

Laboratory and field trials with

Sorptive Dusts and Dibrom

for control of animal and household pests

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Dibrom—1, 2-dibromo-2, 2-dichloro-ethyl dimethyl phosphate—a comparatively new organic phosphate insecticide, can be combined with the sorptive dust Dri-Die 67 to hasten its knockdown action.

Previous work has shown the effectiveness of Dri-Die 67 against drywood termites, cockroaches, fleas on dogs and cats, the brown dog tick, and other arthropods.

Three-fourths pound to one pound of Dri-Die 67 per 1,000 square feet of total floor area—including attics and subfloor areas—has controlled cockroaches in a variety of infested residences, food establishments, and other infested buildings.

German, oriental, and brown-banded cockroaches were controlled with Dri-Die 67 during a 17-month test in a large housing project at Long Beach where conventional insecticides had failed. The results there were so encouraging that other housing authorities are now using or planning to use the compound. Federal registration has been obtained, and Dri-Die 67 is being sold to the pest-control industry through pest-control supply houses.

Control of silverfish, ants, dog and cat fleas, bird mites, and tropical rat mites has been observed following thorough

treatment of buildings with Dri-Die 67 for cockroach control.

Infestations of dog and cat fleas in lawns have been brought under control with Dri-Die 67 dustings at the rate of one pound per 1,000 square feet of lawn or garden area.

Bedbugs in mattresses, springs, bed frames, overstuffed furniture, walls, baseboards and other cracks and crevices have been effectively eliminated by the dust.

Mite-infested snakes and lizards and their cages have been successfully treated with Dri-Die 67 without injury to the reptiles.

Dogs, pigeons, and monkeys were freed of heavy infestations of lice in a few hours following treatment with Dri-Die 67, $\frac{1}{4}$ – $\frac{1}{2}$ ounce for a small animal and 1–2 ounces for a large animal, applied thoroughly with a hand duster.

Dibrom 8 E

The formulation Dibrom 8 E—Dibrom 8 Emulsive—used for the experimental work contains eight pounds of active Dibrom per gallon of concentrate. The concentrate is emulsified in water at the rate of one to three ounces per gallon and applied with a fog-type sprayer.

Dibrom has been found considerably less toxic to mammals than most organic phosphorus insecticides. It is between DDT and malathion in toxicity. The acute oral lethal dose of Dibrom—LD₅₀—is 430 mg./kg., milligrams per kilogram of body weight, for rats. The acute dermal LD₅₀ for rats is 1,100 mg./kg. In sub-acute feeding studies, rats fed 27 days on food containing 30 ppm—parts per million—Dibrom showed no toxic effects in their organs or tissues. However, appropriate precautions should be taken when handling or applying formulations of Dibrom. It can produce toxic symptoms in human beings when inhaled, ingested, or absorbed through the skin. Dibrom may be irritating to the eyes and nasal passages, especially in the

dust form. If spilled on the skin, it should be washed off immediately to prevent skin damage. The antidote for Dibrom is atropine. Iron equipment may be corroded by Dibrom if it is not cleaned out after use.

Dibrom 8 E—one ounce per gallon of water—was sprayed on all inside surfaces of some painted wooden test chambers, 5.8 cubic feet in volume. As soon



Spraying garbage cans with Dibrom 8 E for fly control.

as the chambers were thoroughly dry, several hundred German cockroaches—male and female, adults and nymphs in various stages of development—were introduced into the sprayed chambers. Thirty minutes after exposure all the cockroaches were knocked down, and all were dead in 22½ hours.

However, the killing action of Dibrom 8 E was far slower than that of Dri-Die 67. German cockroaches in test chambers dusted with Dri-Die 67 died in 90 to 150 minutes. Comparable results were obtained when American, oriental and brown-banded cockroaches were treated with the two compounds.

To determine the residual effect of



Dusting a sub-floor area, through outside vent, with Dri-Die 67 for the control of fleas, cockroaches, spiders, ants, and silverfish.

Dibrom 8 E, the experiment with German cockroaches and Dibrom 8 E was repeated every week for 19 weeks, without respraying the chambers. At the end of the 19th week—133 days after spraying—90% of the cockroaches were knocked down in 10 hours and 100% in 14 hours. In 30 hours 90% were dead, and all were dead at the end of 48 hours.

When 40 apartments at the Long Beach housing project were thoroughly sprayed with Dibrom 8 E using three ounces per gallon of water, German, oriental and brown-banded cockroach infestations were under control by the following day, and apartments that remained occupied by the same tenants continued to be free from roaches for a minimum of four months. Apartments where other insecticides had failed to control the cockroaches were selected for the experiment.

Subsequent experiments showed that all four species of cockroaches could be controlled just as effectively with an emulsion containing only 1½ ounces of Dibrom 8 E per 2½ gallons of water. At this rate, Dibrom 8 E has been employed successfully for controlling cockroaches in homes, laboratories, offices, experimental animal rooms and feed storage rooms.

