

PROVINCE OF BRITISH COLUMBIA

FOREST DISEASE SURVEY

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INTRODUCTION

The major efforts of the Forest Disease Survey in British Columbia were again directed towards the collection and appraisal of fungi on living hosts and toward the conduct of surveys of specific diseases. While the total number of collections did not increase, there was an increase in the number of special reports of unusual disease occurrences. In addition, greater effort has been directed toward developing sampling techniques with current emphasis being placed on root diseases.

While a number of collections of fungi designated for national consideration have been received, the previously reported distributions were not changed sufficiently to warrant reporting at this time.

The continued support of the Mycological Unit, Botany and Plant Pathology Division, is gratefully acknowledged, along with the help of other mycologists.

A total of 2,018 collections were submitted to the Survey in 1955, and are listed by host as follows:

Coniferous trees	Collections	Broad-leaved trees	Collections
Fir—		Aspen, trembling.....	40
Alpine.....	581	Alder, red.....	14
Amabilis.....	77	Birch, western white.....	12
Grand.....	12	Willow.....	10
	670	Cottonwood, black.....	6
Douglas fir.....	485	Arbutus.....	3
Hemlock—		Maple, Douglas.....	3
Western.....	217	Maple, vine.....	1
Mountain.....	3	Total.....	89
	220		
Spruce—			
White.....	162		
Engelmann.....	7		
Sitka.....	4		
Black.....	2		
	175		
Pine—			
Ponderosa.....	70		
Lodgepole.....	58		
Western white.....	28		
	156		
Cedar—			
Western red.....	43		
Port Orford.....	25		
Yellow.....	12		
	80		
Juniper, Rocky Mountain.....	8		
Larch, western.....	3		
Total.....	1,797		
Miscellaneous or host not specified.....	132		
Grand Total.....	2,018		

IMPORTANT DISEASES

Foliage Diseases.—Infection by needle cast diseases was, on the whole, lighter in 1955 than during the previous year. Needle cast of yellow pine caused by *Elytroderma deformans* (Weir) Darker, was noticeably less common, although there appeared to be more witches brooms which are sometimes associated with this disease. Needle cast of western larch caused by *Hypodermella laricis* v. Tubeuf was recorded as the cause of severe defoliation in a number of areas, but most stands that had suffered heavy defoliation in previous years were almost free from infection. The severe and widespread infections of Douglas fir by *Adelopus* (*Phaeocryptopus*) *gaumannii* Rohde, reported in 1954, were not in evidence in 1955.

Infection by foliage rusts was notably more severe than in previous years. Particularly severe was the needle rust of spruce caused by *Chrysomyxa ledicola* Lagerh. Severe defoliation by this fungus was reported throughout the northern part of the Province, especially on the Queen Charlotte Islands. The foliage rust of alpine fir caused by *Pucciniastrum epilobii* Otth, which had remained at a low level up to 1955 was reported causing severe defoliation in many parts of the Province particularly around Smithers, Prince George, Quesnel and Kamloops.

Butt Rot of Douglas Fir Associated with Basal Fire Scars.—A young stand of timber near Courtenay, Vancouver Island was surveyed to determine the reason for the reported high incidence of decay and to identify the associated fungi. The results of the survey strongly emphasize the importance of fire history as an influence on decay loss in young merchantable stands.

The logging history of the area was in doubt but indications were that the stand originated about 120 years ago. It had subsequently been cut over for pit props and other minor products. In addition, the stand suffered at least two damaging ground fires. These disturbances influenced the present stand composition which consists of scattered evenaged Douglas fir, in admixture with western hemlock and western red cedar ranging from 50 to 110 years of age. The understory consisted of cedar, hemlock, grand fir and various hardwoods. The site quality was slightly above average and was characterized by a ground cover of salal, May leaf, and Oregon grape.

The survey showed that the excessive cull was closely associated with basal fire scars which occurred 83 and 59 years ago. Most of the scarring was related to the earlier fire when the fir averaged around 35 years of age. The incidence of basal scarring and the related incidence of decay is summarized in the following table.

