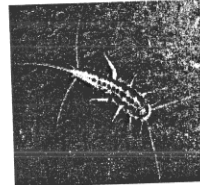


VARIOUS BUILDING INFESTING PESTS, BIO-ECOL AND CONTROL

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SILVERFISH

INTRODUCTION

Silverfish a nuisance pest inside the home or buildings; can contaminate food, paper goods and stain clothing; medically harmless. Many of their habits are similar to cockroaches and they appear to be more common as household pests in drier part state. Although they can live in attics, rooftops and outside siding, silverfish will move into valuable books, record albums, cabinets and clothing. Silverfish and f eat a wide variety of foods, including glue, wallpaper paste, book-bindings, paper,

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photographs, starch in clothing, cotton, linen, rayon fabrics, wheat flour, cereals, dried meats, leather and even dead insects.

Silverfish are active at night or are active in dark places found throughout the structure. Silverfish often live in damp, cool places such as basements and laundry rooms. Sometimes, they are found in a bathtub, sink or washbasin, unable to climb out. Firebrats live in hot, humid places such as attics in summer and near furnaces, fireplaces and heat pipes in winter.

CLASSIFICATION

Common Name: Silverfish, firebrat
Scientific Name: *Leptisma saccharina* (Linnaeus)
Insect Order: Thysanura

Common Name	Scientific Name
Silverfish	<i>Leptisma saccharina</i> L.
Four-Lined Silverfish	<i>Ctenolepisma quadriseriata</i> (Packard)
Long-Tailed or Gray Silverfish	<i>Ctenolepisma longicaudata</i> Esch.

IDENTIFICATION / (MORPHOLOGY)

Silverfish have flat, elongated bodies 1/3 to 3/4 inch long and broad near the head, tapering toward the rear-somewhat "carrot" shaped. These fragile, wingless insects are covered with scales and have two long, slender antennae at the head and three long, antennae-like appendages at the rear. These three appendages, one directed straight back and the other two curving outward, plus the two antennae, are nearly as long as the body. Sometimes these insects are known as "bristletails."

The silverfish adult is about 1/2 inch long with a uniform silvery or pearl-gray color, whereas the four-lined silverfish is about 5/8 inch long and the back displays four dark lines the length of the body. The gray silverfish is about 3/4 inch long and uniform light to dark gray. The firebrat is about 1/2 inch long, grayish and mottled with spots and bands of dark scales. Young resemble the adults except they are smaller.

LIFE CYCLE

Silverfish females may lay over 100 eggs during a lifetime. Eggs are laid singly or two to three at a time in small groups, hatching in three to six weeks. Young silverfish and firebrats resemble adults except being smaller, white and take on the adult color in four to six weeks. Adults may live two to eight years. Firebrats lay about 50 eggs at one time in several batches. Eggs hatch in about two weeks under ideal conditions. Eggs are whitish, oval and about 1/32 inch long.

Silverfish, depending on the species, may reach maturity in three to twenty-four months. These insects normally hitchhike into the home in food, furniture, old books, papers and old starched clothing. Unlike other insects, they continue to molt after becoming adults. Forty-one molts have been recorded for one firebrat. Populations do not build up fast. A large infestation in the house usually indicates a longtime infestation.

HABITAT, FOOD SOURCE(S):

Silverfish are chewing insect and general feeders but prefer carbohydrates and protein, including flour, dried meat, rolled oats, paper and even glue. They can survive long periods, sometimes over a year, without food but are sensitive to moisture and require a high humidity (75% to 90%) to survive. They also have a temperature preference between 70 and 80 degrees F. They are fast running and mostly active at night and generally prefer lower levels in homes, but may be found in attics.

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SYMPTOMS AND DAMAGE:

- They are found in basements, kitchens, sinks, bathtubs, in bookcases, on closet shelves, behind baseboards, wallpaper, window or door frames, wall voids, and sub-floor areas.
- Because they molt during their adult lives their cast skins may be a useful detection too.
- Their diets are high in protein, sugar, or starch, including cereals, moist wheat flour, starch in book bindings, and paper on which there is glue or paste.

COMMON CONTROL MEASURES

There are some household control methods available by which using them can be save foods, wallpaper paste, book-bindings, paper, photographs, starch in clothing, cotton, linen, rayon fabrics, wheat flour, cereals, dried meats etc. to be contaminate or damage by silverfish.

These may be following:

- Remove old stacks of newspapers, magazines, papers, books and fabrics plus foodstuffs spilled and stored for long periods of time.
 - Often reducing available water and lowering the home's relative humidity with dehumidifiers and fans is helpful. Repair leaking plumbing and eliminate moisture around laundry areas.
 - Lighting a dark, sheltered area may force these insects to move to new sites where they can be controlled more easily because Silverfish are mostly active at night or are active in dark places.
 - Sources of any undue moisture, such as faulty plumbing or condensation that provide the humidity favored by these pests should be eliminated.
 - Regularly vacuuming cracks and crevices with a narrow vacuum tip also can be a good method to physically remove these insects from their harborage.
 - Removal of food sources and stored in tight containers.
- Once the infestation has been eliminated, sanitation will help prevent reinfestation.

