

NEEDLESS PUBLIC CONCERNS ABOUT HERBICIDES¹

By Wendell R. Mullison

Should the phenoxy herbicides ultimately be banned owing to the public outcry against their use by a vociferous, well organized minority, it would be only a very short period of time before this same organized minority would start the same attack on another herbicide. Thus the phenoxy controversy is merely a symptom of the anti-chemical attitude and public fears of today.

This is not armchair thinking on my part. I recently was in Oregon and participated in a radio talk show there. In addition to many questions about the phenoxy herbicides and several diatribes against them, one of the listeners said the same things about another excellent herbicide, not made by The Dow Company, but made by one of our competitors. We are in the midst of a back-to-nature movement and are currently going through a period in which there are vociferous segments of the general public who are anti-chemical.

While I'll mostly be discussing the phenoxy herbicides, there are general fears that a certain portion of the public has about all herbicides.

I think it is most important that it be brought to the public's attention that all herbicides, as well as all agricultural pesticides, have to go through an elaborate set of tests and an extensive data base must be gathered on their behavior before a product can be marketed. This information has to be approved by the federal government before the material can be registered and legally sold in this country. The agency that does this is the Environmental Protection Agency, more commonly known as EPA. Obviously the data base varies for the different chemicals but such a data base exists.

There are three general types of information which are required by EPA before any product can be registered: 1) hazard evaluation, 2) environmental chemistry, and 3) product chemistry. There also is an unspecified class which is any other data that EPA may request. I will give you a birds-eye view of these three general areas.

Hazard Evaluation

Hazard evaluation is divided into two parts: hazard evaluation for humans and domestic animals, and hazard evaluation for wildlife and aquatic organisms.

There are three types of toxicological tests involved in hazard evaluation: acute, subchronic and chronic. Acute toxicity studies determine what happens to humans and domestic animals after a single exposure. The acute studies done on experimental animals are: the acute oral, the acute dermal, and the acute inhalation. In other words, what happens if some of the material is ingested or swallowed? If some is spilled on the skin, how much of it is absorbed? What happens if some of the spray is breathed? Other animal acute toxicity studies required are the following: primary eye irritation, primary dermal irritation, and dermal sensitivity. What happens if you get some in your eyes? If the material is spilled on the skin apart from the amount that's absorbed, what then? Is there some primary dermal irritation? Would it cause a rash upon exposure? If you should get some on your skin, does your skin get sensitized to subsequent exposures? With this information you can come to a decision as to the acute toxicity of the product in question.

Subchronic toxicity studies in general are repetitions of the acute exposures over a period of time. We have the subchronic oral, the subchronic 21-or 30-day dermal, the subchronic 90-day dermal, and subchronic inhalation. All of these studies are designed to give us information as to what would happen to test animals upon repeated exposure to small amounts of the material over a relatively short period of time.

The chronic toxicity studies are studies where the material is administered to the test subject over a long period of time. Some of these are lifetime feeding studies where the animal is subjected to the chemical throughout most of its life. Such lifetime data have to be obtained on two mammalian species, usually the rats and mice.

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The average life of these animals is about two years. In practice these feeding studies are run for 24 months with the rat and 18 or 24 months with mice. They are designed primarily to see if the chemical is carcinogenic; that is, does it cause cancer? This is also an additional opportunity to see whether there is some other insidious toxic effect which has been missed in the subchronic studies. Usually a 90-day feeding study will show up any toxic effect except cancer. These two year feeding studies are also used to establish no-effect levels and to develop tolerances, if necessary, in the food we eat. A rough rule of thumb in developing tolerances is that there should be a 100-fold safety factor before the no-effect level is reached.

Other important chronic toxicological information required before the pesticide is approved by EPA are the multi-generation reproduction and teratology studies. The multi-generation reproduction study checks to see whether the fertility or viability of the animals is affected. These also are long-term studies where the animals are fed the chemical being tested throughout the lifetime of the parents and the lifetimes of one or more subsequent generations. This tests the mutagenicity in the mammalian species. Other mutagenic studies are effects on microorganisms. The best known of these is the Ames test. The teratology study is run at a dosage high enough to show maternal toxicity. The young are delivered by cesarian operation and examined to see if there are teratological effects. Another chronic test for fumigants is a two-year inhalation study.

Metabolic studies are often run in conjunction with the toxicity tests. These usually involve radioactive tracer studies on plants and animals and are carried out to determine whether and how the test chemical breaks down.

Some of the same tests that are used on mammalian species are also done on bird and fish species. For example, we determine the acute single oral toxic dose to birds, a bird dietary feeding study, a bird reproduction study, the acute study for fish toxicity and aquatic invertebrates, as well as life-cycle studies of fish and aquatic invertebrates. There also may be simulated testing of marine organisms.

Environmental Chemistry

In environmental chemistry tests we are concerned with the physical or chemical degradation of the products. Does it hydrolyze in water? Is it degraded by light? How does it behave in soil and water? What happens under aerobic and anaerobic soil and water conditions? How does it behave in soil? Does it leach? Is it volatile? Is it absorbed? Thus essentially we are concerned with the field behavior in soil and water and on the ecosystem of the soil and water. Further, does it accumulate in plants or animals? What are the residues after the use of the product? What are the residues on crops? Is there a residue in poultry? Is there residue in eggs, or in milk, or meat? Is there a fish residue? What is the effect on rotational crops, that is, would it be picked up by a succeeding crop after application?

Product Chemistry

Some data requirements on the chemistry of the product are: the identity and disclosure of the ingredients in the manufacturing process, the analysis of the samples, the product's efficacy, and questions that might be raised about potential contaminants in the product that might be toxic themselves. This is not a complete list.

