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TWO SEVERE ATROPELLIS CANKER OUTBREAKS  
ON LODGEPOLE PINE IN ALBERTA

by

R.J. Bouchier

INTERIM REPORT  
FOREST BIOLOGY LABORATORY  
CALGARY, ALTA.

CANADA  
DEPARTMENT OF AGRICULTURE  
SCIENCE SERVICE  
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JANUARY, 1956

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## INTRODUCTION

The fungus, Atropellis piniphila (Weir) Lohman and Cash, is associated with cankers on several species of hard pines and more rarely on soft pines. The trees reported to be susceptible (Lohman and Cash 1940, Weiss and O'Brien 1953, Bouchier 1954, Molnar 1953) are: Lodgepole pine (Pinus contorta Dougl.) in Montana, Idaho, Washington, Oregon, Alberta, and British Columbia; Ponderosa pine (Pinus ponderosa Laws.) in New Mexico, Arizona and Montana; Jack pine (Pinus banksiana Lamb.) in South Dakota?; Jeffrey pine (Pinus jeffreyi Grev. and Balf.) in Oregon; Loblolly pine (Pinus taeda L.) in Alabama; Virginia pine (Pinus virginiana Mill.) in Tennessee; White barked pine (Pinus albicaulis Engelm.) in Washington, Oregon, Idaho, Arizona, New Mexico; and Western White Pine (Pinus monticola Dougl.) in Idaho.

In the Alberta region to date, lodgepole pine is the only tree found attacked by A. piniphila (Plate I). Weir (1921) reports that the disease is most severe in young over-crowded stands 5 to 25 years old. Damage includes malformation of the bole in the vicinity of the canker, and discoloration of the wood beneath the canker. The ability of the fungus to kill trees or to reduce growth in volume has never been definitely established.

Two areas of severe infection of Atropellis canker on lodgepole pine were discovered in Alberta during disease survey scouting activities in 1954. One large infected area is in the vicinity of Robb, Alberta, and a smaller one is in the Blakiston Brook valley of Waterton Lakes National Park. In 1955, more detailed surveys were conducted in these areas to map the infected zones and to make some estimate of the severity of the condition.

## METHODS OF SURVEY

### Robb Area

During the 1954 season, a total of 44 non-permanent, 1/40 acre plots were laid out in lodgepole pine stands along the three roads radiating from the Robb vicinity. All trees on these plots were carefully examined with binoculars for the presence of Atropellis cankers. The stem cankers were counted and the presence or absence of branch cankers on each tree noted.

In addition, thirteen semi-permanent plots, 1/20 acre in size, were established in the immediate vicinity of Robb and Coalspur to study the progress of the disease.

In 1955, further information was obtained on the extent of the disease in the Robb vicinity. The sampling system used was a modification

of the random pair - random bearing technique outlined by Cottam and Curtis (1949). A sampling point was selected in the stand to be sampled, far enough within the stand to avoid any edge or marginal effects. From this point, the closest tree and the tree closest to it, were examined for Atropellis. Twenty single paces were then taken along the bearing between this first pair of trees, and again the closest pair of trees was examined. This was continued until 20 trees had been examined around each sample point.

This method is simply a technique for the random selection of trees. Stands of pole size trees were selected from forest type maps to give a reasonable coverage of the area thought to carry heavy infection. A sampling point was haphazardly chosen in these selected stands. Areas on maps were estimated using a transparent dot overlay, and counting the dots contained in the zone whose area was required. Trees were classified only as to the presence or absence of Atropellis canker. A total of 920 trees were examined around 46 sampling points distributed over a triangular area approximately 30 miles by 30 miles by 24 miles in the Robb-Coalspur infection area.

#### Waterton Lakes Area

At Waterton Lakes a total of 480 trees were sampled in groups of 20 from each of 24 points over an area of approximately five miles by two miles. One tree in most of the 20 tree samples was examined with an increment borer to determine stand age.

### RESULTS

#### Robb Area

The plots laid out in 1954 provided a rough estimate of the size of the area and the incidences of infection to be encountered. This information assisted in locating the 1955 sampling points.

The 1955 sampling points and the percentage of infected trees are shown on the map reproduced in Figure 3. The area inside the hatched line, in which all sampling points except one showed an Atropellis incidence of over 70%, is some 125 square miles in extent. Limited coverage makes it impossible to estimate the size of the medium intensity area (medium intensity arbitrarily set at 41 to 70% of the trees infected) or the light intensity area (light intensity arbitrarily set at 11 to 40% of the trees infected). Information on the number of sample points and the average incidence in each intensity class, together with a statistical measure of dispersion for each average, is contained in Table I. The low values for the standard errors of the means indicates that the sample size in each incidence class was reasonably adequate.

