

DDT for CONTROL of HOUSEHOLD PESTS



FEDERAL SECURITY AGENCY

U. S. PUBLIC HEALTH SERVICE

MALARIA CONTROL IN WAR AREAS

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DDT....

FOR THE CONTROL OF HOUSEHOLD PESTS.

As a result of the recent wide-spread publicity given DDT as the miracle insecticide of the war, a flood of popular, semi-popular, and technical articles about the uses of DDT for controlling household pests has appeared. Its extensive use by the military forces in combating malaria-carrying mosquitoes, flies, and other pests is known to almost everyone. With the announcement that limited quantities are available for general use, the average householder is anxious to try the new insecticide.

The general release of DDT has created a demand for practical information as to how the average person can use this new insecticide. Our aim is to answer some of the questions asked most commonly about DDT and to give the latest available information about its most efficient use in the home.

Knowledge of the practical use of DDT in homes and gardens is still far from complete. Its use in this country is as recent as November 1942. Although large amounts have been used at home and overseas, DDT was restricted and used only for specific purposes by trained personnel under careful supervision. Results of this usage indicate that DDT can be used safely and effectively at home by the average person for certain purposes and under certain conditions.

DDT is not a cure all! IT DOES NOT KILL ALL KINDS OF INSECTS! Its action against certain insects is slower than that of some of the more common insecticides already in use. It has little effect on chiggers and chicken mites, and its value against certain other insects is not fully confirmed. However, it has a specific toxic effect on some kinds of insects. The chief advantage of DDT is its effectiveness against a majority of insects, and its residual or lasting effect when applied properly.

WHAT IS DDT?

The technical grade chemical is a harmless-looking, white, practically odorless powder resembling flour . . . especially flour with lumps in it - as the particles of pure DDT have a tendency to stick or clump together. DDT's chemical name is dichloro-diphenyl-trichloroethane . . . but for convenience we use the first letter of each part of the name and call it DDT.

Since it does not dissolve in water, pure DDT cannot be used as a spray in water solutions. It is soluble in oils such as kerosene, in xylene, and various other organic solvents. As a matter of convenience, DDT is often dissolved in oil for spraying purposes.

WHAT IS A RESIDUAL SPRAY?

DDT acts both as a contact and stomach poison. Its most unusual property is its last-

ing or residual effect. When DDT is sprayed or dusted on walls, ceilings, floors and other surfaces, it leaves a deposit or residue of tiny crystals. If insects such as flies, mosquitoes, cockroaches, fleas, bedbugs, and certain other insects walk over or rest on this deposit long enough to obtain a sufficient exposure, they will be killed. The use of DDT as a coating or residual is quite different from that of ordinary fly spray.

HOW DOES DDT RESIDUE KILL INSECTS?

Just how DDT kills is not fully understood at present. Evidently it is absorbed through the insects' feet as they walk over a spray deposit or DDT residue. After a short period of exposure, the affected insects become restless, drag their legs, and move about in a jerky and spasmodic manner. They may turn over on their backs and be unable to right themselves. Finally they may develop tremors, the so-called DDT's or "double delirium tremens," and die . . . although death may not take place until hours later.

Mosquitoes and flies often move toward the light when they are first affected. After they receive a toxic dose of DDT, they may fly away and die elsewhere. So don't be disappointed at not finding a large number of dead insects after you've treated your house. The best test of DDT's effectiveness is the absence of live insects, not the presence of dead ones. However, flies, cockroaches, and other insects may reinfest the premises from outside sources. If

this happens, live insects may be seen before they have received a toxic dose, thus giving the erroneous idea that the spray is ineffective. Every effort should be made to prevent this reinfestation by other sources, even though residual sprays are used.

IN WHAT FORMS IS DDT AVAILABLE ?

DDT has been released for use by the public in a great variety of forms. These preparations contain DDT in varying amounts. The labels should be read carefully to be certain that the material contains a sufficient amount of DDT to be effective.

OIL SOLUTIONS FOR RESIDUAL SPRAYS

Solutions of DDT in highly refined, deodorized, white kerosene, or in some other commercial solvents, regularly used in ordinary fly sprays, are available. Most of these sprays contain 5% DDT or less. For effectiveness as a residual spray, oil solutions must contain at least 5% DDT. Preparations on which labels fail to state the definite concentration of DDT should not be purchased.

Weaker solutions containing 1 - 2% or less DDT to fortify "fly sprays," are not satisfactory as residual sprays. Users of these weaker dilutions will be disappointed by their ineffectiveness as residual sprays. Since the solvent is important only as a carrier, the purchaser should remember that he is buying DDT and not the carrier, when he purchases a

residual spray. Weak solutions require such large amounts of spray that it is impractical to try to get enough on a wall for an effective residue.

