

A New Concept In Aquatic Weed Control¹

W. G. PATERSON² AND L. A. ERREDE

3M Company St. Paul, Minnesota 55101

A new concept in aquatic weed control has been developed by the 3M Company. A particulate carrier system for aquatic herbicides has been devised which brings the herbicides into direct and prolonged contact with submersed, floating-leaf and emersed aquatic weeds.

The active ingredient in these formulations is an aluminum complex of the herbicide in question. Formulations have been developed containing the active component of the herbicides, endothall, diquat, silvex, 2,4-D, dalapon, TCA, sodium arsenite, and others.

Extensive field testing in different parts of the United States has been done with formulations of endothall, silvex, and 2,4-D. These materials have been temporarily assigned the code designations 3ME68, 3MS68, and 3MT68, respectively. Experimental labels have been granted for them by the U. S. Department of Agriculture. The active ingredient in each of these three particular products may be considered as a basic aluminum salt of the herbicide. Other inert ingredients comprise the rest of the carrier system.

The new products are wettable powders. When used in the field, the powder is mixed with water and the resulting golden-colored aqueous suspension is sprayed into the area being treated, using conventional equipment. An underwater cloud of very finely divided particles settles in the water and coats the weeds. The herbicides are released from the tiny individual particles over a period of many hours, creating a prolonged high local concentration of herbicide at the plant surface. Since the herbicide formulation is particulate in nature, drift of herbicides in the water is greatly minimized.

The foregoing features of the new formulations offer a number of advantages:

1. Aquatic weed control may be achieved at low dosage rates. For example: 3ME68 will usually control pondweeds, coontail, and other submersed and floating-leaf weeds at 0.25 to 1 ppmw endothall a.e. in spot and marginal treatments.

2. Aquatic weed control can be highly localized. Sharply demarcated plots with almost 100% control have been achieved in plots as small as 1000 sq. ft. Since most large area aquatic weed problem situations call for some degree of localized control, this feature of the new system is very desirable.

3. Additional species may be controlled. One of the predominant nuisance weeds in Florida is *Hydrilla verticillata*. The formulation 3ME68 has shown promise for *Hydrilla* control at 2 to 4 ppmw a.e. in several field trials conducted by the U. S. Department of Agriculture at the Loxahatchee National Wildlife Refuge near Fort Lauderdale, Florida, and elsewhere.

4. Since the herbicide is chemically bonded to the particulate carrier system, and is not released under usual handling conditions, skin irritation is greatly reduced, and odor and staining problems can be eliminated.

5. Preliminary tests show that the formulations have a wide margin of safety for fish and wildlife. Warm water fish exposed for 96 hours in aquaria treated at 5 ppmw a.e. with 3ME68, 3MS68, and 3MT68 showed no mortality. Further work is in progress to determine median tolerance limits and other toxicological data.

6. Since lower dosage rates are possible, environmental pollution is minimized.

Some common weed species controlled by 3ME68 are listed in Table 1. Good results have also been obtained in our preliminary work with elodea (*Elodea canadensis*) and fanwort (*Cabomba caroliniana*), but the data are not yet sufficiently conclusive to warrant inclusion in the list.

A partial listing of weed species controlled by 3MS68 is presented in Table 2. Encouraging results have also been obtained on fanwort. The work to date with 3MT68 shows promise for control of various watermilfoil species and water lilies.

ACKNOWLEDGMENTS

The authors wish to express their appreciation to Robert D. Blackburn and Lyle W. Weldon of the U. S. Department of Agriculture for extensive assistance in the field evaluation of these materials.

TABLE 1. PARTIAL LIST OF WEED SPECIES CONTROLLED BY 3ME68.¹

Common Name	Scientific Name
hydrilla	<i>Hydrilla verticillata</i>
coontail	<i>Ceratophyllum demersum</i>
curly-leaf pondweed	<i>Potamogeton crispus</i>
floating-leaf pondweed	<i>Potamogeton zosteriformis</i>
flat-stem pondweed	<i>Potamogeton nodosus</i>
large-leaf pondweed	<i>Potamogeton amplifolius</i>
white-stem pondweed	<i>Potamogeton praelongus</i>
clasping-leaf pondweed	<i>Potamogeton richardsonii</i>
variable pondweed	<i>Potamogeton gramineus</i>
sago pondweed	<i>Potamogeton pectinatus</i>
American pondweed	<i>Potamogeton nodosus</i>
waterstargrass	<i>Heteranthera dubia</i>
water buttercup	<i>Ranunculus longirostris</i>
northern watermilfoil	<i>Myriophyllum exalbescens</i>
bur reed	<i>Sparganium spp.</i>
bushy pondweed	<i>Najas flexilis</i>
southern naiad	<i>Najas guadalupensis</i>

¹Wettable powder formulation based on endothall.

TABLE 2. PARTIAL LIST OF WEED SPECIES CONTROLLED BY 3MS68.¹

Common Name	Scientific Name
spatterdock	<i>Nuphar variegatum</i>
white water lily	<i>Nymphaea tuberosa</i>
coontail	<i>Ceratophyllum demersum</i>
hydrilla	<i>Hydrilla verticillata</i>
northern watermilfoil	<i>Myriophyllum exalbescens</i>
alligatorweed	<i>Alternanthera philoxeroides</i>

¹Wettable powder formulation based on silvex.

¹Contribution No. 502 from the Central Research Laboratories.

²Now in New Business Ventures Division of the 3M Company.