

Monsanto Backgrounder

DIOXIN

MONSANTO COMPANY / ST. LOUIS, MO.

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Introduction

As a major U.S. chemical company with world-class research expertise, Monsanto is frequently sought out by government officials, the news media, the general public and, indeed, its own employees for opinions and information on a wide range of chemical issues.

One such issue, currently the object of considerable public concern, centers on the presence in the environment of minute amounts of a highly toxic, altogether useless chemical with the tongue-twisting name: 2,3,7,8, tetrachlorodibenzo-para-dioxin, or TCDD. Frequently called by its generic name, "dioxin," this substance belongs to a class of chemical impurities which can be formed unintentionally as contaminants during the manufacture of certain pesticides and industrial chemicals.

Research has recently established that most combustion processes like power plants, municipal trash incinerators, automobile engines, and even wood burning fireplaces, also produce measurable amounts of various dioxins, including TCDD. The formation of 75 different dioxin compounds is chemically possible, but we will focus here on only one, TCDD, which we will refer to as simply "dioxin."

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Following is a brief summary of the animal data, human health information and environmental characteristics of this substance, as excerpted from the scientific literature.

Animal Data

The "acute animal toxicity" of dioxin -- that is the amount that will cause immediate poisoning -- differs considerably from one animal species to another. In the guinea pig, the laboratory animal found to be the most sensitive, a single oral dose of an extremely minute amount (in the billionths of an ounce range) may prove fatal. However, other test animals, such as rabbits, dogs and hamsters, can tolerate doses ranging from 100 to more than seven thousand times that which can kill a guinea pig.

Laboratory studies also have shown that some test animals, fed daily doses of dioxin in their diets for prolonged periods of time, have experienced other serious health problems including cancer and birth defects.

Human Health Effects

From the human experience, it's clear that man is much more tolerant of dioxin than most animal species. Since no human is known to have ever died from dioxin poisoning, the amount required to kill a human is unknown. However, much is known about other human health effects.

The Journal of the American Medical Association (JAMA) reported on Oct. 15, 1982, that there is no scientific evidence that dioxin has caused cancer or birth defects in humans.

The British Advisory Committee on Pesticides in late 1982 completed a special review of the relationship between pesticides such as 2,4,5-T, which may contain dioxin, and the occurrence of soft tissue sarcomas. The committee concluded that these pesticides "do not pose a safety hazard, whether used in agriculture, forestry, the home and garden, or elsewhere."

These statements are based in part on findings from many health studies, some done recently, on sizeable groups of people known to have been exposed to relatively high levels of dioxin, going as far back as 30 years. The question of soft tissue sarcomas is still being investigated in several countries. However, the only long-term health problem attributed to dioxin by these authorities is an acne-like skin condition.

This skin condition, known as chloracne, is the hallmark (or visible indication) of both acute and chronic toxic exposure to dioxin in humans. Chloracne manifests itself shortly after exposure (usually within two to three months) and, in its milder forms, is characterized by clusters of blackheads over the cheekbones, around the earlobes, on the face, chest and back. In severe cases, pus pockets, large cysts and scarring have occurred. In some industrial workers, chloracne has persisted for up to 30 years, but mild cases usually clear up shortly after exposure ceases.

In summary, the preponderance of medical evidence published in the scientific literature indicates that chloracne will manifest itself as the first clinical symptom in humans exposed to toxic levels of dioxin. In the absence of chloracne, other adverse effects are improbable.

Environmental Characteristics

In the environment, dioxin tends to bind itself tightly to soil particles making it a fairly immobile substance. It is not mobile or soluble in water either. Rather, it settles to the bottom of rivers and streams, binding itself to the silt or sediment. This characteristic prevents it from contaminating drinking water supplies. However, fish that feed on the sediment can become contaminated. In recognition of this, the U.S. Food & Drug Administration has established 25 parts-per-trillion as the maximum amount of dioxin permitted in fish for human consumption. U.S. Environmental Protection Agency regulations currently permit the sale and use of herbicides containing up to 100 parts per billion of this contaminant. Using up-to-the-minute technology, the chemical industry now produces herbicides typically containing only one-tenth this amount.

Dioxin is a solid material with a high melting point, (about 500 degrees Fahrenheit), thus it does not generate fumes. This means exposure through inhaling the substance is not a concern. The most likely route of human exposure is by

absorption through the skin from direct skin contact with contaminated soil. Ingestion is also possible, especially by children who tend to put their fingers in their mouths. At the same time, the fact that dioxin adheres so tightly to soil suggests that it is less available through soil than through other forms of exposure.

Sunlight destroys dioxin's toxic properties rapidly on plant and soil surfaces. The length of time required to break it down into harmless components below the surface ranges from several months to many years, depending on a number of variables.

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PARTIAL LIST OF SIGNIFICANT SCIENTIFIC
INVESTIGATIONS WHICH HAVE FOUND NO
ASSOCIATION BETWEEN DIOXIN EXPOSURE
AND LONG-TERM HEALTH PROBLEMS

1. A review of the medical evidence regarding the long-term health effects of Agent Orange and dioxin contaminants, conducted by the American Medical Association's Council on Scientific Affairs and published in the October 15, 1982 issue of the Journal of the American Medical Association (JAMA).
2. A report on "The Toxicity, Environmental Fate and Human Risk of Herbicide Orange and its Associated Dioxin," issued by the USAF Occupational and Environmental Health Laboratory, Brooks AFB, TX. Report No. USAF OEHL-78-92, October, 1978.
3. An investigation of health effects in U.S. Air Force Personnel ("Ranch Hand Study") following exposure to Herbicide Orange: A Baseline Mortality Assessment, USAF School of Aerospace Medicine, San Antonio, TX., July, 1983.
4. World Health Organization studies done to date on the human population exposed to high levels of dioxin during an industrial accident in Seveso, Italy in 1976.
5. Special review of the latest evidence on the safety of phenoxy herbicides, including 2,4,5-T, by R. Kilpatrick, et al., the Advisory Committee on Pesticides, Ministry of Agriculture, Fisheries and Food, United Kingdom, December, 1982.
6. A study of long-term health effects of occupational exposure to 2,4,5-T and its dioxin contaminants, conducted by Raymond A. Suskind, M.D., University of Cincinnati. The study examined the current health status of 254 present and former Monsanto employees who had worked in the 2,4,5-T production unit at the company's Nitro, W.VA., plant between 1948 and 1969 compared to the status of a control group of 163 employees who worked in other areas of the plant during the same time frame. The results were presented at the "Third International Symposium on Chlorinated Dioxins and Related Compounds," at Salzburg, Austria, October 14, 1982.
7. Two recently completed mortality (cause of death) studies on groups of former Monsanto employees who had worked with 2,4,5-T since 1948. One group experienced high peak exposure over 30 years ago.
8. A survey of 126 workers, 10 years after exposure to dioxin following a 1968 explosion at the Coalite Oil and Chemicals' 2,4,5-T manufacturing plant at Bolsover, Derbyshire, U.K. Survey presented at the "Third International Symposium on Chlorinated Dioxins and Related Compounds" at Salzburg, Austria, October 14, 1982.
9. A Dow Chemical study of health effects to the offspring of production workers exposed to 2,4,5-T and its dioxin contaminants, and the pregnancy risk to their wives, reported in Chemical & Engineering News, January 5, 1981.
10. A 1974 Report by the National Academy of Sciences on the effects of herbicides in South Vietnam.

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July 18, 1983