Kansas Insect Newsletter

For Agribusinesses, Applicators, Consultants and Extension Personnel

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How Do Plants Defend Themselves Against Insect Pests?

Plants such as trees and shrubs grown in landscapes and nurseries experience a variety of both abiotic (non-living) and biotic (living) factors that may compromise their ability to defend themselves. Abiotic factors include weather (e.g, high or low temperatures and relative humidity), soil condition (e.g., high pH and soil compaction), nutrient deficiencies, and man-made chemical (e.g., pesticide drift and air pollution) and physical disturbances (e.g., mower injury and weed-eater "blight"). Biotic factors such as those associated with insects, mites, and diseases (e.g, fungi, bacteria, and viruses) may be infectious because they can spread among plants where as abiotic factors are not infectious. However, what may not be clearly understood is how defenses are associated with plant health. Plant defenses can be based on physical deterrents such as trichomes (hairs), waxy cuticles, or thick cuticles. In addition, plants have evolved the ability to produce secondary plant substances or chemical defenses, which are not involved in growth or development, but serve as protection from biotic organisms (e.g., insect and mites pests, and diseases); however, there are production costs associated with matter and energy to maintain these defenses. Chemical defenses are designed to reduce or stop feeding by insect pests. One group is the carbon-based defenses, which are associated with compounds such as phenolics, terpenes, and tannins that inhibit tissue degradation and ingestion by invading insect pests. These are oftentimes referred to as "digestability reducers" because they bind to proteins in the insect mid-gut thus reducing the insects' ability to digest any food. In fact, studies have shown that elevated carbon dioxide levels (usually blamed on 'climatic change') may allow certain plant species to increase their carbon-based defenses.

A second group is the nitrogen-based defenses that involve the production of alkaloids and cyanogenic glycosides that either act as toxicants and directly kill insects or repel them away by making the plants unpalatable thus preventing an infestation. In this case, elevated carbon dioxide levels may reduce the concentrations of nitrogen-based defenses. Any trade-offs between carbon- and nitrogen-based plant defenses may have both short and long-term consequences on insect pest populations. The application of fertilizers, particularly those high in nitrogen, may indirectly impact the balance between carbon and nitrogen and thus increase susceptibility to wood-boring insects.

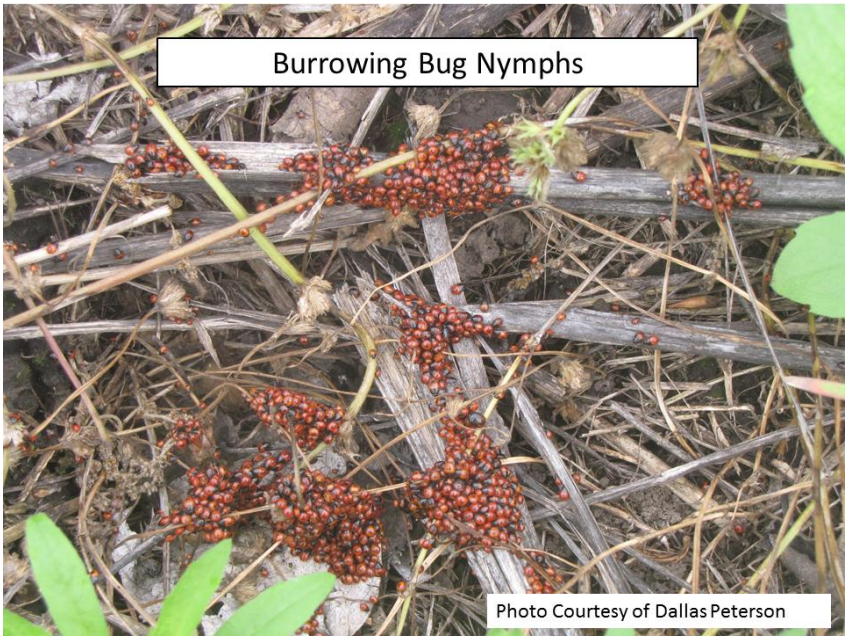
So, how does this relate to growing plants in landscapes and nurseries? Well, this is the primary reason why it is recommended to maintain "plant health" and avoid any stressors, which can inadvertently lead to an increase in susceptibility to insect pests. For example, if trees or shrubs grown in landscapes and/or nurseries, or those that have been recently transplanted in the ground or in containers, are stressed in away due to deficiencies or an overabundance of moisture and nutrients (fertilizers), receive inadequate light, and/or improper mulching and pruning practices, this will compromise the plants ability to defend itself against insect pests; primarily wood-boring insects and certain plant pathogens. In addition, multiple biotic and/or abiotic factors may be involved or there may a combination of interactions (both biotic and abiotic), which may make it

