

favourable moisture range for decay of sterilized and moisture-adjusted spruce wood was between 11 and 39 per cent of saturation (or approximately 49 to 103 per cent (O.D.B.)). Cartwright and Findlay (*In Decay of Timber and its Prevention*, p. 38, 1958) reported that moisture contents between 35 and 50 per cent of saturation were most favourable for the growth of wood-rotting fungi. In an attempt to resolve the apparent differences in moisture relations obtained by the author in the forest, experiments were initiated in the laboratory. This report presents reasons why specimens of fresh heartwood from eastern white pine altered as little as possible from the natural state should be acquired for use in laboratory decay studies and how these pieces were aseptically obtained.

Previous laboratory studies in which specific moisture contents of excised wood specimens were desired have always involved the sterilization of the test pieces prior to moisture adjustment. The sterilization has been carried out by various methods including autoclaving with superheated steam under pressure, fumigating with chemicals, or swabbing with alcohol (Basham, J. T. Can. J. Bot. 35: 31-34, 1957). These methods, however, were considered to alter the chemical and physical properties of the wood and it would be misleading to apply these results to those occurring "in vivo". Moreover, in white pine heartwood discs removed from the tree, water was lost rapidly from the wet zones upon exposure. When the discs were soaked in water after drying, the moisture permeated the discs uniformly. Individual pieces of dried wetwood rarely absorbed sufficient water to regain their original water content. Consequently, unaltered heartwood specimens were collected as follows and used in the laboratory studies. The outer bark of the portion of the felled tree to be dissected was disinfected with a 95 per cent aqueous solution of ethanol. Discs 1½ inches thick were cut and the sapwood and bark removed with disinfected tools. The remaining blocks of heartwood, containing wet and dry portions, were wrapped securely in new aluminum foil to prevent loss of moisture during transportation to the laboratory.

In an inoculation room ½-inch squares were cut from wet and dry areas under aseptic conditions and without any sterilization, each was placed in a flask containing *F. pini* growing on malt agar. The flasks were then closed with rubber stoppers. Moisture contents (O.D.B.) were determined for the wet and dry areas of heartwood immediately adjoining the pieces of heartwood which were used in the tests. No contamination appeared in any inoculation chamber by the end of the second year and certain of the wood specimens were thoroughly decayed irrespective of their derivation from wet or dry regions of the heartwood.

Further studies are being considered to compare the effects of *F. pini* on unaltered samples acquired from wet and dry heartwood areas of eastern white pine with that on wood that has been sterilized by various methods and moisture-adjusted.—S. N. Linzon.

ROCKY MOUNTAIN REGION

Notes on *Itame loricaria julia* Hlst.—This Geometrid is a common defoliator of trembling aspen and willow in Alberta, but also feeds on other deciduous trees and sometimes on white and Engelmann spruces. Alberta Forest Insect Survey records show that in the past 15 years it has caused light to moderate defoliation in localized area. The numbers have varied from area to area but it appears to have been most abundant in outbreak areas involving other aspen defoliators such as the Bruce spanworm, *Operophtera bruceata* (Hulst) and the forest tent caterpillar, *Malacosoma disstria* Hbn. Since 1960 it has increased in numbers in the east, central, and north-western parts of the Province. In that year 96 collections comprising 258 larvae were received through normal survey channels. Ninety-four samples were received the following year containing 344 larvae. By 1962 the number of collections had increased to 180 (875 specimens) with an average of 4.9 larvae per collection.

Mature larvae are about one inch long and vary from yellowish-green to medium brown. The yellowish-green phase is unmarked except for a solid yellow lateral line. The head is pale green. The brown phase usually has dark slanted lateral marks on the third, fourth, and fifth abdominal segments. The head is reddish-brown and the yellow lateral line is broken. It is distinguishable from the Bruce spanworm by having thin, longitudinal lines forming a body pattern and by lacking the distinct dorsal and subdorsal lines that characterize the Bruce spanworm.

