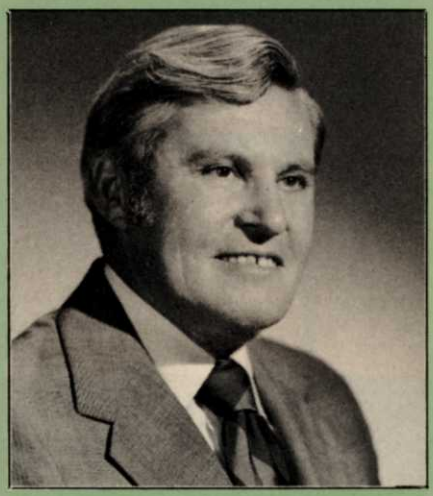

Aquatic Weed Control "Identification Is The First Step"

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Editor's Note: This article was adapted from material used by the author in determining treatment for algae and aquatic weed problems. One of the biggest problems in aquatic weed control is problem identification. Managers of bodies of water must be able to identify weed and algae species before a satisfactory treatment can be recommended. Dr. Stern has devoted much time in helping others help themselves. This article is designed around this goal.

AQUATIC weeds and algae in ponds, lakes and lagoons and other bodies of water are a big problem. There is no single "magic" formula, chemical, or method that will control all types of aquatic vegetation. Each problem waterway should be surveyed and from the information obtained, a treatment program formulated.

It is possible and economically feasible to chemically control algae and weeds in golf course irrigation areas, lagoons, lakes, and other waterways without adversely affecting humans, killing fish, animals or rendering the treated water unsuitable for irrigation purposes.

The first step in solving an aquatic nuisance problem is to identify properly the algae and weeds present. The accompanying chart on page 42 has been developed to more clearly understand what is necessary in identifying algae and establishing control procedures. A similar chart can be easily produced for other aquatic vegetation.

Algae are small primitive plants. They do not have true leaves or flowers, but reproduce by means of minute spores or by continued vegetative growth. They can be found floating or attached to submerged surfaces in most lakes, ponds, and streams. Depending upon the nutritive value of the water, algae reproduce very rapidly, especially in hot weather.

Three types of algae are generally found in most lakes, ponds and streams. These are filamentous algae, unattached or planktonic algae, and branching algae.

1. **Filamentous Algae** are commonly referred to as pond scum and consist of growths of long stringy, hairlike strands. Most of the green and brown scums are slimy or cottony in appearance. Some of the common types are:

Cladophora — usually bright to light green in color and appear as cotton-like wads which often rise from the bottom of the pond.

Pithophora—dark green in color. They have a coarse texture and often feel like tough horsehair in the hand.

Spirogyra—also called "frog spittle." It usually appears as slimy bright-green which grow in strands along pond bottoms. As it matures, the strands loosen and rise to the surface.

Hydrodictyon—a filamentous type which is commonly referred to as the "water net" type. Found in deeper water and often float to the surface.

2. **Unattached or Planktonic Algae** cause green or reddish-brown water color and are more or less "free-floating." In the decomposition stage, these organisms give off a foul odor in water. They are normally found at or near the surface of the water where there is sufficient light intensity to permit them to grow luxuriously. Strains called **Anacystis, Anabeana** and **Ophonizomenon** usually produce green water while **Oscillatoria** species produce reddish-brown water.

3. **Branching Algae** are the most advanced forms of algae. They grow from the lake bottom with stems and branches and have a gritty feel. **Chara** and **Nitella** are the principle types of branched algae. Chara has a musky odor and is usually found growing in hard water, in shallow water and on a gravelly bottom. Chara and Nitella are often mistaken for underwater weeds such as coontail or milfoil. These algae are sometimes difficult to control, even when the proper management practices have been used.

AQUATIC WEED CLASSIFICATIONS

Most aquatic plants can be classified into five categories, floating plants, emerged plants, submersed plants, ditchbank or marginal plants and ditchbank woody plants.

