7-1-1945

Sizing Up DDT

Oscar E. Tauber

Iowa State College

Follow this and additional works at: http://lib.dr.iastate.edu/farmsciencereporter

Part of the Agriculture Commons

Recommended Citation

Available at: http://lib.dr.iastate.edu/farmsciencereporter/vol6/iss3/4

This Article is brought to you for free and open access by the Iowa Agricultural and Home Economics Experiment Station Publications at Iowa State University Digital Repository. It has been accepted for inclusion in Farm Science Reporter by an authorized editor of Iowa State University Digital Repository. For more information, please contact digirep@iastate.edu.
Sizing Up DDT

An Effective Killer Of Some Insects, But Its Exact Place Has Not Been Determined

By OSCAR E. TAUBER

DDT is poison in capital letters for numerous insect species which carry illnesses to man, or eat his crops, or make him uncomfortable, or soil his food.

SUMMARY
1. DDT hasn't been used long enough to fully determine its dangers and usefulness.
2. For many insects it appears to be no better or not as good as insecticides now in use.
3. Its effect on the soil and long-lived plants is not known.
4. It kills many harmful insects effectively, but also some beneficial ones.
5. Its most promising use seems to be in control of stable flies, houseflies, mosquitoes and possibly other household insect nuisances.
6. Disease carrying insects such as lice, fleas, bedbugs, mosquitoes will come closer to eradication than ever before.
7. It shows promise with certain vegetable crops, such as potatoes, squash and cabbage, in controlling insects.
8. It may prove valuable in controlling lice on chickens and in poultry houses.
9. Use it with care until more is known about HOW, WHEN and WHERE to use it.

A LOT OF people have now heard about "DDT." Part of this hearsay is true; part isn't; much is misleading. Perhaps we can satisfy some curiosity and correct some erroneous impressions about this much publicized material. Is it really proving to be as good for killing insects as its first reports indicated? We'll see.

The three initials—DDT—stand for the first letters of the hyphenated syllables making up the name of a chemical, dichloro-diphenyl-trichloroethane. When chemists and entomologists want to be more formal, they call it 2,2-bis-(p-chlorophenyl)-1, 1, 1-trichloroethane. All of that is quite a mouthful, so most of us fall back on the simpler "dee-dee-tee."

Dating Back to 1874

Is DDT a new chemical compound? Not exactly. It doesn't occur naturally; notice of what it contains and how it is made was first published in 1874 by a young chemistry student named Othman Zeidler in Strasbourg, France. At that time only its properties such as color, odor, melting point, etc., were recorded. Apparently nothing was done to determine its value for killing insects. What, then, brought on this recent attention to DDT?

DDT was first used as an insecticide in Switzerland 4 or 5 years ago. During the war Swiss entomologists, like entomologists all over the world, ran into a shortage, not only of rotenone and pyrethrum, but also the old standby insect-killer, lead arsenate, which was not manufactured in Switzerland. In their search for substitutes, probably all kinds of chemicals were tested.

Chemical literature was combed for clues, and, for some reason, what we now call DDT was selected for trial. It proved almost miraculous against flies and some other insects, and saved the Swiss potato crop from the potato beetle—the same "Colorado" beetle that is a pest in this country.

At that time the Swiss manufacturers called their product by the trade name Gesarol. Samples found their way to the United States, where entomologists of the U.S.D.A. Bureau of Entomology and Plant Quarantine were searching for pyrethrum replacements needed by the armed forces in the control of mosquitoes, lice, fleas and other insects which are possible disease carriers among troops. Some of the test results were spectacular.

Cleans Out the Lice

Clothing dusted with DDT powder gives almost complete protection against body lice for as long as 3 weeks. DDT powder is also effective against head lice and crab lice. Cotton and woolen garments dipped in DDT solutions may be worn and laundered six to eight times and still be effective in killing body lice. Special weak solutions of DDT may be sprayed over the entire body as an auxiliary treatment for complete delousing of all three types.

