

Does one of your members walk up to one of the water hazard holes filled with apprehension that he'll "feed the fish" again? And, even worse, find that mother nature has considerably increased his problems?

Where he had only the water itself to contend with before, he now finds a four-foot wall of cattails on the near side to catch any low drive. Then, if he's lucky enough to get over or through these plants, he sees his drive, that would have cleared the water, caught by another stand of cattails on the other side. Or perhaps it was a stand of rushes, reeds, or tough "spatterdock" that grabbed his ball like Willie Mays snares a line drive. Then, again, that errant low drive that looked like it would "skip" out, hit the floating mass of "pond scum"—and sank like a rock.

As a golfer, I do a slow burn to think that "I would have made it if it wasn't for those blankety-blank weeds!" And I do a faster burn when I realize that I lost two strokes to a mess of chlorophyll and water that the course designer hadn't planned as a hazard, and probably hadn't even considered as part of this cow pasture test.

As an aquatic biologist, I become completely unglued when I realize how easily these aquatic plants could be controlled. I finish the par-four hole in nine more strokes,

lay my clubs and bag neatly across the adjacent railroad track, and go home before the National Limited scatters Spaulding scrap all over the B. and O. roadbed.

Then a few days later when I begin to calm down a bit, I realize that, as an aquatic biologist, part of my work and training is water weed control, but I know very little about maintenance of fairways and greens. I can tell you that the ferny-looking water weed is *Myriophyllum*. That the sticky looking one is coontail, and that the floating glop is *Lemna minor*. Then I remember that when it comes to grass that grows on land, I hardly know bent grass from bamboo. About this time I begin to feel sorry for the course superintendent who is expected to know all. I even take back some of the things I called him when my Titleist got caught in the *Typha*—pardon me, cattails!

Seriously though, water areas—however troublesome—usually make up a very minor part of a golf course's acreage, and the field of aquatic botany (water plants) is a very specialized one. Few people know or even pay much attention to water weeds—unless they own a pond or lake of their own. Nearly all the specialists in water plants are either in your state's fish and game agency or in one of the colleges or universities. So don't give the poor superintendent hell when

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Careful application of various chemicals will eliminate almost every type of undesirable plant growth

Are your water holes double hazards?

by H. E. McReynolds



Slime can be found both under and on top of the water. In photo above, dunked pole comes up with mass of needless plant growth. At left can be seen how nice the lake can be cleaned with the use of proper chemicals.

Water hazards

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you have to shoot across that scummy pond. If he knew water weeds as well as he does terrestrial plants, he wouldn't be working for the salary you pay him; he'd be teaching in the horticulture department of the state university.

But, here is a short basic course in aquatic botany that might prove very useful to the superintendent. There are two fundamentally different types of water plants—those that have roots, stems, and leaves (the higher plants) and those that do not (the algae). There are troublesome members in both groups. The rooted plants can be divided into three general categories.

The submersed plants are usually attached to the bottom and are completely beneath the surface, except for a few floating leaves in some species. The emergent plants are rooted to the bottom but stick up above the water, such as cattails or rushes. A third group

is the unattached, floating plants. These floating plants must not be confused with filamentous algae which breaks loose and floats on the top, forming a blanket of scum.

Algae has no true roots, stems, or leaves and comes in two forms, filamentous algae and plankton algae. Filamentous algae are the long green slimy strands that can be found attached to the bottom or to the submersed plants. They tend to break loose and float on the surface as an unsightly, smelly blanket. Plankton algae, on the other hand, are tiny microscopic one-celled plants hardly visible to the naked eye. Occasionally, they become so thick that the water looks like pea soup, and they can cause serious taste and odor problems in water supplies. Certain groups of plankton algae even have a toxic effect, and can sicken or kill fish, wildlife, livestock, or perhaps even humans.

All that I have done so far is merely mention the different basic types of water plants. The superintendent and the golfer couldn't

care less whether that blasted water weed is *Ceratophyllum demersum* or whether it's *Zannichellia palustris*. All they want to know is if there is something that can be put in the water to make it go away. They want a clean, clear lake instead of a scummy green one. This keeps the disgruntled golfer off the staff's back and adds immeasurably to the aesthetic beauty of the course.