Nothing was found in the literature regarding the biology of this insect, but collection and rearing records at Calgary show that the eggs hatch from about the middle of May to early June and that feeding lasts for 2-3 weeks. Feeding may continue until near the end of June. The adults emerge about ten days after pupation.

Male adults have pectinate antennae and a wing expanse of approximately one inch. The forewings are silver grey with a brownish pattern. The hind wings are pale yellow with a greyish border. Female adults have filiform antennae. Their wings are light grey with brownish tips, and are reduced to an expanse of less than 0.5 inches which makes them unserviceable for flight.—D. S. Kusch.

Effects of White Pine Blister Rust in Limber Pine Stands of Alberta.—Limber pine, *Pinus flexilis* James, is native to the mountains and foothills of Alberta and extends from the International Boundary to the North Saskatchewan River. It occurs in either small pure stands or singly in mixture with alpine fir. It has little commercial value, but by occupying an ecological niche unsuited to any other tree species it has a significant effect on watershed stabilization. White pine blister rust was detected in 1952 on limber pine in the Alberta foothills west of Pincher Creek. Since then other infections have been found from the International Boundary north for about 90 miles. The rust has been taken on ribes as far north as the Red Deer Ranger Station, which is approximately 100 miles north of the nearest known infection on limber pine.

In September, 1962, an extensive survey was made of the Alberta foothills to determine the incidence of the rust and the amount of damage caused by this disease. Most of the stands in the areas of Mill Creek, North Fork Drywood River, Spiankop Creek, Yarrow Creek, Dunvarvan Lake, and all of the stands of limber pine in Waterton Lakes National Park were heavily attacked. Up to 97 per cent of the trees were infected and mortality as high as 39 per cent was recorded. Mortality attributable to rust had not occurred north of these areas but in the vicinity of Connelly Creek, Cow Creek, and Todd Creek about 80 per cent of the trees were infected. Some of the trees at Cow Creek had up to 3 trunk infections and as many as 42 active rust cankers on their branches.

Sample plots were established in representative stands at three locations designated as the southern, central, and northern parts of the limber pine region of Alberta. The following summary illustrates the decreasing incidence of rust from south to north. The incidence of rust cankers in the southern plot could not be obtained because of heavy tree mortality in that area.

Location	Percentage of total trees ¹			Av. no. infections per tree	
	Infected	Top-killed	Dead	Active	Total
Southern	100	100	83	Unknown	Unknown
Central	96	74	29	2	19
Northern	79	29	Nil	6	10

A special survey was made of limber pine on the east slopes of Sofa Mountain in Waterton Lakes National Park in 1958. At that time 75 per cent of the stand was infected. A resurvey in 1960 showed that 100 per cent of the stand was infected and that light tree mortality had occurred. Another survey of the same area late in 1962 revealed that 83 per cent of the trees had been killed by rust and that about 25 per cent of the trees had died in 1962. All of the limber pine regeneration in the area was heavily infected.

Limber pine appears to be uniformly highly susceptible to white pine blister rust in the Alberta foothills. In many cases gaps in the range of the host have been effectively bridged by the rust through long distance spread. Intensification within stands appears to have been very rapid and by all indications the rust threatens complete eradication of limber pine in Alberta.—E. Gautreau.

BRITISH COLUMBIA

Translocation of Actidione and its Persistence in Douglas Fir Foliage.—During the fall of 1960, a series of *Pseudotsuga menziesii* (Mirb.) Franco trees were stem-treated with different concentrations of Actidione BR Concentrate. The purpose of the experiment was to demonstrate systematic movement of the fungicide and to establish a period of time during which the material could be detected in the foliage of treated trees.

Trees were sprayed with concentrations of 100, 200, 400, and 800 ppm of the antibiotic in a stove oil carrier, and one tree of each concentration was sampled on each of 11 sample days between August, 1960, and February, 1961. Two 400-gram samples of foliage were collected from each tree, one from the middle and one from the upper third of the crown. The samples were packaged separately and quick-frozen prior to processing.

