Field Uses Of Invert Emulsion

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INTRODUCTION

The continuing need for more effective means of controlling noxious aquatic weeds has made it necessary to develop a variety of innovations in equipment and techniques. The high cost of registering new herbicides, together with the risks involved in a limited market has reduced the number of new products for aquatic weed control.

Improvement in the field of aquatic weed control is coming from a more efficient use of presently available herbicides, rather than from development of new compounds.

Invert emulsions have been used for a number of years, especially in terrestrial weed control.

This paper is to report on results of their use in the aquatic weed control program of Old Plantation Water Control District, with some observations that are intended to be useful to individuals who have not yet used them.

CONTROL OF HYDRILLA

In 1972 several 1.0 acre plots were laid out in one of the District's waterways having a dense infestation of hydrilla (*Hydrilla verticillata* Royle). The canal was 65 ft wide, and was 10 to 12 ft deep. Each acre plot received 100 gallons of emulsion. The emulsion was applied as near the canal bottom as possible, using five weighted hoses 20 ft long, with number 107 orifice plates in the tips. The spray mixture consisted of 10 gallons oil, 2 qt of S-120 inverter, 2 gallons 6,7-dihydrodipyrido, (1,2-*a*:2',1-c) pyrazidinium dibromide (diquat), 4 gallons chelated copper, and 25 lb weighting agent. The invert was mixed in a tank on shore, transferred to barrels in the spray boat, and then applied through the hoses.

Hydrilla showed little change 1 week after treatment, but at the end of 2 weeks, control was 90 to 95%.

Satisfactory control lasted for about 3 months. Since May 1972 this treatment or variations of it have been the principal method of controlling hydrilla in the District canals.

During this time results have varied from excellent to poor. Sediment in the water and on plants appears to tie up diquat in some instances, but other factors not fully understood may also have contributed to irregular results. This treatment cost the District less than 100 dollars per surface acre for herbicide.

When the value of invert emulsion in our situation was established, a mix and application system was built incorporating a 100-gallon fiber glass mix tank with a mechanical agitator, a gear pump to handle viscous emulsion, separate clutches for the pump and agitator, an engine speed control, and a valve system to permit water to be picked up from the canal for filling the mix tank, or discharge the emulsion for application. The pre-mix system was chosen to insure that a true invert emulsion was being applied, and not a simple mixture of ingredients.

DUCKWEED CONTROL

For several years duckweed (*Lemna minor* L.) has been a serious problem in District canals, and residents whose property is adjacent to these canals complain about the appearance and odor of the annual build up. Application of diquat or 2-(2,4,5-trichlorophenoxy)propionic acid (silvex) as a liquid or in a foam carrier has given very poor results. Several types of hydraulic pumps, and floating skimmers were tested, but proved to be impractical for field use.

When the mixer and application equipment used for hydrilla control was operative, we tested invert emulsion minus the weighting agent on duckweed. We used 100 gallons per surface acre as a topal spray employing an OC80 tip at 60 P.S.I. for distribution. The tip produced a swath of droplets 12 to 16 ft wide depending on viscosity, wind, and attitude of the spray gun. One gallon of diquat per acre was applied with 2 gallons of chelated copper added for algae control.

Results of the treatment were excellent. Heavy concentrations of duckweed were controlled with two or three treatments. A light maintenance treatment has held growth down during the summer months, and for the first time in several years, District canals have been free of this troublesome aquatic weed.

The amount of diquat could possibly be reduced by

one half, or silvex substituted at the rate of 1 gallon per surface acre. The invert emulsion should be broken into droplets one half the size of duckweed leaves so that as wind or water currents move the weeds, the floating droplets will also move to contact every plant.

DITCH BANK GRASS

We have found that grasses can be controlled by use of an unweighted invert emulsion carrier with 2,2-dichloropropionic acid (dalapon) as the herbicide. The additional expense and trouble of using the invert carrier is frequently justified by the increase in herbicidal activity.

SUMMARY

1. Invert emulsion is safe to use as a surface spray because it has little tendency to drift.

2. For submersed weed control, the inverts tend to "stick" to the plants, and control is more predictable with about one-fifth the herbicide needed as compared to a "parts per million" treatment.

3. Invert emulsions can be structured to float or sink; the weighting agent may be ammate, sugar, or some of the inert salts such as sodium sulphate.

It is suggested that research be conducted to determine which weight is best for the herbicide used.

4. Invert emulsion can be structured to persist for 72 hr, or break down in minutes. Again research is needed to find the most effective release rates for each plant species controlled. This will probably be attained by pairing a particular inverter with the proper oil product.

It is the hope of this writer that answers to these questions will be found so that the unique benefits of invert emulsions can be produced in a more efficient and predictable manner than is now possible.