Mustang Max 0.8 EC: Mustang Max is now labeled for use on Pasture/Range and other grass crops, Sunflowers, Potatoes, and a number of other crops.

More information can be found on the FMC web site at: http://cropsolutions.fmc.com/

Phil Sloderbeck

Methyl Bromide Inventory Continues Downward Trend

From EPA Pesticide Program Updates 5-16-07

The methyl bromide inventory held by U.S. companies at the end of 2006 continues to shrink, according to data released by EPA today. The data show a steady decline in the inventory since 2003, when the Agency began collecting such information.

Methyl bromide is an ozone-depleting chemical that has been used as a general pesticide across a wide range of agricultural sectors for many years. Under the Montreal Protocol on Substances that Deplete the Ozone Layer and the Clean Air Act, the United States

phased out new production and import of methyl bromide, except for allowable exemptions for users who have no technically and economically feasible alternatives.

The data that EPA is releasing includes, in aggregate form, the inventory held by approximately 35 companies in the United States at the end of 2006. The methyl bromide inventory data, displayed graphically below, shows a steady decline - approximately 16,422 metric tons in 2003, 12,994 metric tons in 2004, 9,974 metric tons in 2005, and 7,671 metric tons in 2006 - and demonstrates that the United States continues to manage its domestic inventory appropriately.

The phaseout of new production and import, and the orderly reduction in the existing inventory, are facilitating a transition to alternatives in a manner consistent with previous successful phaseouts of ozone-depleting substances, such as chloroflourocarbons (CFCs) and halons. The United States continues to protect the ozone layer and meet its obligations under the Montreal Protocol while meeting the needs of American farmers.

For more information on the phaseout of methyl bromide, please visit:
http://www.epa.gov/ozone/mbr

Sharon Dobesh

Accumulated GDD's – March 1 – May 16……

Baxter Springs – 879.5; Clyde – 603.5; El Dorado – 719; Elkhart – 543.5; Ellsworth – 668; Emporia – 711; Garden City – 534.5; Hays – 534; Hiawatha – 648; Hutchinson – 675; Independence – 849.5; Kansas City – 705.5; Lawrence – 684.5; Manhattan – 670; Newton – 654; Olathe – 695.5; Pittsburg – 873.5; Saint Francis – 345.5; Salina – 668; Topeka – 737; and Wichita – 713.5.

A "Hummingbird Harbinger" of things to come……

This is somewhat of a curveball in that "the hummingbird" is not an actual hummingbird. Rather, it is a large sphinx moth ---- the tomato and/or tobacco hornworm moth. Sphinx moths are nicknamed "hummingbird moths" because of: their large size (4 to 5-inch wingspread) which approximates the small size of a hummingbird; their ability to hover like hummingbirds; and their elongated proboscis (akin to a hummingbird's long beak) probing deep into open flowers. Tomato and tobacco hornworm moths are being recovered from blacklight traps. This is the typical flight period for the first generation of tomato and tobacco hornworms.

Tomato Hornworm Moth

Tomato/tobacco hornworm moths deposit eggs from which small larvae emerge, but which eventually grow into the familiar “big-as-your-thumb” green worms with the familiar “horn” on their posterior.

Mature Tomato Hornworm

Given their initial small size and green color, young larvae are seldom detected. Feeding damage is slight and inconsequential because of their small size. The presence of hornworm larvae is usually first detected when (seemingly overnight) stems have been stripped of their foliage and appear bare. On the ground or foliage beneath the stripped leaves, fresh greenish frass pellets can be seen. Even then the large worms are difficult to detect due to their remaining motionless.

"stripped" stems

Frass pellets

Inconspicuous

People wishing to keep ahead of tomato and tobacco hornworms can do so with periodic close inspections of tomato plants. **THIS IS NOT AN EASY TASK!** There are many leaves to inspect for the eggs, and this is further complicated because eggs blend with the tomato foliage. And as mentioned earlier, small larvae are camouflaged amid the foliage

Hornworm eggs

Perhaps the best method for preventing tomato/tobacco hornworms would be to “screen them” from tomato plants. A mesh covering over individual plants would deprive the moths direct access to the foliage upon which to deposit their eggs. As plants increase in size, the mesh covering would have to be expanded. This is time-consuming and labor intensive, and only practical in smaller garden plantings.

There are various synthetic insecticidal products available to homeowners (for use against tomato/tobacco hornworms) which could be applied in a preventive manner if that is the chosen route of control. Also available are organically acceptable products such as horticultural oils and horticultural soaps which are efficacious against soft-bodied larvae. Additionally, products containing spinosad and *Bacillus thuringiensis* are organically acceptable. It is the responsibility of the end-user/homeowner to read product labels to ensure the safe and legal/intended use of the product.

Bob Bauernfeind

TO ROTATE OR NOT TO ROTATE; if so, how?

