

AGRICULTURAL GUIDE

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Weed control

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Aquatic weed control in Missouri

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Aquatic plants are important components of lakes, ponds and streams. Aquatic plants aid in the prevention of erosion along shorelines and are a source of food and shelter for aquatic invertebrates, fish, fowl and game. Algae are the original source of food for nearly all fish and marine animals.

Excessive growth of aquatic weeds not only interferes with fishing and boating but also causes problems with the intended use of ponds, streams, irrigation systems and drainage systems. Excessive weed growth: (1) creates health hazards; (2) interferes with navigation, fishing and other recreational activities; (3) impedes water movement and increases water losses; (4) destroys wildlife habitats; (5) speeds up the rate of silting; (6) causes undesirable odors; and (7) lowers real estate values.

Aquatic weeds can be grouped in several different ways. In this publication, the aquatic weeds are grouped by the following categories: algae, emersed, floating, submersed and marginal (shoreline) weeds.

Algae are green stringy mats, sometimes called "pond scum." Algae are primitive plants without true leaves, stems or roots.

Emersed aquatic weeds are generally rooted in the soil, with part of the plant growing above the water surface. The leaf form may differ for plant portions above and below the water. These plants are seed bearing, persistent and difficult to control.

Floating aquatic weeds are seed-bearing plants that float free on the surface of the water. Others have leaves that float on the surface, connected by long stems to roots in the lake bottom.

Submersed aquatic weeds are rooted in the soil, and the entire plant is under the surface of the water. Some submersed aquatic weeds have flowers that emerge above the water surface.

Marginal aquatic weeds are herbaceous and woody plants that grow around the margins of the water. Marginal aquatic weeds may either grow in the shallow water or along the banks of the shoreline.

Weed control methods

Aquatic weeds are more difficult to control than many other weeds. Less is known about the growth and development of many of the aquatic weeds, and their growth medium is so good that controlling one plant usually assures another will take its place. The general principles involved in aquatic weed control are perhaps more important than in terrestrial weed control.

Aquatic weed control reduces weed density or growth vigor of an aquatic weed population to an acceptable level. Control does not necessarily mean eradication. Cultural and chemical methods can control aquatic weeds.

Cultural control

Cultural control methods include: (1) prevention; (2) competition for light; (3) habitat alteration; (4) mechanical control; and (5) biological control.

Prevention is an important method of weed control that receives too little attention. Aquatic weeds are often unintentionally introduced into a body of water by the transport of boats from one lake, stream or river to another. Pond owners should try to avoid introducing an aquatic weed into a body of water.

Proper pond construction aids in aquatic weed control by preventing many rooted plants from becoming established. Keep the edges of the pond steep and deep (more than 3 feet deep), and keep a well-maintained ground cover around the pond. Pollution from barnyard drainage and septic tank fields encourages weed growth, so keep it away from the ponds.

Weed control via **light competition** occurs with adequate fertilization. This practice produces millions of tiny plants (phytoplankton) and animals (zooplankton), giving the water a cloudy appearance (bloom). The bloom prevents submersed aquatic weeds from receiving adequate light for growth and devel-

List of herbicides, formulations and manufacturers

Trade name	Common name	Formulation	Manufacturer
Aqua-Kleen (various)	2,4-D	27.6 G (Several)	Union Carbide (various)
Aquathol	endothall	101.1 G	Pennwalt
Aquathol-K	endothall	3 lb/gal	Pennwalt
Hydrothol 191	endothall	2 lb/gal	Pennwalt
Aquazine	simazine	80% WP	Ciba-Geigy
Casoron	dichlobenil	10 G	UniRoyal
Copper Sulfate (various)	copper sulfate		Several
Diquat	diquat	2 lb/gal	Chevron
Krenite	fosamine	4 lb/gal	DuPont
Rodeo	glyphosate	4 lb/gal	Monsanto
Roundup	glyphosate	3 lb/gal	Monsanto
Sonar	fluridone	4 lb/gal or 5 P	Elanco

opment. The degree of bloom required to produce effective shading, however, may be unacceptable to pond owners.

