# Kansas Insect Newsletter

For Agribusinesses, Applicators, Consultants and Extension Personnel

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**May 20, 2010 No. 9**

## SOWBUGS AND PILLBUGS

Sowbugs and pillbugs are not insects but are classified as isopods or crustaceans, closely related to crayfish and crabs, and are distributed worldwide. The most common sowbug and pillbug species are *Porcellio laevis* and *Armadillium vulgare*. In Europe, sowbugs and pillbugs are commonly called woodlice. Both are oblong, oval or convex in shape, segmented, and are flattened underneath the body. They are black, gray, or brown in color, and approximately 19 mm (3/4 inches) in length when full-grown. The broad head contains a pair of eyes, two pairs of antennae, and chewing mouthparts. They also have seven pairs of legs. Sowbugs have two small, tail-like appendages (uropods) located at the end of the body; pillbugs do not have appendages. Sowbugs and pillbugs are distinctly segmented with seven hardened individual overlapping plates. Pillbugs can roll-up into a ball when disturbed (thus the common name 'roly-poly') whereas sowbugs cannot.

Sowbugs and pillbugs have a particular biology in which eggs and young remain inside females for several months inside a pouch-like marsupium. This provides protection from predators and prevents desiccation (drying-up). Females may produce two or more broods during the year with between 20 and 28 young per brood. Both sowbugs and pillbugs primarily feed on decaying organic matter and fungi because they possess weak chewing mouthparts; however, they may occasionally feed on the stem and/or roots of young seedlings, and will feed on young, tender vegetation or fruit. They can cause damage to beans, lettuce, and other vegetable crops.

Sowbugs and pillbugs are noctural (night-time) feeders hiding during the day under rocks, plant debris, boards lying on the ground, and in mulch; however, they may be observed during the day-time after rains or when conditions are overcast. They may also burrow several inches into soil. Both sowbugs and pillbugs require constant moisture for survival since they cannot control or regulate water loss from their bodies as they lack a waterproof exoskeleton. Adults may live up to 2 years or more. Sowbugs and pillbugs may occasionally enter homes, primarily damp areas such as basements and around house plants. They may enter greenhouses during the winter due to suitable environmental conditions (e.g., temperature and moisture).

### *Management*

The primary means of dealing with sowbugs and pillbugs is by habitat manipulation. For example, raking mulch and leaf debris will expose sowbugs and pillbugs to natural enemies and pest control materials. Applications of pest control materials are generally not required indoors because sowbugs and pillbugs will quickly dry-out and die after entering homes. Commercially available products for homeowners labeled for

control or suppression of sowbug/pillbug populations (primarily outdoors) may contain the following active ingredients; beta-cyfluthrin, lambda-cyhalothrin, permethrin, and gamma-cyhalothrin. Another product commercially available contains a combination of materials including 2-phenethyl propionate, sodium lauryl sulfate, eugenol, thyme oil, and sesame oil. Most of these active ingredients will only kill sowbugs and/or pillbugs on contact so repeat applications may be required.

Raymond Cloyd

## Jumping Jehoshaphat! Grasshopper Bait! ---- Grasshopper Control?

Driving down the road, I unexpectedly came upon a sign advertising "Hopper Bait" (Figure 1).


**Figure 1**

If the sign had also advertised "Hooks, Worms and Minnows", I would have assumed that I was near a Bait Shop. But Fire pots, and Pond Plants? I knew that I was near a nursery.

So what's with grasshopper bait? I knew that "old time" Grasshopper Baits provided effective grasshopper control --- wheat bran baits laced with active ingredients such as aldrin, dieldrin, heptachlor and toxaphene. Since the demise of those "persistent" active ingredients, carbaryl-laced bran products have been the most commonly recognized standard grasshopper baits.

The above-advertised grasshopper bait is also a wheat bran bait --- but coupled with the spores of the microbial protozoan *Nosema locustae*. There are two such products registered for use in Kansas: Semaspore™ and NOLO Bait™.

The appeal of these biological materials is that protozoans are naturally occurring entities, and thus qualify as "organically acceptable". This is all well and good. But, DO THESE PRODUCTS WORK? The simple answer is that, "Yes. Grasshoppers succumb to *Nosema locustae*". <u>However, these products do have limitations and drawbacks</u> as evidenced by the many qualifier words/phrases used in the literature distributed by the producers/manufacturers of these products: may, can, could, perhaps, although, unfortunately, however, but, usually, seem to, seemed to, indicate that, field observations, some feel that, testimonials.

