

INDUSTRY TASK FORCE II ON 2,4-D RESEARCH DATA

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Issue Background

ENVIRONMENTAL FATE

2,4-D has a relatively short half-life and is rather immobile in the soil. In 35 recent field dissipation studies across the U.S., less than 5% of applied 2,4-D moved downward more than 15 cm (6 inches). The average lowest depth detected ranged from 6 to 12 inches in soils of the southern United States and 16 to 24 inches in low organic soils where greater movement would be expected. Soils were sampled to a depth of 48 inches and analyzed for 2,4-D plus its soil metabolites until two analyses provided a result of “non-detectable” at each sampled depth. Even though laboratory solubility studies indicated 2,4-D is potentially mobile, rapid degradation in the soil and removal from soil by plant uptake minimizes leaching under realistic application conditions.

Field dissipation studies found that 2,4-D had an apparent soil half-life of 5 days with a range of 1.7 to 13.1 days. The moisture content of the soil appears to have a major effect on the half-life, since the main route of degradation is by microorganisms. The commonly used 2,4-D amine salts and 2,4-D esters are not persistent under most environmental conditions. Dissociation of 2,4-D amine salt is expected to be instantaneous (<3 minutes) under most environmental conditions. Ester forms of 2,4-D biotransform and hydrolyze rapidly to the acid in natural soil (1 to 10 days) and natural water conditions (<1 day). Under these conditions, the environmental exposure from 2,4-D esters and 2,4-D amines is expected to be minimal in both terrestrial and aquatic environments.

The average half-lives of 2,4-D in grass and thatch were < 7 days. The half-life in natural water was one to two weeks, although in areas such as a treated rice paddy, the half-life was as short as one day.

The acid form of 2,4-D, as well as the amine and ester chemical groups, metabolized to transitory compounds of nontoxicological significance and ultimately to forms of carbon. Thus, 2,4-D is considered a biodegradable compound. Under normal conditions, 2,4-D residues are not persistent in soil, water or vegetation.

For the most recent published study, which reviews the 35 environmental fate studies funded by the task force, plus other 2,4-D environmental fate studies in the scientific literature, see Wilson, R.D et al, Dissipation in Field Soils after Application of 2,4-D Dimethylamine Salt and 2,4-D 2-Ethylhexyl Ester, *Environmental Toxicology and Chemistry*, Vol. 16(6), pp. 1239-1246, 1997, copies of which can be made available through this task force, or seen on the [2,4-D Review Publications](#) site.

About the Task Force

The Industry Task Force II on 2,4-D Research Data is organized to provide funding greater than 300 Good Laboratory Practice (GLP) research studies required to respond to the EPA reregistration and PMRA pesticide re-evaluation programs. The 2,4-D Task Force is comprised of those companies owning the technical registrations on the active ingredient in 2,4-D herbicides. They are Dow AgroSciences (U.S.), Nufarm, Ltd. (Australia) and Agro-Gor Corp., a U.S. corporation jointly owned by Atanor, S.A. (Argentina) and PBI Gordon Corp. (U.S.).

Environmental Fate Values

Adsorption/Desorption (K_{oc}):	31.2 - 470.9 mL/g
Soil DT_{50} aerobic (20°C laboratory):	1.7 days
Soil DT_{50} anaerobic (20°C laboratory):	333 days (anaerobic aquatic study)
Hydrolysis (pH 7):	1 to 2 years in buffer solutions (sterile water)
Photolysis water DT_{50} :	12.98 days in artificial sunlight
Photolysis soil DT_{50} :	68 days
Aerobic Soil $T_{1/2}$:	6.2 days
Aerobic Aquatic $T_{1/2}$:	15 days
Anaerobic Aquatic $T_{1/2}$:	41-333 days
Vapor Pressure:	1.4×10^{-7} mm Hg at 25°C (non-volatile)