Beetlemania – of another kind
Khapra Beetle is BACK......

There was a minor outbreak in the U.S. in the 1980s (CA, MD, MI, NJ, NY, PA, TX) but the last major infestation was in California in 1953 and after spreading to AZ, NM, TX and Baja California, Mexico, it took 13 years and $15 million to defeat. Currently, all known infestations in the US have been eradicated.
Khapra beetle: Feared pest intercepted at airport

“the number of interceptions of the khapra beetle have increased dramatically in recent years. As of July 26, 2011 the bug has been intercepted 100 times nationwide, compared to an average 15 times in 2007-2009 and an average 6 times per year in 2005 and 2006”
News: Khapra Beetle Could Devastate Farm Economy.....

• Since July 30, 2011 ban on importation of rice from any country currently infested with the bug.
• U.S. trading partners, such as Canada, China, Japan, Mexico and South Korea would likely reject grain products if the beetle settled in America.
• The Indiana Department of Agriculture estimated a ban on U.S. grain could cost the state $800 million or more.
Khapra Beetle Intercepted in Personal Effects

On August 22, 2012 a CBP agriculture specialist inspected a shipment of personal effects from destined for Michigan. Upon inspection, a bag of rice, dried lemons and various chicken soups were found. The rice was inspected and a live Dermestid larva was found which was submitted to the local USDA identifier for identification.

An Emergency Action Notification was issued for this shipment. The rice was destroyed by steam sterilization.
On February 7, 2012 a CBP agriculture K-9 targeted and examined an air cargo shipment of personal effects from the United Arab Emirates, destined for New York, for inspection of prohibited food. Inspection revealed three live larvae and five dead immature specimens.

An Emergency Action Notification was issued for re-export.
On February 9, 2012 CBP agriculture specialists inspected the luggage of a passenger arriving from Iraq. The CBP AS discovered and seized ten packages of vegetable (pepper) seeds to grow. The passenger had traveled to Kuwait, Jordan and Iraq. The pepper seeds are believed to have originated in Iraq. Further inspection of the seeds revealed the presence of an adult beetle resembling the Khapra Beetle.

The peppers were destroyed by the port garbage disposal.
Khapra Beetle Found in Rice

On February 4, 2012 a passenger from Saudi Arabia declared bags of rice (*Oryza sativa*), upon inspection of the luggage the rice was found and seized. The rice was inspected by a CBP agriculture technician who found two live immature insects and one cast skin. The rice was destroyed by port approved methods.
On January 11, 2012 as part of Operation Gone to the Beetles, a passenger originating in Saudi Arabia was selected for inspection. Roasted pumpkin seeds were found in the passenger’s baggage. Upon further inspection, a CBP agriculture specialist found that the pumpkin seeds were infested with what appeared to be dead *Trogoderma granarium* (Khapra beetle) and cast skins.

The infested pumpkin seeds were destroyed by incineration.
On February 24, 2012 a CBP agriculture canine alerted to an express personal effects shipment from Saudi Arabia destined for Missouri Zip code 65807. The shipment contained many items of agriculture interest, including rice. One dead larva was found in the rice; it was tentatively identified as Khapra beetle (KB) and sent to USDA.

The rice was destroyed by steam sterilization.
On March 14, 2012 a container of Moong Dal originating from the United Arab Emirates, destined for Illinois, was inspected by CBP agriculture specialists. Upon examination, various cast skins were found on the bags containing the Moong Dal and one live larva was found inside one of the bags. The shipment was immediately re-loaded and sealed as a safeguarding measure.

On March 15, 2012 a container of Moong Dal, Urad Dal (split black lentils) and Red Chawli (black eyed peas) from the United Arab Emirates, destined for New York, was inspected by a CBP agriculture specialist, who found a live larva inside one of the bags containing the Urad Dal.
Khapra Beetle found in Cargo and Passenger Baggage

On February 29, 2012 a suitcase consigned as personal effects arrived from Saudi Arabia via London. The suitcase, one of four bags in the cargo shipment. A CBP agriculture specialist examined the baggage and seized a large bag of rice and immediately discovered *Trogoderma* sp. cast skins, dead adults, and live larvae.

The rice was destroyed by steam sterilization; the three remaining bags did not contain food items and were released.

On March 1, 2012 a passenger arrived at DFW International Airport from Sudan and was referred to baggage control secondary by the CBP agriculture specialist rover for inspection. The passenger declared food items on her CBP declaration form. During inspection of the passenger’s luggage, several different types of beans were found along with cumin seeds, melon seeds, fresh lemon grass, and bean pods that were seized. Several pests were found on the prohibited and restricted items. Upon further inspection of the dried beans a coleoptera larva was found.

