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IPM in Schools National Coalition "HUG A BUG!"

In This Issue, Stored Product Pests: Granary Weevils & Saw-toothed Grain Beetles

July/August *"Pest Management is People Management"* 2011

What are Stored Product or "Pantry" Pests?

Stored product pests are insects that contaminate food and other agricultural cash crop products making them undesirable for human consumption or use. Insect pests can actually contaminate more food than they can eat. It is estimated that various types of insects that infest stored grains and seeds, can contaminate up to 10% of these food products worldwide. Food products can become infested at any point in time: in crop fields, in granaries and storage bins, in mills, food processing plants, warehouses and distribution centers, restaurants, grocery stores, and in cupboards and pantries in homes, facilities and schools.

Stored Product Pests: Types and Species

There are two basic categories or types of stored product pests - **Primary Pests** and **Secondary Pests***:*

Primary Pests are pests of whole grains and seeds. These primary pests can be broken down into three groups:

- ***Interior Feeders*** are insects in the larval form that feed from inside the grain or seed itself and can remain unnoticed until they emerge as adults. Interior Feeders include: Angoumois Grain Moth, Lesser Grain Borer, Granary Weevil, and the Rice Weevil.
- ***Exterior Feeders*** are insects that feed off the outer portion of grains and seeds and may also masticate the outer portion of the seed coat to feed on the interior portion of the grain or seed. *Exterior Feeders* include: Cadelle Beetle, Cigarette or Tobacco Beetle, Drugstore Beetle, Flat Grain Beetle, Indian Meal Moth, and the Khapra Beetle (AKA - Cabinet Beetles).
- ***Scavenger Feeders*** are insects that feed exclusively upon the interior portion of grain after the seed coat has become damaged or broken by another insect or during processing. *Scavengers* include: Confused Flour Beetle, Mediterranean Flour Moth, Red Flour Beetle, and the Saw Toothed Grain Beetle.

Secondary Pests are insects that feed primarily on damp, decomposing or spoiled grains that also has a developed mold presence or may feed off of the mold itself. Secondary Pests include: Foreign Grain Beetle, Grain Mites, Psocids, and the Yellow Meal Worm.

Granary Weevils

Granary Weevils. Photograph by: Dr. Dave Shetlar, OSU Extension Entomology.

Granary Weevil
(Sitophilus granarius)
Order Coleoptera;
Family Curculionidae.

Appearance: Adults range in coloration from reddish brown or chestnut brown to black.

Although they appear similar to rice weevils the granary weevil has no identifiable markings on their back, non-functioning wings, and the punctures located on the pronotum are elongated and oval in shape.

Granary Weevils have an elongated beak or snout that has mandibles located on the tip of the snout. Granary weevil larvae may be distinguished by two creases crossing the top of the initial four segments of abdomen. Adult size may range greatly as opposed to other insects, as size is dependent upon the size of the grain in which the larvae and pupae stage developed.

Biology & Behavior: Adult granary weevils can live up to eight months. Females will bore through a single seed case to deposit one egg. A female may deposit up to 250 eggs in this manner during her lifetime. Once the egg is laid within the seed the female plugs the hole until the adult can emerge.

Larvae feed on the interior portion of the grain, pupate, emerge as adults, and the cycle is once again renewed. Granary weevils can be found throughout the nation but they are more predominate in the northern states as opposed to the southern states. Granary weevils prefer cooler climates and adults are more resistant to the cold.

Both the adult and larvae feed on un-milled whole grains and are more commonly found in granaries or mills for processing. However, they may also infest beans, nuts and seeds, and cereals products that are stored in school warehouses, kitchens, food pantries, and food cabinets, and other food storage areas in schools. Art and science class rooms are often overlooked as the food is used for projects.

Saw-toothed Grain Beetles

Saw-toothed Grain Beetle
(Oryzaephilus surinamensis)
Order Coleoptera;
Family Cucujidae.

Saw-toothed Grain Beetles. Photograph by: Dr. Dave Shetlar, OSU Extension Entomology.