TABLE I

Atropellis Incidence In The Robb-Coalspur Area, 1955

	Heavy	Medium	Light
Number of Samples	12	13	21
Average Incidence	80.5%	54.3%	25.5%
Standard Deviation	7.5	5.8	7.7
Standard Error of Mean	2.17	1.61	1.68

Waterton Lakes Area

The locations of the sampling points and the Atropellis incidence at each point is shown on the map reproduced in Figure 4. All sample points examined, except three, are in the heavy incidence class (70% of the trees infected). The area within the hatched line is estimated to contain some six square miles. The average incidence of infected trees within the hatched line is 89.3%, with a standard deviation of 8.8 and a standard error of the mean equal to 1.91.

DISCUSSION

The affected stands are generally sub-mature, pole sized trees; those on the Waterton area average 73.4 years old, with a standard deviation of 17.7 (basis 16 trees at 16 out of 21 sample plots). The Robb-Coalspur stands appear to be of similar age judging by size. Unfortunately, ages are not available for trees on the non-permanent sampling plots or points in the Robb area.

A great many branch cankers were noted at both locations. Their presence may indicate that the disease is still building up. Presumably, branch cankers will move inward along the branch and ultimately develop into stem cankers, although this is not firmly established. The presence of branch cankers high in the crowns of 75 year old trees is good evidence that the disease is not restricted principally to young stands 5 to 25 years old as claimed by Weir (1921) and reiterated by Boyce (1948).

The disease is not a rapid killer. Several cankers were sectioned at both localities and found to be upwards of 15 years old, the girdling action must be relatively slow compared to such serious canker diseases as



white pine blister rust and the larch canker. The stands at Robb and at Waterton are not considered to be in danger of immediate extensive mortality.

No information is available in the literature on the loss caused by Atropellis in lodgepole pine. Whether the disease causes increased mortality is not clear, although it is quite likely that such is the case. The losses in lumber and pulp production due to discoloration, misshapen boles, excess resin in the wood, and other factors have never been evaluated. Research is urgently needed on these questions before infected lodgepole pine stands can be managed intelligently.

#### SUMMARY

Two epidemics of Atropellis canker on lodgepole pine are described and mapped. At Robb, Alberta, an area of approximately 125 square miles supports pine stands with an incidence of over 70% of Atropellis infection. At Waterton Lakes National Park, Alberta, an area of approximately six square miles supports stands of pine showing an incidence of Atropellis of over 70%.

Evidence that stands as old as 75 years are still being attacked is presented.

The need for extensive research on the disease is emphasized.

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**PLATES**

PLATE I

Fig. 1. Atrypellis canker on  
main stem of a young  
lodgepole pine.

Fig. 2. Close up of the black  
fruiting bodies of the  
Atrypellis fungus.