There are special points-of-interest which need to be taken into consideration. The first is how *Nosema locustae* works. Whereas the mode of action of contact synthetic insecticides affecting various nervous system receptor sites provide "quick kill", *Nosema locustae* and other microbials **do not** provide similar rapid results. This may be a disappointment to "organically orientated" individuals who (when confronted with large numbers of marauding grasshoppers) apply a *NL* product only to see the grasshoppers seemingly unaffected by their control efforts.

*Nosema locustae* spores must be ingested by grasshoppers. This is why the spores are incorporated with an edible wheat bran bait WHICH IS CONSUMED by grasshoppers. Once inside the insect's gut, the spores are activated, producing a filament which pierces the mid-gut wall. In 1st and 2nd developmental stage grasshopper nymphs, gut bacteria leak into the body cavity resulting in a bacterial infection which kills the young nymphs in a week's time. This, then, really defeats the purpose of utilizing *NL* ---- ideally, you want the insect to live in order for the *NL* to multiply and produce more spores. *NL* is intended as a slow but long-term tactic for the suppression of grasshopper populations.

Third instar nymphs are the recommended stage for targeting when using *NL* products. At this point in time, nymphs are large enough to not "quickly succumb", but rather continue to live, thus allowing *NL* survival and increased production of spores. *NL* derives **its** energy by "consuming" the fat body content of grasshopper nymphs. Depletion of fat body content negatively effects the development of successive nymphal stages resulting in additional grasshopper deaths. Infected grasshoppers that do not die are more lethargic and feed less. "Healthy" grasshoppers may cannibalize weakened individuals or scavenge the carcasses dead grasshoppers thus acquiring and further perpetuating *NL* spore production. Infected females may go on to produce overwintering eggpods, but the pods may lack the full complement of eggs, and eventual hatchlings will be weakened.

As acknowledged in product fact sheets, grasshoppers prefer depositing eggs in areas of undisturbed soil. These "hatching beds" are commonly associated with uncultivated soils, ditch banks, field margins, roadsides and pastures. It is recommended that individuals preferring to use *NL* locate those hatching areas, monitor nymphal development and apply *NL* when the majority of larvae are in their 3 instar developmental stages. The difficulty here is, how does the average home gardener go about locating hatching beds in and around their properties, and if such is possible, will/do the people have the discipline/time/patience to make instar determinations more less pinpoint when the greatest proportion of the population is the preferred instar?

This is possibly a reason that *NL* was first investigated as a suppressive control tactic of grasshoppers on contiguous rangeland expanses. Basically, entire rangelands might be considered ONE HUGH HATCHING BED to which *NL* could be aerially applied.

It is interesting to note that the current product labels for both Semaspore™ and NOLO Bait™ include application instructions only for **Rangeland** (defined as land, mostly grassy, whose plants can provide forage for grazing or browsing animals) and **Cropland**, sites for which *NL* uses were originally intended. And it was

recognized that in those situations that multiple applications would be required due to various limitations such as product degradation and differentials between hatching periods of various rangeland grasshopper species.

Another realization by product manufacturers is that if confronted by sizable invasive grasshopper populations, *NL* would fall short in its ability to thwart the movement. In one instance, a product manufacturer states (on the label) that if quick knockdown is necessary, *NL* can be mixed with "other insecticide baits". The other manufacturer **markets** a carbaryl bait. Neither of these recommendations, then, is compatible with organic production practices. But it goes to show that manufacturers acknowledge the inability of *NL* products to be all that the proponents of organic methods would hope for the products to be. Thus, in some instances then, the grasshoppers win.