Habitat alteration. Lowering the water level in a pond or ditch, which exposes submerged leaves and stems to the sun and air, is an effective means of control. Exposure to freezing and thawing cycles during the winter kills underground rhizomes of aquatic weeds such as Eurasian watermilfoil and waterlilies. The degree of control depends upon the severity of the winter.

Mechanical weed control includes mowing, hand pulling and dredging. Mowing effectively controls weeds along ditch banks. Submerged, motor-driven weed cutters control some plants. Hand pulling weeds is a practical way to control light infestations. Dredg-

ing can be expensive because equipment is expensive and labor requirements are high.

Biological control. Aquatic weeds have been controlled by several species of herbivorous fish. Grass carp (white amur) have been tested in various parts of the United States, but their use is not legal in all states. Grass carp (*Ctenopharyngodon idella*) is an Asian member of the minnow family and is recommended in Missouri. Grass carp pose less risk of oxygen depletion and require only a one-time cost as opposed to annual expenditures for chemical applications. Grass carp do not muddy the water as do common carp. They are capable of eating two to three times their weight in plants each day and may gain 5 to 10 pounds in a year.

For more general information on cultural control of aquatic weeds, refer to *Aquatic Plant Management in Missouri* by Lawrence C. Belusz, published by the Missouri Department of Conservation.

Chemical control

Herbicides can effectively control aquatic weeds. The pond owner must, however, positively identify the weed species, accurately identify the area to be treated, know how much chemical to apply and know when to apply it.

Several herbicides are available for aquatic weed control. When herbicides are handled properly, the majority of aquatic weeds can be controlled without posing any hazard to the fish population. When using herbicides for aquatic weed control, remember, (1) The final authority on proper use of a herbicide is the product label, and (2) Always follow all label directions and warnings.

To obtain efficient economical chemical control it is most important to properly identify the weed or weeds to be controlled. Herbicides are specific for certain species. Pond owners must also determine the appropriate herbicide, recommended rate, time of application, proper weed growth stage and the area or amount of water to be treated. Herbicides are most effective when applied to young, actively growing weeds. Mature plants are usually more difficult to control.

Some aquatic herbicides should not be distributed over the entire area infested with weeds. Herbicide treatment of dense weed areas that cover an entire pond may result in oxygen loss from decomposition of dead weeds. This loss can kill fish through suffocation. To avoid fish loss, treat only one-third to one-half of the dense weed areas at a time. Always consult herbicide labels before applying herbicides and follow all guidelines and precautions.

Some herbicides adhere to soil particles and become deactivated. Avoid creating muddy water during application, and do not apply when it is windy

or there are waves on the pond. Do not apply these herbicides to plants covered with mud deposits.

Calibration

Accurate calculations are important when determining herbicide use rates for aquatic weed control. Correct herbicide application is important to achieve desirable control.

Acre-feet (A ft). Acre feet of water is determined by multiplying the surface area of the pond (in acres) by the average depth in feet. Surface area of the pond is determined by multiplying the length by the width.

$$\text{Acre-feet of water} = \frac{\text{Surface area (Acres)}}{43560} \times \text{Average depth in feet}$$

Calculations for amount of herbicide needed on basis of parts per million by weight (ppmw).

Ditch or Canal

$$W = A \times L \times C \times 0.0000623$$

W = pounds of active ingredient needed

A = cross section area of channel in square feet

L = length of channel in feet

C = desired concentration of herbicide in ppmw

Pond or Lake

$$W = A \times D \times C \times 2.71$$

W = pounds of active ingredient needed

A = area of water surface in acres

D = average depth in feet

C = desired concentration of herbicide in ppmw

Use this guide when selecting and comparing herbicides. The herbicide user should always carefully read and follow the label directions and precautions. The University of Missouri does not warrant commercial products and regrets any errors or omissions in this guide.