Lawns and sidewalks surrounding apartment buildings infested with oriental cockroaches were sprayed with Dibrom 8 E, one ounce per gallon of water. Oriental cockroaches were not seen again in those areas for at least three months following treatment.

Field experiments for fly control with Dibrom 8 E were carried out on the Los Angeles campus, using 1½ ounces of Dibrom 8 E to 2½ gallons of water, to which three ounces of dark molasses had been added as an attractant. The emulsion was applied with an agitating tank hydraulic pump with low-pressure fogging nozzle that gave a spray just less than runoff. The following areas were sprayed at weekly intervals: the outsides and insides of trash and garbage cans and their platforms; under-eaves of lunch counters; animal waste cans; floors, walls and ceilings of waste collection rooms; and similar areas. Controls far surpassed those previously obtained with malathion, diazinon, lindane, or activated rotenone.

Limited studies indicated that the same application gave good control of flies hovering above fresh manure piles. Good control of vinegar flies—*Drosophila*—was obtained in experimental animal rooms sprayed with Dibrom 8 E at the same dosage rate.

Effective control of dog and cat flea infestations was obtained with Dibrom 8 E, using 1½ ounces to 2½ gallons of water, on lawn and play areas and sidewalks around housing projects.

2% Dibrom-Dri-Die 67

A small amount—2%—of the active insecticide Dibrom blended with the sorptive dust Dri-Die 67 produced a fast-acting and long-lasting insecticide.

In laboratory experiments the mixture knocked down German and brown-banded cockroaches 9–12 times faster than Dri-Die 67 alone. Oriental cockroaches were knocked down 18 times faster and American cockroaches 23 times faster. However, the four species of cockroaches were not killed more rapidly in the 2% Dibrom-Dri-Die 67 mixture than in straight Dri-Die 67. Other experiments determined that the four species of cockroaches could be knocked down by the Dibrom-Dri-Die 67 mixture just as rapidly 196 days after formulation as on the day of formulation. Comparative experiments showed that 2% Dibrom-Dri-Die 67 knocked down all cockroaches—German, American, oriental, and brown-banded—more quickly than either 2% malathion-Dri-Die 67 or straight Dri-Die 67.

Field trials with the 2% Dibrom-Dri-Die 67 mixture in 20 cockroach-infested apartments at a Long Beach housing project were more spectacular than laboratory trials. Apartments that appeared on inspection to be lightly or moderately infested with cockroaches were revealed as heavily infested after the mixture was applied. The quick action of the mixture stimulated the cockroaches to leave their hiding places. They became motionless shortly after contact with the dust. Three minutes after dusting, some of the sink-cupboard areas were already littered with unmoving cockroaches, and by the end of seven minutes several thousand German cockroaches in all stages of development were lying motionless on the cupboard floors. After 90 minutes, all the cockroaches were dead. Only one or two live cockroaches had been observed in the cupboards prior to dusting. When straight Dri-Die 67 was used under similar circumstances, cockroaches were forced to leave their hiding places but were not knocked down until several hours after exposure to the dust.

Infestations of bedbugs have been controlled successfully with 2% Dibrom-Dri-Die 67. Two to three ounces of the dust were applied with a hand duster to in-

festated mattresses and bed springs, with particular care on mattress and spring edges, beneath mattress buttons, on bed-frame spring supports, and in the corners and edges of the bed frames. In addition, all possible hiding places, such as overstuffed furniture, cracks in floors or walls or behind baseboards, ceiling moldings, and wall hangings were dusted at the rate of one pound of dust for every 1,000 square feet of surface area.

Excellent control of fleas on dogs and cats has been obtained with 2% Dibrom-Dri-Die 67. One-half to one ounce was effective for cats and small dogs and one to two ounces for larger dogs. The mixture has been found effective in treating flea-infested premises, especially in the areas used and frequented by dogs and cats. The dust has no damaging effect on fabrics or pets.

Field crickets exposed to 500-milligram samples of several test compounds were knocked down 15 to 21 times faster by 2% Dibrom-Dri-Die 67 than by Dri-Die 67, and more than 150 times as fast as by chlordane. In field trials 2% Dibrom-Dri-Die 67 was applied with a hand duster around flower beds and with a fertilizer spreader on large lawns. Dusting of yards prevented entry of crickets into the houses because of the rapid knockdown action of the Dibrom mixture. Indoor infestations also have been treated effectively. Cricket infestations around commercial establishments have been controlled by applying the dust to sidewalks, particularly next to building frontages, and on window and door frames and sills at the rate of three-quarters to one pound per 1,000 square feet of floor or ground area. When killed with sorptive dusts, crickets lose body fluids so rapidly that their bodies do not undergo the decomposition which ordinarily causes offensive odors.

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Results of dusting with 2% Dibrom-Dri-Die 67 for the control of field crickets at Brawley.