RECOMMENDED CHEMICAL MEASURES OF CONTROL

Sanitation is important but not entirely effective in reducing populations because insects often reside between wall partitions, in insulation materials, in books and papers, among book shelves and in other protected places. However Effective control of silverfish For a long period of time some chemical treatment is recommended.

INSECTICIDES

Treatments need to be applied thoroughly to all potential hiding places such as cracks, crevices, inside floor moldings, around steam and water pipes, in and behind seldom moved furniture, closets and even attics. It may be necessary to drill small holes in the walls to treat large populations in wall voids. Control may not be immediate since bristletails in wall voids must move out and contact the insecticides. It may take 10 to 14 days.

There are many insecticides labelled for control of silverfish

1. Residual sprays of **chlorpyrifos** (Duration, Dursban, Empire, Engage, Killmaster II), **chlorpyrifos + pyrethrins** (Dual Use), diazinon and propoxur (Baygon) can be used.
2. Space sprays of **amorphous silica gel** (Drione, Tri-Die), **pyrethrins** (Exciter, Kicker, Microcare, Pyrenone, Pyrethrum, Safer, Synerol, Uld, X-Clude), **resmethrin** (Vectrin) and **esfenvalerate** (Conquer) can supplement residual sprays, especially in attics, crawl spaces and other hard-to-reach areas.
3. **diatomaceous earth**, **diatomaceous earth + pyrethrins** (Organic Plus) are effective in places where sprays are hard to reach such as in wall voids, crawl spaces and attics.
4. Their products include **bendiocarb + pyrethrins** (Ficam Plus), **cyfluthrin** (Optem, Tempo), **cypermethrin** (Cynoff, Cyper-Active, Demon, Vikor), **deltamethrin** (Suspend), **lambdacyhalothrin** (Commodore), **permethrin** (Dragnet, Flee, Pretude, Torpedo), **propramphos** (Safrotin) and **tralomethrin** (Saga).
5. Other insecticides labelled for "restricted use" can be applied only by the licensed pest control operator or applicator. Before using any insecticide, always read the label, follow directions and safety precautions. It is advisable to use the services of a reputable, licensed pest control operator or applicator when infestations are persistent and hard to locate.

SOME PRODUCTS, RATE OF APPLICATION AND THERE METHOD OF USING

(1). NIBAN FG BAIT :

If dusting sounds like too much work, you can bait for silverfish as well. It has been used several years for crickets, ants and roaches. It is also labeled and works well for silverfish. Niban uses boron as the active ingredient so it is safe to use around children and pets. It does not have an odor, can be applied inside and outside and will last a long time.

Product Description: Wheat germ looking granules.

Target Pests: Crickets, roaches, ants and silverfish.

Where To Use It: It can be used both outside and inside, most applications for silverfish should be done in two places, where you see them in living areas and where they are nesting. Nest locations are generally going to be in wall voids and attics. Niban will last long; it remains active for several months so even if all is not eaten initially it will have impact several months down the road if new activity should start.

Rate Of Application: Use one pound for every 500 sq/ft of surface area. This is needed for attics and crawl spaces. Living areas generally don't need that much. Use one pound for every 1000 sq/ft of living area.

(2). **ES FENVALERATE.**

If silverfish around the outside of the home and occasionally one gets inside, perimeter treatments may stop them. The best formulation for silverfish is Estfenvalerate.

Product Description: Esfenvalerate is an emulsifiable concentrate which is very active against silverfish. It is a liquid, odorless and mixes easily with water.

Target Pests: Just about everything. Although it will work well for silverfish and firebrats, it will work well for ants and roaches too.

Where To Use It: Esfenvalerate is labeled for use in and around homes. It is labeled for flea control on carpets. Just keep pets and children off treated surfaces until it dries. Spray it on furniture, pet resting areas, etc.

Rate Of Application: The rate of application will vary with the level of infestation. Use 1-2 ounce per gallon of water to be applied over 1000 sq/ft when using the regular strength concentrate. Repeat once a week until the activity stops.

(3) **DRIONE DUST:**

Drione dust is a silica based material that works as a desiccant on insects. Silverfish cannot live where it is applied. Drione can be used both outside and inside. Apply under the siding, around routes of entry, into storage boxes, into light fixtures, into electric outlets, and broadcast it throughout the attic if they are nesting under the insulation. The great thing about Drione is that wherever you apply it, silverfish, as well as any insect, cannot live.

Product Description: White Powder, low odor, very light and powdery. Drione is very safe to use. In fact, it is labeled as a flea powder to use on dogs and cats.

Target Pests: many different pests. It works on many insects and lasts a long time.

179

Where To Use It: Attics, crawl spaces, cracks, crevices, electric outlets, light fixtures, wall voids, etc.

Rate Of Application: 1 lb covers up to 800 sq/ft.

(4). **PT-230** is Drione in a can. It is ready to apply, does not need an applicator and adheres well to treated surfaces. If need to treat an entire home, get the Drione in the 1 lb jar. This will cover up to 800 sq/ft and a few pounds may be needed.

ANTS AND THEIR CONTROL

Ants are a common pest in many parts of the world and there are many species of ants. However, we have discuss here only Carpenter Ants.

CONTROL METHODS

For some species, elimination of breeding spots such as mulch and other decaying organic matter near a structure can be helpful. However, once ants start appearing inside, the use of bait products can give effective control.

