Kansas Insect Newsletter

For Agribusinesses, Applicators, Consultants and Extension Personnel

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March 26, 2010 No. 1

SEASON'S GREETINGS TO THE 2010 KANSAS INSECT NEWSLETTER

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Insects in 2010 ------- Yes. They will be back!

As we transition into springtime, we look forward to the 2010 season, and quickly forget the wintertime woes of below-zero temperatures and excessive snow. Yet, step back and recall the questions asked when we experienced double digit negative temperatures in December and January: "Do the cold temperatures mean that we will have fewer insect pests in 2010?"

In the first place, using the broad umbrella term "insects" mandates that one asks the questioner to be more specific as to WHICH particular insect pest he/she is referring to. Only then might one attempt an answer. Broadly speaking, insect species which are native to Kansas have adapted mechanisms and habits which allow them to survive the adverse rigors associated with our winter weather.

Two pests (commonly on the tips-of-tongues of many Kansas residents) serve to illustrate survival factors: bagworms and white grubs.

Bagworms overwinter eggs in the female bag. And "Yes! The bags are directly exposed to the wind and cold elements". But a bag's contents are protected against wind because the bags are securely closed at the upper end by the heavy silken tie, and at the lower end by virtue of the opening being small and collapsed (Figure 1). Furthermore, winds do not penetrate through the thick wall of the bags which possess a heavy silken inner lining (Figure 2).

Figure 1

Figure 2

Thus protected, the female pupal case within also provides additional protection by virtue of its thick “shell”. And when split open, it can be seen that the eggs are snuggly nestled/cushioned amongst body hairs which the female moth provided as she deposited her eggs (Figure 3).

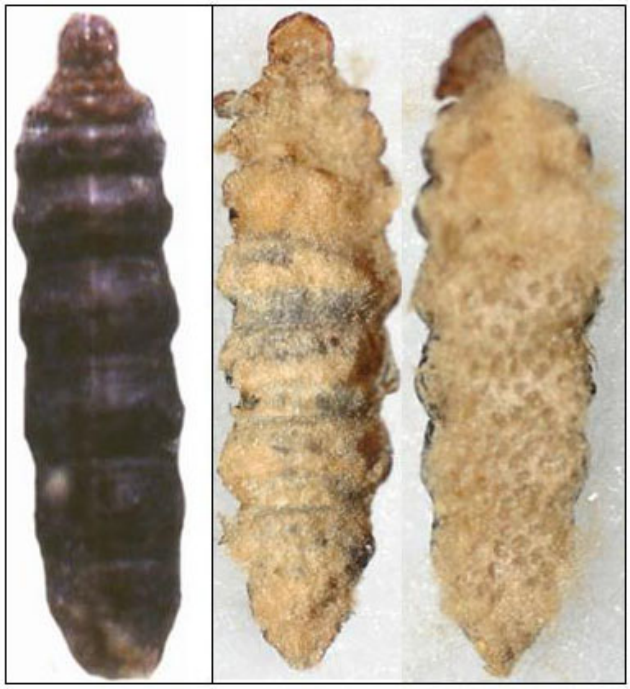

Figure 3

Proof of egg survivability is as follows: 10 female bags were collected on January 16 which followed the two aforementioned double digit sub-zero events of December and January. Pupal cases were removed and individually maintained at approximately 72 °F., Larval emergences were recorded simultaneously from 2 samples on March 20, followed by emergences from 1 each on Mar 21 and 22, 4 on March 23 and 1 on March 24. Larval emergence from remaining pupal case is expected to follow shortly. Thus one can conclude that if he/she experienced bagworm situations in 2009, they need to be on the alert for repeated problems in 2010.

