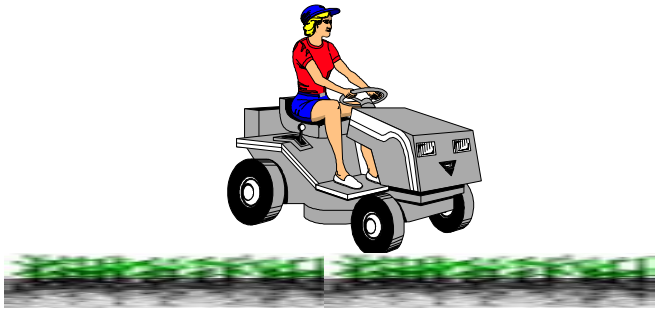
EC 699

CLEMSON UNIVERSITY

2004 Pest Control Guidelines for Professional Turfgrass Managers

This publication funded by the South Carolina Turfgrass Foundation as a benefit for its members

Irrigation Water Supplies



2004 Clemson University Pest Control Guidelines for Professional Turfgrass Managers

Compiled and Edited by Dr. Bert McCarty
Clemson University Turf Specialist

This guide supplies information on pesticides used for controlling pests in turfgrasses. Use pesticides safely to protect against human injury and harm to the environment. Diagnose your pest problem; select the proper pesticide, if one is needed; follow the label directions; and obey all federal, state, and local pesticide laws and regulations. Because of environmental risks, including water quality and wildlife toxicity and similar concerns, and risks of handling, some pesticides are classified as "RESTRICTED USE PESTICIDES". Such products bear this designation on their label and can be purchased and applied only by certified applicators. All other pesticides, classified as "GENERAL USE PESTICIDES", can be purchased and applied by anyone. This guide is also available on the world wide web at: http://hubcap.clemson.edu/scafrs/hort/index.htm

Use of brand names does not imply endorsement of the products or criticism of similar ones not mentioned, but are used herein for convenience only. Mention of a proprietary product does not constitute a guarantee or warranty of the product by the authors.

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Poison Centers (anywhere): 1-800-222-1222

CHEMTREC: 1-800-424-9300; http://www.chemtrec.com/

Provides emergency medical assistance for acute exposure to chemical and information on how to handle spills;

National Pesticide Information Center: 1-800-858-7378

For a pesticide chemical emergency or for any pesticide information, call NPIC toll free, day or night

South Carolina Cooperative Extension Service, Clemson University
www.clemson.edu/turfornamental/

CLEMSON UNIVERSITY TURFGRASS PUBLICATION ORDER INFORMATION

Designing and Maintaining Bermudagrass Sports Fields in the United States - EC 698

Weeds of Southern Turfgrasses - EB 150

Diseases of Turfgrasses in the Southeast - EB 146

Pest Management Handbook (vol. 2), Turfgrass and Ornamentals - EC 695

Sod Production in the Southern United States - EC 702

Southern Lawns - EC 707

Make check or money order payable to the **Clemson University** or for credit card orders call 864-656-3261 during weekday office hours or order on-line at: **http://virtual.clemson.edu/groups/agcomm/pubs/pages/pubs.htm**

Send with this order form to: **Clemson University Cooperative Extension Service**
Bulletin Room, Room 82
Poole Agricultural Center
Clemson, SC 29634-0311
864-656-3261

Other Turfgrass Publications

Common Turfgrass Weeds - 84 slide set with narrative of the most common weeds in golf courses, home lawns, sports fields, & roadsides.

Sports Field Construction - 70 slide set with narrative on designing, constructing, and maintaining all levels of sports fields including baseball, football, and soccer. These slide set are available from: CSSA Headquarters Office, Attn: Book Order Dept., 677 South Segoe Road, Madison, WI 53711-1086, http://www.crops.org

BOOKS

Best Golf Course Management Practices — A complete text covering all agronomic practices which provide an environmentally friendly managed golf course with minimum fertilizer and pesticide inputs. Order from www.prenhall.com; Amazon.com; or BarnesandNoble.com. **ISBN 0-13-088359-X.**

Color Atlas of Turfgrass Weeds — A complete text covering all major weeds occurring in Turfgrass and Ornamentals. Included are detailed biology, reproductive means, distribution ranges and control recommendations. **ISBN 1-57504-142-1.**

Managing Bermudagrass Turf — A complete text concerning Bermudagrass Turf, especially golf greens .**ISBN 1-57504-163-4.** Order these two from GCSAA.com; Amazon.com; or BarnesandNoble.com.