If the manufacturer's label indicates that a DDT isomer or byproduct is the active ingredient, an 8 - 10% solution is needed for satisfactory results. The various byproducts are not standardized and, in general, are less effective than the technical grade DDT.

Oil solutions containing 5% DDT or more can be used as sprays against specific household pests. Since some of the solvents used may be inflammable, proper precautions should be taken against the danger of fire.

DDT FLY SPRAYS

Many manufacturers of well known "fly sprays" are adding small amounts of DDT, ½ - 2½%, to their commercial sprays. This addition insures a greater percentage of kill. However, such weak solutions used as "space sprays," which create a poisonous mist in the air, are not suitable for application of DDT residues.

BE SURE TO DISTINGUISH BETWEEN "SPACE SPRAYS" AND DDT - RESIDUAL SPRAY!

DUSTS

A number of dry mixtures of DDT are available for dusting. These contain 5 - 10% DDT diluted with some powder, such as talc or pyrophyllite, which serves as a carrier. The usual dilution is one part of DDT in nine parts of carrier. For most home use, the dust should contain no less than 10% DDT.

SUSPENSIONS

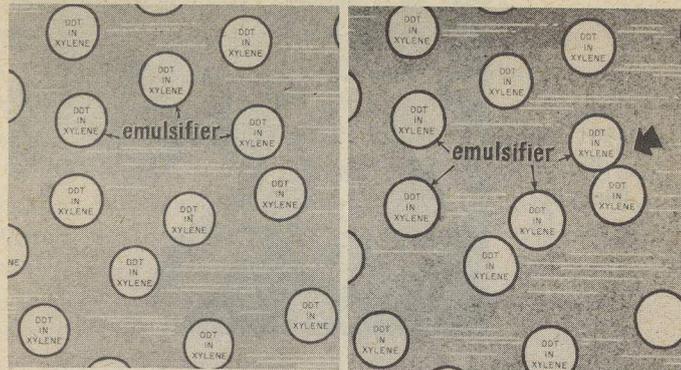
A DDT powder containing a chemical which permits the DDT particles to be mixed readily with water, may also be used as a residual spray. In this mixture, called a suspension, small particles of DDT are distributed evenly throughout the liquid.

A 5% DDT spray is prepared from such a DDT powder by diluting it with water. The amount of water necessary depends upon the concentration of DDT in the commercial product. The manufacturer's label should supply this information.

The DDT suspension can be sprayed on surfaces. It has no odor, presents no fire hazard, and is harmless when applied to the skin of man or to the coats of animals. When the water evaporates, small flecks of both DDT and the carrier remain on the sprayed surface. So the spray shows as a white spotting on dark surfaces such as dark-stained furniture, dark-colored paints, varnished floors, and window glass. However, it is very effective and is easy to apply where spotting is unimportant.

EMULSIONS

Although DDT is not soluble in water, it dissolves easily in some organic solvents. Concentrations of 25 - 40% can be prepared by using these solvents. They may be diluted with water by using a chemical which permits the concentrate to be mixed with water. A chemical used for this purpose is called an emulsifier, and the resulting mixture an emulsion.



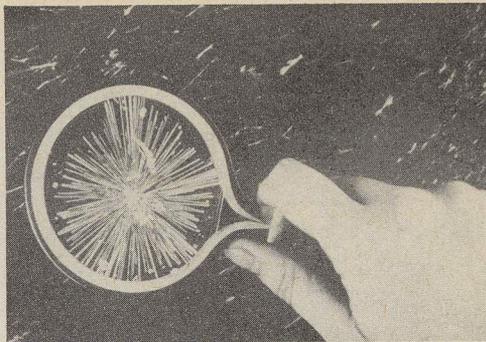
DDT-Xylene + Water + Emulsifier = Stable Emulsion

Xylene is commonly employed as a solvent for DDT, and when an emulsifier is added the material may be mixed with water so that the DDT-xylene solution breaks up into fine droplets. These are dispersed throughout the water giving it a milky appearance. The resulting mixture is a stable emulsion.

Stock emulsion concentrates containing 25 - 30% DDT dissolved in some organic solvent such as xylene, together with an emulsifier to insure ready mixing with water, may also be procured. The proper dilution with water depends on the concentration of DDT in the stock emulsion. By following the directions on the manufacturer's label, a 5% or more residual spray may be prepared.

One gallon of a 35% xylene-emulsion concentrate of DDT consists of 3 pounds technical grade DDT powder, 3 quarts xylene, and 6 fluid ounces of an emulsifying agent. Preparation of the emulsion concentrate from pure DDT powder

Highly
Magnified
DDT
Residue
Crystals



requires materials which may not be readily available to individuals. Also special care is necessary to insure the solution of such concentrated amounts of DDT. Therefore its preparation by inexperienced individuals is not advised.