To summarize the recommendations of how and when to apply *NL* products:

(1) Locate hatching beds and apply NL when grasshoppers are predominantly third instar nymphs; (2) Determine population levels to evaluate their potential to cause damage (8 – 25 grasshoppers per $yd^2$ is the range cited as "potentially threatening"; (3) Apply the appropriate amount of product --- a minimum 1 lb./per acre rate is based on 8 grasshoppers per $yd^2$; (4) Apply by hand broadcasting or use of a "Whirlybird", or, if larger acreages/tracts of land, via aerial applications; (5) Do not apply if rain is expected within 8 hours of application or if there is morning dew (moisture does not deactivate the *NL* spores, but makes the wheat bran bait soggy and unpalatable); (6) Continually monitor grasshopper populations and be prepared to reapply *NL*; (7) Check the formulation date on the package label --- if stored/maintained under cool and dry conditions, maximum effectiveness of the product can be expected up to 13 weeks after its production.

## Chow time ----- Tobacco Budworms

For 16 years, geraniums have been planted next to the walkway to our front door. During that time span, I frequently received reports of "worms attacking geraniums". My turn came last year. Strange as this may seem to many people, I was delighted with the appearance of **MY OWN** tobacco budworms. (Keep in mind that entomologists look at insect "problems/situations" differently than most folks). So this year, I would hope that tobacco budworm moths find 2110 Londondery Drive ---- **The Salad Bar Is Open** (Figure 2).

**Figure 2**

Coming off of last year's experience, I will be prepared for their arrival. Tobacco budworms are an insect species which does not overwinter in Kansas. Rather, moths (Figure 3) move into Kansas from their native


**Figure 3**

ranges in warmer southern habitats. Utilizing a pheromone trap (Aarow, Figure 2), I should be able to be "on alert" if and when they arrive. I will then select groups of plants for treatment while leaving others untreated. Hopefully this limited exercise will serve to illustrate the usefulness of pheromone trapping as a tool for the

timely application of an insecticide to protect geraniums from damage attributable to tobacco budworms. Stay tuned.

*Bob Bauernfeind*

## White Heads in Wheat (Wheat Stem Maggot vs Hail)

Every year just after wheat heads and before it starts to ripen we receive calls about white heads in wheat. Lots of things can cause white heads, but if you can grab the head and pull easily and the head pulls out of the tiller just above the uppermost node, the tiller has probably been infested wit wheat stem maggot or possibly damaged by hail. Evidence of the maggot feeding can generally be seen on the portion of the stem pulled out with the head as an area of macerated tissue at the tip of the stem. However, sometimes the break appears to be almost straight across with no sign of damaged tissue except maybe some decay around the break gradually progressing up the stem as the head dies. In this case closer examination of the leaf sheath between the upper most node and the flag leaf will often reveal noticeable damage consistent with small hail hitting the stem. Evidently if hail occurs at just the right time when the stem is elongating and is very turgid the sharp impact of the hail is just enough to pop the stem and cause the head to die, thus creating the white heads in the field. Separating these two types of damage can become important in adjusting storm damage.

Wheat stem maggot damage - Lots of macerated tissue around larval feeding site.

**Stems broken by hail - breaks in stems are fairly clean and nearly straight across.**

Stems broken by hail - breaks in stems are fairly clean and nearly straight across.

## Get Grain Storage Facilities Ready for Wheat Harvest

Now that wheat has headed, producers need to be thinking about getting their bins ready for wheat harvest. Whether storing seed wheat or the entire wheat crop, storage areas need to be cleaned thoroughly and sprayed with an insecticide prior to filling with this year's harvest. This needs to be done several days prior to harvest so that the insecticide has time to work before new grain is put into the bin.

Also, make sure that any other grain stored on the farm is free from infestation prior to harvest to reduce the chance of insects from moving from one bin to another. Any infested grain should be sold, disposed of or fumigated. Even small quantities of old grain can serve as the source of insects to infest this year's grain.

If the grain will be stored on the farm for more than a few weeks, producers will probably want to consider using a grain protectant to treat the grain as the bins are being filled.

*Jeff Whitworth* *Phil Sloderbeck*

## Report from the Kansas State University Insect Diagnostic Laboratory:

The following samples were submitted to the Insect Diagnostic Laboratory from May 14th to May 20th.

May 14 2010 – Sedgwick County – Bird mites in home
May 19 2010 – Sumner County – Woolly apple aphid
May 20 2010 – Riley County – Termite swarmers in home
May 20 2010 – Riley County – Termite swarmers in home
May 20 2010 – Shawnee County – Drugstore beetles in home
May 20 2010 – Stevens County – Spider in wheat
May 20 2010 – Shawnee County – Common house spider in and 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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