

# DIQUAT CHEMICAL FACT SHEET

## Formulations

Diquat (or diquat dibromide) initially received Federal registration for control of submersed and floating aquatic plants in 1962. It was initially registered with the U.S. EPA in 1986, evaluated for reregistration in 1995, and is currently under registration review. An interim registration review decision was released in 2019. The active ingredient is 6,7-dihydrodipyrdo[1,2- $\alpha$ :2',1'-c] pyrazinedium dibromide. 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 Reward®, Harvester®, Littora® and Tribune™.\*

## Aquatic Use and Considerations

Diquat is a fast-acting contact herbicide (i.e., it affects plant cells on contact and does not move throughout the plant tissue). It is a WSSA Group 22 herbicide, meaning the mechanism of action is by PS I Electron diversion, which destroys cell membranes and chlorophyll, and interferes with photosynthesis. It is a non-selective herbicide and will affect a wide variety of plants. Following treatment, plant tissues will become visibly impacted within several hours after application and will begin to decompose within one to three days.

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 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

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

management strategies as part of any long-term control program.

Diquat is strongly attracted to silt and clay particles in the water and may not be very effective under highly turbid water conditions or where plants are covered with silt. Because diquat is a fast-acting herbicide, it is oftentimes used for managing plants growing in areas where water exchange is anticipated to limit herbicide exposure times, such as localized treatments. Due to rapid vegetation decomposition after treatment, only partial treatments (one-half to one-third of the surface area of a waterbody) should be conducted to minimize dissolved oxygen depletion and associated negative impacts on fish and other aquatic organisms. Untreated areas can be treated with diquat 14 days after the first application.

Diquat is labeled to control a variety of invasive aquatic plants, including Eurasian watermilfoil (*Myriophyllum spicatum*), curly-leaf pondweed (*Potamogeton crispus*) and flowering rush (*Butomus umbellatus*). Native species that are labeled as susceptible to diquat include coontail (*Ceratophyllum demersum*), common waterweed (*Elodea canadensis*), bladderworts (*Utricularia* spp.), pondweeds (*Potamogeton* spp.), watermilfoils (*Myriophyllum* spp.), sago pondweed (*Stuckenia pectinata*), naiads (*Najas* spp.) and duckweeds (*Lemna* spp.).†

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

## Post-Treatment Water Use Restrictions

There are no restrictions on swimming or fishing from water bodies treated with diquat. Treated water should not be used for drinking water for one to three days, depending on application rate. However, in one peer-reviewed study, diquat persisted in the water at levels above the EPA drinking water standard for at least three days after treatment, suggesting that the current drinking water restriction may not be sufficient under all application scenarios. Do not use treated water for pet or livestock drinking water for one day following treatment. The irrigation restriction for food crops is five days, and for ornamental plants or lawn/turf it varies from one to three days depending on application rate.<sup>†</sup>

## Herbicide Degradation, Persistence and Trace Contaminants

Diquat binds indefinitely to organic matter, allowing it to accumulate and persist in the sediments over time. It has a long half-life (the time it takes for half of the active ingredient to degrade) in sediment because of extremely tight soil sorption, as well as an extremely low rate of degradation after association with sediment. Diquat has been detected in the water column from less than a day up towards 38 days after treatment and remains in the water column longer when treating waterbodies with sandy sediments with lower organic matter and clay content. Both breakdown by sunlight (photolysis) and microbial degradation are thought to play minor roles in degradation. Diquat is not known to leach into groundwater due to its very high affinity to bind to soils.

Ethylene dibromide (EDB) is a trace contaminant in diquat products. It originates from the manufacturing process. EDB is a carcinogen, and the EPA has evaluated the health risk of its presence in formulated diquat products. The maximum level of EDB in diquat dibromide is 10 parts per billion, it degrades over time, and it does not persist as an impurity.

## Impacts on Fish and Other Aquatic Organisms

Diquat is slightly to highly toxic to freshwater fish and slightly to very highly toxic to freshwater invertebrates, even at levels below labeled application rates. Diquat is not known to bioaccumulate (the process by which chemicals in the environment or in a food source are taken up by plants or animals) in fish tissues.

## Human Health

The risk of acute exposure to diquat would be primarily to chemical applicators. Diquat causes severe skin and eye irritation and is toxic or fatal if absorbed through the skin, inhaled or swallowed. Wear personal protective equipment and follow label instructions while handling.

The risk to water users of serious health impacts (e.g., birth defects and cancer) is not believed to be significant according to the EPA. Some risk of allergic reactions or skin irritation is present for sensitive individuals.

## For Additional Information

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

Wisconsin Department of Agriculture, Trade, and Consumer Protection  
[datcp.wi.gov/Pages/Programs\\_Services/ACMOView.aspx](http://datcp.wi.gov/Pages/Programs_Services/ACMOView.aspx)

Wisconsin Department of Natural Resources  
608-266-2621  
[dnr.wi.gov/lakes/plants](http://dnr.wi.gov/lakes/plants)

Wisconsin Department of Health Services  
[dhs.wisconsin.gov](http://dhs.wisconsin.gov)

National Pesticide Information Center  
1-800-858-7378  
[npic.orst.edu](http://npic.orst.edu)

