Khapra Beetle
Trogoderma granarium Everts
Order Coleoptera
Family Dermestidae

Introduction

The khapra beetle, *Trogoderma granarium*, is considered one of the most important stored product pests worldwide. It is a serious pest of stored products under hot, dry conditions. The khapra beetle is spread by commerce and trade of infested goods and containers. Beetle larvae are able to crawl into cracks and crevices of packing material and enter diapause for extended periods of time, maintaining its presence in very low numbers. It can live without food for long periods and survive on foods of low moisture content.

The khapra beetle is endemic to the area extending from Burma to west Africa and limited by the 35° parallel to the north and the equator to the south. It first was found in California in 1953, which began a massive control and eradication effort until 1966, costing an estimated $15 million. Isolated infestations have been found in several states throughout the U.S (California, Maryland, Michigan, New Jersey, New York, Pennsylvania, and Texas). Discovery leads to an immediate quarantine of suspected goods and an expensive eradication and control effort. All infestations in the U.S. have been eradicated. The khapra beetle has a tolerance to many surface insecticides and fumigants. It is estimated that 67% of the continental U.S. has suitable climate for the beetle.

Identification

The khapra beetle is oblong-oval and densely hairy. Adult males are 1.4-2.3 mm long, 0.75-1.1 mm wide; brown to black with indistinct reddish brown markings on elytra. Adult females are 2.1-3.4 mm long, 1.7-1.9 mm wide, lighter in color. The head is small with 11-segmented antennae and a club of three to five segments that fits into a groove in the side of the pronotum.

Eggs are milky white and turn pale yellow, cylindrical (0.7 by 0.25 mm), one end rounded, the other pointed with spine-like projections. Larvae are yellowish white with brown head and body hairs. Mature larvae are ~ 6 mm long and 1.5 mm wide, golden to reddish brown in color with more body hairs and proportionally shorter tail. Most specimens collected are in larval form and need special preparation to enable identification by an insect taxonomist.

Life Cycle

Mated females live 4-7 days, while unmated females live from 20-30 days. Males live 7-12 days. Adults have wings but do not fly. Adults feed very little. Mating occurs about five days after emergence. Egg laying is temperature dependent, beginning immediately at 40°C, but is delayed by a few days at cooler temperatures. No eggs are produced at 20°C. Females lay an average of 50 to 90 eggs which are loosely scattered in host material. Eggs hatch in 3 to 14 days. Complete development from egg to adult varies from 26 to 220 days and is dependent on temperature**,** with optimum temperature for development at 35°C. If the temperature falls below 25°C for a period of time or if larvae are very crowded, they may enter diapause. Larvae can survive temperatures below -8°C. In diapause, larvae can molt but are inactive and can remain in this condition for years. Development can occur at a relative humidity as low as 2%.

Hosts

The khapra beetle is associated with man and human dwellings. The larvae feed on a wide variety of stored products and dried foods but prefer whole grain and cereal products. Any dried plant and animal material with proteinaceous content, such as dried seeds, grains, fruits, spices, and gums is a suitable host. It can also occur in grain stores, food stores, malthouses, seed processing plants, fodder production plants, dried milk factories, merchant stores, and stores of used packing materials.

Damage

The major damage of the khapra beetle is the loss of stored grain. Typically, young larvae feed on damaged seed, while older larvae feed on whole grains. Larvae attack the embryo point or a weak place in the pericarp of grain or seed. The khapra beetle can cause significant weight loss (weight loss between 5-30%, extreme cases of 70%) when left undisturbed in stored grain. Damage also may lead to significant reduction in seed viability. Severe infestations may cause unfavorable changes in chemical composition. Additionally, the beetle can damage dry commodities of animal origin. Large numbers of larval skins and setae may cause dermatitis and/or allergic reactions. While feeding, the beetle contaminates grain with body parts and setae which are known to cause gastrointestinal irritation. Larvae can move in and out of sacked material and weaken the sacks.

Control

Airport and maritime port interceptions are vital defenses against the introduction of the khapra beetle. Detection procedures include trapping and visual inspection. Signs of infestation include the larvae and cast skins, although larvae must be identified by microscopic examination.

Eradication programs utilize fumigants and surface sprays with deep penetration capability. Also, heat treatment has proved to be effective. Populations are monitored by using pheromone and larval traps. Preventive measures include good sanitation practices and exclusion.

The khapra beetle is spread mainly through international trade; therefore, inspection at ports and entry points is vital. High risk areas that should be checked first include the following (USDA Fact Sheet, 1993):

1) cracks in walls and floors
2) behind loose paint or rust
3) along pallet, and the end-grain of pallet wood
4) seams and ears of burlap bags
5) low light areas
6) trash from cleaning equipment, and the equipment itself.

If you suspect the khapra beetle, *Trogoderma granarium*, please contact your local cooperative extension agent or your local NPDN diagnostic lab.

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http://www.eppo.org/QUARANTINE/insects/Trogoderma_granarium/TROGGA_map.htm

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Handout developed to accompany the Khapra Beetle
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