BAIT STATIONS - CONVENIENT, LOW RISK

Of all bait forms, stations offer a convenient, low risk approach for pesticide application. Although often referred to as "traps", these products are actually feeding stations where insects can enter and translocate the bait. The two products that we recommend

1. MaxForce FC Ant Bait Stations
2. Advance Dual Choice Ant Bait Stations.

These may be applied both indoors or outdoors, but for best results, they should be placed areas that are well trafficked by ants and away from the sun and rain.

One important point regarding the use of bait stations is to leave the areas near the stations undisturbed. Cleaning or washing the areas near them removes the scent trails left for other ants need to find the bait.

GRANULAR BAITS

- Another type of bait is granular bait. the products, Niban FG Fine Granular Ant Bait a food based bait treated with 5% orthoboric acid.

180

- **MaxForce Fine Granule Insect Bait**, containing 0.1% hydromethylnon, may be used inside or outside as needed.

These products both recommend evenly spreading the product. Because these are fine granules products, they are best suited to smaller ant species such as pavement ants, pharaoh ants, acrobat ants and little black ants. This is not to say that they cannot be used to control other larger ants. They are both recommended for Carpenter Ants which may be quite large.

Advance Carpenter Ant Bait, which may be applied around the outside of the structure and may control a variety of ants, is best suited for larger ant species such as Carpenter Ants due to its larger particle size. Smaller ants may be able to take the bait, but they may not be able to bring the relatively large granules into the smaller nest entrances. Nonetheless, this product may be used for a number of ant species.

Though this products may be applied indoors within cracks and crevices, its fish based food ingredient has an odor which some may find objectionable. The manufacturer recommends that it be applied in a pile from which the ants can draw from.

Baits are effective in many cases, but certain species such as Carpenter Ants and Acrobat Ants have changing food preferences at different times of the year. Also, some ants species prefer sweets while other prefer protein based foods. Sometimes, experimenting with different bait products is necessary.

GEL BAITS

Finally, professionals are using gel baits for ants. There are several on the market. Based on our experience and feedback from commercial applicators, there has been a great degree of success with both **MaxForce FC Carpenter Ant Gel** and the **MaxForce FC Ant Gel**. Fipronil, the active ingredient in both, is "contagious" and affects ants that make physical with an ant that has touched or consumed the bait.

TRADITIONAL METHODS

Residual insect sprays can still be used for most ant species. Most effective is a perimeter treatment applied on both sides of a building's exterior walls. Outside, treatment should include areas around door frames and window frames as well as application to the foundation and any other areas that are vulnerable to entry by ants. Inside, treat around the door frames and window frames as well as along baseboard areas. Additional treatment of damp areas may be required in kitchen and bathroom areas. Liquid insect

181

sprays are best applied using a pin (jet) stream using low pressure rather than a wide fan spray.

There are many liquid and dust materials that may be applied for control of ants. So to control a door/Outdoor Insect Spray and Drone Dust

THE PROBLEM: SPIDERS



INTRODUCTION

Spiders have a widespread, but largely undeserved reputation as being dangerous to the health and welfare of people and their pets. In truth, spiders are extremely beneficial because they prey on many insects that we consider to be pests in our homes and gardens. Not all spiders build webs to snare their prey. Some species ambush their prey from tubular tunnels built in the ground or under rocks. Other species simply build a loose collection of webbing (cob webs) in which they live. The types of spiders that most frequently invade homes fit into these latter categories. They may remain hidden for most of the day and feed primarily at night.

Spiders are not insects. They are close relatives of ticks and mites, which all belong in the group called arachnids. Unlike insects, which have three main body sections and six legs, spiders have two body sections and eight legs. The eyes, mouthparts and legs are found on the front section of the body, known as the cephalothorax. The second section, the abdomen, bears the openings for breathing, the digestive and reproductive systems, and the external organs used for spinning silk or webbing. Most spiders are identified by size, color, markings on the body and the number of eyes (usually six or eight) and arrangement of the eyes. Female spiders wrap their eggs in a silken spun sac. Some species carry this egg sac, while others deposit it somewhere within their nest. Hatching spiders (spiderlings) often produce a silk thread that allows them to be carried by wind currents to other areas (parachuting).

182

Spider Bites

Encounters between people and spiders are usually accidental and bites are a defensive response by the spider when its web or nest is disturbed or when it becomes trapped in clothing or against the body. All spiders produce venom therefore, they could all be considered "poisonous". The venom is stored in glands that empty into the spiders fangs or chelicerae. However, just as bee and wasp stings may trigger allergic reactions in some people, the same can be true for spider bites. Young children, the elderly and hypersensitive individuals are more likely to react strongly to a bite. Some spider bites produce an ulceration or lesion on some parts of the body, but most spider bites are just painful and produce a small red swelling. There are no spiders that can inflict serious injury and any bites are extremely small. Bites most commonly occur when a person picks up firewood with a spider on it or when a spider finds its way into clothing or bedding.