POISON CENTERS

Robert G. Bellinger, PhD
Extension Pesticide Coordinator

Palmetto Poison Center, College of Pharmacy, University of South Carolina, Columbia, SC 29208

Emergency - anywhere:	**1-800-222-1222**	**Georgia:**	**1-800-282-5846**
Emergency - SC state-wide:	**1-800-922-1117**	**North Carolina:**	**1-800-848-6946**
Emergency - Columbia:	**803-777-1117**		
Business number:	**803-777-7909**		

If victim has collapsed or is not breathing, call 911.

National Pesticide Information Center (NPIC): 1-800-858-7378

For a pesticide chemical emergency or for any pesticide information.
E-mail: nptn@ace.orst.edu World Wide Web: http://hpc.orst.edu/

For larger pesticide spills, call CHEMTREC: 1-800-424-9300

Chemical Transportation Emergency Center (English and Spanish); http://www.chemtrec.com/

For small pesticide spills: call the manufacturer (see the product label), or the NPIC at 1-800-858-7378

Application Date: _____

PESTICIDE APPLICATION RECORD

Company Name _____ Commercial Applicator _____ License Number_____

Pesticide License Category _____ Trade Name _____ Active Ingredient & Formulation _____

% Active Concentration _____ Manufacturer _____ Lot No. _____ EPA Registration No._____

Restricted-entry Interval (REI) _____ Safety Equipment Needed/Worn _____

APPLICATION INFORMATION

Application Start Time _____ Treated Site Location _____ Type of Area Treated _____

Target Pest(s)_____ Total Treated Area _____ Application Rate (e.g., per acre or per 1000 sq. ft.) _____

Timing _____ Amount of Pesticide Product Mixed _____ Per _____ Gallons of Water: Gallon Per Acre (GPA)_____

Additives (Surfactant/Wetting Agent/Crop Oil, etc.) _____ Rate _____

WEATHER CONDITIONS

Air Temperature (°F)_____ Relative Humidity (%)_____ Dew Present (Y/N)_____ Initial Wind Velocity (MPH)_____

Wind Direction _____; First Hour_____; Second Hour_____; Third Hour_____; Soil Temperature at 4 inches (F)_____

Soil Moisture___ Cloud Cover (%)_____ Rainfall/Irrigation after application (date/time/amount) _____

APPLICATION EQUIPMENT

Method of Application _____ Speed (mph)_____ Motor Speed (RPM)_____ Nozzle Type_____Number _____

Nozzle Height_____ Spacing_____ Boom Width_____ Spray Pressure (PSI)_____

Nontarget Plant, Animal, or Human Exposure: Yes __ No____ (If yes, identify and list corrective or emergency action taken) _____

Other Comments:

Signature_____ **Date**_____

AQUATIC WEED CONTROL IN IRRIGATION WATER SUPPLIES

Jack M. Whetstone
Department of Forestry and Natural Resources

Aquatic weeds in ponds or lakes used as sources for irrigation water can be controlled by physical removal, biological control, or herbicides. The method, or combination of methods, used will depend on factors such as target weeds, non target plants, and what the water is used to irrigate. Physical removal can be accomplished manually or with machinery. It is time consuming, expensive and normally used alone if other methods are not feasible. However, a certain amount of physical removal may be necessary in combination with the use of biological control and herbicides.

Biological control is an option for certain aquatic weeds. The major advantages are ease of application and no concern over damage to plants irrigated with treated water. Triploid grass carp can control many submerged vascular aquatic weeds. Grass carp are usually used to control all vegetation in a pond, rather than selectively controlling certain vegetation. Replacement stocking of grass carp is necessary when fish are lost. A permit is required to stock grass carp, and only triploid fish can be legally used in SC. Tilapia are stocked in the spring and control most algae species. The concern with tilapia is that they are tropical animals and usually die during cold winters thereby requiring an annual stocking. Tilapia are legal for use in SC. The South Carolina Department of Natural Resources (SC DNR) now requires a free of charge permit prior to stocking tilapia and triploid grass carp for aquatic weed control in SC. A permit can be obtained from SC DNR at 803-734-3891 or from registered dealers in SC. The short permit can be FAXed (803-734-4748) for a rapid turn around. Check with your Department of Natural Resources to determine if grass carp and tilapia are legal to stock and if a permit is required in your state.

