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Red Flour Beetle in Texas Homes

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Red flour beetle, *Tribolium castaneum*, (hereafter RFB) is a common pest in Texas homes, but it has two vastly different ways of arriving in those homes, which in turn, require quite different methods to eliminate it.

Low-level Chronic Home Infestations

The most common route of entry into homes is through infested items brought in from the grocery or pet food store. The insect is found worldwide in processed food commodities, spices, dried peas and beans, milk chocolate, dry pet food, bird seed, etc. It can infest those things during drying, as in the case of dried spices or legumes, or it can infest them while shelved in stores. Once brought home, the insects can continue to multiply in the commodity they arrived on/in, but they often leave to find new food sources, to find a mate, or because they are attracted to lights. This is when they are usually noticed by homeowners. This type of infestation is considered to be "low level" or chronic and can be addressed through relatively simple means, such as disposing of infested foods and sealing uninfested food sources.

Chronic infestations will continue until the food source of the beetles and their larvae are found and discarded. Look in dried pet food, stored flour, boxes of baking mix that are not sealed in plastic inner wrappings, spices, bird food, and any other likely source. Almost anything that contains grain products can be infested. The authors recently encountered an infestation in boxes of RID-X septic tank treatment, in which the first listed ingredient was wheat.

Adult beetles are only about ⅛ inch in length, and their cream-colored larvae may reach ½ inch in length. While difficult to see when they are in a commodity,

Figure 1. Red flour beetle adult

one telltale sign of an RFB infestation is a slight odor, one that is characteristically given off by scent glands in the beetles. This chemical also imparts a foul taste to food. When trying to determine whether a product is infested with beetles, sometimes it helps to sift the contents through a kitchen colander. For large objects such as peas and beans, catch any insects that fall through the holes. Flour can be sifted through a standard flour sifter, and the beetles and their larvae will remain in the sifter after the flour has gone through. Infestations that have been in the home for a long time might have resulted in the beetles moving to new food sources, so inspect all likely possibilities and discard all that are infested.

Removal of infested products and then careful sealing of any new food source will eventually eliminate the infestation, but there may be products present that are infested but not recognized as such. Chronic infestations can be monitored with Storgard Dome Pheromone traps (Trécé , Inc.) that attract and capture RFB adults. Glue boards, available in the pest control aisle of most home and garden stores, can also be used to monitor RFB adults. Because they are good

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fliers and attracted to lights, beetles can be trapped overnight as a monitoring method. Turn off all the lights in the house, but leave them on over the kitchen or bathroom sink. Put a bowl of water in the sink and dissolve a couple of drops of dish soap in the water. The dish soap breaks the surface tension on the water, and the beetles contacting the water will become submerged and drown. None of these methods will control RFB, and they are strictly meant for monitoring.

Insecticides can also be used in the home to kill beetles after they leave their food sources and accumulate along floorboards or the base of walls. It is not necessary to treat large areas of carpets or floors. Just spray corners and floor/wall junctions where the beetles naturally accumulate. Do not use insecticides in food preparation areas, and always read and follow the insecticide label. Table 1 lists insecticides labeled for indoor use.

Note: Only apply indoor-labeled insecticides indoors. It should be noted that the insects need to be exposed to the insecticide residue for several hours before it begins to kill them, so do not be alarmed if the beetles do not die quickly. Most insecticide residues will last several weeks when sprayed indoors, so reapplication should not be considered until several weeks have passed.

More information on pyrethroids can be found at https://citybugs.tamu.edu/factsheets/ipm/ent-6003/.

Table 1. Insecticides and Active Ingredients for Management of Red Flour Beetle

Active Ingredient	Insecticide Class	Application Location
Deltamethrin	Synthetic Pyrethroid	Interior
Permethrin	Synthetic Pyrethroid	Interior/Exterior
Esfenvalerate, Prallethrin, PBO	Synthetic Pyrethroid	Interior/Exterior
Lambda-cyhalothrin	Synthetic Pyrethroid	Interior/Exterior
Bifenthrin	Synthetic Pyrethroid	Interior/Exterior
Bifenthrin & Zeta-cypermethrin	Synthetic Pyrethroid	Interior/Exterior
Beta-cyfluthrin	Synthetic Pyrethroid	Interior/Exterior
Fipronil	Phenylpyrazole	Exterior
Chlorfenapyr	Pyrroles	Exterior

Note: *Some products allow interior **or** exterior applications, while others allow both. Some products are available at retail stores, and all products are available online. Due to the large number of products available for each active ingredient, only the active ingredients are listed out of concern for leaving out any specific product.*

Chronic infestations can be addressed by removing the beetles' food sources and then sealing all new food sources in tight-fitting containers so that they cannot be reinfested. These infestations take time to resolve, but it can be done. If infestations are persistent, professional pest management may be necessary to resolve them.