LIFE CYCLES AND HABITS

Spider mite species seem to be warm weather or cool weather active pests. The two-spotted, European red, honeylocust, and oak spider mites do best in dry, hot summer weather. The spruce and southern red spider mites do best in cool spring and fall weather. All spider mites go through the same stages of development. Adult females usually lay eggs on their host plants. The eggs hatch in days to weeks into the first stage, called a larva. Larvae are round bodied and have only three pairs of legs. The larvae feed for a few days, seek a sheltered spot to rest and then molt into the first nymphal stage. The first nymph now has four pairs of legs. The first nymphs feed a few days, rest and molt into the second nymph. The second nymphs feed, rest and molt into the adult stage. The males are usually the size of the second nymph and have pointed abdomens. The females have rounded abdomens and are the largest mites present. Most spider mites spend the winter in the egg stage.

COMMON SPIDERS FOUND IN HOMES

Crab spiders (*Pholocomus* spp. and *Xysticus* spp.) are named for their crablike shape and scuttling sideways movements. Crab spiders can be distinguished from other spiders by the second set of legs being slightly longer than the other legs. Most are squat spiders, though some are elongate. The cephalothorax is almost circular, and the short often blunt abdomen is frequently patterned. Many species are brightly colored to blend into flowers on which they often lie in wait for insects. These harmless spiders are common throughout world, especially in gardens, meadows, on the bark of trees and may occasionally wander indoors.

183

Wolf spiders (*Lycosidae* spp.) are typically brown to pale gray spiders with variable markings such as bands, stripes, or black dots. The cephalothorax is narrower than the abdomen, and the front pair of legs may have strong spines. Wolf spiders are usually somewhat hairy. Their eyes are arranged in a distinctive pattern that can be seen with a hand lens. They have four large eyes and four small eyes. Two of the large eyes face forward and the two adjacent ones face sideways. The four small eyes are below them and are arranged in a row facing forward. These spiders have excellent eyesight and are vital predators of many pests. Females are often seen carrying an attached egg sac, which she will search for and retrieve if it is dropped.

Wolf spiders and crab spiders are the most common household spiders. They often come indoors in the fall when they are looking for a warm place to overwinter. They are commonly found around doors, windows, house plants, basements, garages, and in almost all terrestrial habitats. They do not spin a web but roam at night to hunt for food. Wolf spiders are often confused with the brown recluse, but they lack the unmistakable violin-shaped marking behind the head. Both the wolf spider and the smaller crab spiders are shy and seek to run away when disturbed.

Cob Web spiders (*Scotoda* spp.) also known as the American house spider. *Scotoda* *grozovi* is commonly called the false black widow because of its shiny black appearance resembling its namesake. The abdomen of these spiders are very rounded, they make irregular webs in foliage, cracks and crevices, and debris, or under buildings, especially the crawl spaces beneath mobile homes.

AVOIDING SPIDER BITES :

The most effective method of avoiding spider bites is to reduce your exposure to spiders. Wear gloves or other protective clothing that covers skin while working in crawl spaces and similar locations, and when retrieving firewood or objects stored in potentially infested areas. Prior to use, shake out clothes, shoes, and other items that have been stored. Screens on basement and ground-floor windows and insulation strips under doors may reduce the risk for spider infestation. To prevent spiders from gaining access to beds, bedspreads should be kept at least 4 inches above the floor.

CONTROL STRATEGIES

Early detection of spider mites, before damage is noticed, is important. The tiny spider mites can be detected by taking a piece of white paper or cardboard and striking some plant foliage on it. The mites can be seen walking slowly on the paper. If 10 or more mites per sample are common, controls may be needed.

184

Option 1: Cultural Control - Syringing Since rainy weather seems to knock off spider mites, using a forceful jet of water from a hose (syringing) can perform the same task. A regular syringing can keep spider mites under control on most ornamental plants in the landscape. This technique also helps conserve natural predators.

Option 2: Cultural Control - Quarantine and Inspection The twospotted spider mite is often introduced on infested bedding and house plants. When purchasing new plants, carefully inspect the lower leaf surface for any signs of mite activity. New house plants should be quarantined from other plants until you are sure that no mites are present.

Option 3: Biological Control - Predators There are numerous insects (lacewings and lady beetles) that prey on spider mites. However, the most commonly sold predators are other types of mites. Predatory mites (usually *Phytoseiulus* spp., *Amblyseius* spp. or *Metaseiulus* spp.) can be purchased and released onto infested plants. Be sure to check listings to determine which species is appropriate. Some species are host specific and each predator works better under different weather conditions. If predators are used, do not apply pesticides that will kill them.

Option 4: Chemical Control - "Soft Pesticides" Most spider mites can be controlled with insecticidal oils and soaps. The oils, both horticultural oil and dormant oil, can be used. Horticultural oils can be used on perennial and woody ornamentals during the summer at the 1 to 2 percent rate. Higher rates of horticultural oil (3 to 4 percent) or dormant oil are useful for killing mite eggs and dormant adults in the fall and spring. The insecticidal soaps are useful in the warm season. Remember that mites are very tiny and soaps and oils work by contact only. Therefore, thorough coverage of the plant is necessary for good control.

