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**INSTITUTE FOR FISHERIES RESEARCH**  
DIVISION OF FISHERIES  
**MICHIGAN DEPARTMENT OF CONSERVATION**  
COOPERATING WITH THE  
**UNIVERSITY OF MICHIGAN**

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**FIELD TRIALS OF SEVERAL AQUATIC  
HERBICIDES, 1962**

By K. G. Fukano

Field trials with several aquatic herbicides were conducted in two southern Michigan lakes in 1962.

The products tested were: (1) Penco Herbicide 47 containing 1.5 pounds of 3, 6-endoxo-hexahydrophthalic acid per gallon--active ingredient di (N, N dimethylalkylamine) salt of 3, 6-endoxo-hexahydrophthalic acid; (2) Penco Herbicide 47 Granular containing 5 percent acid equivalent--active ingredient di (N, N dimethylalkylamine) salt of 3, 6-endoxo-hexahydrophthalic acid; (3) Penco Herbicide 191 containing 2 pounds 3, 6-endoxo-hexahydrophthalic acid per gallon--active ingredient mono (N, N dimethylalkylamine) salt of 3, 6-endoxo-hexahydrophthalic acid; (4) Penco Aquathol-Silvex containing 1.5 pounds of disodium endothal and 1.5 pounds of silvex acid (potassium salt) per gallon; (5) Penco Aquathol-Silvex Granular containing 5 percent disodium endothal and 5 percent silvex acid (potassium salt); (6) Ortho Diquat containing 2.8 pounds of diquat dichloride (1:1 'ethylene-2:2'-dipyridylum dichloride) or 2 pounds of cation per gallon.

All Penco products were furnished gratis by the Pennsalt Chemical Corporation. California Chemical Company supplied the Ortho Diquat without charge.

The trials were conducted at Green Lake, Washtenaw County (Sec. 21, 22, 27, 28, T. 1 S., R. 3 E.) and Pleasant Lake, Washtenaw County (Sec. 21, 22, T. 3 S., R. 4 E.). Water from Green Lake has a methyl orange alkalinity of 150 ppm and that from Pleasant Lake an alkalinity of 95 ppm. All test plots were approximately 1/2 acre in area (100 x 200 feet). Liquid herbicides were diluted two- or fourfold depending upon the amount of chemical necessary to treat the plot, then the diluted herbicide was sprayed on the water surface using a spray unit similar to that diagramed in Fish Division Pamphlet No. 16, "Chemical control of submerged water weeds with sodium arsenite" by F. F. Hooper and A. B. Cook, Jr. Granular formulations were spread by hand. To obtain as uniform coverage as possible, half of the material was applied while the boat was on a course parallel to the long axis of the plot and the rest was broadcast while the boat traveled transversely to the long axis.

Although aquatic vegetation is generally more readily controlled when the plants are small and growing vigorously, these experiments were conducted to determine if these herbicides would be effective under the most difficult conditions. Plots in Green Lake were treated on July 5 and those in Pleasant Lake on July 6, 1962. Weather

conditions were favorable with clear sky and moderate wind. The aquatic weeds in both lakes were approaching maturity, for much of the vegetation had reached the water surface.

The characteristics of the test plots and the effect of the various herbicides are given in Tables 1 and 2. The plots were inspected at intervals of approximately two weeks.

At the time of the first observation the water in Green Lake was very turbid following some rain, and submergent plants were not visible more than a foot below the water surface. In Plot 2 a plant hook picked up some Potamogeton, Elodea, and Myriophyllum that seemed dead and dead Potamogeton were collected in a limited area of Plot 5. No dead plants were retrieved with a plant hook at the other plots. At later observations it was impossible to detect any cleared area where the vegetation had been killed; however, it appeared that the aquatic weeds had been thinned in Plots 1, 2, 4 and 5. The effects of the various herbicides were somewhat obscured by general die-off of aquatic vegetation over the entire lake that occurred shortly after the treatment.

At Pleasant Lake only on Plot 7 did the Potamogeton appear to have been thinned somewhat. Vallisneria showed a temporary effect but did not die.

From these trials in 1962 it was concluded that none of the herbicides, at concentrations used, effectively controlled mature aquatic plants.

Table 1.--Characteristics of test plots (100 x 200 feet) treated with aquatic herbicides

Lake and plot	Average depth (feet)	Bottom type	Density of plants	Species present
Green				
1	4.2	Organic	Dense	<u>Potamogeton amplifolius</u> , <u>P. natans</u> , <u>Myriophyllum</u> spp., <u>Ceratophyllum demersum</u> , <u>Elodea canadensis</u> , <u>Brasenia Schreberi</u> , <u>Nymphaea odorata</u>
2	4.1	Organic	Dense	<u>P. amplifolius</u> , <u>M. spp.</u> , <u>C. demersum</u> , <u>E. canadensis</u> , <u>N. odorata</u>
3	4.5	Organic	Dense	<u>P. amplifolius</u> , <u>E. canadensis</u>
4	4.8	Organic	Dense	<u>P. amplifolius</u> , <u>M. spp.</u> , <u>C. demersum</u> , <u>E. canadensis</u> , <u>N. odorata</u>
5	4.0	Organic	Dense	<u>P. amplifolius</u> , <u>M. spp.</u> , <u>C. demersum</u> , <u>E. canadensis</u>
Pleasant				
6	4.4	Sand, organic	Moderate	<u>P. gramineus</u> , <u>P. pectinatus</u>
7	5.0	Sand, organic	Moderate	<u>P. gramineus</u> , <u>P. pectinatus</u> , <u>Vallisneria americana</u>

Table 2.--Herbicides used on test plots and summary of their effect

Lake and plot	Herbicide	Quantity used	Concentration (ppm)	Observation on effects
Green				
1	Herbicide 47	1.9 gals.	0.5	Little damage but no clear-cut evidence for control
2	Diquat	5.0 gals.	↓1.8	Some damage but no clear-cut evidence for control
3	Herbicide 191	2.1 gals.	0.7	No detectable effect
4	Aquathol-Silvex	5.0 gals.	2.3	Little damage but no clear-cut evidence for control
5	Aquathol-Silvex G	100 lbs.	1.8	Little damage but no clear-cut evidence for control
Pleasant				
6	Herbicide 47	2.0 gals.	0.5	No detectable effect
7	Herbicide 47 G	50 lbs.	0.37	Little damage but no clear-cut evidence for control

↓ Concentration expressed as cation.

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INSTITUTE FOR FISHERIES RESEARCH

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