

# An Overview of Chemicals for Aquatic Plant Control

By James C. Schmidt Applied Biochemists

Written for "Lake and Reservoir Management" Publication, October 1983

## **ABSTRACT**

Scientists' role is to separate fact from fiction to assure that decisions be based upon valid evidence rather than emotions and misinformation. The use of chemicals for aquatic vegetation control is one issue commonly surrounded with fear and uncertainty by the general public, environmental groups, and politicians. This has led to restrictive laws in some States, which severely limit or prohibit the application of registered aquatic pesticides. In-lake rehabilitation methods and watershed protection measures have achieved mixed results in controlling lake nutrient concentrations to suitably limit macrophyte or algae growth. For many bodies of water, high quality water is not presently economically or technologically feasible. However, symptomatic treatment of nuisance aquatic plant growth with chemicals or through integrated pest management methods can provide waterways acceptable for recreational and functional use. Historically, the chemicals used for aquatic macrophyte and algae control were sodium arsenite and copper sulfate, respectively. These did pose a threat to the environment from overdose and abuse in attempts to eradicate rather than manage aquatic plant problems. Today's chemicals and application techniques are more selective and sophisticated. Toxicity limits, breakdown times, and tolerances are established prior to EPA registration. Organic herbicides that characteristically degrade in the environment or become biologically inactive have replaced persistent chemicals such as sodium arsenite. Formulated, chelated copper compounds are replacing copper sulfate treatments as a safer, more effective approach. Improved application equipment, techniques using spray adjuvants and granular formulations have helped overcome problems with drift and uneven distribution. The judicious use of chemicals for aquatic vegetation control is imperative. Loss of any of our limited number of tools for maintaining suitable recreational and functional waterways through regulations imposed by the uninformed could severely limit our ability to achieve future water quality objectives.

It is necessary for scientists involved in lake management consulting and research to evaluate their way of thinking about the use of aquatic herbicides and algaecides. The idea of using pesticide chemicals in a body of water often creates immediate

controversy within the scientific community. This issue may come even more emotional when brought to the attention of the public and politicians. A crisis is reached when emotions get in the way of facts, generating misinformation that leads to poor decisions. Often federally registered chemicals are banned locally or treatment permit procurements severely restricted,

It is not within the scope of this paper to detail the technical data supporting the contention that presently approved aquatic pesticides pose minimal risk to man and environment when used according to label instructions. The fact is that these products already have been tried and have been proven acceptable through the U.S. Environmental Protection Agency's registration process. It is the intent of this discussion to encourage scientists to familiarize themselves with the chemical tools available and accept these products as a viable management alternative for maintaining suitable recreational, functional, and aesthetic waterways.

One of the common arguments used against chemical control of aquatic plants is that this approach is cosmetic in nature, treating a symptom rather than the source of a problem. As a result, chemical treatment has not been considered a fundable management alternative under the Clean Lakes Program. Granted, the ultimate goal is to develop in-lake rehabilitation and watershed protection techniques to solve eutrophication. Being realistic, however, attainment of high water quality to the point of limiting nuisance aquatic vegetative growth is presently not always economically, technologically, nor culturally feasible. Chemical control offers an immediate management alternative that can be implemented while other rehabilitative or protective measures are being studied and developed. It is interesting to note that a large number of the most active lake community organizations were originally formed to combat nuisance vegetative growth. In many cases, these annual weed and algae control programs have encouraged communities to rally around the lake improvement cause. This involvement is a necessary prerequisite for future lake management activities on many lakes.

The question of environmental impact is always raised when a chemical control program is considered. Certainly, this is a valid concern. Eliminating vegetative growth within areas of a lake may affect the movement of fish and localized populations of invertebrates. However, chemical treatment allows the flexibility to control plants on a selective basis as to species and area. Using chemicals to kill aquatic vegetation can realistically be viewed as a means of accelerating their death since plant senescence will occur naturally later in the season. Therefore, claims that this approach contributes nutrients and sediment to the lake bottom are unfounded. Actually, controlling plants in their younger stages of growth results in less accumulation and decay than under natural conditions. Furthermore, preventing flowers and seeds from forming may reduce the reproductive potential of these plant populations.