Option 5: Chemical Control - Miticides Spider mites are usually not killed by regular insecticides, so be sure to check the pesticide label to see if "miticide" is present. Pesticides claiming "for mite suppression" are usually weak miticides and will not perform well. There are few products available to the homeowner. Difeofol (=Kelthane) is registered for over-the-counter use but is difficult to find. Acephate (=Orthene), dimethoate (=Cygon), chlorpyrifos (=Dursban), diazinon, disulfoton (=Di-syston), and malathion have over-the-counter product labels but are considered weak miticides. Avermectin (=Avid), bifenthrin (=Talstar), dicoschlor (=Pentac), fenbutatin-oxide (=Vendex), fluralinate (=Mavrik), oxamyl (=Vydate), oxydemeton-methyl (Metasystox-R), oxythioquinox (Morestan), and propargite (=Omite) are restricted use pesticides.

COMMON PREVENTION CONTROL

Spiders may enter houses and other structures through cracks and other openings. They also may be carried in on items like plants, firewood, and in boxes. Regular vacuuming or sweeping of windows, corners of rooms, storage areas, basements, and other seldomly used areas helps remove spiders and their webs. Vacuuming spiders can be an effective control technique because their soft bodies usually do not survive this process. Indoors, a web on which dust has gathered is an old web that is no longer being used by a spider.

Individual spiders can also be removed from indoor areas by placing a jar over them and slipping a piece of paper under the jar that then seals off the opening of the jar when it is lifted up. To prevent spiders from coming indoors, seal cracks in the foundation and other parts of the structure and gaps around windows and doors. Good screening not only will keep out many spiders but also will discourage them by keeping out insects that they must have for food. In indoor storage areas, place boxes off the floor and away from walls, whenever possible, to help reduce their usefulness as a harborage for spiders. Sealing the boxes with tape will prevent spiders from taking up residence within. Clean up clutter in garages, sheds, basements, and other storage areas. Be sure to wear gloves to avoid accidental bites.

Outdoors, eliminate places for spiders to hide and build their webs by keeping the area next to the foundation free of trash, leaf litter, heavy vegetation, and other accumulations of materials. Trimming plant growth away from the house and other structures will discourage spiders from first taking up residence near the structure and then moving indoors. Outdoor lighting attracts insects, which in turn attracts spiders. If possible, keep lighting fixtures off structures and away from windows and doorways. Sweep, mop, hose, or vacuum webs and spiders off buildings regularly. Insecticides will not provide long-term control and should not generally be used against spiders outdoors.

Sorptive dusts containing *Diatomaceous earth* or amorphous silica gel, a natural product composed of silicon dioxide, may be useful in certain indoor situations. Particles of the dust affect the outer covering of spiders (and also insects) that have crawled over a treated surface, causing them to dry out. When applied as a dustlike film and left in place, a sorptive dust provides permanent protection against spiders. The dust is most advantageously used in cracks and crevices and in attics, wall voids, and other enclosed or unused places. Chemical control is usually not needed for control of spiders, however some relief from a severe spider infestation may be gained with a natural spider spray made from essential oils.

NON-CHEMICAL CONTROL:

1. Eliminate or shield outdoor lights or bright indoor lights that attract the spiders' insect food source.
2. Trim weeds around the building foundation and remove debris to discourage insects and spiders from living next to a structure.
3. Seal openings and install screens and door sweeps to prevent spiders (as well as other unwanted pests) from moving indoors.
4. Use a vacuum cleaner to remove webs, spiders and their egg sacs.
5. Use Cobweb Eliminator to prevent the formation of spider webs.

RAT and MICE

GENERAL INFORMATION

The roof rat (*Rattus rattus*) is the problem rat in Orange County. This rat is slender, agile, and a good climber. They feed on a variety of fruits and nuts such as oranges, walnuts, avocados, plums, peaches, and apricots grown in residential backyards. Roof rats typically nest in large overgrown ivy patches, piles of lumber and firewood, yucca plants, and palm trees. They also may be found nesting in old furniture, storage sheds, and inside buildings.

The roof rat goes by many aliases such as the tree rat, fruit rat, black rat, and power line rat.

RAT CONTROL

Rats may be trapped using snap traps available at most nurseries and hardware stores. For best results, bait the trigger of the snap trap with either peanut butter mixed with oatmeal, freshly cooked bacon, nutmeats, or pieces of apple.

POISONS

The safest rodenticides presently used in rat are anticoagulant formulations which require several feedings to be effective. The homeowner may purchase these rodenticides at nurseries, hardware stores, and farm supply stores.

Keeping rats out of the home and other buildings is an important element of rat control. Roof rats can gain access into the interior of a building or residence through small

exterior openings. Therefore, all ventilation ports, basement windows, attic vents and louvers, vent pipes and shafts, mobile home base skirts, and other access points should be sealed or screened using 1/4 inch hardware cloth to exclude rats. Gaps around pipes and electrical conduits, as well as cracks around doors and windows, also should be sealed. Rodents can enter through very small openings.

STEPS TO RAT CONTROL

The following is the recommended sequence of steps to control rats around the home.

STEP 1. Eliminate Food

- Remove all potential sources of food from the premises. This includes bird seed left out for birds. Routinely harvest ripe fruit and pick up all fruit that has fallen to the ground.
- Store pet food in metal containers with tight sealing lids and do not leave uneaten pet food outdoors.
- Control snails and clean up pet feces because they are favored food items.
- Keep trash cans closed at all times with tightly fitted lids.