Aquatic weeds

Guide to weed response to herbicides

Weed	Aqua Kleen (2,4,-D, various)	Aquathol Aquathol K	Aquazine	Casoron	Copper Sulfate (various)	Diquat	Hydrothol 191	Krenite	Rodeo	Roundup	Sonar	Grass Carp
<i>Algae</i>												
Chara	N	R**	H	H	H	R**	R	N	N	N	N	H
Filamentous algae	N	R**	H	N	H	N	R	N	N	N	N	H
Nitella	N	R**	H	H**	H	R**	N	N	N	N	N	H
Plankton (microscopic)	N	R**	H	N	H	N	R	N	N	N	N	H
<i>Emerged weeds</i>												
Alligatorweed*	R**	N	N	N	N	N	N	N	R****	R	N	R
American lotus	H**	R**	N	H**	N	N	N	N	R	-	R	N
Parrot feather	H**	H**	N	N	N	H**	N	N	N	-	N	H
Pickerelweed	R**	N	N	N	N	N	N	N	R**	-	N	N
Slender spikerush	N	N	N	N	N	R**	N	N	-	-	R	N
Waterlilies	H	R**	N	H**	N	N	N	N	R**	-	R	N
Water pennywort	N	R**	N	N	N	H	N	N	R**	-	N	N
Water primrose	H	N	N	N	N	N	N	N	-	-	R	R
Watershield	H	R**	N	H**	N	N	N	N	-	-	N	R
<i>Floating weeds</i>												
Duckweeds	R**	N	H	N	N	H	N	N	R**	-	R	R
Frogbit	H**	N	N	N	N	H**	N	N	R**	-	N	N
Spatterdock	N	N	N	N	N	N	N	N	R	-	N	N
Water hyacinth	H**	N	N	N	N	H	N	N	R	-	N	N

Weed	Aqua Kleen (2,4,-D, various)	Aquathol Aquathol K	Aquazine	Casoron	Copper Sulfate (various)	Diquat	Hydrothol 191	Krenite	Rodeo	Roundup	Sonar	Grass Carp
<i>Submersed weeds</i>												
Broadleaf watermilfoil	N	H	H	H	N	H	-	N	N	N	R	H
Coontail	R**	R	R	R	N	R	-	N	N	N	R	H
Elodea	N	N	N	H	N	H	-	N	N	N	R	H
Eurasian watermilfoil	H**	H	R	N	N	H	-	N	N	N	R	H
Fanwort	N	H**	R**	N	N	N	-	N	N	N	R	H
Hydrilla	N	R***	N	N	N	R**	-	N	N	N	R	H
Naiads	N	H**	H	H	N	H	-	N	N	N	R	H
Pondweeds (Potamogeton)	N	H	H	H	N	R	-	N	N	N	R	H
<i>Marginal (shoreline) weeds</i>												
Arrowhead	H**	R**	N	N	N	R**	N	N	-	-	N	N
Buttonbush	H**	N	N	N	N	N	N	N	-	-	N	N
Cattail	R**	N	N	N	N	R	N	N	R	R	N	N
Sedges and rushes	H**	N	N	N	N	N	N	N	-	-	N	N
Smartweed	H**	R**	N	N	N	N	N	N	R	R	N	N
Willows	H**	N	N	N	N	N	N	R	R	R	N	N

Rating Scale: H = Highly recommended; R = Recommended; N = Not recommended

*Chemical treatment may not be necessary if specific biocontrol insects—the alligatorweed flea beetle (*Agasicles hygrophila*) or stemborer moth (*Vogtia malloi*)—are present. These insects may not provide control in areas adjacent to fields subject to heavy insecticide usage, such as cotton fields. Contact a qualified entomologist for positive identification.

**Not labeled. This research data is presented for informational purposes only. Use of this herbicide for control of this weed is at the user's discretion. Performance is not warranted by the manufacturer or the University of Missouri.