difficult to actually diagnose the primary problem. For example, most species of bark beetles feed and reproduce in recently dead or dying trees although a few aggressive species may attack and kill so-called "healthy trees." As such, both excessively moist soil conditions (ok…we haven't experienced this in awhile) and mower "blight" can compromise the plants' defense system thus leading to potential problems with both root-rot pathogens and wood-boring insects. So, how do you deduce the actual cause of the problem (something to think about)? In addition, anymore we cannot rely on natural rainfall to provide sufficient moisture to plants, especially those in landscapes, so they can maintain their defensive arsenal. As such, deep but infrequent irrigations are recommended in order to preserve the integrity of plants grown in landscapes and nurseries. This practice will reduce the potential (not eliminate…however) for insect problems to occur during the growing season.

Raymond Cloyd

Burrowing Bug Nymphs

There have been several reports of white-margined burrowing bug nymphs, *Sehirus cinctus*, over the past few weeks (see photos). These little bugs are showing up in gardens, around compost piles, and in field crops (especially those with reduced tillage), often in rather large congregations. These bugs overwinter as adults, mate in the spring, and lay eggs in holes in the soil which usually hatch in mid-May. They are very secretive but live and feed primarily above ground. They are especially abundant on henbit and other mints and nettles in late spring as they feed on the developing seeds from these plants. While these insects often cause concern for growers and homeowners alike they are not harmful and will not damage plants and crops of interest.



Jeff Whitworth *Holly Davis*

Cutworms --- specifically variegated cutworms

So what is a **cutworm**? In a very broad statement, cutworms are sometimes characterized as being kind of dark, pudgy, nondescript "worms"/caterpillars that crawl along the soil surface cutting off young plants. Often times, their presence is signaled by a cut plant laying on the soil surface ---- but the worm is no where to be seen (Figure 1).

"Surface-feeding cutworms" will feed on fallen portions of plants at night but (during daylight hours) conceal themselves beneath surface trash. "Tunneling cutworms" will drag cut portions of plants underground where they will consume their bounty

Figure 1

A "surface-feeding cutworm" can generally be found by finger-raking debris on the soil surface. If a "tunneling cutworm", closely examine the soil surface around the cut plant to detect what appears to be a point-of-entry into the soil (Figure 2A). After a bit of careful probing, the actual cutworm can be found (Figure 2B & C), hiding/waiting out the daylight hours before resuming its foraging/cutting activities under ensuing evening's cover of darkness.

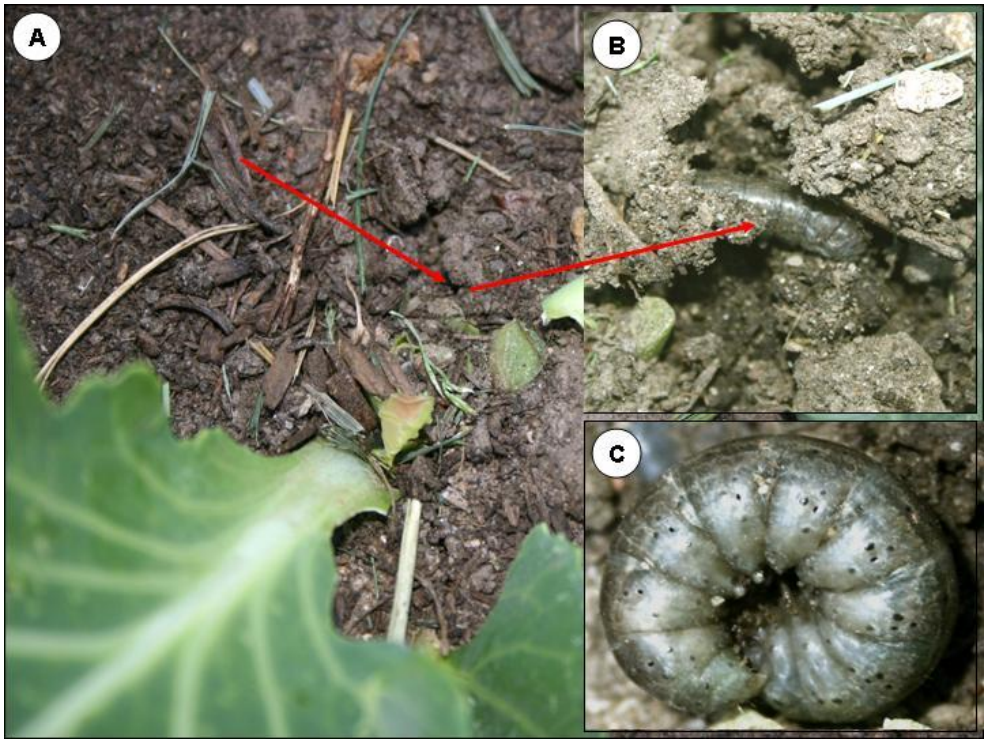


Figure 2

Specifically then, what are **variegated cutworms**? As opposed to the aforementioned cutworms, variegated cutworms are "climbing cutworms". Usually during daylight hours, variegated cutworms seek shelter beneath debris on the soil surface. Then under the cover of darkness, they remerge, ascend plant hosts and resume feeding activities. . However, because variegated cutworms are not entirely nocturnal, they may easily be detected/observed as they munch away during daylight hours (Figure 3).

