

National Khapra Beetle Survey, Taxonomic, and Specimen Routing Guidance

Background

The khapra beetle (*Trogoderma granarium* Everts) is one of the world's most destructive pests of grain products and seeds. Khapra beetle and associated host material are regulated by the USDA under authority of 7 CFR 319.75. While khapra beetle is not known to occur in the U.S., khapra beetle interceptions at ports of entry have dramatically increased recently and the pest risk potential of khapra beetle is high.

The goal of the national survey is to determine if the U.S. is free from khapra beetle.

Some types of properties are more likely to harbor khapra beetle. Inspect properties within an area according to the following order of importance

1. Distributors of host material; spice importers, markets, brassware.
2. Grain dealers
3. Feed lots
4. Users
5. Farm storages

Use a detection survey to determine if khapra beetle exists in an area. Conduct a detection survey by using visual inspection and trapping of all properties capable of supporting a khapra beetle infestation.

Visual Inspection

Begin inspection on arrival at the premises or location. Check exit and entry areas, as well as any storage locations on the premises. Observe the movement of products, containers, or people handling such products, which could have been exposed to khapra beetle.

Be alert for cartons, sacks, debris, woodwork, cracks, loose plaster, loose paint, and other such hiding places. Rodent bait stations with grain or cereal and other such traps should be carefully inspected.

Collect milled products or debris from areas such as cracks and cervices of bins or silos or wherever grain is stored or vacuumed, such as in farm buildings, homes, stores, etc. This visual inspection is to be carried on as part of other collecting and trapping activities.

Light infestations are very difficult to find, and may require repeated inspections. Dirty grain and dockage are attractive to the khapra beetle; conversely, sanitary conditions are a deterrent (USDA-ARS, 1959).

In bulk storage where heavy infestations occur, the larvae tend to congregate in the surface grain and on or near the walls. In empty bins and warehouses, likely places to find larvae are in or on ledges, cracks in the floor or walls, old cartons, rags, sacks, newspapers, and scrap lumber, or other debris. Elevator tunnels also serve as hiding places for the larvae. In the inspection of sacked material, the ears and seams of bags are likely hiding places to examine.

Inspections should be performed at the time of year when insects are active. In areas where khapra beetle cannot survive outside warehouses, conduct surveys indoors in stored grains or other foods.

Areas with inadequate sanitation, low light levels, or cracks and crevices, are at the greatest risk. Mature larvae tend to crawl upward, so places located high up should be checked as well as those locations lower down.

Follow these guidelines when inspecting premises:

- ✓ Locate and survey premises receive or distribute cargo potentially infested with khapra beetle.
- ✓ If practical, initial inspection and survey will be conducted of all premises. This will be done according to the inspection techniques previously described. Limitations of personnel and other resources will require prioritizing premises according to khapra beetle risk and inspecting high priority premises first.
- ✓ Premises that receive direct shipments of khapra beetle host material are considered high risk.
- ✓ Premises that receive manufactured or processed khapra beetle host material are considered low risk.
- ✓ Inspectors will be responsible for monitoring containerized khapra beetle cargo moving in and out of their respective work unit area (example: interstate trucking terminals, transfer points for vans, etc.).
- ✓ Trapping will be done according to instructions in the following section.
- ✓ Inspectors will survey premises when climatic conditions for establishment of an infestation are most ideal (for example, during summer months in northern areas).

Trapping

Use the vertical wall-mount trap inside and outside structures. Place traps around the inside of exterior walls and along interior walls of structures under investigation. Pay special attention to cracks in the walls. Cracks may serve as pathways for insect movement. If possible, place a trap over a wall crack if one is found.

Areas to Avoid—Areas easily affected by activities such as sweeping or foot traffic, very oily or damp locations.

Height—Place the trap at any height, as well as at floor level, as long as it is attached to a vertical surface. Mount the trap high enough to be easily serviced (about 2 feet off the floor). Larvae have been trapped as high as 20 feet on walls within buildings; traps should be kept at least above broom height to avoid trap loss.

Density—Allow 25–40 feet between traps. Or, base placement of traps on the layout of buildings. The more traps that are set, the greater the chance of finding khapra beetle, if present. However, if there are too many buildings and travel is a problem, half of the locations can be trapped in alternate years. This way, a building can be more intensively trapped, thus increasing the chances of finding khapra beetle.

Begin trapping when the warm season starts and average temperatures are above 70°F in the trapping environment. At ports where temperatures remain warm, or in heated environments, use practical judgment to determine if temperatures are warm enough. In more temperate areas, conduct surveys between mid-May through mid-September. Exceptions are heated warehouses, food storage and processing areas, dwellings, and other environments which are heated. These may be surveyed with traps at any time.

Traps should be checked every 1–2 weeks. When checking a trap for the last time and removing it, place the complete trap in a re-sealable plastic bag. Later, the trap can be firmly tapped over a tray to dislodge any insects that may be present. Upon returning to a secure lab, examine and immediately remove adults and large larvae.

Note: Larvae are less mobile than adults, and more difficult to catch in traps. While any khapra beetle caught is important, the presence of larvae in traps is particularly indicative of a problem.

