

AQUATIC WEED CONTROL

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Summary

Diquat at 0.5 p.p.m. throughout entire depth of water has proved very effective in control of *Lagarosiphon major* in large bodies of water. Control is effective as an overall application, even where water movement is up to 1 ft per second.

Paraquat has proved effective as a late season application for drainage weed control. Sodium dichloropropionate mixtures (2,4-D and/or amitrole) must be applied much earlier in the season than paraquat for effective results.

INTRODUCTION

PREVIOUS WORK (Matthews, 1962) reported diquat and paraquat to be effective aquatic herbicides. A further year of trials has clarified the value of these materials in comparison with sodium dichloropropionate mixtures (2,4-D and/or amitrole, hereafter referred to as sodium dichloropropionate mixtures).

SUBMERGED AQUATICS

Lagarosiphon major

In early February, 1963, ten widely scattered areas comprising a total of 32 acres were treated in Lake Rotoiti with diquat at 0.5 p.p.m. to an average depth of 6 ft of water. The water depth varied from 4 ft to 12 ft but an average depth of 6 ft was taken. Water temperature at time of application was 68°F. Water movement was near static in some areas but in one or more areas water movement was in excess of 1 ft per second. The application was made by helicopter as an overall treatment.

Destruction of *Lagarosiphon major* occurred most rapidly in the still water areas but excellent control was achieved even where water movement was greater than 1 ft per second. After two months, even in the deepest water, stems were brittle and partly decomposed.

Aponogeton distachyus (Cape pond weed)

Initial trials with injection of diquat at 5 and 10 p.p.m. (amount adjusted to flow of water) showed some defoliation. In the second series of trials, the diquat was added at ¼ p.p.m. over one hour and two hours (again the rate adjusted to flow of water). Some defoliation occurred. An overall application of diquat at 2 lb a.i. per acre looks more promising.

Callitriche stagnalis

The only effective control of this species has been obtained with aromatic solvents applied as an overall application. Control with diquat and paraquat has been temporary. Other materials have been non-effective, except 2,4-D and fenoprop at 10 p.p.m. in stagnant water.

FLOATING AQUATICS

Duckweeds

These are usually a complex of *Lemna minor*, *Wolffia arrhizia* and *Spirodella oligarrhizia*, and are effectively controlled by diquat

and paraquat as an overall application at rates as low as 0.5 lb a.i. per acre. Excellent control is also obtained with low rates of aromatic solvents applied as an overall application. These species are not controlled by sodium dichloropropionate mixtures or fenoprop.

Azolla filiculoides var. *rubra*

This species possibly shows greater susceptibility to paraquat than diquat. Both, however, are effective at rates of 0.5 to 1 lb a.i. per acre as an overall application. Aromatic solvents as an overall application are equally effective. These species are not controlled by sodium dichloropropionate mixtures or by fenoprop.

EMERGED AQUATICS

Glyceria maxima

Paraquat at 1 lb a.i. per acre plus wetting agent has given excellent control of this species when applied late in the season (May, before the onset of heavy rain). Sodium dichloropropionate applied at 14.6 lb a.i. per acre failed to give adequate control until the following spring when applied at the same period as paraquat.

Glyceria fluitans

All chemicals employed — paraquat, diquat, sodium dichloropropionate mixtures, amitrole plus ammonium thiocyanate, and isocil — have failed to give adequate control of this species in late spring applications in water.

Typha angustifolia (Raupo)

It is known that sodium dichloropropionate and amitrole are effective in control of this species. Paraquat looks promising as a late autumn application.

DISCUSSION

Results of trials indicate the effectiveness of chemicals depends on the inter-related factors of:

- (1) Type of vegetation present.
- (2) Presence or absence of water.
- (3) Whether water is near static or moving.

If moving water is present, sodium dichloropropionate mixtures may give effective control of emerged broad-leaved weeds and grasses but no control of floating and submerged aquatics is obtained. If left unchecked, floating and submerged aquatics largely annul the effect of removing the emerged aquatics. Paraquat applied late in the season gives superior results, as its effect has been to remove floating vegetation and to kill or seriously check emerged vegetation. An increase in water level results in the area being kept weed-free until the water level again drops the following late spring or autumn.

In the absence of water, sodium dichloropropionate mixtures are very satisfactory applied 6 to 8 weeks ahead of water movement. Paraquat, or possibly paraquat plus PP 831, applied a week or so ahead of water movement is possibly equally as satisfactory. Applied earlier, the results of paraquat may not be as good as sodium dichloropropionate mixtures.

Diquat has been effective in water moving at 1 ft per second as an overall application. Under the same conditions, it was not as effective as an injection method. Other trials confirm that the injection method may not lead to as good results. Similar results have been obtained with aromatic solvents applied as an injection method.

CONCLUSIONS

Conclusions are given in Table 1 and refer to areas where water movement is less than 1 ft per second and to overall applications.

ADDITIONAL POINTS

- (1) No advantage has been obtained by adding:
 - (a) Diquat to paraquat; or
 - (b) Paraquat to sodium dichloropropionate; or
 - (c) Diquat to sodium dichloropropionate.
- (2) Iccil and possibly bromacil have given poor results if water is present.
- (3) Diquat has shown no permanent effect on submerged or floating grasses.
- (4) Fenac, 2,4-D, and fenoprop have proved successful only in static water where period of contact may be maintained in excess of 48 hours.
- (5) *Paspalum distichum* is most effectively controlled by amitrole plus ammonium thiocyanate in the absence of water.

TABLE 1: AQUATIC WEEDS

	<i>Broad-leaved</i>	<i>Grasses and Broad-leaved</i>
Submerged	diquat	paraquat (tentative)
Floating	diquat or aromatic solvents	paraquat
Emerged	2,4-D	Dry late summer, early autumn: sodium dichloropropionate mixtures. paraquat + PP 831 (tentative) Water present all year: paraquat.

ACKNOWLEDGEMENTS

The assistance of the Mobile Weed Team, C. R. Taylor of Rotorua, and Shell Oil New Zealand Ltd., in laying down trials is gratefully acknowledged.

REFERENCE

Matthews, L. J. 1962: Aquatic Weed Control. *Proc. 15th N.Z. Weed Control Conf.*, pp. 198-201.