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Toxicity of Altosid and Dimilin to Juvenile Rainbow Trout and Coho Salmon

A. B. McKague, and R. B. Pridmore
B.C. Research, 3650 Wesbrook Mall, Vancouver, B.C., Canada V6S 2L2

INTRODUCTION

Chemicals which disrupt the growth of insects are currently undergoing extensive testing as alternatives to traditional insecticides for the control of insect pests. These chemicals, usually referred to as insect growth regulators, are rapidly biodegraded, highly selective, and effective at very low concentrations, therefore are regarded as being preferable to many of the insecticides in use today.

Altosid and Dimilin are insect growth regulators which have high activity against many Diptera. Altosid can prevent adult emergence of mosquitoes (SCHAEFER and WILDER 1972), houseflies (JAKOB 1973), stable flies (HARRIS et al. 1973) and black flies (CUMMING and McKAGUE 1973) by preventing metamorphosis of final instar larvae. Dimilin inhibits molting of larvae of mosquitoes (JAKOB 1973a), houseflies (JAKOB 1973a), stable flies (WRIGHT 1974) and black flies (McKAGUE 1976) by interfering with chitin synthesis (POST and VINCENT 1973). In conjunction with an evaluation of the effects of insect growth regulators on black flies, we have determined the acute toxicity of Altosid and Dimilin to juvenile rainbow trout, Salmo gairdneri, and juvenile coho salmon, Oncorhynchus kisutch. Both trout and salmon inhabit streams in parts of Canada and would be non-target organisms of major concern should the use of Altosid or Dimilin be contemplated for control of black flies.

MATERIALS AND METHODS

Static bioassays were performed in dechlorinated Vancouver tap water which had the following characteristics: pH 6.5, conductance 14.5 μmhos/cm, alkalinity 2.2 mg $CaCO_3$/l, EDTA hardness 4.55 mg $CaCO_3$/l and temperature 11 ± 1°C. Altosid SR-10 (Zoecon Corporation) and Dimilin W-25 (Thompson-Hayward Chem. Co.) were tested. Fish loading was approximately 1 g/l and dissolved oxygen content was maintained at saturation throughout the 96-h bioassay by gentle passage of air through Pasteur pipettes into the bioassay mixture. In addition to the standard 96-h bioassays using various amounts of Altosid and Dimilin,

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the effect of a 15-min exposure of both species of fish to 1 g/l Dimilin was determined. After the 15-min period, fish were transferred to dechlorinated tap water and maintained in the usual manner for 96 h. All concentrations are expressed as active ingredient. The 96-h LC50 value for Altosid was determined with 95% confidence limits using a NORMIT computer program at the University of B.C., Vancouver.

RESULTS

Dimilin was not toxic to either rainbow trout or coho salmon up to 150 mg/1, the maximum concentration tested for a 96-h period. A 15-min exposure to 1 g/l Dimilin also did not result in any fish mortality. The 96-h LC50 for Altosid (95% confidence limits in parentheses) for rainbow trout was 106 mg/1 (92-121 mg/1) and for coho salmon was 86 mg/1 (81-91 mg/1).

The toxicity of Altosid and Dimilin is very low compared with reported values for black fly larvicides presently in use. For example, the 96-h median tolerance limit of rainbow trout to methoxychlor is reported as 0.06 mg/1 (KATZ 1961) and Abate is 1.0 mg/1 (SAHA 1972). The low toxicity of Altosid and Dimilin to these important species of fish indicates use of these materials for black fly control should be considered in planning future programs.

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