The restricted and prohibited items were seized and destroyed by steam sterilization.
On January 17, 2012 a passenger originating in Saudi Arabia was selected for inspection. Cumin seeds were found in the passenger’s baggage. Upon further inspection, a CBP agriculture specialist found that the cumin seeds were infested with what appeared to be *Trogoderma granarium* (Khapra beetle).

The infested cumin seeds were destroyed by incineration.
On February 29, 2012 a shipment of personal effects arrived at DFW International Airport from Saudi Arabia via London destined for Tennessee. Upon inspection, one larva and two adults were discovered at the bottom of a plastic bag containing various food containers and rice.
On April 5, 2012 a rail container of wood veneer from the Ivory Coast, destined for Washington State, was examined at the rail yard by CBP agriculture specialists who noticed signs of suspect wood boring pests. The container was resealed and scheduled for a devan.

On 4/12/12 the shipment was devanned and no wood boring pests were found. However, a CBPAS found several live suspect *Trogoderma* sp. larvae feeding on kernels of corn. The kernels of corn and larvae were found inside a small nest (possibly made by a mouse) tucked inside the cardboard packing material placed around the shipment for support inside the container.
APHIS estimates that 67% of continental US would have suitable climate for Khapra

Predicted distribution (shaded yellow) of Khapra beetle in the contiguous US.
Survey Status of Khapra Beetle - *Trogoderma granarium*
2010 to present
Khapra beetle will feed on most any dried plant or animal matter

- Prefer grain and cereal products, particularly
  - Wheat
  - Barley
  - Oats
  - Rye
  - Maize
  - Rice
  - Flour
  - Malt
  - Noodles
  - Oat
  - Garbanzo
  - Soybean
  - Lentil
  - Rice
  - Garden pea
  - Grain sorghums
  - Cowpea
  - Corn

They can feed on products with as little as 2% moisture content and can develop on animal matter such as dead mice, dried blood, and dried insects.
Preferred animal feeds and concentrates include:
- Rolled & ground barley
- Ground corn
- Ground dog food
- Rolled oats
- Dried orange pulp
- Ground rice
- Cracked & ground wheat bran

Nuts that may serve as primary hosts include:
- Peanut
- Pecan
- Walnut
- Almond

Grocery items that sometimes serve as hosts include:
- Bread
- Dried coconuts
- Cornmeal
- Crackers
- Lima bean
- Hominy grits
- Baby cereals
- Pearl barley
- Wheat germ
- Raisins
- White & whole wheat flour
If the beetle is left undisturbed in stored grain it can cause significant weight loss, and in case of seeds, it may lead to significant reduction in seed viability.

Weight loss can be between 5-30% in sometimes in extreme cases 70%.

Severe infestation may cause unfavorable changes in chemical composition
Infestation affects grain quality as well as quantity. Infestation of commodities with Khapra beetle can lead to the following consequences:

• Economic loss of valuable grain or other domestic or export products

• Lowered quality of products due to contamination

• Costs associated with prevention and treatment

• Consumer health risks when exposed to products contaminated with insect parts
Identification
Biology

Adults have wings, but do not fly and feed very little

Mated females live 4-7 days
Unmated females live 20-30 days
Males live 7-12 days

Females lay 50-90 eggs

Complete development on dog food 26-220 days (95-70°F)
Optimum temperature 95°F; if falls below 77°F – diapause (larvae molt, inactive, no adults for up to 6 years!). Can survive temperatures below 17.6°F
Detection

Close examination of cracks and crevices; larvae are most likely seen just before dark

Pheromone baited traps – for adults

Wall mount KB trap

Floor KB WHB trap
Detection – pheromone trapping

- The common warehouse beetle is a strong flyer. If it is abundant, its numbers may overwhelm the vertical wall-mount traps meant to trap khapra beetle.

- Use aerial sticky traps (Pherocon II or any diamond-, delta-, or wing-shaped trap) to resolve this problem – beetles caught in aerial traps cannot be khapra beetle, eliminating the need for further identification.

- Aerial traps - hang high in the open headspace of the building. Use one aerial trap per 2,500–5,000 sq ft or one for every 5–6 khapra beetle wall traps.
Management

Some fumigants give control at high dosages, even though this beetle is more resistant to fumigants than most stored product pests. (phosphine resistance ratios of 10-47.9)

High concentrations of fumigant must be maintained over the fumigation period (3-7 days) to allow penetration into all cracks and crevices.

Heat – if reach 180°F during processing or held at 150°F for 7 min.