1. Floating Plants include those that are not attached. They float freely on the surface of the water. Water hyacinths are one example of this type weed which has plagued southern waterways for many years. In other areas duckweed and watermeal form a green blanket on the water surface. Duckweed has tiny leaves called fronds with rootlets that hang down in the water. Watermeal appears as tiny green grains or granules floating on the surface of the water. Both are commonly found growing together. Duckweed is difficult to control be-

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cause the tiny leaves have a waxy coating which makes herbicide penetration difficult.

2. Emerged Plants usually grow in water or moist soil with roots attached in the bottom mud. They may spread by means of an underground root system. Leaves and stems of these plants extend above the water surface. Common examples of this type include cattails, arrowhead, water willow, water primrose, bulrush, spatterdock and waterlilies.

3. Submersed Plants are usually, but not always, rooted to the bot- Duckweed is difficult to control be- tom, and their stems and leaves may fill the water to the surface. Submersed plants have three distinct types of leaf attachments. Whorled leaf attachments are those that have more than two leaves attached at the same point on the main stem. Examples are coontail, watermilfoil and American elodea. Opposite leaf attachments are those with two leaves attached at the same point on the main stem but opposite from each other. Examples of this type are horned pondweed, waterstargrass, southern naiad and brittle naiad. Alternate leaf attachments are those which have one leaf attached singly at different heights on the stem. Examples include leafy pondweed, Sago pondweed, small pondweed. Some alternate leafed weeds have leaves large enough to float. These would include American pondweed, Floatingleaf pondweed, Largeleaf pondweed, and waterthread pondweed.

Miscellaneous submersed plants include water buttercup and bladderwort.

4. Ditchbank or Marginal Plants are those found principally along the water's edge. They are not truly aquatic nor terrestrial. Examples include southern cutgrass, knotgrass, paragrass, torpedograss, water paspalum, southern watergrass and common reed. It is often difficult to identify ditchbank plants when mixed with woody plants.

5. Ditchbank Woody Plants can usually be distinguished from other ditchbank plants by a fibrous or woody plant structure. Trees and brush commonly found along ditches, ponds and other water areas include willow, castorbean, common guava, Australian pine, seamyrtle, tai-tai, and others.

FOR BEST RESULTS

To obtain satisfactory algae and

aquatic weed control in any body of water it is essential to know the species and amount of algae and aquatic weeds present. A moderate to heavy infestation of aquatic weeds with any algae problem is an important consideration in determining the recommendation to be made for algae treatment, for aquatic weed treatment, or for both. The greater the aquatic weed infestation, the more essential it becomes to treat the water either for both algae and aquatic weeds or to increase the dosage used for algae control.

Most all registered algaecides and aquatic herbicides are absorbed equally rapidly by algae and aquatic weeds. Thus, a chemical added to a body of water which is heavily infested with weeds and algae and is being treated only for algae, may fail entirely because much of the algaecide is being absorbed and detoxified by the aquatic weeds.

Other than the kinds and amounts of algae and weeds present, it is essential to know vegetation location in the water, and whether the algae and weeds are young and actively growing.

All plants and algae are easier to kill in their earlier growing stage than when they are mature.

Temperature of water is also important. Treat for algae and weeds in late spring or early summer after water temperatures have reached 62-65° F. and before the aquatic plants have gone to seed.

The physical condition of the water is equally important in assuring successful control of algae and plants. Muddy water rapidly deactivates most of the known algaecides and aquatic herbicides. Thus, a pond should never be treated after a rain when the water may be muddy. Environmental protection chemicals will be rapidly deactivated and performance will not be effective. Be sure not to stir up the shallow water with oars, paddles, motors, or other equipment.

Time of application especially for algae control is important. The best time of the day to treat for algae is in the middle of the day in a bright sun when the algae are growing rapidly. They are much easier to kill when in an active metabolic state. Postpone the treatment if conditions are not right.