Figure 3

So the question, "Why now are variegated cutworms of interest/concern?" Variegated cutworms appeared on the 2012 radar screen early this year ----- a report of "mysterious worms" feeding on plants in Douglas County on April 16, and 3 days later the appearance of "mysterious egg masses" on sides of homes in Finney County. Both incidences were identified as variegated cutworms.

Variegated cutworms are native to Kansas, and as such are present on a yearly basis. Their early "noted presence" this year may be correlated with the warmer-than-normal spring. Variegated cutworms overwinter as pupae in the soil within earthen cocoons (Figure 4A). Warmer soil temperatures may have accelerated pupal development culminating in the early emergence moths (Figure 4B). Moths deposit egg masses (Figure 4C) in an indiscriminate manner which suggests a wide host range ---- that newly emerged larvae will feed on whatever host plant is immediately available. In Kansas, variegated cutworms produce 3 generations per year, and in one instance, a partial 4th generation was documented.

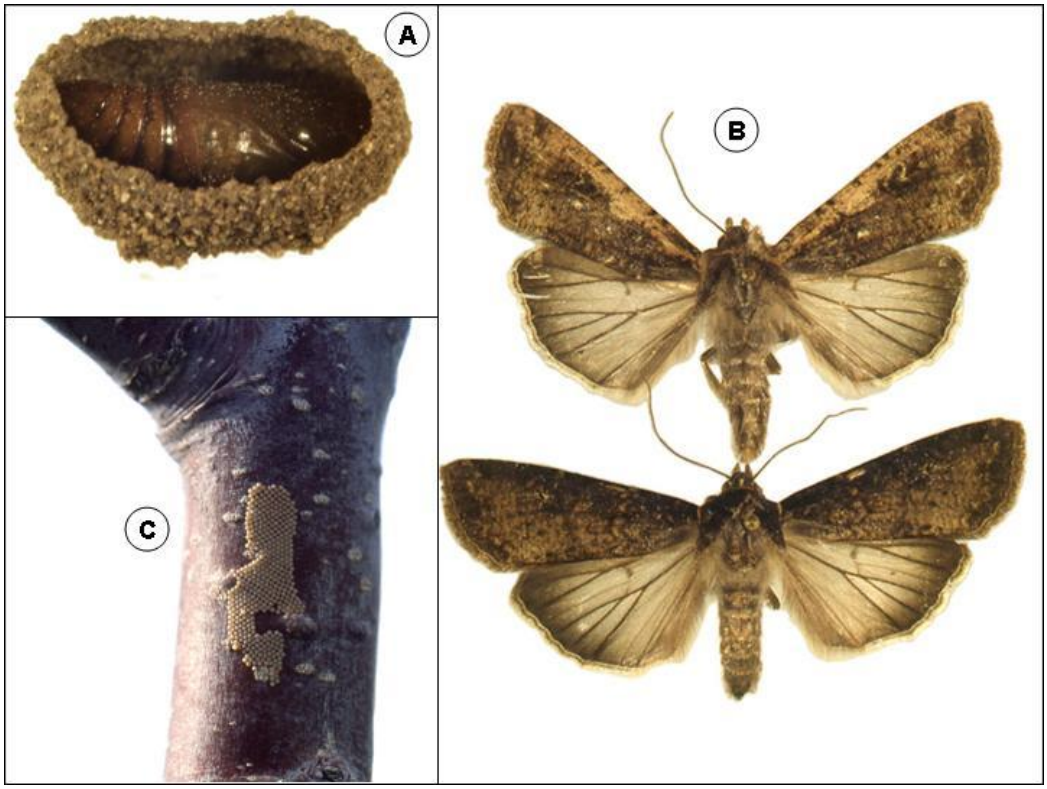


Figure 4

Because of the recent mild winter, it is conceivable that many more pupae survived the rigors of winter. So starting 2012 out with a higher moth population, and in combination with their early emergence, AND COUPLED WITH THEIR ENORMOUS REPRODUCTIVE CAPACITY (in one study, an average of 2,111 eggs per female moth), this could be a banner year for variegated cutworm activities.

Just a couple of side notes: as is the situation with most insect pests, their presence goes undetected until such time that they are of sufficient size to cause noticeable damage. Figure 5 illustrates this.

