

Turf Management

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The Furor Over Dioxin

In early August, ABC-TV's "20/20 New Magazine" aired an account of "the domestic harms that may now be traced to what was the deadly component in Agent Orange, dioxin." Agent Orange, a mixture of the herbicides 2,4-D and 2,4,5-T, was used in the Vietnam war as a defoliant. Although the program dealt with the present agricultural uses of 2,4,5-T, the component containing dioxin, in one of the telecast leads a Chem Lawn truck was shown. The implication of its use in the lawn care industry has led to a considerable backlash in the turf industry. Numerous lawn care operators have reported lost accounts or complaints which were resolved when the facts were presented. Several inquiries have been received from golf course superintendents, golfers, homeowners, sod growers and neighbors of sod growers as well as grounds managers.

The herbicide 2,4,5-T is in the class of herbicides known as the phenoxy compounds. Several of the phenoxy herbicides have been or are used in turf for broadleaf weed control (Fig. 1).

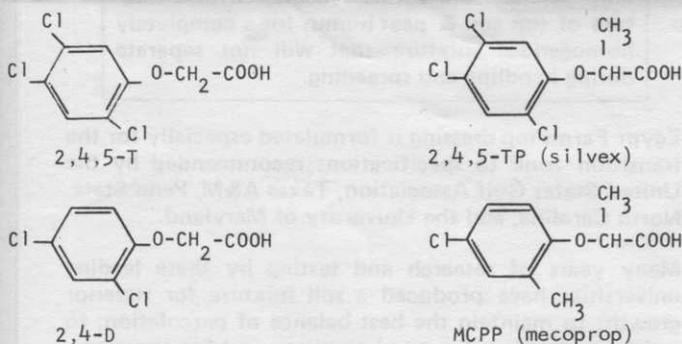


Figure 1. Chemical structure of four phenoxy herbicides.

2,4,5-T was used in turf up until the early 1970's when it was banned for homelawn use. Partly because of its dioxin content and partly because other herbicides were as effective for broadleaf weed control in turf and were also less phytotoxic. Several relatives of 2,4,5-T however are still widely used in turf. The closest relative of 2,4,5-T is 2,4,5-TP or silvex. Because of similarities in the manufacturing process between 2,4,5-T and 2,4,5-TP, dioxin would be expected to be found in 2,4,5-TP. Recent analytical procedures have detected dioxin in silvex in the range of .020-.070 ppm (parts per million). The EPA allows no more than 0.1 ppm dioxin content of the active ingredient in 2,4,5-T and 2,4,5-TP. Thus far no dioxin has been detected in 2,4-D or MCPP. These

two phenoxy herbicides are manufactured using different starting products and the occurrence of the highly toxic dioxin, TCDD, is unlikely.

There are many types of dioxin compounds. It is the highly toxic dioxin, TCDD (2,3,7,8-tetrachlorodibenzo-p-dioxin) that has caused the greatest concern. Dioxin (TCDD) is a highly toxic manmade substance with a toxicity of 10,000 times greater than that of sodium cyanide (but only 0.0001 times greater than that of tetanus toxin and 0.00003 times as great as that of botulinum toxin, both natural bacterial toxins) (2).

According to the recently published CAST (Council for Agriculture Science and Technology) report the ABC television program consistently confused the toxicity of the compound with the dose. Annual applications of dioxin in Agent Orange in Vietnam were 3,000 to 30,000 times greater per acre than in current applications of 2,4,5-T in the United States (3). Day, Akesson, Bode et al. (3) also point out that to obtain a toxic dose of dioxin, from 200 to 2,000 toxic doses of the moderately toxic 2,4,5-T would have to be injected (depending on the test species).

Spraying a turf area with 2,4,5-TP (silvex) containing the maximum allowable dioxin content at the rate of 1 pound per acre would result in only 4.5 micrograms of dioxin per acre. The CAST commentary cites an incident in which fallout from an accidental release of chemicals from an Italian factory contaminated an area with amounts of dioxin in excess of 52,000 micrograms per acre (1). The medical records from 623 pregnant women in the contaminated area showed that the number of spontaneous abortions and the number of children born with birth defects were below normal. In this instance exposures were more than 10,000 times greater than those that could be expected to occur with the prudent use of 2,4,5-TP on turf.

Nevertheless, there is always the argument that introducing any amount of a toxic substance into the environment is not good. Fortunately, there are other weed control alternatives that could replace the use of 2,4,5-TP without seriously affecting the degree of weed control obtained. MCPP is active on most of the same winter annual weeds as 2,4,5-TP, but in some cases to a lesser degree. In many of the more resistant winter annual however, combining MCPP with 2,4-D and/or dicamba will provide excellent weed control.

1. Behrens, R., D. E. Davis, R. W. Fogleman and M. Newton. "Commentary on Dioxin." Council for Agric. Sci. & Technol., Aug. 25, 1978.
2. Davis, D. E., R. Behrens, L. K. Binning, et. al. "Commentary on Agent Orange." Council for Agric. Sci. & Technol., Aug. 25, 1978.
3. Day, B. E., N. B. Akesson, L. E. Bode, et. al. 1978. "The phenoxy herbicides." Second Edition. Council for Agric. Sci. & Technol., Rpt. 77.