Diquat, endothall, glyphosate, fluridone, triclopyr, copper, and sodium carbonate peroxyhydrate compounds can be used safely in ponds used as irrigation sources if the manufacturer's label directions are followed. Certain waiting periods may be required before using water for irrigation after the herbicide is applied, while in some cases waiting periods are not required. Various chemicals have different product formulations; only aquatic labeled pesticides and surfactants/adjuvants may be used in aquatic applications, by law. ***Labels change frequently; refer to the current herbicide label for specific application information. Never exceed the rates recommended on label of the specific product applied. The label is the law.***

Amount of Formulation for Application

Herbicide	Rate*
Aquathol	0.3 to 2.6 gal/acre foot of 4.2 L or 13 to 108 lb of 10G/acre foot or 2.2 to 22.0 lb of 63G/acre foot.
Hydrothol	0.3 to 3.4 gal/acre foot of 2L or 11 to 136 lb of 11G/acre foot.
Diquat	1 to 2 gal/surface acre of 2L.
2,4-D	1 to 2 gal/surface acre of 3.8 L or 150 to 200 lb of 20G/surface acre.
Copper Compounds	0.6 to 3.4 gal of Chelated Copper/acre foot or 0.1 to 0.5 ppm elemental copper.
Fluridone	0.25 to 0.5 gal/surface acre. Check with Company rep for exact rates.
Glyphosate	4.5 to 7.5 pt/surface acre of 5.4L.
Triclopyr	2 to 8 quarts per surface acre of 3L
Sodium Carbonate Peroxyhydrate	3 to 170 pounds per acre-foot of 50G

*Acre foot = 1 surface acre of water (43,560 ft^2) 1 foot deep.

Effectiveness of Herbicides for Aquatic Weed Control.

Weed	Copper complexes, copper sulfate (various)	2,4-D (various)	Diquat (Reward)	Endothall		Fluridone (Various)	Glyphosate (Various)	Sodium Carbonate Peroxyhydrate	Triclopyr
				Aquathol K Aquathol G	Hydrothol G Hydrothol 191				
ALGAE									
Filamentous	E	P	P	–	G	P	P	E	-
Planktonic	E	P	G	–	G	P	P	E	-
Branched (Chara)	E	P	G	–	G	P	P	P	-
Nitella	E	P	G	–	G	P	P	P	-
FLOATING PLANTS									
Bladderwort	P	P	E	–	–	E	–	P	-
Duckweeds	P	G[1]	G	P	P	E	P	P	-
Water hyacinth	P	E	E	–	–	P	G	P	E
Watermeal	P	P	P	–	–	G	P	P	-
SUBMERSED PLANTS									
Broadleaf watermilfoil	P	–	E	E	E	E	P	P	E
Coontail	P	G	E	E	E	E	P	P	-
Egeria	P	P	G	F	F	E	P	P	-
Elodea	P	–	E	F	F	E	P	P	-
Eurasian watermilfoil	P	E	E	E	E	E	P	P	E
Fanwort	P	F	G	E	E	E	P	P	-
Hydrilla	F[2]	P	G	G	G	E	P	P	-
Naiads	P	F	E	E	E	E	P	P	-
Parrotfeather	P	E	E	E	E	–	F	P	F
Pondweeds (Potamogeton)	P	P	G	E	E	E	P	P	-
EMERGENT PLANTS									
Alders	P	E	F	P	P	P	E	P	-
Alligatorweed	P	F	P	P	P	G	E	P	E
American lotus	P	E	P	P	P	F	G	P	E
Arrowhead	P	E	G	G	G	--	E	P	-
Buttonbush	P	E	F	P	P	P	G	P	-
Cattails	P	G	G	P	P	F	E	P	-
Common reed	P	P	P	P	P	P	G	P	-
Fragrant & white waterlily	P	E	P	P	P	E	E	P	E
Frogbit	P	E	E	--	--	--	--	P	E
Maidencane	P	P	F	–	–	F	E	P	-

