within 5 days, while >50% of those from control logs survived 5 or more days.

Then, Durban 64 appears to be slightly more effective than Serin 81, but only at a concentration of no less than 2%. These encouraging results with water-based formulations indicate that a detergent such as dish-wash soap need not be transported to target areas that have an adequate source of nearby water.

The effectiveness of both insecticides for remedial treatments (Table 1, Fig. 1), and their efficacy in preventing attack by Dendroctonus spp. (Hall et al., 1982; McCashrey 1985) suggests that they may reliably replace lindane for direct suppression of the mountain pine beetle in lodgepole pine.

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REFERENCES


SOME EFFECTS OF PINE OIL ON MOUNTAIN PINE BEETLE (COLEOPTERA: SCOLYTIDAE) AT DIFFERENT POPULATION LEVELS
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ABSTRACT
Two formulations of pine oil (BBRE and Norpine 65) were tested for effectiveness in preventing attacks by mountain pine beetle and reducing bud production at different population levels in lodgepole pine trees. Pine-oil-baited trees sprayed with BBRE had a lower attack intensity than baited check trees and a lower brood success than either baited check trees or baited trees sprayed with Norpine 65. Only at a low population level was attack intensity reduced by both pine oil treatments. The proportion of attacked trees within 10 m of the treated trees was lower in low than in high populations but showed no difference among treatments.

RESUME
On a vérifié l'efficacité de deux préparations d'huile de pin (BBRE et Norpine 65) pour prévenir les attaques des dendroctones du pin poudros et réduire la production de bourgeons chez les insectes à différents niveaux de population habitants les pins tordus. Avec la BBRE, l'intensité de l'attaque des arbres piégés avec des phragmites a été moins élevée que dans les cas des arbres témoin piégés, et les couvées ont été aussi moins nombreuses que dans le cas des arbres témoin piégés ou des arbres piégés avec Norpine 65. L'intensité de l'attaque a été réduite par les deux préparations à de faibles niveaux de population seulement. La proportion des arbres attaqués à 10 m de distance des arbres traités a été similaire à des faibles niveaux de population qu'à des niveaux élevés, mais l'emploi de l'une ou de l'autre préparation a fait auxseances définitives remises.

INTRODUCTION
Pine oil (Norpine 65) has been demonstrated to be effective in preventing attacks on treated and untreated neighboring trees by three species of Dendroctonus bark beetles (Niholt and McMullen 1983, Niholt et al. 1983), and by ambrosia beetles on larch (Niholt 1980). Another formulation of pine oil (BBRE) appears to be effective also in preventing attack by mountain pine beetle, D. ponderosae Hopkins, on lodgepole pine. Pine oil contains Douglas (Niholt, personal communication). However, BBRE as sheeted pine pieces distributed on the ground at the rate of 50 kg/ha (McMullen and Safarank unpublished) or fastened on baited trees (Niholt, personal communication) did not prevent attack on lodgepole pine by mountain pine beetle except in one location where population pressure might already have been low.

This report describes a study in which both pine oil s, BBRE and Norpine 65, were used in locations with different beetle populations to compare their effectiveness in preventing attacks on treated and neighboring untreated lodgepole pine trees.

MATERIALS AND METHODS
The study was carried out in mature (>50 yrs. +), predominantly pure lodgepole pine stands of poor to medium site quality in the Cariboo Forest Region. The beetle population in each stand was rated as high or low on the basis of general tree mortality within the area. The locations of each stand and its population ratings were as follows:

a) Alkali Lake Road, high population.

b) Toth Lake, high population.
c) Tyke lake, low population.

d) Each location of treatment was selected to encompass a 250 x 250 m plot. The location of each stand was selected at the rate of approximately 2 per stand (0.52 ha area) with a garden-type pressure sprayer. The check treatment trees were left unsprayed. Each treatment tree was baited with 0.5 cm of tree-removal and 0.5 cm of moss in separate, size 00, REEMAI capsules. The treatment trees, as well as three trees within 10 m, were monitored for attack (entrance holes) between August 3 and 13 (Table 1), after the attack period. The
Early Season Apple Pest Management: Control of Two Species of Scales (Homoptera: Diaspididae) and Bruce Spawnworm (Lepidoptera: Geometridae) with Methidathion

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Abstract
The organophosphate insecticide, methidathion, proved to be more effective for the control of San Jose scale (Quadraspidiotus perniciosus (Comstock)) and European flat scale (I. oryzae) than dormant oil when applied at the tight cluster stage of bud development. The compound also provided effective control of Bruce spawnworm (Prosthesia tredecimpunctata (Hulst)) and did not cause excessive mortality of the predatory mites responsible for the biological control of orchard phytophagous mites. Methidathion use could be integrated into existing orchard pest management programs by using currently accepted sampling schemes for the above pest complex to determine when thresholds requiring treatment have been exceeded.

Introduction
In British Columbia, apple orchards, San Jose scale and European flat scale are serious pests in view of the requirement of several overseas export markets for apples to be free of San Jose scale. On apple fruit, European flat scale is almost indistinguishable from San Jose scale and hand sorting to remove scale infested apples increases packaging costs that can best be reduced through improved control measures in the orchard.

Current recommendations for San Jose scale involve application of petroleum oils during the dormant period with later applications of the organophosphate diathane for control of the flying males in order to disrupt mating (Boivin and Logan 1977) and for control of summer crawlers. These procedures have inherent logistical, financial and technical difficulties that cause them to be less than 100% effective. The oil sprays are difficult to apply because of adverse winter weather and because equipment limitations often prevent the complete tree coverage which is necessary for effective scale control. In some years the scales emerge during the dormant period which prohibits economical use of spray application with these single emulsions. The crawlers are very small and difficult to detect, thereby making the timing of spray applications difficult.

Control of European flat scale currently relies on the application of dormant oil only, as the males almost always emerge during late fall and emergence of crawlers extends for much of the winter season which would therefore require repeated diathane applications.

The objective of this project was to:
1. determine if the organophosphate, methidathion, could be used during the dormant period to control both species of scale;

2. determine if this single spray could replace all or any of the currently recommended sprays.
3. measure the effects of methidathion on predatory mites in order to determine the potential impact of the compound on the integrated mite control program;
4. measure the effects of methidathion on the early season bud-feeding Bruce spawnworm.

Materials and Methods
For all treatments, the spray mixture used was a commercial 25 EC formulation (Supradite) which contains 50% diluted dimethyl phosphate. The commercial 25 EC formulation (Supradite) was used. Dormant oil used was Ace dormant spray oil (viscosity approximately 150-200). San Jose Scale. 1983
A commercial orchard in Osoyoos, B.C. consisting of mixed Red Delicious, Golden Delicious and Winesap apple trees, about 20-year-old and planted 8 x 6 m, was divided into 4 equal-sized plots that each consisted of at least 4 trees heavily infested with San Jose scale (SJS). Red Delicious trees were used as much as possible but Winesaps were included as necessary. Two guard trees were left between each plot. Treatments were assigned randomly and applied at the 5 mm green stage of bud development on the Red Delicious trees, using an air-blast sprayer calibrated to deliver 357 L/ha. At harvest, 300 apples were sampled from each of the 6 designated cored plots. Treatments and rates of application are shown in Table 1. 1984
The same orchard was used again with some operational differences. Only Red Delicious trees were used, treatments were applied during the tight cluster stage of Red Delicious bud development, and only 400 apples per tree were sampled at harvest.