Regarding white grubs, people ask how white grubs can withstand subzero temperatures? To be sure, if directly exposed to freezing temperatures, white grubs would certainly be killed. However, grubs are underground and therefore not exposed to the extreme cold. In fact, given the added insular protection provided by substantial snow cover during the two coldest time frames, grubs were relatively "comfortable" (Table 1)

	Air °F on Coldest December Night	Corresponding 2-4-inch Soil °F	°F Difference	Air °F on Coldest January Night	Corresponding 2-4-inch Soil °F	F Difference
Scandia	-16.3	33.1	**50.4**	-14.7	34.1	**49.8**
Manhattan	-11.7	34.4	**47.1**	-10.7	32.9	**44.6**

Table 1

For the most part, <u>average</u> soil temperatures remained above freezing throughout winter. Even when they dipped below freezing, it was (but) by slight measure (Table 2).

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	12/10/2009	1/08/2010	1/31/2010	2/14/2010	2/28/2010	3/07/2010
Scandia	33.1	34.1	30.3	29.5	33.0	42.2
Manhattan	34.4	32.9	31.5	32.2	31.5	43.4

Table 2

Thus grubs (which generally burrow deeper than the 2- and 4- inch depths at which the temperatures were recorded) probably never experienced below freezing temperatures, thus insuring their survival. Thus as stated above for bagworms, be vigilant (in 2010) for any insects pests which "bugged you" in 2009. They could reappear in 2010.

Look, up in the sky. It's a bird. It's a plane. It's Superman! … or Something Else

Everybody knows that there is no such person as Superman. But yes ---- a lot of airplanes going N-S-E-W as evidenced by crisscrossing contrails. And flocks of snow geese and Canada geese headed north as evidenced by their "honking". But something else has silently begun their yearly northward movement into Kansas and states further north: **black cutworm moths**.

As previously mentioned, insects native to Kansas typically survive the rigors of Kansas winters characterized by the extreme cold weather experienced this past December and January. At the same time, non-native insect species did not survive. But as usual, those insects (notably black cutworm moths, corn earworm moths, fall armyworm moths, tobacco budworm moths, aster leafhoppers, potato leafhoppers and greenbugs) will eventually move northward into Kansas from their southern native ranges.

The first black cutworm moths of the year appeared in a "sticky" trap (baited with the black cutworm pheromone lure) Wednesday morning, March 24 (Figures 4 and 5).

Figure 4

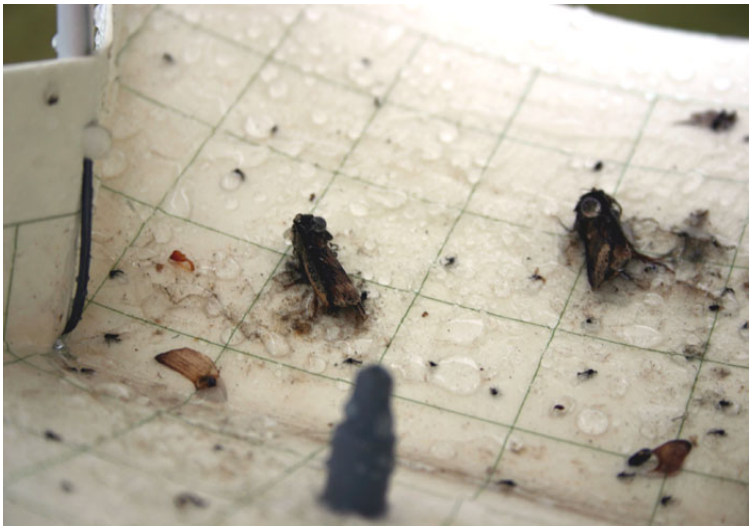

Figure 5

What one sees in the sticky traps are only male moths. Males (Figure 6, bottom) have enlarged bipectinate antennae versus the more filamentous antennae of female moths (Figure 6, top). Bipectinate antennae have a larger total surface area allowing for increased numbers of olfactory receptors which facilitates a male moth's ability to detect/"smell" the synthetically-produced female pheromone contained in the lure placed in the wing trap.