Other Desired Data

The fourth class of test data that EPA wants should answer any additional questions about the safety of the product. You must answer any question that EPA raises and back it up with data. This is not only true at the time of registration, but at any later time should they choose to raise the question. In essence, the system is updated at all times if any question about safety arises. This very important point is not recognized by the general public.

I have not discussed all the tests that must be run before a company can obtain registration. I have merely outlined some which I think are most important in regard to concerns of the public about the safe use of pesticides.

Phenoxy Herbicides

The public appears to have concerns about the phenoxy herbicides regarding miscarriages and

birth defects. According to the World Health Organization, the worldwide rate of spontaneous abortions or miscarriages has been estimated to be 15 or 20 percent. A 20 percent figure is often used in this country. It is generally recognized that the majority of miscarriages result from chromosomal or developmental abnormalities in the fertilized egg of the developing fetus. Thus, a miscarriage is nature's way of handling a mistake. With such a complicated process occurring in the development and birth of a complex human being, it is surprising that more mistakes do not occur.

Birth defects also are far more common than is usually realized. In the United States it has been estimated that 7 percent of all live babies born each year have a serious birth defect. Approximately 3.5 percent of such defects are discovered in the hospital at the time of birth and another 3.5 percent are discovered during the first year of life. Even today, 65 to 70 percent of all birth defects have unknown causes. In a recent handbook by J.G. Wilson on teratology, it is stated that drugs and environmental chemicals cause only 4 to 5 percent of all birth defects. There is no scientific evidence that the phenoxy herbicides cause either birth defects or miscarriages.

Another major concern of the public is cancer. Are the phenoxy herbicides carcinogenic? Lifetime feeding studies with these products clearly show that they are not carcinogenic. The first publication describing their use as herbicides occurred in 1944. They have been in widescale use up to the present time, which is 37 years later; and there is no evidence whatsoever that they have caused cancer. This is in complete agreement with the laboratory testing that has been done with these products and with our knowledge of their metabolic fate on plants and animals. Very little dermal absorption takes place, they do not break down within the animal body, and they are rapidly excreted.

These products have been studied extensively for environmental effects and to determine whether or not they are accumulating in the environment. Government studies have shown that they are usually not present in the food we eat, the water we drink, the soil upon which we walk, or the air which we breathe. The only way the

average person might come in contact with such products would be an accidental exposure. The toxicology and behavior of these compounds in humans is such that should accidental exposure occur, it would have no harmful effect.

Studies have been made of applicators who apply the product daily during the spraying season. These studies have shown that these products do not accumulate in the applicators. Clearly the applicators have the greatest likelihood of exposure to these chemicals. Studies of manufacturing operations also have shown no ill effects among the workers who make these products.

One quote from the Texas agricultural authorities on the safety of 2,4,5-T to humans and animals is as follows:

The chemical has been used in Texas since 1949-1978 (29 years). In this span of years, approximately 50,000,000 acres have been treated, with many areas of land receiving 3 to 5 applications. To date there has not been a single lawsuit because of attributed health damage to man or animal. There have been lawsuits on damage to vegetation outside of target areas. Percentage of calf, lamb and kid crop is up in Texas. There are fewer deformities in newborn animals than in the entire history of the livestock industry. The cause of practically all deformities has been traced to plants that historically cause deformities to fetuses.

The California Department of Food and Agriculture completed a detailed study April 6, 1978 on the aerial application of phenoxy herbicides in California. Their summary stated:

At the public hearings, allegations were made concerning gross, readily apparent effects of the herbicides, and these alleged gross effects were the target of a subsequent investigation by the Phenoxy Herbicide Investigation Team. None of these effects, such as human illness, animal deaths or deformities, plant damage, or environmental damage, could be provided for any correlation between geographical locations of residents in relationship to the spray site and the etiology of disease. Examination of pesticide illness reports from California physicians by this Department have not revealed any significant health hazards that can be attributed to the

phenoxy herbicides as used today in California.

In summary, there is a tremendous volume of scientific information available on the phenoxy herbicides. These herbicides have been the subject of many carefully controlled toxicological experiments, perhaps more than any other pesticide on the market today. The known scientific data about these chemicals, combined with a 37-year history of safe use fully support these following

conclusions: The phenoxy herbicides are safe, efficient, and selective herbicides to control weeds and brush and their use has not caused cancer, birth defects, or miscarriages.

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APPLYING FOR FEDERAL FUNDING GRANTS FOR URBAN TREE MANAGEMENT ACTIVITIES

by Robert L. Tate

Abstract. Due to cutbacks in local sources of funding for urban tree maintenance activities, urban tree managers may become more reliant on federal funding grants. The need for information regarding the grant process was desired by a high percentage of surveyed urban tree managers. The sources of information about federal grants and the general process of writing and applying for them is summarized to enable tree managers to be in a more competitive position if outside funding is sought.

Generally in the 1970's a higher level of local, state and federal government activity was experienced related to trees in the urban environment. Unfortunately this has not necessarily brought with it a higher level of urban tree management (Richards 1980) because funding levels are in most cases inadequate for the proper

maintenance of urban trees. Due to general public dissatisfaction with taxes and the size of government, the move to cut state and local spending (Propositions 13 in California, 2½ in Massachusetts and the 5 percent budget cap in New Jersey) is firmly underway.

Even though local political decision-makers may be sympathetic, it is increasingly difficult to obtain minimal funds for tree maintenance activities when budgets for the more essential services such as police protection and fire control are in jeopardy. Because of this the urban tree manager is faced with a situation in which the reliance on local funding that has traditionally been the major source of municipal budget funds (Ottman and Kielbaso