Summary

In the interior of British Columbia, carbophenothion, diazinon, endrin, and ethion were tested for control of onion maggot, *Hylemya antiqua* (Meig.). They were applied as granular formulations to the furrow at 1 or 2 lb toxicant per acre or as wettable powder to the seed at 1 oz per lb of seed. Captan was added to half of each plot for smut control. The three organophosphate insecticides gave good to excellent control in mineral and peat soil. Endrin, to which resistance had arisen, allowed various amounts of damage up to 78.5 per cent. Diazinon caused considerable reduction in the number of emergent seedlings, especially in sandy loam. The other treatments had little or no effect on emergence, nor were other phytotoxic symptoms noted. Average yield in lb of marketable onions from 20 row-feet were: ethion, 14.7; carbophenothion, 14.5; diazinon, 14.4; endrin, 12.9; and untreated, 2.7.

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CONTROL OF MOUNTAIN PINE BEETLE, *Dendroctonus ponderosae* HOPK. BROOD IN LOGS WITH LINDANE EMULSION

D. A. Ross[1]

Introduction

In the southwestern United States, lindane in oil, to a great extent has replaced other chemicals in the control of *Dendroctonus* spp. in logs and slash. In British Columbia, Kinghorn (1955) demonstrated that ethylene dibromide or lindane in oil-in-water emulsion was effective against the mountain pine beetle in lodgepole pine. Nevertheless, ethylene dibromide, without exception, has been recommended and used as the bark beetle control insecticide in the interior of British Columbia. Ethylene dibromide in oil-in-water emulsion has proved inconvenient to handle and recently the insecticide has become difficult to obtain. Therefore, the following test was carried out in order to assess the effectiveness of lindane emulsion against mountain pine beetle, *Dendroctonus ponderosae* Hopk., in white pine, *Pinus monticola* Dougl., under conditions in the interior of British Columbia.

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Methods and Results

On 4 May 1964 at Trinity Valley, a white pine tree infested by *D. ponderosae* in 1963 was felled and cut into 14 three-foot-long bolts.

On 25 May every second bolt from the tree bole was sprayed with one per cent emulsion*. The emulsion was applied with a hand sprayer to all sides of the test bolts at the rate of one gallon per 100 square feet. The alternate bolts were left unsprayed as a check.

A two-foot-long section of each bolt was caged individually at Vernon on 15 July, and adult emergence was recorded daily until the test was discontinued on 24 August. A one-foot-long section of each bolt was peeled and the numbers of living and dead *D. ponderosae* were recorded.

The number of emerged adults and the numbers of living larvae, pupae and unemerged adults per square foot are shown for each bolt in Table 1. Data from paired adjacent treated and untreated bolts are given beginning with the basal pair "A" to the uppermost pair "G."

Total emergence was 1,268 adults. The adults were segregated by date of emergence in screen-topped jelly jars in the insectary and the date of death of each individual was noted. Fifty per cent mortality of adults occurred 2.5 days after emergence from the lindane treatment bolts and 6.8 days after emergence from the check bolts. The beetles emerging from the treated logs died with their elytra open and wings extended; almost all beetles from untreated logs died with elytra closed.

TABLE 1—Number of **Dendroctonus ponderosae** larvae, pupae and adults, per square foot of white pine bolt, 24 August, 1964.

	Lindane			Check			
Bolt	Emerged adults	Living L.P.A.	Total living	Emerged adults	Living L.P.A.	Total living	% Survival treated
A	1.2	13	14.2	32.4	7	39.4	36
B	0	11	11.0	56.8	2	58.8	19
C	5.8	6	11.8	12.9	25	37.9	31
D	1.0	14	15.0	27.0	4	31.0	48
E	0	2	2.0	16.5	15	31.5	6
F	0	1	1.0	0.3	35	35.3	3
G	0	4	4	2.4	58	60.4	0

Discussion

The total number of adults emerging from the treated bolts was only about five per cent of the number that emerged from the untreated bolts. The former lived for a shorter time after emergence than did the adults from untreated bolts. All adults that emerged from the sprayed bolts died with elytra open. Lyon and Wickman (1960) observed that *Dendroctonus* "—had their elytra locked open, which is the most conspicuous symptom of lindane poisoning." Probably sufficient poison was picked up to produce a debilitating effect making them incapable of reproducing during their shortened lifetime.

Adults were removed from the cages only once daily and therefore those from the treated logs may have been exposed to poison on the bark longer than they would have been under normal field conditions. However it is believed that the most critical period of exposure to the poison may have occurred as the adults chewed their way out through the bark, particularly since dead adults were more numerous in the exit galleries of the treated than the untreated bolts.

The test was adequate but not complete since a number of living adults and larvae were still in the bolts on 27 August. Living larvae and pupae in the check bolts were more numerous in the sections from the upper bole, whereas they were more

* 8 fl. oz. of Lintox (an emulsible concentrate containing 20% lindane) per Imp. gal. of water.

numerous in the sections from the lower bole in the lindane treatment. Possibly control may have been more effective against the larvae in the thinner-barked upper sections.

This trial indicates that more experimental work should be done with lindane, preferably under varied environmental conditions. Air temperature at the time of spraying was 70° F; temperature rose to the high 70's daily for the following week, during which time there was no rainfall. Possibly an oil carrier might have been desirable had inclement weather followed treatment or if treatment had been carried out in the winter.

Summary

A one per cent emulsion of lindane applied on 24 May, 1964 controlled *Dendroctonus ponderosae* Hopk. in a freshly-felled *Pinus monticola* Dougl. tree at Trinity Valley in the interior of British Columbia.

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RELEASES OF CINNABAR MOTH, *Hypocrita jacobaeae* (L.), (LEPIDOPTERA: ARCTIIDAE) ON TANSY RAGWORT IN BRITISH COLUMBIA[1]

A. T. S. WILKINSON

Introduction

Tansy ragwort, *Senecio jacobaea* L., a noxious weed native to Eurasia, has been introduced into New Zealand (Cameron, 1935) Tasmania, Australia, South Africa, and North and South America (Harper and Wood, 1957). In Canada it is established in Nova Scotia and has been in British Columbia at least since 1950 (Harris, 1964, Hughes, 1951). It is well established in pastures in the lower Fraser Valley near Abbotsford and on Vancouver Island near Nanaimo. Regular spraying with herbicides or cutting before flowering is needed to keep it in check.

In British Columbia only three insects have been found feeding on tansy ragwort during four years: caterpillars of *Phragmatobia fuliginosa* L.; *Aphis lugentis* Williams; and the dipterous leaf miner *Phytomyza atricornis* Meigen. Only a few of the caterpillars have been found and the aphids appear to have little effect on the plant. The leaf miner becomes effective only in the laboratory. In Washington, Oregon and California, 15 endemic insects were reared to maturity on tansy ragwort but many of these were of minor importance and some were rare (Frick, 1964). None of the endemic insects appears to be effective in impeding the growth and spread of this weed.

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