DO NOT USE ORDINARY KEROSENE IN MAKING HOUSEHOLD SPRAYS. USE ONLY WHITE KEROSENE.

PAINTS

Whitewash paints and oil base paints containing DDT are being produced. However, since little is known about them, the manufacturer's directions should be followed. No recommendations as to their effectiveness can be made at this time.

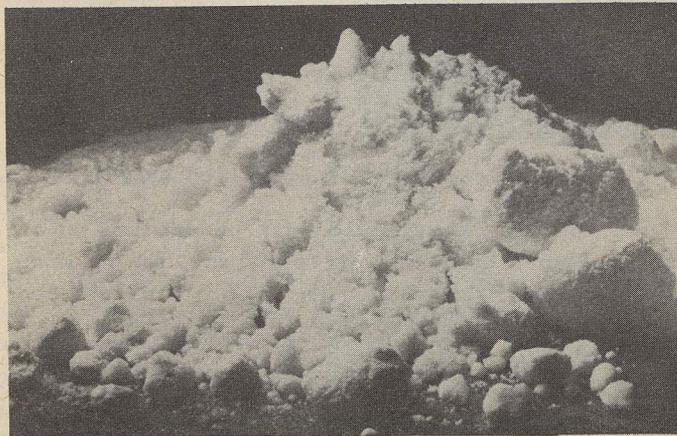
PURE DDT (TECHNICAL GRADE)

An undiluted, technical grade DDT may also be available . . . but the preparation of dusts

and emulsion concentrates by the householder for his own use is not recommended. Pure DDT is difficult to mix with a dry powder unless the two are ground together with special equipment.

However, an oil spray can be made rather easily by dissolving pure DDT in a highly refined, deodorized, white kerosene. One cup of the powder thoroughly dissolved in one gallon of kerosene makes a solution which contains about 5% DDT. Before using the spray solution, it should be strained to remove particles that may clog the nozzle.

UNPURIFIED, COMMERCIAL GRADES, OF DDT MAY STAIN FINE FABRICS AND WALLPAPERS.



Pure DDT Resembles Flour

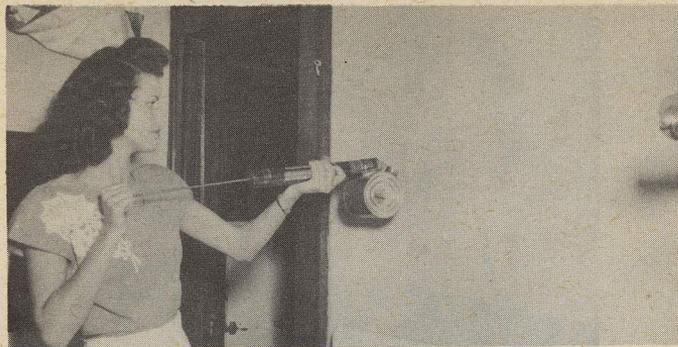
HOW ARE DDT RESIDUAL SPRAYS APPLIED?

The use of DDT as a residual spray is an entirely new approach to household pest control. It should not be used in the same way that ordinary fly sprays are used. The aim of residual spraying is to coat the treated surface with a very fine layer of the insecticide to give a lasting effect in killing insect pests.



Mosquitoes on a Wall... Killed by DDT

To do this, the liquid must be painted on or applied as a coarse, wet spray so that as much DDT as possible will remain on the treated surface and not blow away in a mist. For best results, the surface should be wet as much as possible without letting the spray liquid run down the walls. This requires about 2½ quarts of 5% DDT spray for the average sized room.



Applying DDT Residue with Hand Sprayer

The ordinary household sprayers now in common use can be used for applying DDT, although pumping a hand-sprayer is tiresome when more than a single room is treated at a time.

It is also difficult to apply an even coat of DDT with these small plunger-type hand sprayers.

Larger 2½ - 4 gallon air pressure garden - type hand sprayers can be used when more than one room or larger areas are to be treated. The small, size 3, opening plate in the nozzle is used for delivering the proper amount of spray.



