

Table 1. Comprehensive list of herbicide chemical names approved for aquatic applications within Ohio and some generalizations regarding effectiveness and use restrictions. See *individual brand labels for details*. Updated by Eugene Braig, Ohio State University Extension, November 2022.

<b>Chemical name<sup>1</sup></b>	<b>Absorption</b>	<b>Selectivity<sup>3</sup></b>	<b>Water-use restrictions<sup>4</sup></b>
<b>Copper</b> (copper sulfate and copper chelates)	Contact	Broad	Minimal
<b>Sodium carbonate peroxyhydrate</b>	Contact	Broad	Minimal
<b>Carfentrazone-ethyl<sup>2</sup></b>	Contact	Broad	Moderate
<b>Diquat dibromide</b>	Contact	Broad	Moderate
<b>Endothall</b> (monoamine or dipotassium salt)	Contact	Broad	Moderate
<b>Flumioxazin</b>	Contact	Broad	Moderate
<b>Glyphosate</b>	Systemic	Broad	Minimal
<b>Imazamox<sup>2</sup></b>	Systemic	Broad	Moderate
<b>Fluridone</b>	Systemic	Selective	Moderate
<b>Topramezone<sup>2</sup></b>	Systemic	Selective	Moderate
<b>Bispyribac<sup>2</sup></b>	Systemic	Selective	Extensive
<b>Florpyrauxifen-benzyl<sup>2</sup></b>	Systemic	Selective	Extensive
<b>Imazapyr</b>	Systemic	Selective	Extensive
<b>Penoxsulam<sup>2</sup></b>	Systemic	Selective	Extensive
<b>Triclopyr</b>	Systemic	Selective	Extensive
<b>2,4-D</b>	Systemic	Selective	Extensive

1. Many listed active ingredients will also be present in products designed for terrestrial applications. Only brands specifically approved and labeled for aquatic applications may be applied to surface waters or their shorelines.
2. New patents, each with only one manufacturer's brand available as of spring 2019.
3. See label of each brand for detail on weed species controlled or partially controlled.
4. Use restrictions may refer to domestic water (including human consumption) and distance to water intakes; swimming; recreational fishing and fish consumption; livestock watering; irrigation of turf, greenhouses/ornamentals, and food crops; aquaculture; etc. Some use restrictions may be very broad (e.g., irrigation) while some can be very specific (e.g., crawfish farming). Those active ingredients described here as "minimal" are restricted for very few use categories or have very brief (or no) periods of restricted time before an intended use can resume. "Moderate" may effect more use categories, have longer waiting periods, or require concentrations of active ingredient fall below a moderate threshold before use resumes. "Extensive" implies effects on several use categories, prolonged periods of non-use, or concentrations of active ingredient that must fall below a very restrictive threshold (sometimes as low as 1 ppb) before use resumes; some are classified as "do not use" on waters intended for some uses. Non-active ingredients (incorporated adjuvants, etc.) can vary among products and may affect use restrictions. Applicators must read and understand any given product's use restrictions prior to application.

Table 2. Comprehensive list of contact herbicide chemical names approved for aquatic applications within Ohio (with a few representative brands) and some generalizations regarding target organisms controlled. *See individual brand labels for details.* (Also, see footnote 3 below.) Updated by Eugene Braig, Ohio State University Extension, November 2022.

- **Carfentrazone-ethyl** (e.g., Stingray): misc. floating and emergent plants.
- **Copper sulfate**<sup>1,2</sup> and **copper chelates**<sup>1,2</sup> (a vast many: e.g., Cutrine brands, Captain XTR, EarthTec, etc.): mostly algae (some submersed).
- **Diquat dibromide**<sup>1,2</sup> (e.g., Reward, Weedtrine-D, Aquastrike [endothall blend], etc.): submersed plants and some filamentous algae.
- **Endothall**<sup>1,2</sup> (e.g., Aquathol brands, Cascade, Hydrothol, Evac Biocide, Aquastrike [diquat blend]): submersed plants and some algae.
- **Flumioxazin**<sup>2</sup> (e.g., Clipper, Pond-Klear, Propeller, Flumigard, etc.): misc. submersed and free-floating plants, especially duckweeds and watermeal.
- **Sodium carbonate peroxyhydrate**<sup>1,2</sup> (e.g., GreenClean, Pak 27, Phycomycin, etc.): near-surface and shallow algae.

1. For additional information, see:

Lynch, W. E. Jr. 2009. Aquatic control of aquatic plants: Agriculture and natural resources fact sheet A-4-09. Ohio State University Extension, Columbus.

2. Term of patent has expired and many brands may be available. Shop competitively, considering product labels for concentration of active ingredient and appropriate application methods.
3. Karmex is no longer approved for aquatic applications. Many long-time pond owners want to apply Karmex to water, and many long-time retailers even still recommend it. *Do not apply Karmex to or near surface water!*

Table 3. Comprehensive list of systemic herbicide chemical names approved for aquatic applications within Ohio (with a few representative brands) and some generalizations regarding target organisms controlled. *See individual brand labels for details.* Updated by Eugene Braig, Ohio State University Extension, November 2022.

- **2,4-D<sup>1,2</sup>** (e.g., AquaKleen, Navigate, Aquacide, Sculpin G, Weedar 64, etc.): specific plant species such as Eurasian watermilfoil, coontail, and limited effectiveness on waterlilies.
- **Bispyribac** (e.g., Tradewind): misc., esp. floating and submersed.
- **Fluridone<sup>1,2</sup>** (e.g., Sonar, Avast, Whitecap, etc.): primarily submersed and some free-floating plants.
- **Glyphosate<sup>1,2</sup>** (e.g., Rodeo, Aquamaster, AquaPro, Shore-Klear, Eraser AQ, etc.): emergent and some floating-leaved plants.
- **Imazamox<sup>1</sup>** (e.g., Clearcast): very broad effectiveness, including several submersed invasives.
- **Imazapyr<sup>1,2</sup>** (e.g., Habitat, Arsenal, Imazapyr E Pro 2, etc.): emergent (esp. grasses) & some floating weeds.
- **Penoxsulam** (e.g., Galleon): emergent and some floating weeds.
- **Florpyrauxifen-benzyl** (e.g., ProcettaCOR EC): select emergent and submerged weeds, especially watermilfoils.
- **Topramezone** (e.g., Oasis): Select submersed, floating, and emergent species including several grasses.
- **Triclopyr<sup>1,2</sup>** (e.g., Renovate, Garlon 3A, Navitrol, Element 3A, Vastlan, etc.): selective effectiveness similar to 2,4-D.

1. For additional information, see:

Lynch, W. E. Jr. 2009. Aquatic control of aquatic plants: Agriculture and natural resources fact sheet A-4-09. Ohio State University Extension, Columbus.

2. Term of patent has expired and many brands may be available. Shop competitively, considering product labels for concentration of active ingredient and appropriate application methods.