***Aquathol K only

****Partial control only

Herbicide rate table for aquatic weed control

Herbicide	Formulated material per broadcast acre	Pounds active chemical per broadcast acre	Weeds controlled	Precautions and restrictions for aquatic herbicides ¹	Method of application
Grass carp (white amur)			Most aquatic weeds except very fibrous, tough species such as water hyacinth.		8 to 10 8-inch fish per surface acre. Stock anytime fish are available.
Algae					
Aquazine 80% WP	1.7 to 3.4 lb/A ft	1.4 to 2.7 lb/A ft	Microscopic, filamentous algae, chara	Do not treat ponds that have bordering trees with roots visibly extended into the water, because injury to these trees may occur. Fish taken from treated water may be used for human consumption. S = 4 hours after application. A.S., D, I or L = 12 months following treatment.	Refer to label for the specific rate on weed to be controlled. Treat ponds after seasonal flow has ceased and early in the weed growth period before they reach the surface of the water. Apply Aquazine before water temperature exceeds 75 degrees F. Aquazine can be used as a whole pond treatment. Determine amount of Aquazine needed to treat pond. Slurry a convenient amount in a bucket and toss into water from shoreline at several points around pond. Uniform distribution is not necessary because the material will become distributed in the water over time. May kill shoreline trees.
Copper sulfate			Microscopic, filamentous algae, chara	No restrictions on treated water. May be used immediately for F, I and S. May be toxic to fish in soft water. Do not exceed 4 ppm in potable water.	Early spring treatment prior to formation of matted growth. Repeat as needed. Apply under water or on surface. If algae is abundant, treat 1/3 of body of water at a time with 10 days between treatments. Catfish are not very tolerant to copper. Always leave untreated areas for fish to move into.
Hydrothol 191	0.6 to 2.2 pt/A ft (0.05 to 0.2 ppm)	0.15 to 0.55 lb/A ft	Microscopic, filamentous algae, chara	Avoid contact or drift to other crops or plants, as injury may result. A.S., D, I, or L = 7 to 25 days after treatment (Refer to Label). F = 3 days of treatments.	Early spring treatment prior to formation of matted growth. Repeat as needed. Hydrothol liquid is recommended for use only by commercial applicators. Apply so as to get uniform coverage. Fish will be killed by dosages in excess of 0.3 ppm. Details on label.

¹A.S. = agricultural use; D = domestic use; F = fishing; I = irrigation; L = livestock; S = swimming.

²These precautions listed are for Union Carbide's Aqua Kleen. Other 2,4-D formulations may not be registered for aquatic weed control. Read the label thoroughly before buying or using any aquatic herbicide.

Herbicide	Formulated material per broadcast acre	Pounds active chemical per broadcast acre	Weeds controlled	Precautions and restrictions for aquatic herbicides ¹	Method of application
<i>Emerged weeds</i>					
Aqua Kleen (2,4-D) ²	100 to 200 lb/A	27.6 to 55.2 lb/A	Waterlilies, spatterdock	Avoid contact with skin, eyes or clothing. Clean application equipment thoroughly before using it for any other purpose. Vapor from this product may injure susceptible plants in the immediate vicinity. Avoid drift of dust to susceptible plants. Do not apply to water used for A.S., D, I, or watering dairy animals. Do not use in or near a greenhouse. Avoid Drift.	Apply in spring or early summer, during time weeds start to grow. Refer to label for second application. Distribute evenly over infested area.
2,4-D LV esters	1 to 2.4 qt/A of 4 lb/gal 2,4-D	1 to 2.4 lb/A	Arrowhead, lotus, parrot feather, smartweed, water lilies, water primrose	Avoid Drift.	Apply when plants are actively growing. Spray at 100 gal/A in water with surfactant or in 1:20 oil/water emulsion.
2,4-D granules	20 to 40 lb of 10% granules 10 to 20 lb of 20% granules	2 to 4 lb/A	Arrowhead, lotus, parrot feather, smartweed, waterlilies, water primrose	Avoid Drift.	Apply when plants are actively growing. Distribute so as to get uniform coverage.
Rodeo (glyphosate)	4 to 6 pt/A	2 to 3 lb/A	Alligatorweed, American lotus, water primrose	Do not apply within 0.5 mile upstream of potable water intakes. Do not apply this product on rice levees when flood water is present. Where emerged infestations require treatment of the total surface area of impounded water, treating the area in strips may avoid oxygen depletion due to decaying vegetation. Oxygen depletion may result in fish kill. Avoid Drift. There is no restriction on the use of water for D, I, or S.	Apply to actively growing weeds. Add ½% nonionic surfactant (2 qts/100 gal water). For emerged weeds only. May need to repeat application. May not control weeds with the majority of the leaf area submerged.
Sonar	0.5 to 4 qt/surface A of 4 lb/gal or 10 to 80 lb/surface A of 5 P Refer to label	0.5 to 4 lb/A Refer to label	Common duckweed, creeping water primrose, spatterdock, water purslane, waterlily	Do not apply in tidewater or brackish water. Do not apply in crayfish farm water. Trees and shrubs growing in water treated with Sonar may be injured. Do not apply Sonar within 0.25 mile (1,320 feet) of any potable water intake. There are no label restrictions against F or S in water treated with Sonar.	Can be applied to entire surface area of a pond. In lakes and reservoirs, Sonar should be applied to areas greater than 5 acres to prevent dilution with untreated water. Takes 30-90 days to see results. Refer to label for rates for specific water depths.