The part taken by DDT dusts in preventing a widespread typhus epidemic in Naples, Italy, has been widely publicized. Residents of the town were infested with lice. As many as 60,000 persons per day were treated with DDT. Nearly the entire population was dusted; the disease subsided; thousands of lives were undoubtedly saved in this one town.

Since these initial successes, the
Not Always Best

Though there’s no “fly in the ointment,” there are certain dull spots on the glamour of DDT. It is true that DDT will kill the insects mentioned above, and others, too, but, so far at least, in some cases it is no better than insecticides already in use. For example, 3 percent DDT was no better than the standard pyrethrum method for the cross-striped cabbage worm; 10 percent DDT was not superior to 1 percent dinitro-o-cresol or 1 percent dinitro-o-cyclohexylphenol against a certain stinkbug; 3 lbs. of DDT in 100 lbs. of bran was no more effective as a grasshopper bait than 1 qt. of 32 percent sodium arsenite solution per 100 lbs. of bran; and so on—other similar comparisons could be found. In some cases where DDT is no better than material now used, it would be ruled out, if for no other reason, because of its present higher cost.

According to some published data, DDT is inferior to older insecticides for some purposes. Without mentioning details of the tests, DDT isn’t as good as nicotine for the spirea and cotton aphids. DDT is comparatively ineffective against the boll weevil and the cotton leaf worm. DDT did not control the sugar cane borer as well as synthetic cryolite. DDT grasshopper baits were inferior to sodium fluorosilicate baits.

When compared with rotenone, DDT is of little value in Mexican bean beetle control. The tartar emetic-brown sugar spray against onion thrips was better than DDT treatments. As a dust for killing mosquito larvae, DDT is no more useful than Paris green; but 1 to 2 quarts of 5 percent DDT dissolved in kerosene is as effective as 18 to 20 gallons of fuel oil per acre.

Tests in Iowa

Last summer, in the Insectary Gardens on the Iowa State College campus, we set up experiments to test DDT dusts on potatoes, cabbage and squash. With Irish cobbler potatoes, 3 percent DDT dust effectively controlled the Colorado potato beetle and the potato leafhopper as well as the potato flea beetle and potato aphid, although the infestation of the last insect was not heavy.

On cabbage 1 percent DDT dust gave slightly better control against the imported cabbage worm than did 1 percent rotenone. The 1944 populations of squash bugs and striped and spotted cucumber beetles were exceptionally low, but the number of squash vine borers was extraordinary high. However, 3 percent DDT dust gave almost perfect protection against the borer, which is very difficult to keep in check. Even 1 percent DDT dust gave much better control than the widely used 8 percent calcium arsenate in gypsum. The 1 percent DDT was also as good as 1 percent rotenone, which was about half as good as 3 percent DDT when measured by pounds of squash produced.

In general, our results with DDT at the Iowa Station have been similar to those of entomologists elsewhere; more tests will be conducted this year. Larger amounts of DDT have been released for experiments so that field trials of greater extent will be possible. Occasional use at Ames of DDT for dog and cat fleas, for bedbugs and for roaches has proved highly successful.

Poison Man, Animals?

If DDT is so potent against some insects, the question naturally arises: Is it also toxic to man and other animals? Tests on chickens, rabbits, rats and mice have shown that DDT is a poison for higher animals. So far, no deaths of human beings, attributable to DDT poisoning, have been recorded, but presumably the chemical is toxic to man, also.

Apparently, ordinary precautions about inhaling the dust should be followed; greater care needs to be taken when using DDT sprays, especially if in oil solutions, for it is believed to be absorbed through the skin when in liquid form. However, many other highly toxic compounds such as arsenicals and hydrogen cyanide gas have long been used as insecticides, and are safe when certain rules are sensibly followed.

