

Pest Control

SOLUTIONS FOR YOUR BUSINESS

STORED PRODUCT IPM



Red-legged ham beetle adult.

RLHB invade pet stores

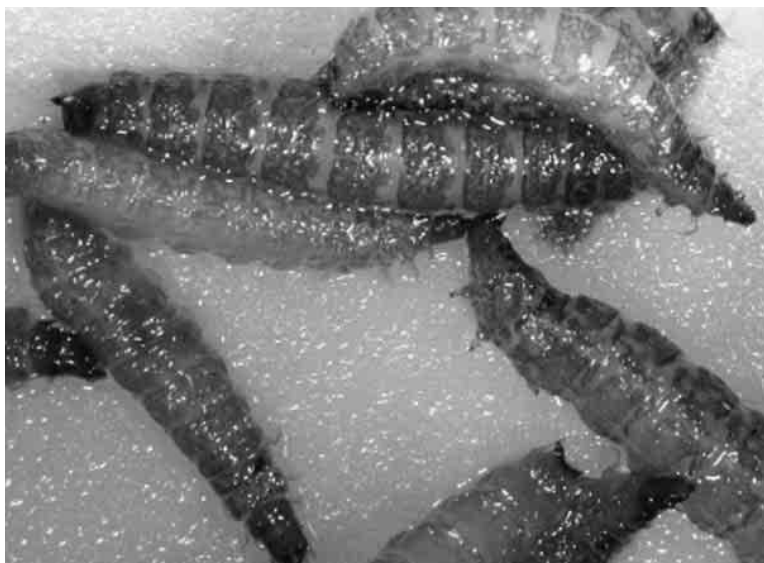
Pet store inventory was overtaken by an unwelcome critter — the red-legged ham beetle

BY DRS. RENNIE ROESLI AND
BHADRIRAJU SUBRAMANYAM *Contributors*

When our team conducted a survey on stored product insect infestations in pet stores in Kansas from February to August 2001, we encountered infestations of a rather unusual stored product beetle. It was *Necrobia rufipes* (DeGeer), commonly known as the red-legged ham beetle (RLHB) in the United States and the copra beetle in tropical countries, such as the Pacific Islands. It belongs to the family Cleridae in order Coleoptera. What follows is information on the biology, infestation and management of RLHB in eight Kansas retail pet stores.

The red-legged ham beetle is a cosmopolitan pest, causing considerable damage to stored commodities such as copra (dried coconut), ham, cheese, dried fish and other products rich in protein content. Interestingly, these insects are also facultative predators (occasionally preying on other insects such as larvae of the cigarette, merchant grain and corn sap beetles) and cannibals (preying on their own inactive stages — eggs and pupae). They are also animal decomposers, eating away the dried flesh parts of dead animals (including

RED-LEGGED HAM BEETLE



Red-legged ham beetle larvae caught in food-baited trap.



Damaged and/or opened pet food bags are a common source of RLHB infestation. Here, the insects (circled) were visibly infesting the product.



At the Topeka store, RLHB adult and white pupal cases were even found on uniform shirts stored in the office area.

humans). Thus, its potential forensic importance has been studied intensively.

The insect goes through egg, larval, pupal and adult stages. As pests, they are destructive both in the larval and adult stages, but the larval stage is more destructive than the adult stage.

Identification of the problem

The adult is about .14 in. to .28 in. long and has a shiny metallic green or bluish-green body when examined under a microscope. The legs are red, and the base of antennae is red with a black tip. Without the microscope, they appear black. The female is bigger than the male.

In warm conditions, adults may be seen flying; however, they are generally found actively crawling on the floor. When disturbed, adults will emit a strong, unpleasant odor.

The adults mate soon after they emerge from pupae, and may live for more than 14 months. Females deposit eggs in clusters in cracks and crevices. Depending on the surrounding conditions (such as temperature and humidity) and foods, a female lays eggs at a rate of zero to 28 per day. Thus, a female can produce anywhere from 54 to 3,000+ eggs throughout her life.

The egg is .04 in. long and .01 in. wide, cylindrical, slightly curved, round at both ends, smooth, shiny and translucent. The egg incubation period varies from four to six days. The average size of newly hatched larva is .05 in. long and 0.1 in. wide; and the color of the body is white, but the head and abdominal tip are brown. When they are fully grown (which takes 30 to 140 days), the length increases up to 0.4 in. and the width up to .06 in.; the color of the body turns into brownish dark purple. By this time, the larva has shed its skin two or three times.

Before turning into pupae, larvae become less active, find dark and concealed places to pupate and secrete frothy substance from their mouths to

RED-LEGGED HAM BEETLE

Store #	Location	# visits	# all stored-product insect adults	# RLHB adult and relative abundance (%)	# all stored-product insect larvae	# RLHB larvae and relative abundance (%)
1	Overland Park	11	3,425	14 (0.4)	412	65 (15.8)
2	Overland Park	8	1,984	1 (0.1)	214	1 (0.1)
3	Overland Park	11	4,014	0 (0.0)	91	0 (0.0)
4	Overland Park	8	1,697	0 (0.0)	273	0 (0.0)
5	Wichita	7	969	12 (1.2)	101	11 (10.9)
6	Wichita	7	439	1 (0.2)	44	0 (0.0)
7	Topeka	12	16,711	1,608 (9.6)	1,847	1,663 (90.0)
8	Lawrence	11	2,086	57 (2.7)	128	65 (50.8)

*There were a total of 27 species of stored-product insects associated with retail stores.

