AQUATIC HERBICIDES DESIGNED FOR ENVIRONMENTAL COMPATIBILITY

By James C. Schmidt

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The concept of using chemicals in lakes, ponds and waterways carries with it some degree of negative connotation. Unfortunately, this often stems from unrelated incidents of water pollution where toxic or dangerous chemical contaminants such as insecticides, terrestrial herbicides, or industrial wastes have been introduced into our waterways. It is important to keep in mind that registered aquatic pesticides, herbicides and algaecides are designed to be compatible with and effective in the aquatic environment.

Approved use sites, conditions of applications, and water-use restrictions for swimming, fish consumption, irrigation and domestic use will appear on the label. Use statements are usually based upon the chemistry of the compound and the time it takes for chemical uptake or degradation to occur. If a chemical is incompatible with a certain type of water quality or within a certain use site, it will be stated on the label. Let's examine several examples of commonly used products:

Diquat, a liquid broad-range aquatic herbicide, specifically states on its label: "DO NOT USE IN MUDDY WATER." The active ingredient, diquat cation, is bound up by negatively charged, suspended soil particles. Besides that which is bound up by the sediments, it is further degraded through photodecomposition. Water use restrictions are in effect for 10 days following application.

Aquathol K, a liquid or granular contact killer for aquatic plant control, indicates on its label: "For best results, water temperature should be 65°F. or above." Microbial breakdown of the active ingredient occurs in soil and water. Following treatment, water should not be used for swimming for 24 hours; fish should not be consumed for 72 hours; and water should not be used for irrigating or domestic purposes for 7 days. There is no waiting period required for sprinkling bent grass, however.

Aquazine (Simazine), a wettable powder algaecide/herbicide formulation for pond use only, cautions on its label: "Do not treat ponds which have bordering trees with roots visibly extended into the water since injury to these trees may occur. Usually, trees 50 feet or more from the pond's edge will not be injured." Simazine is metabolized to simpler compounds by susceptible plants. Residual activity in certain pond bottom types does occur, therefore, treated water cannot be used for irrigation or stock watering purposes for a period of one year. No restrictions apply to swimming or fish consumption.

Cutrine-Plus, a broad-range algaecide available in liquid and granular formulations, lists its use sites as: potable water reservoirs; irrigation conveyance systems; farm, fish, and fire ponds; lakes; and fish hatcheries. The label advises that this product should be used when water temperatures reach 60°F. and algae growth first becomes apparent. Calm, sunny days provide optimum treatment conditions. Elemental copper, the active ingredient, is taken up by both weed and algae growth but is only toxic to the algae at the rates used. Some is rechelated by natural organic compounds in the water, lost to the sediments in plant tissue, or utilized as a micronutrient within the system. The chelating agents, ethanolamines, are broken down by microbes. There is no waiting to use the water for swimming, fishing, irrigating, stock watering or domestic purposes following treatment.

As one can see, there is some variability on where any given aquatic pesticide should be used. Assuming proper identification of the nuisance vegetation has been made, the use site and water use restrictions are important considerations in choosing between alternative chemicals.

The previously mentioned products are certainly not all the compounds available for aquatic weed control. Unfortunately, many chemicals which are not specifically labeled or designed for an aquatic use site do find their way into the water. Diuron (Karmex®), for example, is approved for treatment of irrigation and drainage canals. It should be incorporated into the soil, and the water above it cannot be used. Ornamental and fish ponds are not approved use sites and yet people have a tendency to stretch the label's clearances. Abuses like this can result in environmental damage, ineffective control and negative side-effects, giving all aquatic chemicals a bad name.

Following are some additional questions and concerns which arise in the debate over using aquatic herbicides and algaecides. The answers, although general, should provide some clarification to those confused over what they might expect following chemical application.

Death and decay of chemically treated vegetation usually occurs within two weeks following treatment. Discoloration, elongation, or drooping are signs of weakness and impending death. The physical action of wind and waves assist in breaking the plants apart. Microbes then take over in furthering the decomposition process. Since these

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microorganisms utilize oxygen, it is important that heavily infested areas be treated a portion at a time where fish are present. Nutrients contained in the decaying plant material are assimilated by the microorganisms and reutilized within the food chain. Occasionally, some algal growth may be initiated. This can be easily controlled with an algaecide. Eventually, a fine organic silt made up of dead cellular material settles on the bottom. If these plants were allowed to mature before treatment and died by natural causes, the amount of organic material added to the bottom would be greater and more seeds or reproductive structures would have been produced. Chemical treatment, therefore, can be viewed as a means to accelerate the death of nuisance plants.

Properly timed and applied, herbicide treatments will control a species of plant for an entire season. Since there is sometimes the threat of reinfestation from cuttings, unaffected seeds or underground reproductive structures, some late season touch-up work might be required. In addition, periodic algaecide treatments might be necessary (four to six weeks apart) during hot weather or runoff periods.

Weed and algae control is a seasonal maintenance requirement. Residual control from year-to-year should not be expected. Keep in mind that some aquatic plants are cyclical, having good and bad years. Species might change naturally within a body of water, requiring a change in chemical. Many times a late season "regrowth" is actually a new species which has invaded the area.

Control failures or apparent failures which do occur are often the result of one of the following reasons:

— Not reading the label or following directions
— Incorrect species identification and subsequent use of the wrong chemical
— Miscalculation of the treatment area size
— Poor weather or water conditions during or immediately following treatment
— Reinfestation by new weed species
— Treating too late or too early in the season
— Not compensating for water inflow in high turnover situations

With the chemical tools available, most nuisance plants are controllable with a little planning, investigation, and careful application. An understanding of the product's basic chemistry, knowledge of its mode of action, realization of water use restrictions, and familiarity with what to expect following treatment will be helpful in choosing and using proper aquatic chemicals to enhance the aesthetic and recreational quality of our waterways. **WTT**