STEP 2. Destroy Rats

- Rats should be snap trapped if they are inside a residence or building. Poisoning with baits indoors is not recommended because a rat may die inside the structure and create an odor and fly problem.
- Place traps near nesting areas or where rats are likely to hide. Do not place traps where children or pets will disturb or be harmed by them. Remember! Snap traps are **DANGEROUS!**
- Remove dead rats by placing animals in tightly sealed containers for proper disposal.
- Poison baits may be used outside when following these recommended guidelines:
 - Use tamper-resistant bait stations.
 - Bait stations must be secured so they cannot be carried away or moved.
- Bait stations should not be placed in the open, but hidden behind shrubbery and other objects where evidence of rat activity has been observed.

- If a bait station is placed in a tree or vegetation, the station must be secured in a way so that the bait will not spill out.

- Commonly These formulations are *POISONOUS* and must be placed where pets and children cannot reach them.

STEP 3. Eliminate Shelter

• After the rats have been destroyed, harborage and nesting areas should be removed. It is important to wait until after the rats have been eliminated because they may disperse into the surrounding area when the harborage is removed. Algerian ivy, palm trees, yucca, bougainvillea, and other dense shrubbery should be thinned or eliminated completely.

• Barbecues and pool heaters are favorite nesting sites. Close off all openings with 1/4 inch hardware cloth screen.

• Firewood and lumber piles should be stacked at least 18" off the ground and 12" away from fences and walls.

STEP 4. Maintaining a Rat Free Property

• After rats have been reduced, keep reinfestation from occurring by keeping harborage and food sources to a minimum.

There are many rodenticides available in the market

TOXICANTS: ANTICOAGULANT RODENTICIDES:

(Slow Acting: Rodent's death occurs within 3-5 days after ingestion of a lethal amount of bait) some of are:

ACTIVE CHEMICAL	SAMPLE BRAND NAMES
Brodifacoum	Talon, d-con
Bromadiolone	Maki, Conrac
Chlorophacinone	RoZol
Diphacinone	Ditrac, Tomcat
Warfarin	Final

NON-ANTICOAGULANT RODENTICIDES :

(May be acute or chronic poisons: single dose usually lethal within 1-3 days after ingestion) Some examples are

ACTIVE CHEMICAL	SAMPLE BRAND NAMES
Bromethalin	Assault, No-Pest
Cholecalciferol	Quintox
Zinc phosphide	ZP

CARPET BEETLES & CLOTHES MOTHS

Carpet beetles and clothes moths can become serious pests in the home because the larvae of these insects feed only on materials such as wool, silk, hair, bristles, feathers and fur. You can keep them from becoming pests in your home by knowing where to look for them, how to recognize them, and what actions to take to protect your belongings from them. In this article, you will learn a little of the biology and habits of these pests, as well as what products to use in carpet beetle and clothes moth elimination.

CARPET BEETLES

Several species of carpet beetles enter houses. The adult black carpet beetle is dull black with brown legs. Adults of other species of carpet beetles (Common Carpet Beetle, Varied Carpet Beetle) are mottled with white, brown, yellow or black. Carpet beetle adults are about one eighth of an inch long. They fly readily and are attracted to light. Many of the adults feed on flower pollen. Carpet beetles breed and feed outside on dead animal material and in bird or rodent nests of dropped feathers and hairs. Old wasp nests under eaves and in attics may also serve as carpet beetle breeding sites, since wasp skins provide a suitable food source. Removal of wasp nests, Mud Dauber nests is a must in carpet beetle control and elimination.

A female carpet beetle lays about 100 eggs that hatch in a week or two. The black carpet beetle generally has only one generation a year, but other carpet beetles may have as many as four generations a year. Developmental time may take longer if food is scarce. The larvae begin feeding as soon as they hatch.

Carpet beetle larvae are carrot-shaped with tail bristles. Black carpet beetle larvae may grow to be one half inch long, are dark yellow to brown and have long tail bristles. Other

carpet beetle larvae are generally about one fourth of an inch long, stubby and are covered with dark bristles. Carpet beetle larvae may crawl from place to place and may be found on items on which they do not feed. Unlike the adult beetles, the larvae avoid light and prefer to live in undisturbed places. Larvae are often attracted to soiled fabrics (such as clothing soiled with body oil or perspiration) and cracks and crevices where lint, food crumbs or dead insects accumulate. Carpet beetle larvae may also feed on stored cereals, dry pet food and wool piano felts.

CLOTHES MOTHS

Two species of clothes moths are of primary importance in homes: the case-making clothes moth and the webbing clothes moth. Adults of both species are buff-colored with few distinguishing marks and look very much alike. They do not feed and are not attracted to light. Female moths lay from 100 to 150 small, pinhead-sized, white eggs which hatch in about five days. Full-grown larvae are about one third of an inch long. Larvae stage varies from six weeks to several years. Larvae of the case-making clothes moths live in silken cases which they drag with them. As the larva grows, so does the case, until finally the case is converted into a tough cocoon in which the pupa develops. The moth emerges in one to four weeks. Clothes moth larvae feed on wool, wool blends, feathers, fur hair, dry milk powder, leather, other animal products and sometimes on lint, dust or paper. Clothes moth larvae do not wander like carpet beetle larvae so look for them on materials on which they feed.