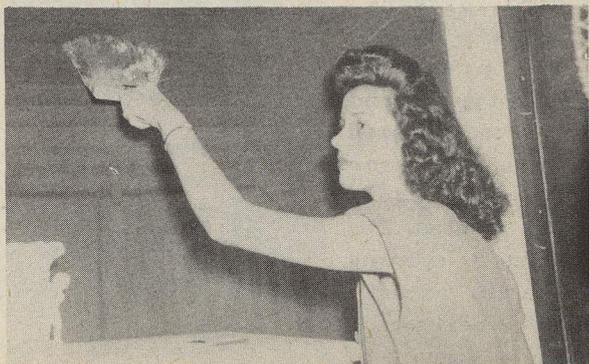
Air Pressure Sprayer in Use



Vacuum Cleaner with Spray Attachment

Some vacuum cleaners have a spray attachment which can be used to apply DDT solutions to walls, rugs, furniture, and other places where a residual deposit is desired.

For applying DDT to screens, shelves, electric light cords, or other special surfaces, a wide paint brush should be used to insure an adequate, even coating. Spraying screens wastes



Painting Screens with DDT Solution



Roller Application of DDT Residue

DDT, because much of it passes through the mesh. However, a heavy coat should be applied to screens as some insects prefer them for resting surfaces. This coat is effective for only about 2 weeks, as DDT loses its toxicity more readily from the exposed screens than from inside protected surfaces. Avoid spotting window glass when treating screens.

A special roller of felt or other material used in applying certain types of paints, can be used instead of a brush or sprayer for applying DDT solution to walls, screens, shelves, or other flat surfaces.

DO NOT PERMIT DDT OIL SOLUTIONS OR EMULSIONS TO REMAIN IN SPRAYERS. THIS RESULTS IN RUSTED SPRAY TANKS, DECOMPOSED GASKETS AND HOSE, AND CLOGGED NOZZLES.



DDT Dust Residues

For applying DDT residues in dust form, the ordinary small hand dust gun can be used to force the DDT into narrow crevices, or to distribute it generally over a surface. A coarse salt shaker is useful in distributing small quantities of the dust, and in treating dogs for fleas and ticks. DDT dusts may contain an added material such as pyrethrum for a quick knock down - otherwise a considerable length of time may elapse before the insects are killed.

HINTS ON HOUSEHOLD SPRAYING

In wetting surfaces with DDT spray, it is important to guard against spotting. Varnished floors or dark linoleum may be protected by newspapers. Dark-stained furniture should be covered. Shades may be pulled down to avoid spotting the window glass. Even in treating kitchens, some of the spray may drift into adjoining rooms and spot the floors and furniture. Such spotting can be removed from furniture,

varnished floors, and dark baseboards with furniture polish applied liberally, then wiped with a clean, dry cloth.

Be sure to wipe light wall surfaces with a clean, dry rag to remove dust before spraying. Otherwise, droplets of spray will collect particles of dust and leave a dirt-spotted wall.

If wall cleaning or painting is contemplated, be sure to do it before DDT is applied. Don't apply DDT to freshly painted surfaces - its period of effectiveness will be greatly shortened.

Some wall surfaces may spot - especially certain shades of blue or green wallpaper. Most light wallpapers, however, will not show the deposit after it has dried. Calcimined surfaces should not be sprayed . . . the spray may cause the calcimine to run.

If there is any question about applying DDT to papered or painted surfaces, treat a small test area in an inconspicuous place and allow it to dry thoroughly to see the result.



Cover Varnished Floors and Furniture

Don't touch a sprayed surface while it is still wet. Streaking will result, and this shows when the spray dries. If a surplus of the spray results in white spotting, wait until sprayed surface dries before rubbing it with a clean white cloth to remove it.

HOW LONG WILL DDT RESIDUES LAST?

Under experimental conditions, DDT has very long-lasting residual properties . . . months for killing flies and mosquitoes under special conditions. But the duration of effectiveness under actual household conditions is a different matter. It varies with different types of surfaces, with the dosage used, and with various other conditions.

In the average household, one cup of 5% spray is sufficient to treat effectively each 60 square feet of surface against flies and mosquitoes for about 3 months. When applied to newly painted surfaces, the effect is lost rapidly. Dust and grease deposits covering treated surfaces reduce the length of effectiveness. Vibrations cause a flaking-off of the DDT deposit, and shorten the period of residual effect.

WHAT PRECAUTIONS SHOULD BE TAKEN WHEN USING DDT?

Although DDT is deadly to many insects, it is not harmful to man in the dilutions recommended. It is definitely less toxic to man than paris green and sodium fluoride which have long

been used as common insecticides. However, as with any insecticide, the user must take certain precautions to avoid any possible harmful effects to him.

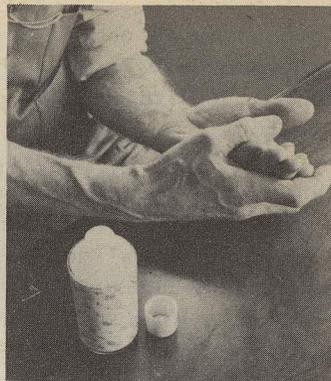
In spite of its toxicity, harmful effects have not been observed in animals exposed in rooms which contained many times the recommended insecticidal concentration of DDT in sprays or dusts. But careless use and exposure to abnormally high concentrations of DDT may cause toxic effects. Therefore, it is essential to follow carefully the directions for its use as a household insecticide.

