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Kansas Insect Newsletter

For Agribusinesses, Applicators, Consultants, and Extension Personnel

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INSECT "KILLER:" *BACILLUS THURINGIENSIS* (BT)

Bacillus thuringiensis (Bt) is a soil-borne bacterium that is widely used in landscapes and nurseries to control a variety of ornamental insect pests. Different insect pests are controlled by different strains, sub-species, or variants of the bacteria. The common strains and the insect groups that they are active on include *Bt* var. *kurstaki* (caterpillars), *Bt* var. *israelensis* (larvae of mosquitoes and certain flies), and *Bt* var. *tenebrionis* (leaf-feeding beetles). Unlike fungi, bacteria have to be ingested in order to be active. This means that thorough coverage of all plant parts is essential when using *Bt* products so that the target insect pest will consume the bacteria. Once the bacteria are ingested, they produce endotoxin crystals that bind to the gut membrane creating pores, which results in leakage and swelling. The swelling continues until cells burst, allowing the gut contents to enter the insect's blood (hemolymph). This disrupts the blood pH, and results in paralysis and death within 24 to 72 hours after consumption of the bacteria. It should be noted that *Bt* var. *kurstaki* is not effective against sawfly larvae since most of them are in the order Hymenoptera (bees and wasps), not Lepidoptera (butterflies and moths).

It is important to understand the following characteristics of *Bt* products available to professionals and homeowners in order to maximize effectiveness when used to manage or control certain ornamental insect pests.

Selectivity. In contrast to many conventional insecticides (e.g. Orthene, Sevin, and the pyrethroid-based insecticides), *Bt* products (e.g. Dipel and Thuricide) don't have broad-spectrum activity. However, since they, in general, have minimal impact on non-target organisms including natural enemies (parasitoids and predators), there are fewer problems associated with target pest resurgence and secondary pest outbreaks (too be discussed in a future newsletter article), which may occur when using broad-spectrum insecticides. Currently registered *Bt* products have no activity on phloem-feeding insects (e.g. aphids, whiteflies, mealybugs, and soft scales) and mites (e.g. twospotted spider

mite and spruce spider mite). An alternative product must be used if phloem-feeding insects or mites are the primary pest.

Application Timing. *Bt* products must be applied when the young (=immature) insect stages are present because due to their small size, insects, at these stages, don't have to consume as much plant material before the bacterium becomes effective. They are also killed before they cause severe plant injury and reach the reproductive phase. If *Bt* is applied too late, insects have to consume much more plant material containing the bacterium in order for it to be effective. This results in greater plant injury since it takes longer to kill the insect. In addition, the insect may switch from the growing or developmental phase to the reproductive phase before consuming a lethal enough concentration of the bacterium. If this occurs, less of the bacterium will be consumed and there is a higher probability of adult survival, which means a new generation of insects will be produced in the future.

Residual Activity. *Bt* products don't last long in the environment (24 to 48 hours, in general) because they are susceptible to fragmentation by sunlight (ultraviolet light degradation) and removal by rain. As a result, repeat or multiple applications may be necessary.

Speed of Activity. Since *Bt* products are slower-acting than most conventional insecticides, they must be applied before insect pest populations reach damaging levels. Again, *Bt* products are most effective against the young or immature stages of the target insect pest.

Safety. The mode of action of *Bt* products is specific for insects due to the fact that the endotoxin crystal is only active in high pH (>7.0) guts. There are no direct affects on humans and mammals because humans have a very acidic pH stomach due to the presence of hydrochloric acid (HCl).

Storage Life. *Bt* products must be stored at temperatures of 50 to 60ºF to prolong the shelf life of the bacterium. Avoid exposing any products to extreme cold and hot temperatures, which may breakdown the bacterium into molecules that are not insecticidal.

Water Quality. Alkaline water (pH greater than 7.5) can reduce the effectiveness of the *Bt* toxin, so the water solution must be adjusted to a pH of 7 or lower. This may be accomplished by using vinegar (acetic acid).

Bacillus thuringiensis products can be used as part of a pest management program to manage certain ornamental insect pests; however, it is essential that you understand their advantages and limitations in order to use them effectively.

