

PROVINCE OF BRITISH COLUMBIA

FOREST DISEASE SURVEY

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INTRODUCTION

Forest disease conditions during 1956 featured a marked reduction in the intensity of foliage diseases. This tendency was particularly well demonstrated by the status of needle rusts which were little in evidence despite a very high level of infection during the summer of 1955.

The unusually severe winter of 1955-56 brought reports of winter damage from many regions. Early frost damage to yellow pine was particularly noteworthy. Apparently affected before dormancy by a sudden drop in temperature in early November, this species sustained widespread and severe foliage mortality. Many exotic ornamentals were killed, particularly in southern Vancouver Island and lower mainland areas.

An aerial and ground survey of winter-damaged Douglas fir was carried out during the summer of 1956 in the Cariboo region. Stands examined had suffered varying degrees of damage as the result of the extremely low winter temperatures of 1952-53 and attack by the Douglas fir bark beetle, *Dendroctonus pseudotsugae* Hopk. Reports of extensive mortality indicated a potential salvage problem and prompted a request for a complete investigation of the pathological condition of the affected stands. The survey was carried out to meet this request.

A canker and dieback disease of Douglas fir, previously reported as having a sporadic occurrence, reached epiphytotic proportions in some areas during the past spring and summer. The nature of the sudden build-up suggests climatic influences.

The task of cataloguing and maintaining observations on plantations of introduced trees was begun in 1956. This project is intended to provide a check against the spread of potentially dangerous non-indigenous forest diseases and an evaluation of the effects of native diseases on introduced trees. Agencies concerned with the introduction of exotic trees for plantation purposes were requested to report the establishment of plantations to the Survey Officer, Forest Pathology Unit, 409 Federal Building, Victoria, so that new plantations might be registered and kept under observation.

A check list and host index of the Victoria Mycological Herbarium has been completed and brought up to date and the Herbarium has recently been listed in the Index Herbariorum, Utrecht, Netherlands.

Grateful acknowledgment is hereby tendered to the many co-operators who have submitted samples and reports during the past year. The Mycology Unit, Botany and Plant Pathology Division, has continued to render valuable identification service to the Survey.

The emphasis placed on decay fungi and the Douglas fir dieback problem during 1956, required nearly 90 per cent of the 5074 collections to be examined in culture. The collections were derived from the principal host trees as follows:

Coniferous trees	Collections	Broad-leaved trees	Collections
Douglas fir.....	2,051	Willow.....	26
Fir—		Alder, red.....	17
Alpine.....	1,026	Aspen, trembling.....	14
Amabilis.....	7	Birch, western white.....	7
Grand.....	5	Cottonwood, black.....	5
	1,039	Apple, Pacific crab.....	3
		Oak, Garry.....	3
Pine—		Dogwood, western flowering.....	1
Ponderosa.....	726	Maple, vine.....	1
Lodgepole.....	25		
Western white.....	10	Total.....	77
Red.....	5		
Scots.....	3		
	769		
Spruce—			
White.....	565		
Sitka.....	33		
Engelmann.....	14		
Black.....	3		
	615		
Cedar—			
Western red.....	195		
Yellow.....	1		
	196		
Larch—			
Western.....	56		
Alpine.....	3		
	59		
Hemlock—			
Western.....	23		
Mountain.....	1		
	29		
Juniper, Rocky mountain.....	7		
Cypress, Monterey.....	5		
Yew, western.....	1		
Total.....	4,771		
Miscellaneous or host not specified.....	226		
Grand Total.....	5,074		

IMPORTANT DISEASES

Decay and Post-felling Deterioration of Interior Douglas Fir and Yellow Pine.—Sampling was resumed in 1956 on volume and decay analysis plots established by the British Columbia Forest Service. This work involved studies to determine the fungi responsible for decay before felling as well as those responsible for post-felling deterioration. Sample plots were classified as to site, using a plant indicator method so that the influence of forest habitat on decay and deterioration could be assessed.

A total of 514 fir and 266 pine trees were sampled in 21 areas throughout the Douglas fir—yellow pine region as far north as Kamloops. Further analysis of data and completion of cultural identifications are required before the results of this survey are fully known. However, an interesting trend was noted on the basis of field observations and limited examinations of data to the effect that yellow pine sapwood deteriorates much more rapidly than that of Douglas fir. Average radial depth of penetration in Douglas fir, 3 years after felling, was about 1 inch while that for yellow pine was nearly three times as great. This trend is considered significant for it was consistent in all areas.

