



Dust Application in Professional Pest Control

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INTRODUCTION

Dust formulations are very effective in treating pest harborage such as cracks and crevices in kitchens for cockroaches, and wall voids for bed bugs and ants. A small amount of dust provides long-term control of pests crawling in these enclosed spaces. There is renewed interest in the use of dust for bed bug, cockroach, and spider control, and there are new formulations and improved dust application equipment.



The effectiveness of dust depends on proper application. Dust formulations are a concentrated form of insecticide, so only a thin surface coating is needed. Dust application requires training, experience, and professional equipment. The objectives of this bulletin are to review important aspects of using dust for controlling cockroaches, bed bugs, ants, spiders, and other indoor pests.



DEVELOPMENT OF DUST INSECTICIDES

Developing a dust formulation for professional use begins with selecting an insecticide that provides quick knock-down and kill, and has an extended residual activity. The traditional pyrethroids, neonicotinoids, and other modern classes of insecticides provide these features and many are available in dust formulations.

The next step is to select an inert 'carrier' for the insecticide. This material helps protect the active from ultraviolet light or to repel moisture and prevent clogging application equipment.

Some carriers can be made into a fine powder, which increases surface coverage.



Most dust formulations use a white or gray color carrier so the application can be seen. The insecticide and carrier are chemically joined, so that the pattern of dust on the surface is the actual location of the insecticide. Silica aerogel is a very fine dust and often does not have a carrier. This material easily mixes into the air during application and particles are small enough to be inhaled. Always wear personal protective equipment recommended by product labels.



DUST APPLICATION

The objective of a dust application is the same as that for liquid application: create a lethal residue on a surface that will be contacted by a crawling pest. The standard liquid spray places small droplets on a surface, while a dust application places small dry particles on a surface. Dust particles are smaller than droplets, but both formulations rely on the target pest to crawl over a treated surface.

Dusting. Applying a thick layer of dust to a surface is wasteful. Excess dust will actually reduce efficacy by repelling a crawling pest from a surface. The result of a dust application should be a layer of dust particles on a surface. An insect has to contact only a small number of particles for



dust to be effective. More dust will not kill an insect faster or make it any more dead.

Electrostatic charge. Dust particles applied through a professional duster may have an electrical charge. Dust forced through a plastic delivery pipe will have a positive electrostatic charge when it leaves the application tip.

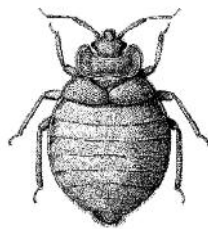


Although this charge lasts for a short time, it helps the dust cling to surfaces close to the tip. Wood and some other surfaces have a natural negative charge, and attract positively charged dust particles.

Residual efficacy. The residual activity of dust formulations makes them ideal for treating inside wall voids, behind baseboards, and in other undisturbed sites. When insecticide dust applied away from light, humidity, and other environmental factors it remains active for months or even longer. The residual activity of silica aerogel is generally considered to be about 5 years.

HOW DUSTS WORK

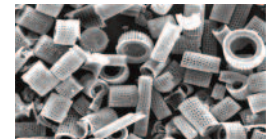
Bed bugs, cockroaches, spiders and other crawling pests are killed when they pick up particles of insecticide dust on their antennae and legs. Once dust particles cling to the body or enter the mouthparts after grooming, the lethal action begins.



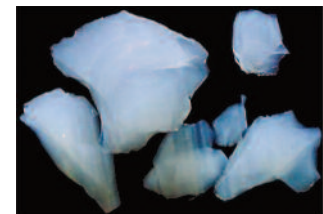
Dust formulations have a physical or chemical mode-of-action, depending on the active ingredient. The dust formulations made from diatomaceous earth and silica, take several days to kill. Death is through water loss and that may take several days to reach the lethal level of about 30%. However, soon after contact with the dust-treated surface the insect or spider will become inactive.

Physical action. These materials damage the protective outer layer of the insect body. This outer layer is composed of a waxy or oily substance that functions to protect the insect from losing water. The fine particles of these products act to absorb some of the oily layer, or scratch regions of the wax layer. Once the protective covering is damaged, the insect will die within a few days.

Diatomaceous earth products are made from the fossilized bodies of aquatic diatoms. The structure of their skeleton absorbs the oily and wax layer on the surface of insects. Diatomaceous earth (DE) is available as a fine powder, and typically no carrier is used.



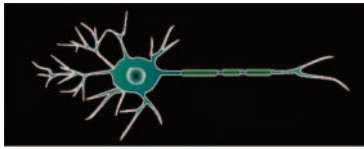
Silica and *silica aerogel* products are made from finely ground silica. This material is very absorbent and it removes the oils on the skin of insects and the sharp edges can scratch the wax layer. Silica aerogel is a porous material, and because it has an extreme amount of surface area it is highly absorbent. Most silica aerogel formulations contain the insecticide pyrethrin, which acts as a flushing agent. The most common silica aerogel product, Drione[®], contains 40% amorphous silica and 1% pyrethrins.



