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# A Discussion of DDT Through Questions and Answers

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A DISCUSSION of DDT  
Through Questions and Answers

by

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## INTRODUCTION

DDT received and is still receiving more publicity than any insecticide ever enjoyed in the history of man's war with insects. Newspapers, farm journals, cattle magazines, horticultural publications, women's magazines, the radio, motion pictures and every other conceivable means of advertising have lauded DDT to the skies. Much of this publicity was released while DDT was still not available to the civilian but only to our Armed Forces. This avalanche of publicity created hundreds of thousands of potential buyers, many of whom began to clamor for the new marvelous insecticide. Press releases were then made from the State Experiment Stations and the United States Bureau of Entomology and Plant Quarantine and these painted less glowing pictures of DDT. In these releases, the dangers of the improper use of the new insecticide were pointed out and attention was called to the fact that not all harmful insects could be killed by the DDT and that, at times, highly beneficial insects were unfortunately destroyed when this was not intended. The buying public, as a consequence of the diametrically opposed publicity, has become confused, but is still ready to buy DDT at prices that are frequently greatly out of line.

Question: What does the average Experiment Station Entomologist think of the publicity given DDT up to date?

Answer: DDT deserves much of the praise that has been given it, but unfortunately there are some objectionable features about the insecticide that the public should understand. For the control of certain insect pests, DDT is at present, the most satisfactory insecticide known. But the control of other species DDT is only fair and other insecticides do a far better and safer job of killing the pests. Many insect pests are not controlled by DDT even at reasonable dosages. Contrary to popular belief, DDT is not an insecticide that can be used by anyone, in any way to kill any and all insects.

Question: There are many more beneficial species of insects than harmful in this world of ours. What has been the effect of the use of DDT on these useful insects?

Answer: Unfortunately DDT may kill our insect friends as well as our insect enemies. Many beneficial, predaceous insects as well as parasitic species may be killed by an application of DDT, when we intended only to destroy one or more insect pests. The destruction of these beneficial insects may result in a rapid increase in one or more harmful species because their checks are no longer existant. Pollinators may also be destroyed by the DDT with the consequence that a reduced fruit set results.

Question: Since DDT is so destructive to certain insects, is it also toxic to warm blooded animals including birds, cattle, hogs, sheep, dogs, cats and man?

Answer: DDT is poisonous to warm blooded animals and, therefore, it must be used with care and understanding. However, other insecticides such as: Paris Green, lead arsenate, sodium fluosilicate, white arsenic, calcium arsenate, and numerous others are also toxic to warm blooded animals and man, but because they are toxic they are not discarded, but we have learned to use them properly.

Question: Is DDT poisonous to cold blooded vertebrates such as fish and to invertebrate animals other than insects?

Answer: DDT has been found to be highly toxic to fish. Concerning the invertebrate animals other than insects, DDT is highly toxic to some species and non-toxic or only slightly so to others. Crayfish and many other Crustaceans are readily killed through small amounts of DDT while most mites are little affected by the material.

Question: What is DDT and what do the letters D - D - T stand for?

Answer: DDT is a synthetic organic chemical material known by the chemist as dichlorodiphenyl-trichloroethane. The contraction DDT results from using the first letter of each of the generic terms, dichloro-diphenyl-trichloroethane. The product DDT is obtained when one molecule of chloral and two molecules of monochlorobenzene react with each other in the presence of concentrated sulphuric acid.

Question: When and by whom was DDT first prepared?

Answer: A student in Strassburg University, Othmar Zeidler, first synthesized the compound in 1874 in fulfillment of a portion of the requirement for his Ph.D. degree.

Question: Why was it that approximately 65 years elapsed before it was realized that DDT had many important insecticidal properties?