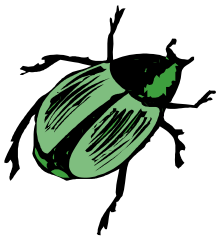
Weed	Copper complexes, copper sulfate (various)	2,4-D (various)	Diquat (Reward)	Endothall		Fluridone (Various)	Glyphosate (Various)	Sodium Carbonate Peroxyhydrate	Triclopyr
				Aquathol K Aquathol G	Hydrothol G Hydrothol 191				
Most grasses	P	P	P	P	P	P	G	P	-
Pickerelweed	P	G	G	--	--	P	F	P	E
Pond edge annuals	P	–	G	–	–	E	E	P	-
Rush	P	P	F	P	P	F	E	P	-
Sedges and rushes	P	F	F	P	P	P	G	P	-
Slender spikerush	P	--	G	--	--	G	P	P	-
Smartweed	P	E	F	--	--	F	E	P	E
Spatterdock	P	E	P	P	P	E	G-E	P	E
Southern watergrass	P	P	--	--	--	G	E	P	-
Torpedograss	P	P	P	--	--	F	G	P	-
Watershield	P	E	P	--	--	G	G	P	-
Water pennywort	P	G	G	P	P	P	G	P	E
Water primrose	P	E	F	--	--	F	E	P	E
Willows	P	E	F	P	P	P	E	P	-

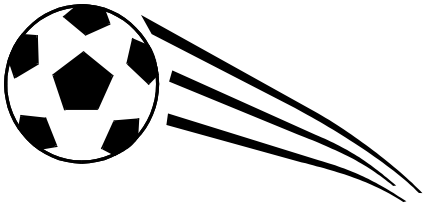
E=excellent control (90 to 100%); G=good control (80 to 89%); F=fair control (70 to 79%); P=poor control (<70%). A blank space indicates weed response is not known.
[1]Ester formulations only.
[2]Copper complex only.

Waiting Period (Days) Before Using Water After Application of Herbicides for Aquatic Weed Control

Common Name	Trade Name	Irrigation	Fish Consumption	Watering Livestock	Swimming
Copper	Crystalline copper sulfate and various liquid organic copper complexes	NR[1]	NR	NR	NR
2,4-D	Various formulations and manufacturers[2]	Water use restrictions vary by formulation and manufacturer. In general, if water is used for irrigating crops, 2,4-D should not be used. Certain labels allow irrigation if an approved chemical assay has reached acceptable levels. A few labels allow irrigation with specific waiting periods.			
Diquat	Reward	3 to 5[3]	NR	1	NR
	Weedtrine D	5	NR	5	NR
Endothall	Aquathol K	7 to 25	3	7 to 25	NR
	Aquathol granular	7	3	7	NR
	Aquathol Super K	7	3	7	NR
	Hydrothol 191	7 to 25	3	7 to 25	NR
	Hydrothol 191 granular	7 to 25	3	7 to 25	NR
Fluridone	Avast, Sonar AS, Sonar SRP, Sonar PR, Sonar Q	7-30+	NR	NR	NR
Glyphosate	Rodeo, AquaNeat, Eagre, AquaMaster, AquaPro	NR	NR	NR	NR
Sodium Carbonate Peroxyhydrate	Green Clean	NR	NR	NR	NR
Triclopyr	Renovate 3	120[4]		NR[5]	NR

[1]NR = No restrictions.
[2]Most formulations do not permit application to ponds used for irrigation or for watering dairy cattle.
[3]Three days for irrigation of turf and nonfood crops; five days for irrigation of food crops (including tobacco) or for preparation of agricultural sprays.
[4]No restriction for established grasses
[5]14 Day Restriction on grazing site and growing. Season grazing restriction on lactating livestock after irrigating pasture





To become a member of the **South Carolina Turfgrass Foundation**, complete the following and send a check to the indicated address.

Individual Name:_____

Company/School Name:_____

Address:_____

_____

City:_____

State:_____ Zip:_____

Home telephone:_____

Work telephone:_____

E-mail:_____

Dues Information:

Regular Member: $35 ea.
Student Member: $10 ea.

Send this to:

South Carolina Turfgrass Foundation
Sam Cheatham
Executive Director
P.O. Box 1061
Lexington, SC 29071

803-957-0616
803-957-0626 (fax)