ELIMINATE CARPET BEETLE AND CLOTHES MOTH INFESTATIONS

- **Locate** the source of infestation. Look in places where carpet beetle and clothes moth food is likely to be found. Check corners, under furniture that has not been moved for a long time, behind baseboards, etc. Carpet beetle larvae tend to wander, so consider sites in addition to the place you first found larvae.

- **Clean up** or eliminate the source of infestation. Good housekeeping is as important in preventing carpet beetle and clothes moth infestations as it is in control. Your vacuum cleaner is often your best pest management tool. Pay close attention to areas where lint accumulates (corners, baseboards, shelves, etc.). Be sure to dispose of the contents of the vacuum cleaner bag after you clean. Clean or dispose of infested clothing, cloth, blankets and other fabrics. Freeze-treat small items such as ornaments and fur toys by placing them in the home freezer for a week. Periodic brushing and sunning of stored fabrics is helpful in prevention and control.

- **Treat** with a recommended insecticide. However, chemical treatment will not be effective if proper cleaning is not done first. Chemical sprays should be used only for spot treatment of cracks and crevices, along baseboards and other areas where clothes moth larvae and carpet beetle larvae are most likely to crawl or encounter your pesticide. A professional insecticide that is labeled for carpet beetles, fleas and clothes moths will be water-safe for fabrics such as upholstery and carpets. Suspend SC is the best insecticide for carpet beetles, clothes moths, spiders. We also recommend the use of Suspend SC because it is odorless, non-staining, has an excellent residual and controls a wide range of household pests. In areas inaccessible to pesticide sprays (small cracks & crevices, wall voids,) Drione Dust should be applied for heavy or stubborn infestations. It is very important to apply Drione Dust at wall/carpet junctures, behind baseboards, beneath furniture, inside cushions of couches & chairs -- all areas where sprays cannot reach and where all stages of pests are hiding and breeding!

- **Inspect** possible food sources regularly. Regular and thorough inspection and cleaning are of utmost importance in prevention and control of carpet beetles and clothes moths.

CARPET BEETLES AND CLOTHES MOTHS

Proper inspection and sanitation are the keys to enhancing your pesticide application. Destroy any wasp nest, Mud Dauber nests, old bird nests in or around the structure. Use Suspend SC to eliminate existing moth and beetle infestations and for long term control of these and other household pests. For hard to reach areas or severe infestations, Drione Dust should be applied. Ficom W is \$39.50 for a box which gives you ten applications. Each application lasts for three months indoors, and one to two months outdoors!

CONTROLLING FABRIC PESTS

Many insects feed on a variety of foods. For insects such as carpet beetles and clothes moths, their nourishment comes from eating items made of organic materials. The most commonly attacked items include those made from wool, silk, fur, feathers and animal hair. You can protect your fabrics, rugs and other items from fabric pests by knowing what they look like, where to find them and what to do to prevent or control infestations.

CARPET BEETLES

Several types of carpet beetles (*Attagenus megatoma* and *Antrrenus* species) enter homes from outside locations. Adults are good fliers and are attracted to light. In natural settings

most adult carpet beetles feed on flower pollen. The larvae (immature stages) often feed on dead animal material or in the nests of birds, rodents and even old wasp nests.

Description: Some adult carpet beetles are dull black with brown legs. Other adults are mottled with white, brown, yellow or black. Carpet beetle adults are about 1/8 inch long. Carpet beetle larvae (immature forms) often are carrot-shaped with tail bristles and body hairs. They may grow to be 1/4 to 1/2 inch long. Because larvae can shed many times, an infestation may look larger than it really is.

Life Cycle and Habits: Female carpet beetles lay about 100 eggs that hatch in a week or two. They generally have between one and four generations a year. Development time may take longer if food is scarce. Larvae begin feeding as soon as they hatch.

Carpet beetle larvae may crawl from place to place and may be found on items on which they do not feed. Unlike the adult beetles, the larvae avoid light and prefer to live in undisturbed places. Larvae are often attracted to soiled fabrics (such as clothing soiled with body oil or perspiration) and cracks and crevices where lint, food crumbs or dead insects accumulate. Besides fabrics, carpet beetle larvae may also feed on other items such as stored cereals.

CLOTHES MOTHS

The case-making clothes moth (*Tinea pellionella*) and the webbing clothes moth (*Tineola bisselliella*) are the most common pests in the clothes moth group.

DESCRIPTION:

Adults of case-making clothes moths and webbing clothes moths are buff-colored and look very much alike. Full-grown larvae are about 1/2 inch long. Larvae of the case-making clothes moths live in silken cases, which they drag along with them as they move.

LIFE CYCLE AND HABITS:

Females moths lay from 100 to 150 small, pinhead-sized, white eggs on or near the fabric they infest. Eggs usually hatch in about five days. The length of the larval stage varies greatly, from six weeks to several years depending on the species and conditions where they live. It is the larvae that damage fabrics. Usually, clothes moth larvae do not wander like carpet beetle larvae, however they can occasionally be found off fabrics feeding on dust or other materials of animal origin. Eventually the larvae pupate (transform to a

nonfeeding stage where the larva changes to an adult) in a silken case. The adult moth emerges in one to four weeks. Adults do not feed nor are they attracted to lights.