Silica aerogel is effective in controlling a range of household pests. It can have a quick knock-down effect, but death may take several hours. For example, the knock-down time for German cockroaches is about 45 minutes, and death occurs in about 90 minutes; knockdown for bed bugs takes about 6 hours, and death occurs in about 20 hours.

Chemical action.

These materials attack the insect nervous system and kill insects that same was as liquid insecticides. When dust particles contact the legs or antennae the active ingredient moves through the skin of the insect and enters the blood stream.



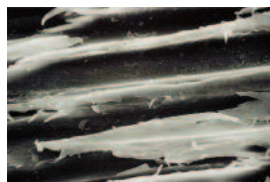
Pyrethroid dust formulations attack the nerve fibers and the insect dies quickly. The nervous system is attacked at the junction of two nerves, or the membrane covering the nerves. The result is excessive 'firing' of the nerves and shutdown of the entire system.

Boric acid powder acts as a contact insecticide because it penetrates the skin of insects to enter the body. The particles enter the body when the legs and antennae are cleaned through the mouthparts. When quantities of boric acid are consumed, it acts as a stomach poison.



SURFACES

Bare wood is common in most indoor locations treated with dust, such as behind baseboards and in wall voids. This is a porous substrate that can reduce the amount of insecticide transferred to the legs and body of bed bugs and cockroaches as they crawl across it. Bare wood has deep furrows in the surface where dust particles may remain out-of-reach of a crawling insect.



APPLICATION METHODS AND EQUIPMENT

Insecticide dusts are suitable for treating behind baseboards, headboards, wall voids, and attics and crawl spaces. Basically, any enclosed space this is harborage or travel route for

crawling pests. The objective is to create a thin layer of dust on all surfaces.

The equipment for dust application is designed to fit the treatment space: Electric dusters for treating large spaces, hand dusters for treating small spaces, and power dusters to treat everything else.

ELECTRIC DUSTER

This duster is for treating large spaces, with horizontal and vertical surfaces, with a coating of dust. The large capacity tank can hold enough dust for treating attics and crawlspaces without refilling. The dust particles have an electrostatic (+) charge when they exit the application hose. The wood rafters in attics and joists in crawl spaces have a (-) charge. This results in a better application because the dust particles are attracted to the wood surfaces.



Treatment Zone. 20 square feet with the hose attachment, 45 square feet with the plastic tube attached to the hose. Dust will move 10-15 feet from the end of the hose or tube.

Delivery Rate. 8 ounces per minute.

Application Rates: To treat a 50 square foot space:

- Tri-Die® (1 oz. / 50 sq. ft.) = 8 seconds
- Pyganic® (1.5 oz. / 50 sq. ft.) = 12 seconds
- Tempo® (8 oz. / 1,000 sq. ft.) = 3 seconds
- Delta Dust® (8 oz. / 1,000 sq. ft.) = 3 seconds

MINI-DUST-R



This hand-held duster is for treating small spaces and voids. The extension tips are heavy-duty plastic and are stored in the handle to prevent loss. The fan tip can be used to thoroughly coat the inside of enclosed spaces.

Treatment Zone. 2 to 3 square feet with the straight tip extensions, and the siphon tube positioned at the top. Dust will move about 36 inches from the end of the application tube.



Delivery Rate.

1 to 4 ounces per stroke

Application Rates: Talstar® PL (3 lbs. / 1,000 sq. ft.) = 1 stroke / sq. ft.

BULB DUSTER

This hand-held duster is for treating small spaces and voids. The extension tips are heavy-duty plastic and this eliminates the potential of electric shock with treating wall outlets.



Treatment Zone. 4 to 5 square feet with the straight-tip attachment tube. Dust will move about 24 inches from the end of the straight-tip application tube.



Delivery Rate. .01 to .04 oz. per squeeze

Application Rates:

Drione® (2 oz. / 100 sq. ft.) = 50 squeezes = 2 oz.

Delta Dust® (2 gr. / sq. yard) = 1 squeeze = 1 gram

VERSADUSTER



For Technicians using dust as an important part of their treatment protocol, the Versaduster is a great choice. This compressed-air duster is used for treating small spaces and enclosed voids with a limited amount of dust. The application tips include a crack-and-crevice tip along with several extensions. Application is with 1-second pulls of the trigger and allows the Technician to treat over many application areas in a short period of time with just the right amount of dust. It's virtually maintenance free and easy to use.

Treatment Zone. 1 to 2 square feet with the crack-and-crevice-tip attachment tip. Dust will move about 12 inches from the end of the straight-tip application tube.

Delivery Rate.

0.002 to 0.003 oz. per 1 second trigger pull

Application Rates:

Borates, diatomaceous earth, silica aerogel, or pyrethrin products: 10 trigger pulls

Pyrethroids (Tempo® and Delta Dust®): 4 trigger pulls



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