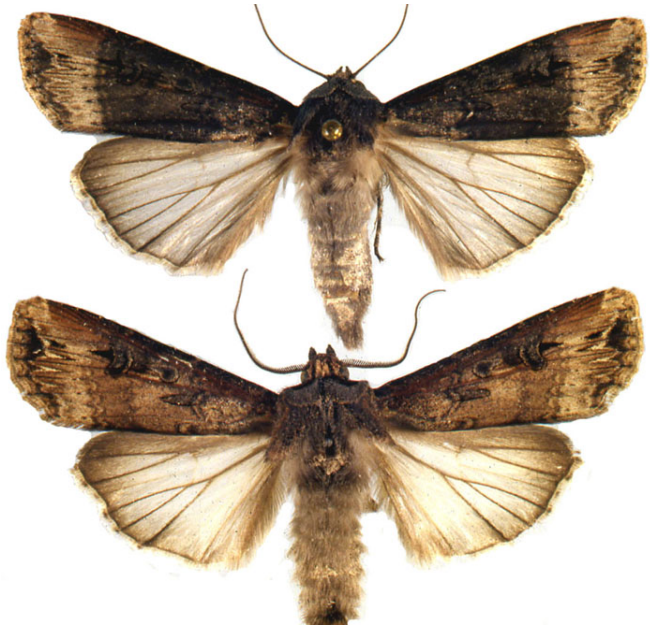

Figure 6

While I have not monitored initial movements of black cutworm moths into Kansas on a regular yearly basis, my records do show "first catches" for 2001, 2002, 2003 and 2009:

March 30, March 23, Week of March 15-21 and March 19, respectively. So the current catch of March 23, 2009, is almost a bull's-eye hit. Because larval development will be somewhat slowed down due to cooler springtime temperatures, it will be 6-7 weeks before black cutworms attain larger size as late-instar larvae with capabilities of causing significant damage. For golf course superintendents, damage is in the form of tunneling damage to greens. Thus as greenskeepers approach mid-May, they need to be on the alert for signs (such as "trails in the morning dew") of black cutworm larvae moving onto greens from adjacent rough areas. For corn producers, this would coincide with the time that many corn fields are in the seedling stage and plants are especially tender and susceptible to stand reductions attributable to black cutworm activities. Prior histories/experiences of black cutworm damage should dictate areas/golf courses/fields that should be kept under surveillance.

The Color Purple ……..

1. A movie title? Yes.
2. The color of royalty with connotations of luxury, wealth, and sophistication? Yes.
3. The color of a GREAT UNIVERSITY? **YES!!!**
4. The color of Sheb Wooley's one-eyed, one-horned flying purple people eater? No --- the 1-eyed, 1 horned flying monster **just ate** purple people ---- more than a half century ago (1958) for the "youngsters" out there.

5. The color of strange traps hanging in ash trees? Yes ---- purple prism "sticky" traps (Figures 7 & 8).

Figure 7

Figure 8

Why are these traps appearing in Kansas? Because, Kansas Department of Agriculture personnel as well as APHIS workers are deploying traps as a front-line effort to detect the presence of emerald ash borers in Kansas. The purple color used for these traps has been documented to be attractive to EABs which become ensnared in the coating of "sticky material". Traps are also baited with Manuka oil and Phoebe oil which contain "attractive" compounds (comparable to those produced when an ash trees are stressed) which appeal to the olfactory senses of EAB.

To date, emerald ash borers have not been recorded from Kansas. Their closest known presence to Kansas is 280 miles to the east in Greenville, MO, where they were first detected in 2008. Results from Missouri's 2009 statewide trapping project conducted at 64 high risk sites in 47 counties resulted in negative recordings from those sites. And intensive trapping within an 8-mile radius around the original site where EAB were initially recorded in 2008 resulted in no new finds for 2009. Thus, again, the previously mentioned 280 mile separation between Greenville to the southeast Kansas border near Baxter Springs is maintained.

Speculation is that emerald ash borers were introduced into North America (possibly as early as the mid-to-late 1980's) via wood used in shipping crates/pallets/dunnage. One has but to look at the current EAB distribution map to see the association of established EAB infestations adjacent to navigable waterways. More inland infestations are attributed to dispersal of EAB via shipments of infested nursery stock, lumber and firewood.