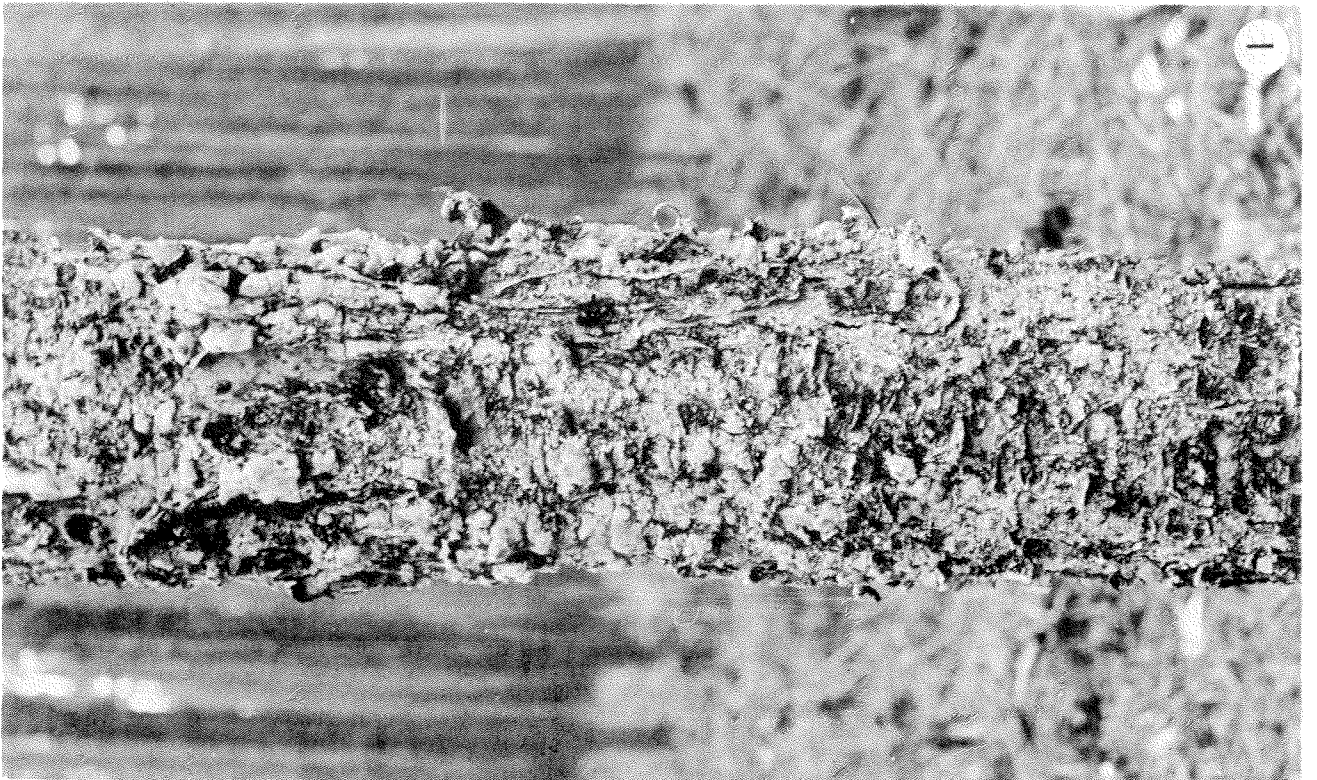


PLATE II

Map of the Robb - Coalspur  
Atropellis infection area.

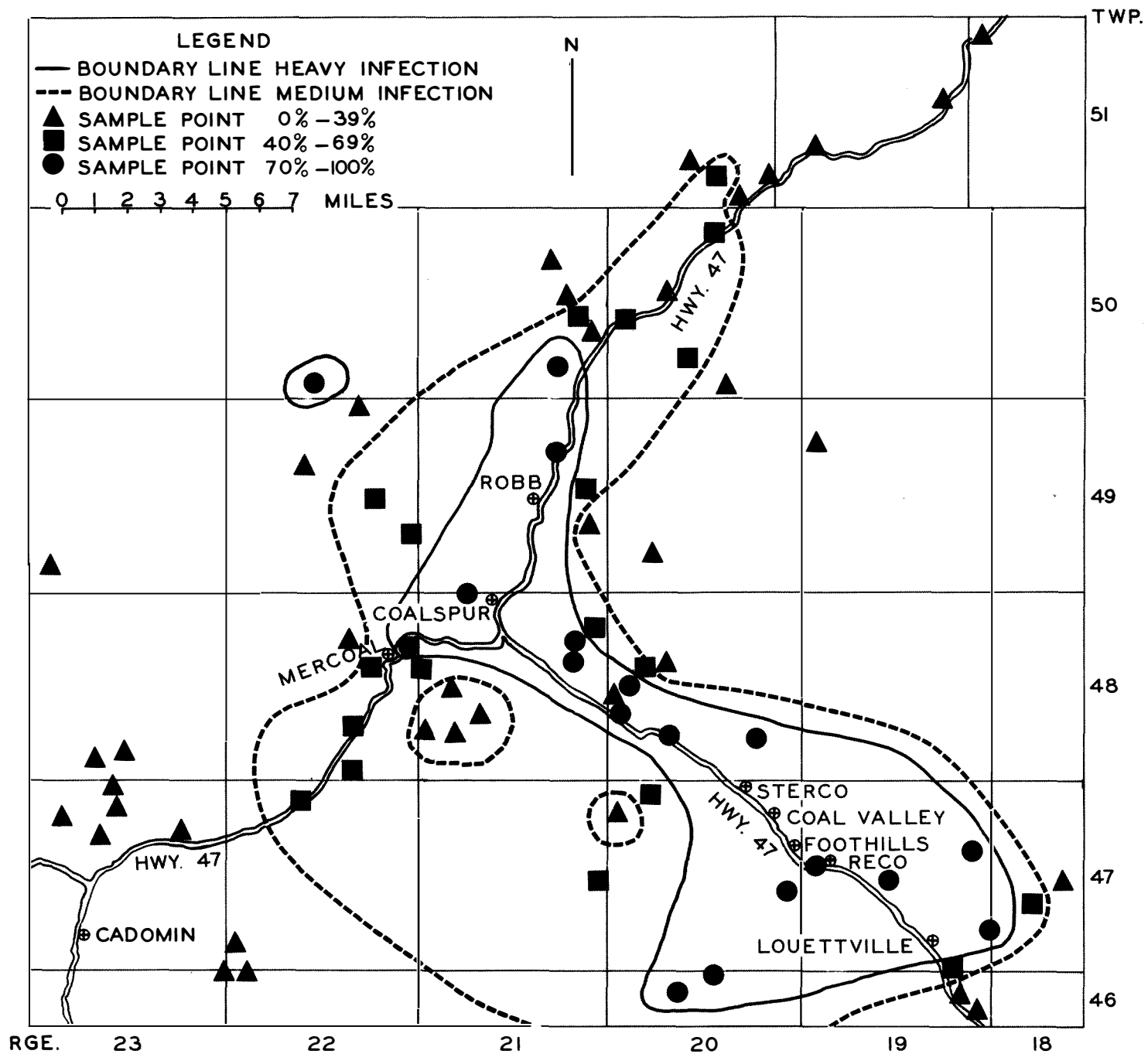


PLATE III

Map of the Waterton Lakes  
Atropellis infection area.