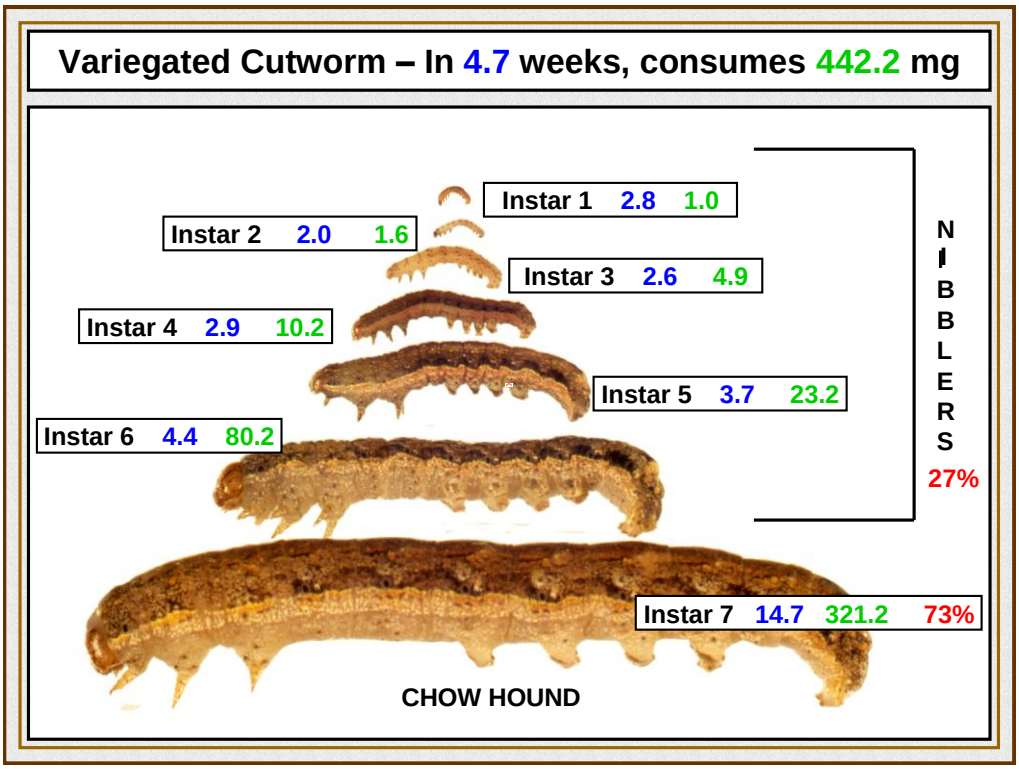


Figure 5

Under ideal/controlled conditions in a laboratory study where variegated cutworms were reared on an artificial diet, initial nutritional needs were minimal. That is, through their first 6 developmental instars, they only consumed 27% of the total required 442 mg diet. Depending on the size of a host plant, this minimal feeding usually is negligible and easily be overlooked. That all changes during their last developmental stage (which constitutes nearly 45% the duration of the feeding period) when they consume the remaining 73%. This results in the rapid destruction/disappearance of plants.

Under outbreak instances when variegated cutworms consume their available food source, they will assume the "army habit" in search of additional host plants. Little is spared in the path of their march. In rural settings alfalfa (Figure 6) and clover are favorite hosts.

Figure 6

Gardens in entire neighborhoods may be ravaged. Under dire circumstances, sapling trees may be striped of foliage and even the tender bark consumed (observed this in Sumner County – 2002) (Figure 7).

Figure 7

Only time will tell what is in store during 2012.

Bob Bauernfeind

Report from the Kansas State University Insect Diagnostic Laboratory:

The following samples were submitted to the Insect Diagnostic Laboratory from May 11th to May 17th.

May 11 – Ness County – Insect galls on Maple leaves
May 11 – Meade County – Soldier beetles in Juniper
May 11 – Nemaha County – Snow flea springtails on driveway
May 11 – Miami County – Saddled prominent moth caterpillar around mulch
May 14 – Shawnee County – Honey bee swarm in tree
May 14 – Douglas County – Periodic cicada, *Magicicada* sp.
May 14 – Johnson County – Cynipid gall wasp larvae on sidewalk
May 14 – Riley County – Bat bug in commercial building
May 14 – Riley County – *Trichobaris* sp. weevils in garden
May 15 – Sumner County – White-margined burrower bug nymphs in garden
May 16 – Geary County – Common variegated fritillary caterpillars around hostas
May 16 – Riley County – Common variegated fritillary caterpillars on pansies
May 16 – Stevens County – Beet armyworms in corn
May 16 – Brown County – Termite swarmers around 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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