TITLE Cone and seed insect control trials - interim report

Report prepared by: D. Summers (Typed)

Report & Distribution approved by: J. Konishi (Typed) (for Regions - Silviculture Officer)

(a) Wide Distribution □
(b) Limited □
   (i) Internal - Branch only □
   (ii) External - Designated □
   (iii) Ministry only □

COPIES TO

Silviculture Branch Library □
Coastal Technical Planning Committee □

Approved:

Manager - J. Konishi (Typed) (for Regions - Forestry Manager)
CONE AND SEED INSECT CONTROL TRIALS

SX 82301 Q

INTERIM PROJECT REPORT

BY

D. SUMMERS
Objective

The objective of this trial was to test tree injections and soil incorporation of systemic insecticides for Douglas-fir cone and seed insect control. Methods and chemicals tested are outlined in Table 1.

Location

Sites were selected to account for a variety of growing conditions. Federal and Provincial research permits were obtained for the sites in Table 2.

Work Done

1. Injections

A total of 186 trees were injected using Mauget injectors containing bidrin, acephate or metasystox-R. The injection process was as follows: a small hole was drilled into the cambium layer and an injection tube was inserted; a factory loaded capsule was pressurized and fitted on the other end of the tube; the seal of the capsule was then broken to allow the pesticide into the hole. This process was repeated at approximately 6 or 12 inch intervals around the tree as measured by a special tool used in the injection process. Capsules were removed when empty and disposed of.

Table 1 Methods and materials used in 1982 Cone and Seed Insect Control Trials

1. Tree injection
   Mauget Injecticide capsules containing metasystox-R
   Mauget Injecticide O capsules containing acephate
   Mauget Injecticide B capsules containing bidrin

2. Soil Incorporation
   Furadan 10 G granules
   Metasystox R emulsifiable concentrate
Table 2 Sites used in 1982 Cone and Seed Insect Control Trials

<table>
<thead>
<tr>
<th>Site</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quinsam Seed Orchard</td>
<td>Campbell River, B.C.</td>
</tr>
<tr>
<td>Lake Cowichan Research Stn.</td>
<td>Lake Cowichan, B.C.</td>
</tr>
<tr>
<td>Saanich Seed Orchard</td>
<td>Saanichton, B.C.</td>
</tr>
<tr>
<td>Australian</td>
<td>near Quesnel, B.C.</td>
</tr>
<tr>
<td>Keremeos</td>
<td>near Keremeos, B.C.</td>
</tr>
</tbody>
</table>

Treatments were made at the recommended time, that is, when the conelets were erect and opening. At least 1 sample of at least 30 cones was taken at each site after the cones were pendant to determine if insects were present in the area. Cones were collected near the end of August at sites where the possibility of significant insect activity was noted.

2. Soil Incorporation

A total of 40 trees at Australian, B.C. had either Metasystox-R or Furadan 10 G incorporated into holes around the dripline. Four to 5 holes were dug equidistantly around the tree and pesticides were distributed evenly at rates of 5 or 10 g active ingredient per inch dbh. Timing and sampling was the same as for the injections but because there was no significant insect activity at the site, no cones were collected.

Results

Populations of the Douglas-fir cone moth (*Barbara colfaxiana*) and the Douglas-fir cone gall midge (*Contarinia oregonensis*) were extremely low at all sites except one. When cones were collected at that site, copious amounts of coarse, webbed frass in cones indicated that late feeding *Diorystria* sp. had destroyed the cones along with most evidence of the other insects. For these reasons, no significant information was obtained regarding control of the cone moth or gall midge. It is not known exactly when *Diorystria* entered the cones and as no larvae were found, any conclusions would only be speculative. Some observations should be noted however regarding the application techniques themselves.
Operationally, the Mauget injection system is fairly straightforward but it is not without problems. The injectors won't drain if the holes are drilled more than 3-4 mm past the cambium and it is sometimes difficult to be that accurate with 2 inches of bark to drill through. Capsules often leak on thin barked trees where there is not enough bark to support the injection tube adequately when the capsule is tapped on. The contents can also be lost if the capsule is not exactly straight when being attached to the tube. In this case, the plastic around the seal will break and the pesticide will squirt out. Some capsules do not have a hole quite large enough for the injection tube to fit in easily. Unless extreme care is taken with these the tube will rip the plastic around the hole it is supposed to fit into and cause a loss of pesticide. Most of these problems are overcome with care and experience with the method but the fact that they do happen shows a need for training in the technique and for strict observance of safety precautions.

