

FLUMIOXAZIN CHEMICAL FACT SHEET

Formulations

Flumioxazin (2-[7-fluoro-3,4-dihydro-3-oxo-4-(2-propynyl)-2H-1,4-benzoxazin-6-yl]-4,5,6,7-tetrahydro-1H-isoindole-1,3(2H)-dione) has been used as an agricultural chemical since 2001 and was conditionally registered with the U.S. EPA for aquatic use in 2010. It is currently under registration review. An interim registration review decision was released in 2021. It is labeled for control of submerged, emergent and floating-leaf plants using direct foliar, surface or subsurface application. It is available in granular and liquid form for aquatic use. Commercial formulations approved for aquatic use in Wisconsin include SureGuard® SC, Propeller™ and Clipper®.*

Aquatic Use and Considerations

Flumioxazin is a broad-spectrum contact herbicide (i.e., it causes damage at the area of contact). It is a WSSA Group 14 herbicide, meaning the mechanism of action is by inhibiting protoporphyrinogen oxidase, which blocks production of heme and chlorophyll. Treated plants will respond quickly to treatment and rapidly decompose. For larger treatments or in dense vegetation, split treatments about two weeks apart are recommended to prevent fish suffocation from low oxygen due to decaying plants. The efficacy is dependent on both light intensity and water pH; herbicide efficacy decreases with increasing pH and decreasing light intensity.

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

Flumioxazin needs to be applied to young plants early in the spring as they begin to grow. It should not be used in very hard-water lakes (pH over 8.5), which are periodically found in southeastern and central Wisconsin. Application in the early morning will increase efficacy, particularly in hard-water lakes. A waterbody should not be treated with flumioxazin if there is an outlet, or in flowing waters such as rivers or streams.

Flumioxazin is labeled to control invasive Eurasian watermilfoil (*Myriophyllum spicatum*) and curly-leaf pondweed (*Potamogeton crispus*)†. Native species that are labeled as susceptible to flumioxazin include coontail (*Ceratophyllum demersum*), native watermilfoil (*Myriophyllum* spp.), naiads (*Najas* spp.), pondweeds (*Potamogeton* spp.), waterlilies (*Nuphar* spp. & *Nymphaea* spp.), duckweeds (*Lemna* spp.), watermeal (*Wolffia* spp.), and sago pondweed (*Stuckenia pectinata*). Some types of filamentous algae may also be controlled.†

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

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

Post-Treatment Water Use Restrictions

There are no post-treatment restrictions on water use for swimming, fishing, or pet/livestock drinking water. There is a five-day restriction on irrigation.†

Herbicide Degradation, Persistence and Trace Contaminants

Flumioxazin is broken down rapidly by water (hydrolysis), light (photolysis), and microbes. The half-life (the time it takes for half of the active ingredient to degrade) is dependent on the pH of the water, and ranges from approximately four days at pH 5 to 18 minutes at pH 9. In most Wisconsin lakes, half-life should be less than a day.

Flumioxazin degrades into APF (6-amino-7-fluoro-4-(2-propynyl)-1,4-benzoxazin-3(2H)-one) and THPA (3,4,5,6-tetrahydrophthalic acid). Flumioxazin has a low potential to leach into groundwater due to the very quick hydrolysis and photolysis. APF and THPA have a high potential to leach through soil and could be persistent.

Impacts on Fish and Other Aquatic Organisms

Flumioxazin is slightly to moderately toxic to freshwater fish on a short-term basis, with possible effects on larval growth below the maximum label rate of 400 parts per billion. Flumioxazin is moderately toxic to freshwater invertebrates, with possible impacts below the maximum label rate. Flumioxazin is practically non-toxic to birds and small mammals on a short-term exposure basis.

The potential for bioaccumulation (the process by which chemicals in the environment or in a food source are taken up by plants or animals) is low since degradation in water is rapid. The metabolites APF and THPA have not been assessed for toxicity or bioaccumulation.

Human Health

Short-term exposure risk is primarily limited to chemical applicators; concentrated flumioxazin can cause some skin and eye irritation and may pose an inhalation risk. Wear proper personal protective equipment and follow label instructions while handling.

Long-term health effect studies indicate that flumioxazin is not carcinogenic. However, flumioxazin may be an endocrine disrupting compound in mammals, as some studies on small mammals observed effects on reproduction and larval development, including reduced offspring viability, malformation in cardiac and skeletal development, and anemia. Flumioxazin does not bioaccumulate long-term in mammals; most of the herbicide is excreted within a week.

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