Herbicide rate table, continued

Herbicide	Formulated material per broadcast acre	Pounds active chemical per broadcast acre	Weeds controlled	Precautions and restrictions for aquatic herbicides ¹	Method of application
<i>Floating weeds</i>					
2,4-D amine or LV esters	1 to 2.4 qt/A of 4 lb/gal	1 to 2.4 lb/A	Duckweeds, frogbit, water hyacinth	Avoid drift.	Apply as coarse spray when weeds are actively growing and when good coverage of foliage can be obtained. Aqueous spray with wetting agent at 100 gal/A. Spray at low pressure with large nozzle tips. For duckweed use ester in 20 gal/A of fuel oil. Do not treat more than ½ lake or pond at one time to avoid oxygen depletion and fish kill.
Diquat	1 gal/A	2 lb/A	Duckweeds, water hyacinth	Treatment of dense weed areas can result in oxygen loss from decomposition of dead weeds. This loss can cause fish suffocation. Therefore, treat only ⅓ to ½ of the dense weed areas at a time and wait 14 days between treatments. Do not use treated water for A.S., I, or L within 14 days after treatment. Do not apply to muddy water. Avoid creating muddy water during application. Do not apply under conditions of high wind and wave action. Do not use dirty or muddy water for Diquat dilution because Diquat will be inactivated.	Do not apply directly to water except as specified on label. Spray or inject liquid-water mix into infested area. The mix can be used as a spot treatment. Consult state fish and game agencies before applying this product to public waters.
Rodeo (glyphosate)	1.5 to 7.5 pt/A or ¾ to 1.5% solution	0.75 to 3.75 lb/A	Duckweeds, frogbit, spatterdock, water hyacinth	Do not apply within 0.5 mile upstream of potable water intakes. Do not apply this product on rice levees when flood water is present. Where emerged infestations require treatment of the total surface area of impounded water, treating the area in strips may avoid oxygen depletion due to decaying vegetation. Oxygen depletion may result in fish kill. Avoid drift. There is no restriction on the use of water for D, I, or S.	Apply to actively growing weeds. Add ½% nonionic surfactant (2 qts/100 gal water). For emerged weeds only. May need to repeat application. May not control weeds with the majority of the leaf area submerged.