Food contaminated with DDT from ordinary home use will probably cause no serious toxic effects in man. Such contamination should be avoided, however, by removing food from the room or by covering it during the spraying.

If DDT is swallowed accidentally, drink some **MUSTARD WATER** immediately. This is made by adding one tablespoon of mustard to a glass



If DDT is Swallowed, Drink Mustard Water



In Large-Scale Spraying Operations

-- Wash Hands Frequently

and Use a Greaseless Skin Lotion

of warm water. Mustard water causes vomiting which empties the stomach. Call or see a physician at once!

DDT in dust form is not absorbed through the skin unless grease, oil, or greasy skin lotion is already present on the skin. Nevertheless, DDT powders should not be allowed to remain on the skin. Avoid excessive inhalation of the powder. Since the diluted dust, especially if uncolored, may be mistaken for flour or other foodstuffs, carefully label DDT and take every precaution to keep it away from children. Avoid food contamination.

DDT in oil solution is readily absorbed through the intestines and the skin. Therefore, DDT-oil solutions should not be allowed to remain on the skin or to saturate clothing. If some does get on the skin, wash the hands and exposed skin with warm, soapy water.

If oil solutions or concentrates are spilled on the clothes, change them promptly. Avoid inhaling the mist and contaminating food with the spray. Never use a DDT-oil solution on the skin or on coats of animals. If the solvent is inflammable, keep it away from fire.

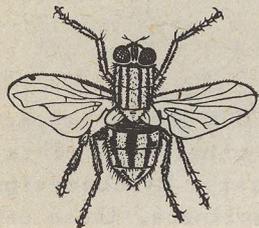
It should be pointed out that many of the solvents used in preparing DDT sprays may irritate the skin and cause other harmful results when handled carelessly. By observing proper precautions and cleanliness, these can be avoided.

If a great deal of spraying is to be done, it is advisable to wear gloves, goggles, and a respirator to avoid excessive contact and inhaling of DDT and its solvents.



Wear Goggles, a Respirator and Rubber Gloves

FLIES



Housefly

The use of DDT as a residual spray is our most effective way of controlling flies. By applying a coating of 5% DDT spray, a residue is left which will be effective for a period of three months or longer under average conditions.

A small hand sprayer, a larger air pressure garden sprayer, a wide paint brush, or a roller applicator for treating the walls and ceilings of the kitchen and dining room, are satisfactory for applying DDT spray for controlling flies in the house. Under ordinary circumstances, it is unnecessary to treat all the rooms.

The principal resting places of flies should be covered with the spray residue. At night they prefer to rest on ceilings, around cracks and crevices, along edges of ceilings, doorways, and furniture. Electric and switch cords should be painted or sprayed with DDT solution. When flies cling to them, they receive a toxic dose of DDT. In some places, fly control can be accomplished merely by spraying these special places without treating the entire room. If

strips of bandage, heavy string, or cord are soaked in DDT solution and hung in the room they may serve the same purpose.

In spraying or painting kitchen walls and ceilings, permit the spray to dry thoroughly before removing any excess. If an objectionable white residue is left on some spots, the surplus can be removed with a clean white cloth. Don't touch the wet sprayed surface. If the spray is rubbed or touched before it has dried thoroughly, smearing will result.

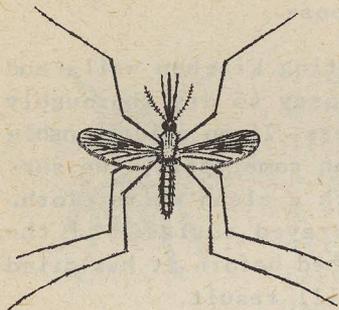
Protect pictures, glass, mirrors, and windows from the spray. Since DDT is not soluble in water, it is difficult to remove even with a damp cloth. Kerosene or mineral oil will remove it from glass.

When treating screen doors and windows, it is advisable to use a wide brush for painting the 5% solution on the wire screening. This gives a heavier deposit and eliminates the loss of DDT sprayed through a screen. A felt roller used in applying certain water soluble paints can also be used for this purpose.

Spraying garbage cans and adjacent fences will help reduce the fly population. Treating the back porch and steps or the area around the kitchen door, will be effective too.

KEEP FOOD AND WATER CONTAINERS COVERED AFTER SPRAYING THE ROOM. FLIES FALL INTO THEM AS THE DDT TAKES EFFECT.