The process techniques used were developed by Lemin et al (For. Sci. 6: 306-314, 1960) for use in similar studies on western white pine (*Pinus monticola* Dougl.). Macerated Douglas fir foliage, when treated with methylene chloride, gave excessive amounts of residue which was reduced in amount through the addition of reagent grade acetone. Only that portion of the residue soluble in acetone was used in chromatographic separation. Aliquots of extracts 0.1 ml in volume were spotted on Whatman No. 1 paper and 0.005 ml of a solution of crystalline Actidione (cycloheximide) in methanol was spotted on the same paper as a standard. Papers were equilibrated overnight in a chamber saturated with a 1:1:2 mixture of benzene, methanol, and distilled water and were developed with the upper phase of the mixture as the solvent. Developed chromatograms were air-dried, placed on an agar tray previously inoculated with the yeast assay organism, and incubated overnight at 30°C. The agar trays showing inhibition caused by cycloheximide were photographed immediately after incubation.

The results of the experiment showed that detectable amounts of Actidione may be found in the foliage of trees 192 days after being stem-treated with concentrations of Actidione as low as 100 ppm. Evidence of upward translocation of the antibiotic was found in the upper foliage extracts of all trees sampled the first day after spraying.

Some trees failed to give positive results. These failures, occurring in 25 per cent of the sampled trees, have been attributed to differences in translocation rate and pattern between trees as shown by Hendrickson and Vité (Contrib. Boyce Thompson Inst. 20: 353-362, 1959) and to dissipation of the antibiotic prior to sampling. One-half of the negative results occurred in samples taken after 4 months and the remaining half were interspersed with positive results throughout the earlier sampling periods.

The data indicate that Actidione, applied to the stems of Douglas fir trees under 20 years of age will, in the majority of cases, be translocated to the foliage and persist for at least six months.—L. C. Weir.

Pine Butterfly Infestation in Interior British Columbia.—A localized infestation of pine butterfly, *Neophasia manapia* Feld., was discovered in a discrete open stand of ponderosa pine in the summer of 1962 at Okanagan Landing, Vernon, B.C. This is the first known pine butterfly infestation in the interior of British Columbia; several have been recorded in Douglas fir at the Coast. The Okanagan infestation blanketed some 400 acres of lightly timbered hill-side facing eastward onto Okanagan Lake. Excepting several trees, defoliation in 1962 was barely noticeable; on the other hand production of adults and eggs was tremendous. The number of eggs per cluster ranged up to 30, with an average of 7.6 and mode of 12. A sample ponderosa pine tree, 14 inches d.b.h. and 40 feet tall, bore about 26,000 eggs on the old foliage and almost 25,000 eggs on the new foliage.

The majority of eggs overwintered successfully and hatching began late in May, 1963. The larval population was extremely large but severe defoliation did not become apparent until the first week in July; by that time some 100 acres of ponderosa pine 2 to 14 inches d.b.h. had been almost

completely stripped of needles. By June 28, pupae were present; by July 9, male butterflies were in flight. By mid-July butterflies were flying about the infested trees in spectacular numbers.

The population in this stand of marginal ponderosa pine may decline because of the current unfavourable weather conditions and reduction in the available foliage. Nevertheless a good population probably will persist in 1964 around the periphery of severe infestation and it is predicted that some tree mortality will occur.

Some dispersal of adults beyond the infested stand occurred late in July on hot, calm days and this could result in an increase in the number of infestations.—D. A. Ross.

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ROGER DUHAMEL, F.R.S.C., Queen's Printer and Controller of Stationery, Ottawa, 1963

O. H. M. S.

A. Z. Loussean

DOUGLAS C. EIDT,
FOREST ENT. & PATH LAB.,
CANADA DEPT. OF FORESTRY, (3-6)
COLLEGE HILL, L-205
FREDERICTON, N.B.

DEPARTMENT OF FORESTRY
OTTAWA