Canker and Dieback of Douglas Fir.—A canker and dieback of Douglas fir, which has been reported from time to time as causing negligible damage, assumed outbreak proportions in 1956. Both natural and planted stands up to 30 years of age were affected generally throughout the range of Douglas fir on Vancouver Island and the adjacent mainland.

The disease is readily recognized by the occurrence of leader and branch flags resulting from a dieback condition beginning at or near the terminals. In addition cankers are produced, occurring anywhere on the branches and stems. The extent of the dieback varies from a few inches to several feet, often involving several internodes. The cankers vary in size from less than 1 inch to almost 12 inches in length but rarely cause girdling. Needles are cast from most of the affected branches by mid-summer. These dead sticks remain quite conspicuous against the background of normal foliage.

Preliminary surveys showed damage to range from mortality to various degrees of deformation. Mortality in the current year appeared light, although it was as high as 15 per cent in some areas. Incidence of infection ranged from 0 to 85 per cent. Since much of the disease remained active without apparent callusing during the summer, accurate damage appraisal will require further observations. Early indications are that the damage was most severe on below-average sites.

Although the cause of the damage has not been definitely established early indications are that at least two fungi are involved. Both these fungi will require testing for pathogenicity. A species of *Pullularia* was found closely associated with the dieback and some of the cankering. Another fungus, producing a cream colored coremium in its imperfect stage, was consistently associated with the remaining cankers which were distinct as to size, shape, and coloration.

Winter-Damaged Douglas Fir in Interior British Columbia.—A large portion of the Cariboo District of British Columbia was subjected to extremely low temperatures during the winter of 1952-53 and subsequent attack by the Douglas fir bark beetle *Dendroctonus pseudotsugae* Hopk. As a result, extensive areas of Douglas fir were damaged to varying degrees. A satisfactory level of recovery was observed in some of the areas involved but considerable mortality was reported to have occurred in others. The extent of mortality reported indicated that a salvage problem of considerable magnitude existed and prompted a request for an investigation into the pathological condition of Douglas fir in the district concerned.

An aerial survey of the district and ground surveys of a limited number of areas were carried out during the summer of 1956 and substantiated the existence of extensive areas of mortality. It became evident that although some mortality could be traced to the initial damage of 1952-53 additional killing had occurred and was continuing subsequent to that date. The extensive killing that had already taken place justified a more complete investigation than was possible during the initial appraisal. Therefore, a detailed investigation was initiated later in the summer.

Frost Damage to Yellow Pine.—Severe and widespread killing of yellow pine foliage was attributed to a sudden drop in temperature early in November, 1955. Damage first became apparent in early spring. Ground and aerial surveys made later in the year showed the region of severe damage to extend from Princeton to a point 10 miles north of Merritt; the Thalia, Brookmere, and Alleyne Lake areas being the most heavily damaged. One or two other small centers of damage were noted but in general the Merritt-Princeton region was the only major area to give cause for concern.

Damage was confined to the foliage, the buds and young twigs being generally uninjured. The percentage of foliage killed was quite variable in trees within the same stand, ranging from 0 to 100 per cent. When only part of the needles were killed, the older needles were most severely affected. Mortality was much less than early summer observations indicated for only a few trees of previously low vigor died. Should a severe winter occur in 1956-57 further mortality might occur, for many of the defoliated trees have been badly weakened.

In order to evaluate the results of this winter damage 15 sample plots including 520 trees were established. The British Columbia Forest Service and the Forest Zoology Unit co-operated in this project. Trees ranging from reproduction to overmature were tagged and described according to degree of defoliation and Keen's age-vigor classes. Spring and fall examinations are planned until the stands appear to have returned to normal. Finally radial increment will be measured to determine the effect of defoliation on growth.

Plantations of Non-indigenous Trees.—A beginning was made in cataloguing all plantations of exotic tree species in British Columbia and in maintaining a record of their pathological condition. The project was initiated to check against the spread of foreign disease and to evaluate the effects of native diseases on the introduced trees.