Answer: When Zeidler prepared DDT he did not know that it had any insecticidal properties, nor was he interested in the properties of the compound from this angle. It was not until 1839 that Paul Mueller, employed by the J. R. Geigy Company of Switzerland, used some DDT successfully to control a few insect pests. One hundred pounds of the chemical was then made up and shipped to the New York Branch of the Geigy Company. This one hundred pounds was turned over to the United States Bureau of Entomology and Plant Quarantine and to a few State Experiment Stations with the request that it be used in an experimental way for the control of insect pests. It was soon learned that DDT could be used with remarkable success to destroy human lice, mosquitoes and their larvae, fleas, bedbugs, certain species of cockroaches, and certain species of noxious flies other than mosquitoes. As soon as these discoveries were made, the United States War Production Board restricted the use of DDT and practically all of it went to the Armed Forces. A small amount, however, was set aside for experimental purposes for the United States Bureau of Entomology and Plant Quarantine, and for the State Agricultural Experiment Stations, who were to use the material chiefly in attempts to control insect pests harmful to agriculture and to man himself. There is no doubt what-so-ever that the DDT, used by our Armed Forces saved the lives of thousands, yes hundreds of thousands of our men.

Question: Is DDT still restricted to our Armed Forces or can the civilian now obtain and use this new insecticide in the quantity that he desires?

Answer: When it was learned that DDT could be used so successfully against certain highly important disease transmitting insects such as lice, mosquitoes, fleas and flies, and against other insects that are regarded as objectionable nuisances, production of the insecticide was greatly increased. At the present time DDT is being produced in the United States in large quantities by several different manufacturers, and a large quantity is available to the civilian. While our Armed Forces still have an A1 priority on the chemical, it now appears that sufficient quantities will be available for civilian use to satisfy his needs.

Question: What does DDT look like and does it have any characteristic odor?

Answer: DDT is a whitish crystalline powder resembling flour. It has a tendency to lump, however, and then occurs in ball like form, with the balls varying in size from those of a pin head to small marbles or larger. The odor of the material is sweetish. DDT is not soluble in water, but dissolves in certain fluids such as kerosene, deodorized kerosene, motor oils, pine oil, acetane and xylene.

Question: Is there just one grade of DDT?

Answer: Two grades of commercial DDT are available in quantity at the present time, one known as technical DDT and having a melting point of 88 or 89°C; and DDT purified and having a melting point of at least 103°C. Impurities are produced in the manufacture of DDT and these are separated out when the DDT is refined. By-products resulting from the manufacture of DDT should be labelled DDT by-products. Little is known about the properties of these by-products and their possible effect upon insects, plants, and soil. Regulations require that all ingredients other than dichloro-diphenyl-trichloroethane in either DDT technical or purified be shown on labels attached to the containers of DDT.

Question: In what forms are DDT purified and DDT technical used?

Answer: DDT purified is intended for use in aerosol bombs to control insects, while DDT technical is used in dusts, sprays, washes, paints, and dips. Aerosol bombs are, at present, intended primarily for treating small enclosed spaces such as rooms, tents, cabins of planes, etc., although aerosols have also shown some promise in controlling some insects feeding on vegetables. Dusts, sprays, washes, paints, and dips are applied to animals, plants, surfaces of walls, furniture, rugs, beds, clothing, store counters and shelves, windows, screens, light cords, etc. with the purpose of coating the surfaces of these with a deposit of DDT.

Since only a very small amount of DDT is necessary to kill insects, DDT technical is usually applied in dilute form to the surface of objects. If the DDT is to be used as a dust, pyrophyllite or talc are the diluents employed ordinarily. Any desired percent of DDT dust may be obtained by mixing the proper proportions of the insecticide and the diluent. When the DDT is to be used as a wash, dip, paint, or spray the insecticide may be used as a suspension in water, with or without the addition of a wetting or sticking agent. Or the DDT may be dissolved in an oil such as kerosene, deodorized kerosene, lubricating oil, pine oil or xylene and applied as a solution. Or the DDT may be applied as an emulsion by dissolving the insecticide in xylene for example, adding triton and then diluting with water. By varying the amounts of DDT per gallon of water, kerosene, etc. any strength of DDT spray, wash, paint or dip may be obtained.

Question: How does DDT kill insects?