MOSQUITOES



Malaria Mosquito

Residual spraying for the control of anopheline mosquitoes has become a routine procedure in the fight against malaria both in this country and with our military forces overseas. In houses sprayed with DDT, mosquitoes infected with malaria parasites have ample opportunity to rest on a treated surface and be killed before they have a chance to spread the disease. This is the basic principle of malaria control through residual spraying.*

The same type of residual spraying is also effective against other types of mosquitoes which enter houses.

In applying a residual spray for mosquitoes, all wall surfaces and ceilings should be treated . . . especially dark corners, portions of walls behind pictures and furniture, and other undisturbed places where mosquitoes rest during the day. The undersurfaces of tables, backs of bookcases and beds, under parts of chairs and tables, closets, porches, and screens should also be treated.

The methods of application already discussed on pages 10 - 16 and 20 - 21 can be followed in applying DDT residues for mosquito control.

Residual spraying for the control of anopheline mosquitoes has become a routine procedure in the fight against malaria both in this country and with our military forces overseas. In houses sprayed with DDT, mosquitoes infected with malaria



Spray Dark Corners and Ceilings for Mosquito Control

Most mosquitoes which enter houses do so at night or in the early morning. Some live mosquitoes may be seen as late as 10:00 a.m. But by this time, the majority will have been exposed to a treated surface and killed. Such treatment is effective for three months or longer if DDT is applied properly.

VENTILATE ROOM WHEN SPRAYING WITH DDT SOLUTIONS.

*See the "Handbook of DDT Residual Spray Operations," *Malaria Control in War Areas, USPHS, Atlanta, Ga., March 1945.*

COCKROACHES



German Cockroach shelving, behind sinks, around pipes, and in any other possible hiding place in the pantry, kitchen, and other infested rooms. Any excess dust can be wiped away with a cloth if it proves unsightly. Allow some time for the dust to take effect. A week may elapse after using the dust before any marked reduction in the roach population is noticed.

For quicker results, use a **5% DDT spray**, oil solution, suspension, or emulsion. Force the spray into the hiding places described, and spray or paint the under parts of sinks, tables, chairs, drawers and shelves, and along baseboards, and any other places where roaches have been seen. Most of the roaches will be killed almost immediately if the spray contacts them.

A combination of spraying for immediate control plus residual dusting in places that cannot be reached by the spray, will be most effective in cockroach control.

The initial treatment of DDT for a heavy infestation of cockroaches will bring these

insects out of hiding, even in the middle of the day. They may remain active for some time before the DDT takes effect.

Painting a DDT solution on cupboard shelves, undersides of tables and other similar places, is the most efficient way to treat these surfaces. Special attention should be given to crevices and small openings where roaches hide.

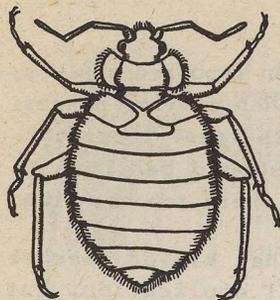
In some premises, DDT has killed roaches a month after its original application, but its effect is most noticeable during the first week after spraying. Continual reinfestation by cockroaches is common, especially in the South where the roaches are active outdoors. Hence, new roaches may constantly enter the house. Since it takes from 3 to 4 days to kill these new invaders, the housewife may still see an occasional roach and feel that the spray is not effective. These will be killed, but if new ones take their place every day, a few roaches may still be seen.



American Cockroach

DO NOT PERMIT DDT DUST OR SPRAY TO FALL ON DISHES, FOOD, OR COOKING UTENSILS.

BED BUGS



Bedbug

DDT is our most effective weapon against bedbugs and is far superior to the pyrethrum sprays formerly used in controlling these pests. When a **5% DDT spray** is properly applied to mattresses and bedsteads, a single treatment will "bugproof" them for 6 months or longer.

A small hand sprayer can be used to force the DDT solution into each crack and joint of the bed and into the springs. Spray all surfaces - top, bottom, and sides - until they have a misty-wet appearance. Be sure to get the spray into the seams and folds where the bedbugs hide. About $\frac{1}{2}$ cup of **5% spray** should be sufficient for each bed.

In heavy infestations, spray the walls around the bed, cracks along the baseboards, surfaces behind loose wallpaper, and other small spaces in the bedrooms where the bugs may hide during the day.

DDT is somewhat slow in its action against bedbugs, so don't expect a complete kill until 48 hours after the bugs have been exposed to the deposit.

WARNING....DON'T USE OIL SPRAYS NEAR FIRE.