Over all sites, the average time for 2 men to find and inject a tree was 10 minutes. An average of 4-6 injectors were used to give the recommended dose of one capsule/6" circumference. Using an arbitrary rate of $12.00/hour for labor and an average cost of $1.64/capsule, the cost per tree works out to $10.56-$13.84. This cost includes only the time on site because all sites were located close enough to Ministry District Offices for treatments to be completed in one working day per site. Dale and Frank (1981) injected 27 trees spread over 4 seed zones in California at a reported cost of $68.39 per tree. They also estimate a minimum cost of $25.00 per tree in more localized treatment areas. This trial affirms that substantially less cost is incurred when treatment trees are located close together. Even so, whether such expense is economically justified would depend on the value placed on the seed, the amount of seed being produced on each tree, the amount of insect damage expected in a given year and the degree of protection afforded by the insecticides.

Dale and Frank (1981) found that treatments applied when flowers were approaching pendant apparently controlled the cone moth and gall midge just as well as earlier treatments did. In the present trial, injections were made at the recommended time when flowers were erect and opening. As a result, the treatments were made before insect populations could be sampled.
time for cone moth and gall midge is when the flowers are closed (Nursery Production Guide 1982). If treatments are delayed until this time it would appear that adequate control can be achieved and that individual trees or areas with significant insect populations could be selected.

Soil incorporation of Furadan 10 G and Metasystox-R was relatively straightforward. It was more time consuming than the injections because each tree had to be measured, rates had to be calculated, pesticides had to be measured and holes had to be dug. Trees were close enough together however, that 40 trees were treated in 8 hours. This works out to about 12 minutes per tree for 2 men.

There are no recommendations to follow regarding timing of soil applications for cone an seed insect control. If Maugé injections are effective from when flowers are erect until they are approaching pendant, it can probably be assumed that soil treatments should be applied a bit earlier to allow for the chemical to be taken up by the roots. Treating trees no later than when flowers are closed and turning would probably allow enough time as long as there is sufficient soil moisture.

Chemical costs per tree for soil application at the highest rates used was approximately $6.00 for Metasystox-R and $3.45 for Furadan 10 G. Using the same cost for labor as was used for the injections this amounts to $10.00 per tree for Metasystox-R and $7.45 per tree for Furadan. Again, this does not include long distance travel costs. This trial did not indicate whether these rates controlled the insects so the figures must be viewed with caution.

Conclusions

Slight modifications in the timing of application are necessary to ensure significant insect populations in test areas. According to Dale and Frank (1981), this should not affect the expected degree of control.

The techniques are relatively simple to learn but safety precautions must be adhered to. Travelling can increase the cost of treatment substantially but as long as cone producing trees in a stand are located close together, costs can be kept down.
Status

A smaller, more intensive trials should be conducted in 1983. The treatment date should be delayed long enough to sample insect populations on individual trees or on a site and only trees on sites with significant populations should be used. Sampling methods outlined for seed orchards in the 1982 Nursery production Guide should be used as a guideline for treatment. Cones should be collected in mid to late July so that the presence or absence of Dioryctria can be established with certainty and so evidence of other insect activity can be distinguished.

References cited

B.C. Ministry of Agriculture and Food. Nursery Production Guide 1982