High-level Infestations from Outdoors

The other type of home infestation comes from large numbers of beetles developing in host material outside the home and then moving in large numbers into the home, usually at dusk or at night. These infestations can be more serious than the chronic infestations mentioned above. Often, there are hundreds to thousands of beetles arriving overnight, which can lead to many problems. First among these is the mental anxiety caused by a large indoor insect infestation. Sleep can be affected when beetles crawl on people, and job performance and family relationships can decline due to stress and lack of sleep. While most people need not worry about direct medical impacts of the beetles, a small minority of people can be sensitive to bites and the chemicals emitted by beetles. This sensitivity can be evidenced as red spots or rashes, and a physician should be consulted to help alleviate the symptoms.

RFBs are not known to carry human pathogens, but when in large numbers in homes, they often can be found on or in all types of food, not just the types they prefer. Some people discard food like vegetables and meats when beetles are observed on them, but a simple washing in water will allow the food to be safely consumed. If infested, only loose products like grains, flour, etc., need to be discarded because the beetles can live and reproduce in such food sources.

Home-invading populations of red flour beetles are generated because they have a local source of food and shelter and can build up to great numbers over time before they begin to fly from the source and infest homes and neighborhoods. The source of the insects is usually a stored agricultural waste product that has been arranged in piles or used to fill in low spots in urban and/or rural settings. Recent large infestations have been associated with stored almond shells, stored pecan hulls, and stored cotton seed, but almost any stored agricultural commodity has the potential to generate an infestation. Experience with these populations has shown that homes within 1.5 miles of stored commodities, and possibly farther, are subject to invasion by RFB.

Tools for inspecting suspected beetle sources are available, and Texas A&M AgriLife Extension personnel can do the work if the owner of the commodity agrees. Control of the beetles at their source depends on many factors, and Extension personnel can work with the owner of the commodity to develop an action plan to eliminate the source of the infestation. Homeowners should report the problem to their town or city managers, who can, in turn, ask their local Extension office for help. Beetle movement into homes will not stop until their food sources outside have been eliminated or winter arrives and it is too cold for them to fly.

During an episode of large numbers of beetles coming in from outdoors, homeowners can act to both keep beetles from entering and control beetles once they are inside the home.

Prevention of home entry is best accomplished by making some changes to the physical aspects of the house and also applying an appropriate exterior insecticide to the outside of the house.

Prevention of Beetle Entry

- Weather-seal the bottoms of doors.
- Caulk all cracks around windows and gaps in entry/exit holes in exterior walls for appliances and plumbing.
- Put fine-mesh screens on roof vents, attic vents, soffit vents, and any under-home access points. (Beetles can enter the attic and "crawl space" to then make their way into living spaces.) Conventional window screens will not prevent the small beetles from getting through, so purchase screens with a finer mesh.
- An insecticidal barrier spray can be applied to exterior parts of the house to provide some control and a repellent effect. Table 1 lists exterior insecticides. Beetles that contact the insecticide will die but probably live long enough to make entry. Most insecticides will provide at least 30 days of control when applied to the exterior of a house. (Pyrethrins, the organic alternative to pyrethroids, break down very quickly in sunlight and are not a good choice for exterior insect control.)
- Turn off all exterior lights if possible. Red flour beetles are attracted to light at night. Keep windows closed unless the screen has been switched to the type with a finer mesh than a standard window screen.

Beetles that make it to the interior of the home from an outdoor infestation can be controlled with the insecticides listed in Table 1. Some homeowners choose to hire a professional pest control company to apply insecticides inside the house. Professionals have access to insecticides other than what homeowners can get, and often these are faster-acting. However, it is still the case that an insecticide application indoors, whether done by homeowners or professionals, lasts many weeks, so reapplying because beetles continue to invade the house does nothing except elevate insecticide levels inside the home without providing any improvement in insect control. Work with the local municipality to locate the source of the beetles and have it removed. This is the only way to stop beetle invasions from outside the home.