Now, can anything be done to eliminate this problem if certain limitations are recognized? Yes. First, if the water is used for human or livestock consumption, only one chemical is approved for use by public health officials. This is copper sulfate, (also called blue vitriol or bluestone) which is an algae killer. It is used for this purpose even in city water reservoirs. Yet, even this chemical must be used at the proper dosage or it may kill fish.

Fish are the second limitation. In waters where fish are present, some of these weed-killing chemicals must be used very carefully, and by someone who is trained in their application. Some of these chemicals are dynamite to fish if too much is applied.

The third limitation is that treatment of the golf course waters does not affect water of other owners downstream. Don't get caught in a liability suit by poisoning some guy's fish or livestock!

One last warning: there is presently no single chemical which will kill all water plants. There is some plant that is resistant to each of these weed killers, but on the other hand there is some chemical that will kill any particular species of plant. If one kind of plant persists after treatment, you'd better call in an expert and he will know what chemical to use to eradicate this stubborn one.

For the treatment of algae, or "pond scum," you have to know the approximate volume of the body of water you are treating. You should use two and three-quarters pounds of copper sulfate for each acre-foot of water in the lake. (An acre-foot of water is one acre of water one foot deep). For figuring a lake's volume you need to know the surface acreage and the average

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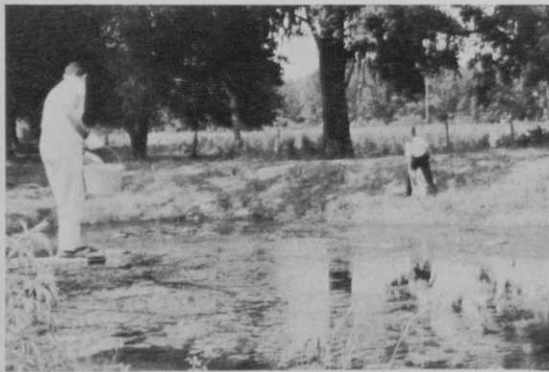


Photo at left shows Howard MacKay Lake, Baton Rouge, La., before it was treated with Aquathol. Picture below shows what the lake looked like after the chemical was applied.



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depth—and note that word "average." As an example, a pond with two acres of surface which averages five feet in depth holds ten acre-feet of water. Therefore you would need 27½ pounds (2 ¾ x 10) of copper sulfate to treat it.

Copper sulfate will not kill the rooted or floating plants so don't even bother with it unless your problem is algae. For rooted plants, one must select from several other weed killers. For cattails, a relatively safe formulation called Dalapon is very effective. Four ounces of Dalapon powder can be dissolved in one gallon of water and sprayed directly on plants to thoroughly wet the foliage. Treat these plants before they form the wiener-shaped seed spikes.

Bullrushes should be sprayed with four ounces of 2, 4-D liquid ester per gallon of water. Another plant that grows along the margin of the water can usually be controlled by two ounces of 2, 4-D per gallon of water. This is *Sagittaria*,

which has a large, three-pointed, leaf, shaped like an arrowhead. (It is commonly called arrowhead or arrow arum.) A pelleted form of 2, 4-D can also be used and can be applied by broadcasting with a hand seeder.

If a single chemical had to be selected which would kill most of the underwater species, it would be Aquathol Plus. This formulation is a combination of endothal, which kills many of the submersed species, and silvex, which knocks out many of those missed by endothal. Diquat is another chemical which will kill a number of species, and 2, 4-D will take care of several of these water weeds.

Among the hardest underwater species to kill are the floating plants. These include duckweed and watermeal; small plants which vary from less than the diameter of a pencil to about the size of a dime. Watermeal looks like tiny green spots floating on the water, and is actually the world's smallest flowering plant. However, so many of them may be present that they will literally cover the entire sur-

face of a lake.

Treatment is sometimes ineffective, but try liquid endothal at four ounces per gallon of water sprayed directly on plants, or diquat at two ounces per gallon of water.

There are many more species that I have not covered, but unless you can accurately identify them, you better call a specialist since treatment can be difficult. If your state fish and game agency has management biologists, they can often identify the species of weed for you even though they are not permitted to perform the actual treatment on private land. In addition, there are commercial outfits who have professional aquatic biologists on their staff who will identify the problem weed, prescribe the treatment, and actually do the work.

One last warning. Remember this—some of the chemicals used to kill water weeds will also kill terrestrial plants, including grass. So if you use your lake as the source for watering your greens and fairways, check with an expert before treating your lake! □

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