NON-CHEMICAL CONTROL :

Generally fabrics that are frequently used or in areas with regular human activity are not attacked by pests. Stored fabrics or organic materials undisturbed for long periods of time are the items most damaged. The best prevention is to inspect materials that contain animal fibers regularly and to store them only after they have been brushed and cleaned appropriately.

Stored items should be kept in tightly sealed chests or storage closets. Many people like to store fabrics in cedar chests, which is fine. However, most types of cedar chests and closets are only marginally effective against fabric pests and that is for fabrics that are initially free from these pests. Over time, the repellent benefits of the cedar oils lessens. If using cedar closets, clutter should be kept to a minimum to allow the volatile cedar oils to be most effective.

If fabrics that are "moth-eaten," look in places where carpet beetles and cloths moth are likely to be found. Check corners around rugs, under furniture and in woolen and silk clothes that have not been moved for a long time in closets. Cleaning is the best option to eliminate an infestation — or prevent one — and your vacuum often is your best weapon. When cleaning, pay close attention to areas where lint accumulates, around furniture and in the corners of rooms. If you are cleaning an active infestation, be sure to dispose of the contents of the vacuum cleaner bag outside. Clean or dispose of infested materials. For items that cannot be discarded or cleaned well, consider placing the infested item in a freezer for one week. Periodic brushing and sunning of stored fabric is also helpful in prevention and control.

CHEMICAL CONTROL

Moth crystals and moth balls can provide some protection. Some materials including many plastics and furniture finishes can be damaged by direct contact with the moth crystals and balls. Inhaling the vapors for extended periods is unhealthy. Moth crystals are usually considered to be more effective than moth balls. Clutter in the closets should be kept to a minimum to allow moth crystals and moth balls to work properly.

There are a number of common household insecticide sprays available for fabric pest control. All should be equally effective if used properly. This means applying the sprays to cracks and crevices in closets and chests where the pests may be hiding. Sprays should

only be used if an infestation exists. Sprays will not be effective as a preventative measure and should never be applied directly to fabrics.

HOUSE FLY

The common Indian housefly is *Musca Nebulo*. It is found in all places of human dwelling. They are specially abundant and very active during summer and rainy season.

SYSTEMATIC POSITION

Phylum	: Arthropoda	Class	: Insecta
Sub class	: Pterygota	Division	: Endopterygota
Order	: Diptera	Genus	: Musca
Species	: Nebulo		

There are many other species of *Musca*, such as - *Musca domestica* in Europe and America; *Musca Vicina* is common in all oriental countries; *Musca autumnalis* is found in Europe and Southern Asia; *Musca sorbens* from the Mediterranean throughout warmer asia.

HABITAT AND HABITS

The housefly is a diurnal insect. It neither bites nor stings us. It have insanitary habit. During the day, it actively flies about out sits upon all sorts of dirty organic matter, foodstuffs and household articles. It rests upon walls, clothes, wires, ropes etc. in the night. These are efficient fliers and can fly fast over long distances. House flies are unisexual.

EXTERNAL FEATURES

The body of housefly is about 5 to 8 mm long, elliptical but conical behind and dark grey dorsally, but yellowish on ventralside. The body is distinctly divided into head, thorax and abdomen.

LIFE CYCLE

Eggs → Hatching → Larvae → Pupa → Adult

The female lays about 120 to 160 eggs at one time. In the course of a breeding season a single female may lay eggs 4 to 6 times.

195

The eggs hatch in 8 to 24 hours depending upon the temperature, and larvae emerge in the dung.

All filth flies have developmental cycles with four life stages.
[Egg, Larva (maggot), Pupa and Adult]

The adults are medium to large-sized flies with lapping sponging or piercing mouthparts.

The house fly may take about 10 days from egg to adult.

PEST STATUS

Spread a number of infectious human diseases, such as dysentery, typhoid, paratyphoid, diarrhoea, bubonic plague, leprosy, cholera anthrax, gangrene, gonorrhoea, tuberculosis, trachoma etc.

Contaminate foodstuffs and other articles with all sorts of pathogenic organisms.

Transfer a number of parasitic worms like *Ascaris*, tapeworms, hookworm etc. to foodstuff.

Housefly is a curse to mankind It is responsible for the death of many people.

PREVENTION AND CONTROL

(1) Physical Control

Physical methods include the use of sticky traps, light traps with electrocutor and fly swatters.

(2) Chemical Control

Several insecticides can use for fly control. These can be destroyed by spraying DDT, flit, benzene hexa chloride, gammexane, pyrethrum, chlordane, lethane etc.

Main types of application for chemical control of flies.

1. Larvicides
2. Toxic baits
3. Fumigation
4. Space sprays
5. Impregnator materials
6. Residual treatment

196

(3) Environmental Sanitation and Hygiene Measures

- Garbage and other organic waste in urban areas should be eliminated by proper collection, storage, transportation and disposal.
- Installation of fly-proof scientific latrines.
- Hygiene measures include prevention of contact between flies and sick people and other sources of pathogenic organisms, protection of food and eating utensils by placement in fly-proof containers protection of infants by nets and screening of buildings.
- Flies can also be prevented from entering buildings by closing cracks and ill-fitting doors and windows or by the establishment of an air current in doorways.

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