Qualified State, county, or cooperating university personnel can screen and perform tentative identification of suspected khapra beetle specimens. Before survey and control activities are initiated in the United States, a specialist recognized by USDA-APHIS-PPQ-National Identification Services (NIS) must verify the first detection of khapra beetle.

Trap procurement:

IPHIS will be utilized for all trap and lure procurement. Please follow the national guidance for procuring traps and lures for surveys, there will be special guidance that pertains to farm bill funded projects.

Survey Records

Survey records should be entered into the Integrated Plant Health Information System (IPHIS) under the template Khapra Beetle Detection, a national template has been published for everyone's use. The types of data that will be collected are; location, date, host, activity (install or trap check), and lure.

Note: This guidance is based on information contained in: Stibick, J. 2007. *New Pest Response Guidelines: Khapra Beetle*. USDA-APHIS-PPQ-Emergency and Domestic Programs, Riverdale, Maryland. http://www.aphis.usda.gov/import_export/plants/manuals/online_manuals.shtml

The New Pest Response Guidelines should be referenced if further information is needed.

Khapra Beetle Survey Specimen Routing and Taxonomic Guidelines

Several states are expected to receive Farm Bill funds to survey for Khapra beetle, *Trogoderma granarium*, in 2012. Identification of dermestid beetle larvae or adults recovered from Khapra beetle survey traps can be difficult. State or PPQ offices given the responsibility for this survey should seriously take into account the ability, experience, and expertise of those assigned to the various steps of sorting, screening, and identification of trap samples.

There are the various suggested progressive levels for processing survey trap samples:

Sorting raw trap samples requires familiarity with insect groups and experience in examining specimens. *Sorting* is the first level of activity that assures samples submitted are of the correct target group of pests being surveyed, i.e., after removal of debris, ensures that the correct order, or in some cases family, of insects is submitted. There should be a minimum level of sorting expected of surveyors depending on the target group, training, experience, or demonstrated ability. Sorting in a Khapra beetle survey involves removal of non-beetle specimens,

Screening is removing obvious beetle larvae or adults not fitting the general descriptions of dermestid or similar looking beetle families, and should be done by someone familiar with beetle pest family taxonomy and terms. *Screening* is a higher level of discrimination of samples such that the suspect target pest family (Dermestidae) are separated from the known non-target families.

The following linked module developed for Custom and Border Protection Agriculture Specialists in their inspections and is applicable for domestic surveys and has aspects of both sorting and screening:

Dermestid Beetle Recognition and Screening Aid: http://caps.ceris.purdue.edu/webfm_send/1670

Identification of dermestid larvae to exclude non-quarantine important genera and identifying a suspect *Trogoderma* sp. should be done by a taxonomist, i.e., someone who does insect identifications on a full-time or regular continuing basis. They would receive already screened samples normally. The following resources are useful guides for taxonomists performing the identification from sorted or screened samples:

Dermestidae Adults Self-tutorial

http://caps.ceris.purdue.edu/webfm_send/697

Dermestidae Larvae Self-tutorial

http://caps.ceris.purdue.edu/webfm_send/698

If *Trogoderma* sp. larvae or adult identifications are made, the specimens must be forwarded with a completed PPQ form 391 to a PPQ domestic identifier. (Many PPQ port identifiers are skilled at identifying *Trogoderma granarium*, but their workloads normally do not allow processing of domestic samples). If PPQ is conducting the survey, not all samples need to be entered into Pest ID by those who have access, only the suspect *Trogoderma* spp. going forward to a domestic identifier. The domestic identifiers can also enter these records if necessary for samples going forward for final national confirmation.

The domestic identifiers listed below will accept specimens for possible dissection, forwarding to the USDA Systematic Entomology Laboratory for final confirmation, and logging into the Pest ID database for those forwarded. Always notify them in advance by e-mail that samples are coming and give the number being sent.

For the *PPQ Eastern Region* states, both PPQ surveyors and/or state taxonomists send specimens to:

Bobby Brown
USDA, APHIS, PPQ
901 W. State Street
Smith Hall, Purdue University
West Lafayette, IN 47907-2089
robert.c.brown@aphis.usda.gov

Phone: 765-496-9673

For the *PPQ Western Region* states, both PPQ and state surveyors send specimens to:

Kira Metz
USDA, APHIS, PPQ
Minnie Belle Heep 216D
2475 TAMU
College Station, TX 77843
kira.metz@aphis.usda.gov

Phone: 979-450-5492

For states with no taxonomist and/or screening ability, the domestic identifiers can accept sorted or screened samples with prior arrangement. Contact the PPQ regional program managers to arrange for this and estimate the numbers of samples to be sent. (Eastern Region: Brian Kopper, brian.j.kopper@aphis.usda.gov or Western Region, Katie Hough, katherine.p.hough@aphis.usda.gov).

Results Reporting

Negative results from identifiers will be communicated directly back to the submitter. Any suspect positives going to SEL for confirmation will be communicated via the PPQ Domestic Diagnostics Coordinator and the National Survey Coordinator to the SPHD and SPRO of the state of origin, along with alerting national and regional program managers.