Whereas the shipment of nursery stock and lumber can be somewhat regulated, it is the unregulated transport of firewood which is of utmost concern regarding the introduction of EAB into Kansas. Thus the rationale for (in Kansas) concentrated EAB trapping activities at high-risk sites such as rest stops along major transportation corridors, and at various campgrounds, raceways, nurseries, forest debris dumps, pallet re-manufacturing sites and sawmills.

Again, to date, emerald ash borers have not been documented in Kansas. People may think that they chance upon and emerald ash borer if the encounter other beautiful metallic green buprestid beetles native to Kansas (Figure 9). However, these beetles are relatively large (5/8-inch long and ¼-inch wide) in comparison to the emerald ash borer which barely approach ½-inch in length and 1/8 inch in width (Figure 10).

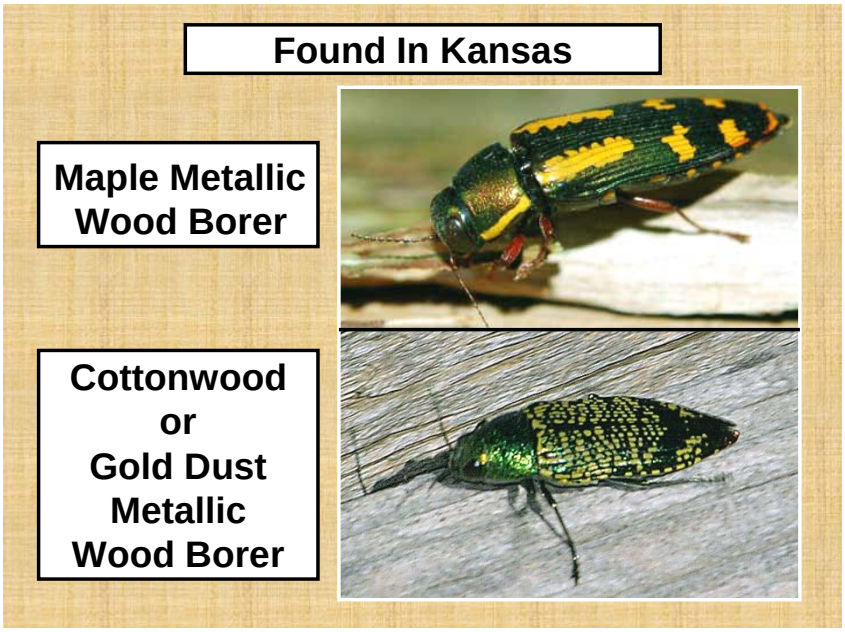

Figure 9

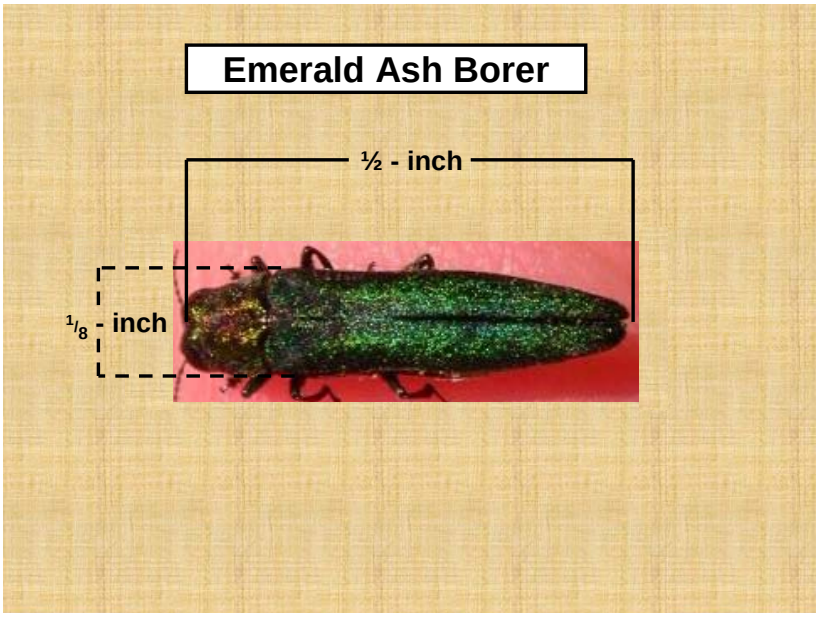

Figure 10

There is little that we can individually do to stave off what might become an actuality in Kansas. People sometimes ask whether they should begin preventative treatments against EAB on their ash trees. There is little reason to do so at this time. Consider the guidelines in areas where EAB are established: initiate preventative treatments if known EAB infestations are within 15 miles of YOUR ASH TREE! Thus, at this point in time, the best that one can do is to follow the continued status/distribution of the emerald ash borer in North America. It may be years before they near Kansas. But never say never ----- just ask Mrs. Ann Hodges (Your "Google" probability assignment).

Bob Bauernfeind

Organic Disease Control (ODC™): Is This "Stuff" For Real and How Does It Work?

We have received numerous inquires regarding the product Organic Disease Control or ODC™, and its supposed effectiveness against insects and diseases. This product contains chitosan (0.25%) as the active ingredient and is being marketed by AgriHouse Inc., (Berthoud, CO) with claims that the product protects trees from attack by pine beetles and blue stain mold. First of all, it is important to discuss the characteristics of the active ingredient. Chitosan (poly-D-glucosamine) is a common polymer present in nature in the cell walls of certain fungi and insects, and the commercial formulation is prepared from chitin that is found in the shells of crustaceans (e.g., crabs and shrimps). Chitosan is supposed to enhance, stimulate, or boost the plants immune (or defense) response. Well, how does it do this? It has been proposed that chitosan is active on the octadecanoid pathway. What happens in this pathway is that linolenic acid is converted to jasmonic acid resulting in the transcriptional activation of genes associated with defense that "turns on" compounds and/or