Answer: DDT is both a stomach and contact poison. It can kill by being taken into the food tube or it can kill by coming in contact with the exterior of the body or appendages of an insect. When the insecticide comes in contact with the exterior of the insect, some of the DDT is absorbed through the body wall or the wall of the appendages and this absorbed material then paralyzes the nervous system. The death of the insect is not instantaneous, for the paralysis is at first slight, but the paralysis progresses until the insect dies. Naturally better and faster controls will be obtained by a good heavy coverage of the surface on which the insects rest, but recent evidence seems to indicate that better controls are obtained when the DDT occurs as minute finely divided particles instead of the reverse.

Question: How long will a surface coated with DDT remain effective?

Answer: That will depend upon many conditions. Some of these are the following:

- (a) The amount of DDT deposited per square inch of surface.
- (b) The form in which the insecticide was deposited, whether as a dust, paint, wash, spray, dip, etc.
- (c) Also whether the chemical was deposited in a solution, emulsion, suspension, or otherwise.
- (d) The amount of rainfall or other washing with water that the treated surface is subjected to.

- (e) The prevailing temperature.
- (f) The amount of sunlight striking the treated surface.
- (g) The chemical composition of the surface and the resulting reaction of the chemical compounds with the DDT.
- (h) The amount of dust that accumulates over the deposit of DDT.

Question: Is it possible to list all of the insect pests of South Dakota that may be controlled through the wise use of DDT?

Answer: A list of insects that may be controlled through the wise use of DDT would indeed be a long one; consequently, only a small number of species of such insects are listed in this publication:

On potatoes: flea beetles, Colorado potato beetle, blister beetles, and potato leaf hopper.

On cabbages, cauliflower, and kohlrabi: cabbage worms, cabbage looper and flea beetles.

On tomatoes: flea beetles and Colorado potato beetle.

On radishes: flea beetles.

On cucumbers, melons, squash: Striped cucumber beetle and twelve spotted beetle.

On livestock: sucking and chewing lice.

On sheep: sheep tick.

On poultry: lice

On man: lice.

In buildings such as houses, stores, restaurants, barns, dairy buildings, etc: bed bugs, house flies, mosquitoes, stable flies, fleas, clothes moths, silver fish, certain species of ants, termites, and cockroaches.

Question: To summarize, what information should the potential user of DDT have before he actually employs the material?

Answer: DDT has been available for experimental purposes only a very short time. It should be realized that while considerable reliable information is available concerning DDT and its effect on insects (both harmful and beneficial) on animals other than insects, on man, on plants, and on the soil, much more research is needed before we shall have the answers to many questions that are now worrying us. If any person wishes to use DDT, that person should first of all identify the pest that he wishes to control. He should then learn whether or not DDT may be used effectively to control the pest. If some other insecticide can do the job more efficiently and with greater safety and more cheaply, then the other insecticide should be used. If DDT is to be used then it becomes necessary to know in what form it is to be employed and at what strength. Above all it should be kept in mind that DDT is toxic to man and other animals and the individual should govern his actions accordingly. Under no circumstances should DDT be permitted to drop into food that is to be used for human consumption or consumption by domestic animals. Nor should the operator who is using DDT breathe any considerable amounts of DDT into his lungs.

The safest form in which DDT can be used on animals and plants is as a dust diluted with pyrophyllite or talc, or as a water spray in which the DDT is suspended attached to minute particles with or without a suitable wetting or sticking agent added. DDT, when dissolved in an oil such as kerosene or gasoline should never be applied to plants or to the bodies of animals for the control of any insect pest or ticks. While DDT sprays of emulsions have been used on animals usually without damage to the animals, it is advisable to employ DDT sprays of water dispersable powders or dusts instead. For the control of insect pests in homes or on walls or other surfaces where a whitish deposit is objectionable, a solution of DDT in deodorized kerosene may be used. On walls and other surfaces where a whitish deposit is not objectionable a spray containing a DDT water dispersable powder with a suitable wetting agency should be employed.