Appearance: Adults are brownish to dark brown in coloration. Saw-tooth's are very small, slim and slender beetles that measure a little under 1/8 of an inch in length. Identifying features include three fine ridges that run parallel in length atop the thorax, and six saw like shaped teeth projecting out on each side of the thorax. Larvae are tiny and slender (less than 1/8") and white to off white in coloration. Larvae have mouthparts that point forward rather than downward and the head is marginally flat in appearance.

Biology & Behavior: Adults can not fly but are so tiny that they can enter via crack and crevices of stored product packages. Adults can live and reproduce up to three years. Females lay their eggs loosely in flour, otherwise eggs are deposited in small bunches or laid separately. Adult females may deposit from 50 to 300 eggs that are tiny, and shiny white in coloration.

Larvae are unable to feed off of larger food products, such as, whole grain kernels. Therefore, they feed upon small portions of broken down fine meal products. Larvae and pupae are difficult to spot in infested food products as they are often covered in food material dusts or flour and appear to be only tiny lumps in the product.

Saw-toothed Grain Beetles are scavenger pests infesting and feeding off a variety of food products such as: cereals, chocolate, dried fruits and meats, flour, and pastas (like elbow or bowtie macaroni stored in class rooms for art & science projects). Due to this feeding behavior, both adults and larvae may be simultaneously found with other stored product pests which feed on larger grain portions, such as the Indian Meal Moth.

IPM Techniques for Stored Product Pests

Inspection: Inspection is a key element in any sound IPM program. Food box cartons should always be inspected as they are brought into the school and whenever possible products should be removed from the boxes, and the boxes discarded into the appropriate trash or recycle containers.

- ►When possible, visually inspect the food product itself after opening the product. Report any suspicious products to your school IPM Coordinator and make sure to mark the proper notations in your pest sighting logs.
- ►Additionaly, encourage teachers and staff members to check the foods that they are bringing from home into the school setting for lunch, art, and science projects.
- ►Inspect kitchens and food preparation equipment for proper sanitation and proper food storage. Similarly, inspect other areas in the school for these conditions Where food will be stored, such as: teacher lounges, break rooms, kindergarten rooms, art and science rooms, and preschool/afterschool program areas.

Identification: Collect pantry pest species when found during the inspection process for proper identification. It is always best to know the pest that you are dealing with, to understand its morphology and life-cycle for proper management and remediation.

Sanitation and Storage: Assure that all food areas are clean and free of food debris: pantry areas, cabinets, food storage bins, food preparation equipment, and remember to corner clean! Additionally, assure that food stock is dated and rotated on a regular basis. Old food products should be removed from the building and properly disposed.

Exclusion: Food and food products should be properly contained in plastic or metal containers with air-tight sealable lids, no matter if it is to be consumed or used for school projects. Seal seams in cabinets & pantries.

Managing Infestations: Use of monitoring traps with a grain base or sticky traps with bits of grain in the center are useful in controlling insects out in the open and out of the infested product.

- ►Pheromone traps may also be used in place of or used in conjunction with sticky traps. There are two basic pheromone traps: *aggregation* and *sex*. Aggregation pheromones are mostly produced by males and used to attract like species of long living insects, including weevils and the saw-toothed grain beetle. Sex pheromones are mostly produced by females to attract males of short duration living insects.
- ►Freeze and then discard any infested food products.
- ►Use of temperature controls for room infestations can also be of benefit as many insects are affected by hot or cold temperatures. Light traps are also beneficial.
- ►Remember, research the pest to learn what controls work.

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Pest Press Distribution: Provided through a **USDA** grant through the **University of Illinois**.

Informational Resources: ►***Truman's Scientific Guide To Pest Management Operations*** *Sixth Edition; Bennett, Owens, Corrigan; A Purdue University/Advanstar Communications Project, 2003.*

►***Peterson Field Guides; A Field Guide to the Beetles of North America*** *Eighteenth Edition, Richard E White, 1983.*

►***An Instant Guide to Insects*** *Pamela Forey & Cecilia Fritzsimons, 1999 edition, Gramercy Books.*

► **All photographs by:** Dr. David Shetlar, OSU Extension Entomology.