enzymes such as proteinase inhibitors and polyphenol oxidase. In other words, chitosan may elicit or activate plant defense responses. However, the mechanisms affiliated with this process are not clearly understood.

Currently, there is no quantitative information (based on scientific studies) on the efficacy of ODC™ against the mountain pine beetle (*Dendroctonus ponderosae*) in lodgepole or ponderosa pine. Furthermore, the publications (#672 and #5322) referred to in the in-house blog (http://agrihouse.wordpress.com/) do not contain any conclusive data to substantiate the claims being made associated with this product. In fact, one of the publications presented only one years' worth of data (1996) and did not even test for activity against bark beetles. Additionally, the methodology or procedures used (inoculation) are questionable. I have listed four publications at the end of this article that discuss the potential role of chitosan; however, none of these are studies that have conducted or include evaluations against wood-boring beetles.

There are a number of claims being made regarding ODC™ including: 1) "pre-arm pine trees to resist the mountain pine bark beetle" (Question: how does chitosan do this?); 2) "pine tree resin levels increase within 30 to 45 days when ODC is applied as directed (what is interesting is that there is no information or study cited on how they measured this increase in pine resin levels); 3) "tree resin traps the pine beetle preventing it from laying eggs inside the tree" (Question: where are the studies or information that substantiate this statement? Also, will trees respond similarly if "healthy" or "stressed?"); 4) "ODC will boost the tree's natural defensive response to beetles by increasing the resin pitch-out by 40 percent" (Question: were is the data to substantiate this claim?); 5) "ODC can increase pine tree pitch-out by 40% and has the potential to destroy 37% of the pine beetle eggs in infected pine trees. This was confirmed by the US Forest Service in a 2008 study (it must be noted that these supposed conclusions are based on only one years' worth of data); and 6) "ODC elicits a natural defense response in trees that increases pine resin out up to 40% ($P<0.05$). Pine beetles get trapped in the resin pitch-out and never make their way into the tree. (According to the US Forest Service this amount of pine resin has the ability to limit as much as 37% of pine beetle eggs in pine trees)" (Question: where is the scientifically-reviewed publication that supports this statement? In addition, is the product effective if beetles are already present in trees?).

