

2,4-D CHEMICAL FACT SHEET

Formulations

2,4-D has been widely used since 1946 as a household weed-killer, agricultural herbicide and aquatic herbicide. It was registered with the U.S. EPA in 1986 and re-reviewed in 2005. It is currently under registration review. An interim registration review decision is expected in 2023. The active ingredient is 2,4-dichloro-phenoxyacetic acid. There are three types of 2,4-D used as aquatic herbicides: dimethyl amine salt, butoxyethyl ester and choline salt. 2,4-D is available in both liquid and granular formulations. It is labeled for control of emergent, floating-leaf and submerged vegetation using direct foliar, surface or subsurface application. Commercial formulations approved for aquatic use in Wisconsin include Weedar® 64, Sculpin® G and Freelexx®.*

Aquatic Use and Considerations

2,4-D is a systemic herbicide (i.e., it moves throughout the plant tissue) that primarily affects broadleaf plants. It is a WSSA Group 4 herbicide, meaning that the mechanism of action is by mimicking the plant growth hormone auxin. Following treatment, 2,4-D is taken up by the plant and translocated through the roots, stems and leaves, resulting in bending and twisting of stems followed by growth inhibition. Plants begin to decay within one to two weeks after application, but it can take several weeks for plants to fully decompose. Treatments should be made when plants are actively growing.

It is important to note that repeated use of herbicides in the same WSSA group (i.e., with the same mechanism of action) can lead to herbicide-resistant plants, even in aquatic

* Product names are provided solely for your reference and should not be considered exhaustive nor endorsements.

environments. In order to reduce the risk of developing resistant genotypes, avoid using the same type of herbicides year after year, and utilize effective integrated pest management strategies as part of any long-term control program.

For many years, 2,4-D has been used primarily in small-scale spot treatments. Some recent studies have found that 2,4-D moves quickly through the water and mixes throughout the waterbody regardless of where it is applied. Accordingly, 2,4-D has been used in Wisconsin experimentally for whole-lake treatments.

2,4-D is labeled to control the invasive plant species Eurasian watermilfoil (*Myriophyllum spicatum*). Native species that are labeled as susceptible to 2,4-D include native milfoils (*Myriophyllum* spp.), coontail (*Ceratophyllum demersum*), common waterweed (*Elodea canadensis*), naiads (*Najas* spp.), waterlilies (*Nymphaea* spp. and *Nuphar* spp.), bladderworts (*Utricularia* spp.) and duckweeds (*Lemna* spp.).†

Post-Treatment Water Use Restrictions

There are no post-treatment restrictions on treated water use for fishing or livestock drinking water. Following the last registration review in 2005, the butoxyethyl ester products require a 24-hour waiting period for swimming. Minimum setback distances may apply for applications on waterbodies with potable water intakes. If 2,4-D is applied within the minimum setback distance, treated water should not be used as human drinking water for at least 7 to 21 days after treatment, depending on product and application rate. However, in one study, 2,4-D persisted in the

† May vary by formulation, application rate and/or product. Every product label must be carefully read and followed by the user.

water at levels above the irrigation threshold 93 days after treatment, suggesting that the current restrictions may not be sufficient under all application scenarios. Treated water can be used as potable water sooner if the concentration of 2,4-D falls below 70 parts per billion (ppb). Restrictions on treated water use for irrigation may apply based on application rate, product and irrigation site.[†]

Herbicide Degradation, Persistence and Trace Contaminants

The half-life of 2,4-D (the time it takes for half of the active ingredient to degrade) ranges from 13 to 40 days. In anaerobic lab conditions, the half-life has been measured up to 333 days. After treatment, the 2,4-D concentration in the water is reduced primarily through microbial activity, off-site movement by water, or adsorption to small particles in silty water. 2,4-D degradation in water is highly variable depending on numerous factors such as microbial presence, temperature, nutrients, light, oxygen, organic content of substrate, pH and whether the water has been previously exposed to 2,4-D. It is slower to degrade in cold or acidic water and appears to be slower to degrade in lakes that have not been treated with 2,4-D previously.

Once in contact with water, both the ester and amine formulations dissociate to the acid form of 2,4-D, with a faster dissociation to the acid form under more alkaline conditions.

Impacts on Fish and Other Aquatic Organisms

Toxicity of aquatic 2,4-D products vary depending on whether the formulation is an amine or an ester. The ester formulations are moderately to highly toxic to freshwater fish and invertebrates; the amine formulations are slightly toxic to practically non-toxic to freshwater fish and invertebrates.

2,4-D does not accumulate at significant levels in fish tissues. Although fish exposed to 2,4-D may take up very small amounts of its breakdown products to then be metabolized, most of these products are rapidly excreted in urine.

On a short-term exposure basis, 2,4-D is practically non-toxic to honeybees and slightly to moderately toxic to birds and mammals.

As with all chemical herbicide applications it is very important to read and follow all label instructions to prevent adverse environmental impacts.

Human Health

Adverse health effects are possible after short- and long-term exposure to 2,4-D. It can cause irreversible eye damage and is harmful if swallowed, inhaled or absorbed through the skin. Wear proper personal protective equipment and follow label instructions while handling. In its consideration of exposure risks, the U.S. EPA believes no significant risks will occur to recreational users of water treated with 2,4-D.

There is not a clear link between exposure to 2,4-D and elevated cancer risk. The U.S. EPA has determined that there is not sufficient evidence to classify 2,4-D as a human carcinogen.

For Additional Information

U.S. Environmental Protection Agency (EPA)
Office of Pesticide Programs
epa.gov/pesticides

Wisconsin Department of Agriculture, Trade,
and Consumer Protection
datcp.wi.gov/Pages/Programs_Services/ACMOOverview.aspx

Wisconsin Department of Natural Resources
608-266-2621
dnr.wi.gov/lakes/plants

Wisconsin Department of Health Services
dhs.wisconsin.gov

National Pesticide Information Center
1-800-858-7378
npic.orst.edu