DDT’s widespread toxicity to forms of life other than insects must sometimes be taken into consideration. When wooded areas have been airplane-dusted with DDT to control certain forest insects, some dust has fallen into streams and killed such aquatic animals as fish and crayfish.
Kills Beneficial Insects

Does DDT sometimes kill beneficial insects? Yes—bees coming to orchards which have been sprayed with DDT during the blooming season are likely to be innocent victims. DDT also kills some valuable insects such as ladybird beetles which feed on other insects such as aphids.

In some orchards and gardens, DDT poisonings have killed some beneficial as well as harmful insects. Subsequently, red spiders or mites, or some aphid species— all relatively immune to DDT— increase tremendously to injurious levels simply because their natural insect enemies have been eliminated. A useful balance of nature has been upset. Such results have been reported from certain regions where codling moth control was attempted with DDT sprays.

Harm Plants, Soil?

Will DDT harm plants? California workers have recorded spotted leaf injury to apple and pear foliage when DDT was used in certain oil sprays. Tomatoes treated with DDT are reported to have a decreased yield. Our Insectary Garden tests showed no harm to Irish cobbler potato, late flat Dutch cabbage, Chicago warty Hubbard squash and buttercup squash. Acorn squash treated with DDT, however, showed some stunting, especially in earlier periods of growth. Some varieties of cucumbers and muskmelons were slightly “yellowed” after heavy applications of DDT dust. Much more research needs to be done with this phase of DDT’s use.

Very little is yet known regarding possible accumulation of DDT in soil, with subsequent effects on plant growth. We will need to wait for a verdict on this point.

More Testing Needed

Now that we have sketchily looked over some of the good and bad points of DDT, what conclusions may we formulate? How useful will DDT be in combating insect pests, especially in Iowa?

Before we attempt to give an answer, we should recall several pertinent factors about DDT. Its history as an insecticide has been short. There hasn’t been time to explore it thoroughly. It is known to be useless, or practically so, for certain insects. For many pests, it is no better than materials commonly used.

Some published results have been contradictory—sometimes because of differences in the manner of testing. Neither its favorable potentialities nor its unfavorable characteristics have been completely evaluated. The human body’s tolerance for DDT in all of its various modes of use has not been established; its effect on the soil or on long-lived plants after repeated applications has not been determined for sure.

In short, DDT is not going to be the complete solution for controlling harmful insects. As yet it should not be used indiscriminately. Better and different methods of application may broaden DDT’s usefulness, while at the same time reduce any of its possible hazards.

Its Probable Role

What, then, will probably be DDT’s most promising uses? Without doubt, one will be in giving man protection against such household nuisances as flies and mosquitoes. DDT’s long-lasting residual effectiveness against the housefly is almost unbelievable. In some tests, DDT solution sprayed on unpainted wood was still able to kill flies by contact as long as 250 days after the original treatment.

Under actual conditions, one spraying of home or office or school walls and ceilings, thoroughly and correctly done each year, should do the trick. DDT has been successfully incorporated in certain types of paint for wood and plaster surfaces to give long lasting killing properties indoors.

Perhaps DDT will also be the housewife’s answer to carpet beetles, silverfish and clothes moths.

Spraying of barns will probably do much to reduce to a minimum fly troubles in dairy barns, hog houses and other farm buildings.

A special powder containing DDT and which mixes with water will probably be available for spraying or even dipping farm animals. Eradication of disease-carrying insects such as lice, fleas, bedbugs, mosquitoes, etc., will come closer than ever before to realization.

It should come in handy to keep cat and dog pets free of fleas; it should have value in keeping down lice on hens and in henhouses. For certain vegetable crops, the potato as a notable example, DDT has much promise, but its selectivity in ability to kill insects and harm plants will limit its value. Under certain conditions, perhaps as a dormant spray, DDT may be the answer to certain problems of the orchardist.

At present, almost all available DDT is still going to the armed forces for protecting human beings against insects that carry disease. To the impatient farmer and fruit grower and gardener and housewife, we can only suggest a little longer wait until a larger supply of DDT is released, and until entomologists have had a chance to prepare tested recommendations.

DDT won’t be the whole answer to all insect problems, but it will have a lot to say about some of them eventually.