Raymond A. Cloyd

Alfalfa

Very tiny potato leafhoppers were common in uncut alfalfa fields on 15 June in Dickinson County. This indicates eggs are hatching and thus populations will probably be rapidly increasing. Symptoms of “hopper burn” were already starting to show.

Jeff Whitworth

Soybeans

If the mild summer temperatures continue, soybean growers need to be watching for the 1st indications of soybean aphids. These insects historically have not migrated into Kansas until mid July but the possibility exists that they could arrive anytime. Once established in a soybean field soybean aphid populations can increase very quickly if temperatures remain under 95 degrees F. For specific information regarding alfalfa or soybean insect pests please consult your county extension agent or check online at: http://www.oznet.ksu.edu/.

Jeff Whitworth

Wheat Head Armyworm

We have received a few calls over the last few days from producers finding some wheat head armyworms in wheat in western Kansas. With harvest delayed it is still too early to know if populations are heavy enough to cause any serious damage or any concerns at the elevator. Wheat head armyworms are present every year, but occasionally they are abundant enough to cause enough injury to be detected at the elevator. Frequently the infestations are limited to the borders of fields and thus the problem often shows up in the first few loads delivered to the elevators. Often times, infestations are not detected until worms are found crawling around the trucks or dump-pits at the elevator or partially eaten kernels of grain are detected in the samples pulled at the elevator. With wheat nearing harvest there is really nothing that can be done about the wheat head armyworms at this time. If caught early insecticides could probably be used to control the worms, but sprays at this time would leave unwanted residues or cause unwanted delays in harvest. If serious infestations are detected, we would be interested in hearing about the problems so that we can build a case for more research on this pest (send a brief message to psloderb@ksu.edu or phone 620-275-9164. Additional information on this pest including pictures of the worms and their damage can be found at: http://www.entomology.ksu.edu/DesktopDefault.aspx?tabindex=217&tabid=503

Phil Sloderbeck

Accumulated GDD's – March 1 thru June 21……

Baxter Springs – 1651.5; Clyde – 1264; El Dorado – 1432; Elkhart – 1198.5; Ellsworth – 1418.5; Emporia – 1415; Garden City – 1650.5; Hays – 1134; Hiawatha – 1371.5; Hutchinson – 1374.5; Independence – 1623.5; Kansas City – 1435.5; Lawrence – 11438; Manhattan – 1461; Newton – 1345.5; Olathe – 1427.5; Pittsburg – 11646; Saint Francis – 898.5; Salina – 1413.5; Topeka – 1509 ; and Wichita – 1468.

This is the final 2007 Kansas Insect Newsletter in which Accumulated GDD's will be presented. It is hard to believe that we are nearly 4 months past the March 1 starting date for the current growing season. We are well beyond the GDD guidelines assigned to the initiation of first generation activities of specific insect pests for which guidelines were established. Yet to come are accumulated GDD's with which to gauge the initiation of second generation activities of several species of scale insects (refer back to the February 23, 2007, Kansas Insect Newsletter #3). Continuing to calculate and compile GDD's for all 21 selected sites in Kansas does not seem warranted given the few (generally speaking) obscure and infrequent incidences associated with these scale species. However, any individual wishing to receive continued accumulated GDD information can contact me, and I will provide a weekly update to that individual.

Bob Bauernfeind

"Masked Chafers" ……

Masked chafers are being picked up nightly in blacklight traps operated in the Manhattan area. Chafer activities are likely underway throughout most of Kansas. At this point, we are not concerned with chafer flight peaks which are important when applying "short residual" grubacide preventative treatments against annual grubs. However, now is the time to apply longer-residual systemic grubacides if preventative measures are a part of lawn/turf maintenance programs. Two active ingredients (imidacloprid and halofenozize) are formulated into various products for sale to and use by homeowners. Both are systemic. A post-treatment irrigation is important for moving the active ingredients into the soil where they can be picked up by plant root. systems. When grubs feed on roots, they ingest the active ingredients. Imidacloprid is a nerve poison whereas halofenozide is an insect growth regulator which disrupts the normal molting process.

A third active ingredient has recently received registration for use in controlling grubs in turf. Thiamethoxam is incorporated into the product, Meridian, which is marketed to licensed and certified lawn care specialists

Bob Bauernfeind

Sincerely,

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