Herbicide	Formulated material per broadcast acre	Pounds active chemical per broadcast acre	Weeds controlled	Precautions and restrictions for aquatic herbicides ¹	Method of application
Submersed weeds					
Aqua Kleen (2,4-D) ²	100 to 200 lb/A	27.6 to 55.2 lb/A	Coontail, Eurasian watermilfoil	Avoid contact with skin, eyes or clothing. Clean application equipment thoroughly before using it for any other purpose. Vapor from this product may injure susceptible plants in the immediate vicinity. Avoid drift of dust to susceptible plants. Do not apply to water used for A.S., D, I, or watering dairy animals. Do not use in or near a greenhouse. Avoid drift.	Apply in spring or early summer, during time weeds start to grow. Refer to label for second application. Distribute evenly over infested area.
Aquathol 10.1 G or Aquathol K (Liquid)	Refer to label. Rate depends upon water depth and area.	Refer to label.	All rooted species, coontail and pondweeds	Avoid contact or drift to other crops or plants, because injury may result. A.S., D, I, or L = 7 to 25 days after treatment (refer to label). F = 3 days of treatment. S = 24 hours after treatment.	Apply when weeds are actively growing. Refer to label.
Aquazine	3.4 to 8.5 lb/A ft	2.7 to 6.8 lb/A ft	Coontail, fanwort, naiad, pondweeds and watermilfoil	Do not treat ponds that have bordering trees with roots visibly extended into the water, because injury to these trees may occur. Fish taken from treated water may be used for human consumption. S = 4 hours after application. A.S., D, I, or L = 12 months following treatment.	Refer to label for the specific rate for weed to be controlled. Treat ponds after seasonal flow has ceased and early in the weed growth period before they reach the surface of the water. Apply Aquazine before water temperature exceeds 75 degrees F. Determine amount of Aquazine needed to treat pond. Slurry a convenient amount in a bucket and toss into water from shoreline at several points around pond. Aquazine can be used as a whole pond treatment. Uniform distribution is not necessary because the material will become distributed in the water over time. May kill shoreline trees.

¹A.S. = agricultural use; D = domestic use; F = fishing; I = irrigation; L = livestock; S = swimming.

²These precautions listed are for Union Carbide's Aqua Kleen. Other 2,4-D formulations may not be registered for aquatic weed control. Read the label thoroughly before buying or using any aquatic herbicide.

Herbicide rate table, continued

Herbicide	Formulated material per broadcast acre	Pounds active chemical per broadcast acre	Weeds controlled	Precautions and restrictions for aquatic herbicides ¹	Method of application
Casoron 10G	50 to 75 lb/ surface acre	5 to 7.5 lb/A	Broadleaf watermilfoil, chara, coontail, elodea, naiads, pondweeds	Do not contaminate water by cleaning equipment or disposal of wastes. Consult state fish game department before applying Casoron 10G to public waters. Do not apply directly to any body of water, except as specified on label. Do not apply to water that will be used for D, I, L. F = 90 days. Do not apply to commercial fish or shellfish water.	Spot treatment of small infestations or for use around docks. Apply in early spring either to exposed pond bottoms or through the water. This product is not selective and may destroy all types of vegetation. Apply only to areas where complete plant control is desired. Do not apply to areas on slope above lawns or susceptible crops because run-off water from treated area could cause injury.
Diquat	1 to 2 gal/ surface A	2 to 4 lb/ surface A	Coontail, elodea, naiad, pondweeds, watermilfoil	Treatment of dense weed areas can result in oxygen loss from decomposition of dead weeds. This loss can cause fish suffocation. Treat only 1/3 to 1/2 of the dense weed areas at a time and wait 14 days between treatments. Consult state fish and game agencies before applying this product to public waters. Do not use treated water for A.S., I, or L within 14 days after treatment. Do not apply to muddy water. Avoid creating muddy water during application. Do not apply under conditions of high wind and wave action. Do not apply to plants covered with mud deposits. Do not use dirty or muddy water for Diquat dilution, because Diquat will be inactivated.	Do not apply directly to water except as specified on label. Spray or inject liquid-water mix into infested area. The mix can be used as a spot treatment.
Sonar	0.5 to 4 qt/ surface A of 4 lb/gal or 10 to 80 lb/A of 5P	0.5 to 4 lb/A	Coontail, watermilfoil, pondweeds	Do not apply in tidewater or brackish water. Do not apply in crayfish farm water. Trees and shrubs growing in water treated with Sonar may be injured. Do not apply Sonar within 0.25 mile (1,320 feet) of any potable water intake. There are no label restrictions against F or S in water treated with Sonar.	Can be applied to entire surface area of ponds. In lakes and reservoirs, Sonar should be applied to areas greater than 5 acres to prevent dilution with untreated water. Takes 30-90 days to see results. Refer to label for rates for specific water depths.