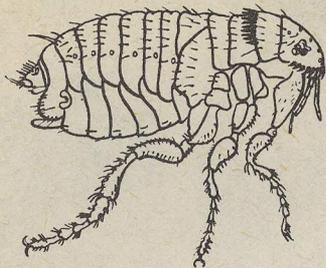


Treating Mattress for Bedbugs



Spraying Baseboard for Bedbug Control

FLEAS



Dog Flea

typhus from rat to man.

The sleeping places of pets are most heavily infested, but if pets have the run of the house, all rooms, especially the basement, may become infested.

Dust the infested rooms thoroughly with 10% DDT powder and pay special attention to sleeping places of the pets or to places where they are accustomed to lie down. The powder can be dusted into cracks and crevices, in basements, and in other places where fleas may breed. The excess powder can be wiped up with a cloth or removed with a vacuum cleaner. If left in place, the treatment may control fleas as long as 80 days after dusting. Yards and leaves can be treated with powder for flea infestation.

If a board floor is dusted, the powder can be left in place for a day or two and then swept up. By sweeping across the boards, much of the DDT is forced into the cracks and will remain between the boards where flea larvae live.

If powder is undesirable, a 5% DDT spray either in a highly refined kerosene solution or in an emulsion may be applied to floors, rugs, furniture, and in places where pets sleep. About 1 quart of 5% DDT spray covers 250 square feet of surface. If a kerosene-base spray is used, take precautions to avoid danger from fire.

Most dogs of average size may be dusted safely with about a tablespoon of 10% DDT powder. Often a line of dust along the middle of the back is sufficient to kill all the fleas, and to prevent reinfestation for a week or more. DDT dust activates fleas before causing their death. The rapid crawling and biting of the fleas cause the dog to scratch and bite vigorously until the fleas are paralyzed.

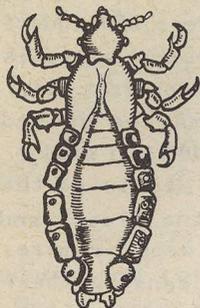
CATS SHOULD NOT BE TREATED WITH DDT DUSTS, because they lick themselves and may swallow enough DDT to make them sick. Treating the house and the cat's bed will probably be sufficient without having to treat the cat itself.

Many commercial flea powders contain some pyrethrum, rotenone, or other quick-killing poison in addition to DDT. When used alone, DDT is slow in action.

DDT dissolved in oil may be absorbed directly through the skin of animals with fatal results. Kerosene and other oils are poisonous to the skin. Several instances are already on record of valuable animals being killed as a result of their being sprayed with or dipped in DDT oil-solution.

NEVER USE DDT-OIL SOLUTIONS ON ANIMALS.

LICE



Body Louse

DDT first made a name for itself in the control of lice during the typhus epidemic that threatened Naples during the early days of the Italian campaign. DDT is effectively used against all species of human-infesting lice and is easily applied, but a knowledge of the different species of lice is essential for effective use of DDT.

As a result of their work in developing a louse powder for the Armed Forces, the following recommendations have been made by the Division of Insects Affecting Man and Animals, Bureau of Entomology and Plant Quarantine, U.S. Department of Agriculture.

BODY LICE

Since body lice are usually found in clothing and not on the body itself, clothing should be treated . . . especially the underwear where lice are most likely to be found.

Sift 10% DDT powder over the entire inner surface of the underwear and take special care to rub it into the seams. The inside of shirts, trousers, hats, and other articles of clothing should be treated at the same time. About one ounce, 2 heaping tablespoons, of the powder per treatment will remain effective for

periods of three weeks or longer if the clothing is not washed. Clothing treated in this way will kill lice even after being washed once in warm soapy water.

Great care should be taken to avoid reinfestation from discarded clothing or bath towels. Bedding can also be treated by dusting between sheets.

HEAD LICE

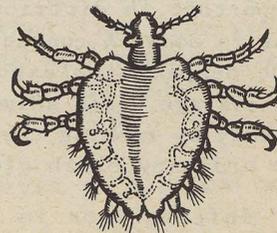
A 10% DDT dust is effective against head lice. A teaspoonful of 10% dust should be rubbed thoroughly into the hair. Since DDT does not kill the eggs or nits, a second treatment should be made 8 - 10 days later.

Liquid solutions of DDT for head lice are available also, but the manufacturer's directions should be followed carefully.

CRAB LICE

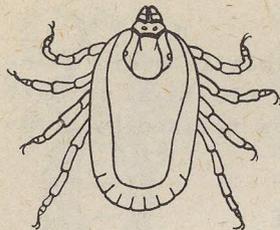
Crab lice infestations can be controlled easily by dusting the affected parts lightly with a 10% DDT dust. The pubic region and armpits are most commonly infested. In a very hairy person the entire body should be dusted lightly.