The localized impact of controlling portions of aquatic plant populations with chemicals does not compare with some of the major impacts resulting from dredging, drawdown, nutrient deactivation, diversion, and other total lake management techniques. Although these latter approaches are intended to improve water quality, what is the effect of total habitat change upon the fishery in these less productive waters? Any manipulation of the delicately balanced aquatic ecosystem will have some impact. It should not be

assumed that the use of chemicals is a drastic technique.

Certainly, past uses and abuses of chemicals in our waterways have contributed to some of these negative attitudes. In addition, pesticide scares and groundwater contamination have made the general public quite wary when plans are proposed to put chemicals into water. It is the scientist's obligation to educate the public and pacify unfounded concerns. Unfortunately, urban universities, in particular, tend to stress the environmental impacts of pesticides with little mention of their economic necessity. They cite historical examples such as the widespread use of sodium arsenite in the early and mid-1900's. Similarly, long-term use of high doses of copper sulfate has led to residue problems from copper precipitates within the hydrosol. The old approach to aquatic vegetative control was geared more towards eradication than management and control.

Fortunately, the herbicides used today have much more environmentally acceptable properties. They characteristically biodegrade or become biologically inactive. These products include endothall compounds (Aquathol K, Hydrothol 191), Diquat (now called Reward), fluridone (Sonar), glyphosate (Rodeo), and 2,4-D esters and amines. Similarly, formulated chelated copper compounds (e.g., Cutrine-Plus) are replacing copper sulfate treatments. These products can be used in lower dosages and less frequently for more effective control.

EPA registration of aquatic pesticides requires data on non-target organisms, toxicity, environmental persistence, and breakdown products. These products are viewed very similarly to a pesticide used on food crops in that acceptable residue levels must be established. Under cross-referenced requirements of the Federal Food, Drug, and Cosmetic Act and the Federal Insecticide, Fungicide and Rodenticide Act, it is necessary to determine safe concentrations of these pesticides in water used for human consumption and raw agricultural commodities, which might be directly or indirectly contacted by the treated water (e.g., fish, shellfish, irrigated crops, etc.) These tolerances and exemptions from tolerance as they are called are listed, by active ingredient, under chapters 20 and 40 respectively, of the Code of Federal Regulations. These clearances dictate labeled product use sites (e.g., irrigation water, fish hatcheries, potable water reservoirs, etc.), maximum allowable dosage rates and water use restrictions.

Obviously, pesticide manufacturers should promote the safe, proper use of their products. They do not want product misuse and the consequent negative publicity to jeopardize the millions of dollars spent on product research and development. Product labels provide key information needed for proper application. Supplemental technical and promotional information is also available for those who desire a more in-depth understanding of these materials.

Nationally, professional interest in aquatic plant control has resulted in the formation of the Aquatic Plant Management Society. Within the past several years, regional chapters of this group have organized in Florida, South Carolina, the Midwest, the Midsouth and the West. In addition, the U.S. Army Corps of Engineers, which is responsible for numerous water management projects, generates and disseminates information on aquatic plant control technology.

All of these organizations hold annual conferences and publish proceedings,

newsletters, and magazines. Although a significant portion of these meetings involves chemical control technology, sessions on biological, mechanical, and habitat manipulation techniques are included. Professional aquatic pesticide applicators and chemical company representatives who make up a significant portion the audience are exposed to a wide range of techniques and disciplines. There is a willingness to exchange ideas and develop more scientific approaches to aquatic plant control including integrated management approaches. Technical developments such as applying equipment, spray adjuvants, tank mixes, and granular formulations have improved chemical distribution and drift control, and lowered application rates. Professional applicators who are trained as scientists should become an integral part of the total lake management scheme.

No single method will answer all the problems associated with maintaining suitable water resources for recreational, functional, and aesthetic purposes. Just as the study of an aquatic system requires a multi-disciplinary approach, its management will require integrating available technology. Therefore, it is imperative that lake managers, scientists, consultants, politicians, and the concerned public continue to support the judicious use of chemicals for aquatic vegetation control. Overly restrictive regulations imposed upon these products by the uninformed could severely limit our ability to achieve future water use objectives.