Insecticide resistant populations of horn flies started to appear just about 2 – 3 years of using pyrethroid insecticide ear tags. Since then, how to slow down or avoid the further development of resistant populations, and how to use existing and new insecticides against resistant populations have been among the most common and controversial questions asked. Unfortunately, we have little experience and data dealing with this subject. However, the consensus among some of my colleagues working on this problem is to rotate insecticides by chemical groups and to completely avoid rotating insecticides within the same chemical group because of cross-resistance (once a population of insects becomes resistant to one chemical, they become resistant to other chemicals in the same chemical group).

Classes of Insecticides

CLASS	COMMON CHEMICAL NAMES
I	**Pyrethroids :** Pyrethrum(-in), Permethrin, Cypermethrin, Cyfluthrin, Fenvalerate/Esfenvalerate, Lambda-Cyhalothrin
II	**Organophosphates :** Tetrachlorvinphos (Ravap & Rabon), Dichlorvos (DDVP), Malathion, Coumaphos, Dioxathion, Phosmet, Diazinon, Primiphos-methyl
III	Methomyl
IV	**Insect Growth Regulators :** Dimilin, Methoprene—IGRs

(Source: Wes Watson, North Carolina State University)

Thus, having the information on the various chemical groups of insecticides, one should be able to devise rotation schemes using different types of formulations, as long as the concept of rotating among chemical groups is followed. Some users prefer to rotate within year, whereas others prefer to do so among years. Examples follow:

Within Year Rotation

(Three "Within year rotation" schemes)

June	July	Aug	Sept	Oct
Class VII Pour-on	Class II Dust Bag	Class II Dust Bag	Class II Dust Bag	Class VII Pour-on
Class VII Pour-on	Class I or II Ear Tag	Class I or II Ear Tag	Class I or II Ear Tag	Class VII Pour-on
Class IV Mineral	Class IV Mineral	Class VII Pour-on	Class IV Mineral	Class IV Mineral

Among Years Rotation

(Two schemes of "Among years rotation")

- Year 1, use chemicals in Class I, and Class VII if needed
  Year II, use chemicals in Class II

- Year 1: Use chemicals in Class VII and Class I
  Year II: Use chemicals in Class II

Keep also in mind that aiming at controlling 100% of the pest flies often leads to resistance development as the selection pressure is at its maximum (or we might say, we don't get 100% but 99.9%, and that 0.1% survivor is the resistant individual that will be the beginning of resistant populations. In addition, we should also remember that livestock can have certain densities of the pest attacking them without these causing

economic damage; this depending on many factors, such as physiological status of the hosts, type of pest, host nutrition, environmental factors, etc.

Alberto Broce

Adult Alfalfa Weevils:

Adult alfalfa weevils are causing considerable concern throughout the eastern 2/3rd of the State. The combination of freezing temperatures in April, ideal pathogen-promoting weather since then and continued adult weevil populations are creating havoc with many alfalfa fields. We have a few concerns every year relative to adult weevil feeding but it has never been this widespread or with population densities this great.

Generally, we don't recommend treating entire fields prior to cutting, to control adult weevils. Usually by the time the adults are active the fields have been or are close to cutting, so the recommendation is usually to harvest, especially considering the pre-harvest interval for most registered insecticides is at least 7 days. Also, there is no well-defined treatment threshold or economic injury level for adult weevil feeding and not much data regarding insecticide efficacy. In most years, if adult weevils are a problem its after the field has been cut and the weevils are accumulated in the windrows. They will feed on the plants immediately under the windrow, thus creating stripes through the field, where these windrows were, of plants a few inches shorter then those not covered by the windrows and thus not fed upon by the adult weevils. Usually, this situation clears up on it's own as the hay is removed and the sun starts shining on these areas causing the adults to seek cooler oversummering sites. This situation seems to be occurring in some fields now as there seem to be fewer weevils this week then last week. Once the adult weevils leave, generally after temperature start exceeding 85oF on a regular basis, they will not return to alfalfa fields until fall.

Bird Cherry Oat Aphids in Wheat:

Bird cherry oat aphids (BCOA's) have also created considerable interest, again at least throughout the eastern 2/3rd of Kansas. These populations seem to be declining naturally. Lady beetle and parasitic wasp populations seems to finally be rebounding from the April freeze and this is contributing to the reduction of the BCOA populations.

Bird Cherry Oat Aphids

Armyworms in Wheat:

Scattered reports of substantial populations of armyworms infesting wheat have been received during the last few days. Armyworms can be variously colored but are usually some shade of dark green or black with a faint whitish-colored stripe down the back and orangish and black line running down either side. These are relatively robust worms usually 11/2 – 2" long at maturity. Larvae sampled last week were approximately ¾" in length. Most reports of armyworm infestations have been from Southeast Kansas with reports of heavy infestations from Northern Oklahoma. Armyworms consume more plant tissue as they get larger and feeding from those sampled will probably continue for another 10-14 days. Thus, most of the damage is yet to come. Please consult the Wheat Insect Management Guide (2007) for treatment thresholds and importance of plant growth stage relative to armyworm damage potential. Wheat fields with substantial dead foliage afford good protection under which armyworms may feed and be protected from foliar insecticide applications. This needs to be considered also prior to considering insecticide treatment.

Armyworms in Wheat

Jeff Whitworth and Aqeel Ahmad

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Sincerely,

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