It is important to understand that the response of plants (e.g., shrubs and trees) to applications of chitosan may be dependent on a number of factors including plant age, plant health, plant type (e.g., dicot vs. monocot), and level of infestation by wood-boring beetles prior to application of the product. Of course, none of these factors has been addressed in the information available. Overall, this appears to be an example of an "aggressive marketing" strategy, which may cause confusion among homeowners/consumers. As such, this supports the value of extension at land-grant universities because it is our responsibility as extension personnel to provide un-biased information to homeowners/consumers so they can make sound pest management decisions based on the results from "sound" science…not mis-information.

Publications:

Klepzig, K. D., and C. H. Walkinshaw. 2003. Cellular response of loblolly pine to wound inoculation with bark beetle-associated fungi and chitosan. Research Paper SRS-30. Ashville, NC. United States Department of Agriculture, Forest Service, Southern Research Station. Pgs. 9.

Mason, M. E., and J. M. Davis. 1997. Defense response in slash pine: Chitosan treatment alters the abundance of specific mRNAs. Molecular Plant-Microbe Interactions 10(1): 135-137.

Doares, S. H., T. Syrovets, E. W. Weiler, and C. A. Ryan. 1995. Oligogalacturonides and chitosan activate plant defensive genes through the octadecanoid pathway. Proceedings of the National Academy of Science 92: 4095-4098.

Walling, L. L. 2000. The myriad plant responses to herbivores. Journal of Plant Growth Regulation 19: 195-216.

Raymond Cloyd

Indianmeal Moths in Homes

The Insect Diagnostic Lab has received multiple samples of a common household pest, the Indianmeal moth, *Plodia interpunctella*, in the last few weeks. In most cases, homeowners do not realize they have an infestation until they see the small, rather unique looking moths flying around the home, especially near lights (see Photo). However, it is the larvae that are the damaging stage. These small, white to greenish or pinkish caterpillars attack a wide range of products found in the home. This includes cereal, cereal products, dried fruits, dehydrated vegetables, nuts, chocolate, candies, and other confections. As the Indianmeal moth larvae reach maturity they may wander far from the original food source to pupate, spinning a web, and leaving behind a silken train wherever they crawl. These silken trails and casings may be found in the corners of cabinets and pantries, under canned goods, or in other areas near the source of the infestation.

Mature Indianmeal moth larva (1/2 inch long)

Adult moth – 3/8 inch long. Outer 2/3 of wing appears reddish or bronze while inner portion is gray to a light yellowish color.

Control of the Indianmeal moth involves finding the source of the infestation and thoroughly cleaning the area. Treat infested or food suspected of being infested by freezing to 0°F for 3 days (larger items may take longer to cool to the center and may require 7 days) or heating to 150°F for 20 minutes. Clean pantry shelves and seal all cracks and crevices that may collect food particles. To avoid future infestations by this insect, avoid letting susceptible products sit unused and unprotected for long periods. If a product is going to be around for awhile, heat-or cold-treat these items and then store then in tightly sealing containers such as plastic snap-lock containers.

For information on this and other stored-product pests please visit:

http://www.ksre.ksu.edu/library/entml2/mf2271.pdf

http://www.ksre.ksu.edu/library/entml2/mf2270.pdf

Holly Davis

Report from the Kansas State University Insect Diagnostic Laboratory:

The following samples were submitted to the Insect Diagnostician Laboratory from March 1st to March 25th.

March 02 2010 – Labette County – Indianmeal moths in home
March 05 2010 – Scott County – Roundheaded wood borer larvae in firewood
March 11 2010 – Jefferson County – Indianmeal moths in home
March 19 2010 – Jackson County – Carpenter ants
March 19 2010 – Atchison County – Bed bugs in home
March 19 2010 – Miami County – Varied carpet beetle adults in home
March 19 2010 – Sherman County – Winged termites in greenhouse
March 22 2010 – Wabaunsee County – Carpenter ants in garage
March 22 2010 – Wyandotte County – Pyralidae larvae in basement
March 24 2010 – Nemaha County – Indianmeal moths 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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