Checklist For Algae Control

1. List types and number of bodies of water to be treated. .....
   .....
   .....
   .....
2. For each body of water give the following general information:
   a. Size in acre-feet $\frac{\text{(length x width x average depth)} = \text{No. of acre-feet}}{43{,}500}$
   .....
   b. Kinds of algae present:

(free floating)	(unattached)	(branching)
.....	.....	.....
.....	.....	.....
.....	.....	.....
.....	.....	.....

   c. Amount and location of algae:
   Is entire body of water covered? Yes..... No..... Where: .....
   .....
   Is algae present on bottom? Yes..... No..... Where: .....
   .....
   Are algae present only near shoreline? Yes..... No.....
   Where: .....
   d. Are algae in an actively growing state? Yes..... No.....
   (presence of bright green color and gas bubbles suggest active algae growth)
   e. Are other aquatic weeds also present? Yes..... No.....
   If yes, describe their abundance .....
   State of growth: vegetative ..... mature (seed) .....
   f. Physical condition of water. Is it clear? Yes..... No.....
   Are dirt, clay, organic matter (leaves, etc.) present? Yes..... No.....
   g. Is the water used for irrigation? Yes..... No.....
   h. What is the source of water? Drainage....., Spring.....
   River or creek....., Other.....
3. What has been done in the past to control algae and weeds? List chemicals or other treatment used. .....
   .....
   .....
   .....

Will one treatment control weeds and algae all year? This question is often raised. Usually aquatic weeds can be controlled with one application. It is sometimes necessary to spot treat a week or two later to take care of weeds which may have been missed by the initial application. For algae control it is usually necessary to treat more than once a season, followed by periodic spot treating when new growth appears.

Algae are better controlled if the algaecide is applied directly on the algae. If a pond has filamentous algae concentrated primarily near the shore or on the bottom in the shallow areas, use the recommended amount of algaecide to treat the entire pond but apply it only where the algae are growing. Never add algaecide to clear algae-free water, It probably will be wasted.

Finally, if the weed and algae growth are moderate to heavy, don't treat the entire body of water at one time. Treat half of it one week and half a week or ten days later. This will insure that the dead weeds and algae will not rapidly and completely deplete the dissolved oxygen. A great number of fish kills result not from any toxic property of the chemical used but from a lack of oxygen caused by decaying dead algae and weeds.

Algae and aquatic weeds can usually be controlled satisfactorily in most bodies of water. To obtain satisfactory control, however, it is necessary to survey the body of water, to determine the kinds of weeds and algae present, the area, and the flow of water through the pond or lake. On the basis of this and other information a sound and successful recommendation for treatment of the body of water can be made. □

Man Major Agent In Seed Dispersal

Man is the most important agent in seed dissemination reports Frieda Wertman of Central Seed Laboratory in Hopkins, Minn.

The distribution of agricultural and garden seeds is the prime source of weed seeds. Almost every crop includes some seed which resembles the desirable kind in size-shape-weight and even color so well that even the best cleaning equipment does not do a perfect job.

The actual spread of species varies. A large number of plants remain confined to the area where they were introduced; others spread rapidly even though they had been introduced but once.

Significant though man's role is, Ms. Wertman noted, plants, fruit and seeds have natural means of dispersal. Wind, water, animals and structual features of the seeds help in seed dispersal.

Minute seeds like witchweed, paint-brush and orchids can be borne aloft like dust for miles. The wind also carries heavy seeds that are plumed like the milkweeds, thistles, dandelions and willows or with wings like maple, poplar and dock. Gusts of wind may blow seeds across the surface of snow and ice or hasten their progress downstream.

The winged fruits of common dock have corky protuberances which permit them to float. These seeds also provide food for rodents and birds or if dropped in mud along with other seeds that occur in wet areas, they adhere to the feathers, feet or fur of other animals.

Burred fruits and seeds like cocklebur, buffalobur, sticktight may help in the dispersal of the plant but they are more than a nuisance.