The 1956 program consisted primarily of locating plantations and gathering general information as to their condition and the problems involved in their regular examination. A total of 38 European and non-indigenous North American tree species have been recorded from 57 plantations. These are all located on Vancouver Island and the lower mainland coast. Aside from a few plantations established between 1930 and 1940 all existing plantations are under 10 years old and over 50 per cent of them are under 4 years old.

From general observations in 1956 the main difficulties in young plantations are competition from naturally occurring trees and brush, animal browsing, and poor adaptation to site. The role of disease is not yet clear, for the identity of causal factors is obscured. Regular annual examinations will, however, provide a clearer picture. Evidence of disease activity was more readily recognized in older plantations. A 26-year-old lodgepole pine plantation, very poorly adapted to its present site, was severely damaged by a number of diseases and at least one insect. The combined infection by a blister rust *Cronartium coleosporioides* Arth. var. *stalactiforme* (A. & K.) Arth. and a canker caused by *Atropellis pini-phila* (Weir) Lohman and Cash resulted in severe deformation to 28 per cent of the stems. The major portion of early mortality in the stand was apparently caused by the rust. A pitch moth, *Vespamima sequoiae* Hy. Edw. was found infesting 58 per cent of the trees. Root rot caused by *Armillaria mellea* (Vahl ex Fr.) Quél. was common in trees of poor vigor.

Disease Conditions in Forest Nurseries.—In 1956, post-emergence damping-off was very light at the Campbell River and Green Timbers nurseries, and moderate at the Duncan and Cranbrook nurseries.

At Cranbrook, some of the yellow pine seed used was several years old and required a heavy rate of sowing. In a fungicide test bed, using some of this old seed, some of the fungicides tested increased emergence by 75 to 200 per cent as compared with the control. This would indicate that pre-emergence damping-off is a factor in some parts of this nursery. The old seed appears to be more susceptible to pre-emergence damping-off probably because of its much slower emergence.

OTHER NOTEWORTHY DISEASES

(V.I.—Vancouver Island; Q.C.I.—Queen Charlotte Islands)

Host	Organism	Locality	Remarks
Alder, red	<i>Eutypella stellulata</i> (Fr.) Sacc.	Saanich, V.I.	Associated with dieback of the branches of a living tree. First herbarium record.
Alder	<i>Eutypa</i> sp.	Courtenay, V.I.	Associated with dieback of alder. First herbarium record.
	<i>Tympanis alnea</i> (Pers.) Fr. var. <i>hysterioides</i> Kehm.	Prince George	Associated with dieback of alder. First herbarium record.
Birch, western white	<i>Melampsorium betulinum</i> (Fr.) Kleb.	Lumby and New Denver	A leaf rust disease, locally abundant. First host record for Canada.
	<i>Naematoloma fasciculare</i> (Huds. ex Fr.) Karst.	Aleza Lake	Associated with trunk decay. First herbarium host record.
Hemlock, mountain	<i>Hericium</i> sp.	Copper Canyon	Causing white pitted decay. New host record of an undescribed species.
Huckleberry, red	<i>Chrysomyxa ledi</i> de Bary var. <i>vaccinii</i> Ziller	Qualicum Beach, V.I. and Masset, Q.C.I.	A newly discovered and recently described variety of foliage rust disease. (The alternate state of this rust, although still unknown, probably causes a needle cast of spruce.) Ref.: Can. J. Bot. 33: 492-493. 1955.
Pine, Scots	<i>Peridermium</i> sp.	Powell River, V.I.	In a plantation of exotic conifers. Single tree infected with an unidentified species of blister rust.
Spruce, white	<i>Coccophacidium</i> sp.	Aleza Lake	Associated with dieback. No species of <i>Coccophacidium</i> previously reported on spruce.
	<i>Polyporus schweinitzii</i> Fr.	Prince George	Causing root- and butt-rot. First herbarium record, previously isolated in culture.
	<i>Xeromphalina campanella</i> (Batsch ex Fr.) Kühner & Maire	Prince George	Associated with decay of slash. First herbarium record, previously isolated in culture.
Spruce, white and black	<i>Chrysomyxa pirolata</i> Wint. (= <i>C. pyrolae</i> (D.C.) Rostr.)	Prince George	Spruce cone rust; locally epiphytotic near Stone Creek and Tabor Mt. Ref.: Annu. Rept. For. Ins. Dis. Surv. for 1951: 151.