Herbicide	Formulated material per broadcast acre	Pounds active chemical per broadcast acre	Weeds controlled	Precautions and restrictions for aquatic herbicides ¹	Method of application
<i>Marginal (shoreline) weeds</i>					
Diquat	1 gal/100 gal water		Cattails	Treatment of dense weed areas can result in oxygen loss from decomposition of dead weeds. This loss can cause fish suffocation. Treat only 1/3 to 1/2 of the dense weed areas at a time and wait 14 days between treatments. Consult state fish and game agencies before applying this product to public waters. Do not use treated water for A.S., I, or L within 14 days after treatment. Do not apply to muddy water. Avoid creating muddy water during application. Do not apply under conditions of high wind and wave action. Do not apply to plants covered with mud deposits. Do not use dirty or muddy water for Diquat dilution because Diquat will be inactivated.	Do not apply under conditions of high wind and wave action. Do not apply where plants are covered with mud deposits. Consult state fish and game agencies before applying this product to public waters.
2,4-D LV esters	1 to 2.4 qt/A of 4 lb/gal 2,4-D	1 to 2.4 lb/A	Arrowhead, smartweed, waterlilies, parrot feather	Avoid drift.	Apply to actively growing plants. Spray at 100 gal/A in water with a surfactant or in 1:20 oil water emulsion.
2,4-D granules	20 to 40 lb of 10% granules or 10 to 20 lb of 20% granules	2 to 4 lb/A	Arrowhead, smartweed, waterlilies, parrot feather	Avoid drift.	Distribute so as to get uniform coverage.
Krenite	1.5 to 6 gal/A	6 to 24 lb/A	Willows	Do not apply directly to water. Do not allow drift or spray mist to contact desirable trees, shrubs or other plants, because injury may result. Keep from contact with fertilizers, fungicides and seeds. Avoid drift.	Refer to label for specific rates and timing.

¹A.S. = agricultural use; D = domestic use; F = fishing; I = irrigation; L = livestock; S = swimming.

²These precautions listed are for Union Carbide's Aqua Kleen. Other 2,4-D formulations may not be registered for aquatic weed control. Read the label thoroughly before buying or using any aquatic herbicide.

Herbicide rate table, continued

Herbicide	Formulated material per broadcast acre	Pounds active chemical per broadcast acre	Weeds controlled	Precautions and restrictions for aquatic herbicides ¹	Method of application
Rodeo	4.5 to 7.5 pt/A	2.25 to 3.75 lb/A	Cattail, smartweed, willows, perennial grasses and broadleaf weeds	Do not apply within 0.5 mile upstream of potable water intakes. Do not apply this product on rice levees when flood water is present. Where emerged infestations require treatment of the total surface area of impounded water, treating the area in strips may avoid oxygen depletion due to decaying vegetation. Oxygen depletion may result in fish kill. Avoid drift. There is no restriction on the use of water for D, I, or S.	Apply to actively growing weeds. Add ½% nonionic surfactant (2 qts/100 gal water). For emerged weeds only. May need to repeat application. May not control weeds with the majority of the leaf area submerged.
Roundup	3 to 5 qt/A	2.25 to 3.75 lb/A	Cattail, willows. Most annual and perennial grass and broadleaf weeds		Apply when plants are actively growing and when canals or ditches are not carrying water or after final drawdown in irrigation system. Better control of weeds near maturity. See label for details.

All herbicides

Always read label thoroughly.

¹A.S. = agricultural use; D = domestic use; F = fishing; I = irrigation; L = livestock; S = swimming.

²These precautions listed are for Union Carbide's Aqua Kleen. Other 2,4-D formulations may not be registered for aquatic weed control. Read the label thoroughly before buying or using any aquatic herbicide.

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