Total number of all stored product insects and RLHB captured in food-baited traps in eight Kansas retail pet stores*

form a thin cocoon. The pupa is smaller than the larva, and is about .2 in. long. The head, antennae and wing sheaths are translucent, the eyes are black and the abdomen is light brown. The period of pupal stage varies from six to 21 days.

The RLHB thrives under warm (86 to 93°F) and damp conditions. Minimum temperature and humidity requirements for growth of this insect are 69°F and 50%, respectively.

RLHB in retail pet stores

During our survey in Kansas retail pet stores, the larvae and adults of RLHB were one of the many stored product insects captured in food-baited trap samples in six out of the eight stores surveyed (see table above). The total number of adults captured in each store ranged from one to 1,608, but constituted up to 9.6% of total stored product insect adults captured. The total larval captures ranged from one to 1,663 and constituted as much as 90% of all stored product insect larvae. RLHB was most abundant in a pet store located in Topeka (see table).

Contour maps generated from trap captures in retail stores (See “It’s in the detail for retail,” *Pest Control*, May 2001, page 26) are useful for identifying infestation foci and for indicating areas of risk within a store. These areas can then be inspected visually or cleaned and treated to mitigate a pest problem.

From contour maps of RLHB distributions in the Topeka store during two different periods (February-March 2001 and April and June 2001), we could surmise that RLHB adults and larvae

were concentrated near shelves of dry cat and dog food. The dry cat and dog food products are rich in protein content (20% to 30%) and are often enclosed in paper packages that may not be insect resistant. Furthermore, any damaged or torn packages cause spillage and create openings that provide easy access to insects.

Product spillage in the Topeka store was not properly cleaned, so it accumulated in various places — providing continuous and abundant food supply for RLHB. From an area of high RLHB larval captures, we sampled a bag of pet food product. The bag was torn, but repaired with duct tape. Numerous RLHB adults were found in this product.

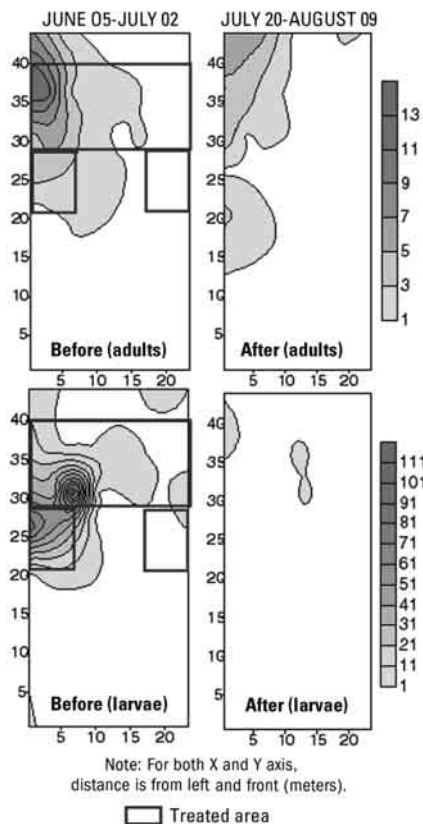
During the first week of July 2001, when we visited the Topeka store for collecting trap data, the store manager and workers shared their RLHB concerns. Adults were seen on almost the entire area in the store, including the office and restrooms, and flight activities of adults were also observed. The office room was terribly invaded — adult RLHB and pupal cases were even found in boxes containing new worker uniform shirts. The female workers even found that they were unintentionally bringing RLHB home on or in their purses!

Gaining control

In the Topeka pet store, we performed sanitation, which included sweeping the floor, vacuuming spillage under kick plates and removing infested products in areas of high trap captures as indicated by the contour maps. The sanitation per-

RED-LEGGED HAM BEETLE

Fig. 1: Distribution of adults and larvae of RLHB before and after sanitation/cyfluthrin treatment in targeted areas of the Topeka store



formed did not reduce RLHB numbers. Therefore, we performed sanitation sweep a second time, followed by cyfluthrin application to targeted floor areas. During our second sanitation, we found two dead mice covered with larvae and adults of RLHB under a kick plate; the trap located near this area caught 450 RLHB larvae and a dozen adults. We removed the dead mice and vacuumed the area.

To determine the impact of our intervention, we compared contour maps of RLHB distributions before and after the applications. Precision targeting using sanitation alone did not have an impact on adult RLHB captures, but slightly reduced the RLHB larval captures. However, precision targeting with sanitation followed by cyfluthrin spray greatly reduced trap captures of both adults and larvae. Therefore, a combination of sanitation and cyfluthrin spray is a reliable IPM practice for RLHB management. **PC**

Dr. Rennie Roesli is a research associate and Dr. Bhadriraju Subramanyam is an associate professor in the Department of Grain Science and Industry, Kansas State University, Manhattan, KS. Contact them at pcontributor.com.