A second application should follow 8 - 10 days after the first, to kill any young lice which may have hatched during this time.



Crab Louse

BROWN DOG TICK



Brown Dog Tick

Adults as well as young ticks may appear around baseboards, window casings, curtains, and furniture in great numbers. They do not usually attach to any animal except the dog, but their presence in the house is often annoying.

The Division of Insects Affecting Man and Animals, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, has made the following recommendations regarding the use of DDT against the brown dog tick.

A 10% DDT powder can be used in treating infested dogs. Since ticks do not move about actively after they have once attached, it is important to distribute dust evenly over the entire body. A coarse salt shaker can be used. One heaping tablespoon should be applied to an average sized animal. It can be distributed evenly by rubbing the powder into the fur with an ordinary cloth glove or brush.

Infestations in the home can be treated by applying a 10% DDT dust or 5% DDT spray



Dusting Dog with DDT Powder

to cracks and crevices about baseboards of floors, to the undersides of rugs and other floor coverings, on window casings, and in other hiding places of the ticks. Engorged ticks remain in their hiding places and are not killed easily. When they shed their skins and when the eggs hatch, ticks are ready for a blood meal. Since they are very susceptible to DDT during this stage, they will be killed when they contact a treated surface or attempt to attach themselves to a dog dusted with DDT.

The dust kills adult ticks slowly. It should remain on fabrics, floors, and other places for about 2 weeks. After that time, the powder can be wiped up or removed with a vacuum cleaner. A second treatment may be made later if it is necessary.

OIL SOLUTIONS SHOULD NEVER BE USED ON DOGS.

ANTS



Ant

DDT is effective in controlling certain species of ants. The first step in controlling them is to locate their entrances to the house and treat these areas with a heavy spray or dust deposit of DDT. Paint or spray 5% DDT solution over the door sills, door frame, back steps, cupboard, shelves, drawers, and other places where ants are seen; or dust these areas with 10% DDT powder.

If the ant hills or nests can be located, dust these with 10% DDT powder. Don't spray them with oil solutions or emulsions. These will merely repel the ants and they will quickly make a new entrance. DDT dust will be carried down into the nest and gradually the entire colony may be killed.

SANDFLIES



Sandfly

The tiny sandfly—sometimes called the no-see-um or punkie—is an irritating, biting pest found most commonly along our eastern and gulf coasts. Sandflies are so small they can come through all but the finest screens, so their control in the house is difficult.

DDT is effective in controlling certain species of ants. The first step in controlling them is to locate their entrances to the house and treat these areas with a

However, DDT offers some hope for reducing the number that may get into the house. Paint the screens with a heavy application of 5% DDT solution and spray or paint the walls and ceiling near lights which attract the pests. This treatment should be effective for several weeks.

OTHER HOUSEHOLD PESTS

Other household pests such as silverfish, clothes moths, and carpet beetles may be controlled by applications of DDT . . . although the use of DDT for these pests has not been studied as thoroughly as the others.

SILVERFISH

The general treatment recommended for cockroaches will be equally effective against silverfish.

Dust or spray the places frequented by silverfish. Pay special attention to their breeding places. These are usually near their food supply . . . behind loose wall paper and book cases, around furnaces, hot-water pipes, and similar places.



Silverfish

CLOTHES MOTHS



Clothes Moth

Clothing, woolens, furs, upholstered furniture and rugs can be protected from moth damage by spraying all surfaces with DDT in oil solution or emulsion before storing.

Care should be taken so the oil solvent will not damage the fabrics. A hand sprayer or vacuum cleaner sprayer can be used to apply a fine mist over the surface of the material to be protected. The inside of closets, trunks, and other storage places may also be treated. Dusting fabrics with 10% DDT powder before storage of clothes or furniture is also effective. Dry cleaning removes all traces of DDT deposits.

DO NOT SUBSTITUTE DDT FOR GOOD SANITATION AND CLEANLINESS. DDT SHOULD BE USED IN CONJUNCTION WITH OTHER COMMON PRACTICES TO PREVENT DAMAGE BY HOUSEHOLD PESTS!

IN APPLYING 5% DDT

RESIDUAL SPRAY

1 cup will treat 60 square feet

1 pint will treat 120 square feet

1 quart will treat 240 square feet

1 gallon will treat 960 square feet

WHEN THE SPRAY LIQUID EVAPORATES,
A RESIDUE OF ABOUT 200 MILLIGRAMS OF
DDT PER SQUARE FOOT WILL REMAIN.

THIS SHOULD BE EFFECTIVE IN KILLING
INSECTS FOR THREE MONTHS OR LONGER.