RELATION OF BASAL FIRE SCARS TO BUTT ROT IN DOUGLAS FIR IN A YOUNG MERCHANTABLE STAND NEAR COURTENAY, VANCOUVER ISLAND

Plot number	Area (acres)	Total fir	Per cent of fir scarred	Per cent scarred fir with butt rot*
1.....	0.6	19	74	86
2.....	0.6	21	71	87
3.....	1.5	29	41	83

*Rot positively traced to basal fire scars.

Volumetric analyses were not possible because the timber had been removed previous to the examination but the average diameter of the fir at a one-foot stump height was 28, 27, and 24 inches for plots 1, 2 and 3 respectively. The decay diameters averaged 11 inches for the first two plots and 8 inches for plot 3.

All the rots positively related to fire scars were brown cubical butt rots, mostly caused by *Polyporus schweinitzii* Fries, with a few instances of brown cubical butt rot caused by *Polyporus balsameus* Peck. The latter is a new record on Douglas fir in British Columbia and apparently has only been recorded on this host once previously, in Washington.

Leader Damage to Douglas Fir.—An unusual type of leader damage to Douglas fir was recorded in two areas on Vancouver Island, at Bear Creek and in the Nitinat Valley. Toward the end of the growing season, leaders of young trees in stands 10 to 20 years of age were found to wilt and break at the base resulting in multiple leaders and distorted stem development. As many as 50 per cent of the trees had suffered damage from one to eight successive years. Several hundred acres were involved in each of these areas. All affected areas were on very high growing sites with more than 3 feet annual terminal growth being quite common.

Three types of symptoms were found associated with the condition. Most commonly, leaders broke off with little or no necrosis at the base of the current year's growth. In other cases there was marked girdling necrosis at the base of the current year's leader growth killing the leader, which remained erect or broke at the base. Less frequently the necrosis proceeded downward from the terminal portion eventually killing the leader. The latter two types of symptoms also occurred on lateral branches.

The examination of a large number of affected leaders showed that in every case where damage occurred the pith was abnormally large and the cortical tissues were very succulent, whereas the xylem band was extremely narrow or almost non-existent. Undamaged leaders most frequently had a normal width of woody growth. The primary cause of the condition appeared to be mechanical damage stemming from the weak structural development of the rapidly growing leaders. The affected stands had less than normal stocking and were particularly susceptible to damage by wind action.

Further study is required before reliable predictions regarding the long-term effects of the condition can be made. Host vigor was not reduced for laterals quickly took over as leaders and growth in the year following leader damage was not retarded. If this rapid growth does not continue for more than a few years, stem distortion will be rapidly covered over by subsequent diameter growth. Some multiple leaders will persist.

Root Rot of Douglas Fir.—A special survey of Douglas fir root rot caused by *Poria weirii* Murr., started in 1954, was continued. A large part of the field season was devoted to developing testing sampling techniques designed to determine if a correlation exists between the occurrence and intensity of root rot damage and site factors.

Armillaria Root Rot in Immature Forests.—Root rot caused by *Armillaria mellea* (Vahl ex Fr.) Quel. continued to inflict light mortality in young Douglas fir plantations and natural stands on Vancouver Island. Damage was most evident in stands under 25 years of age, particularly in the Forbidden Plateau area, although even in these stands mortality seldom exceeded one per cent of the stems annually. Other species, which occur in association with fir appeared to be equally susceptible.

Despite the light annual mortality a more detailed evaluation of the problem seems warranted, for frequently the best developed trees in the upper crown

classes are killed and the disease commonly occurs in patches causing localized under-stocking and uneven stem distribution. Permanent sample plot studies, to follow the development of root rot infected stands, may provide the most reliable answers to the questions pertaining to the long-term effects of the disease.

Late Frost Injury to Arbutus.—A severe and widespread browning of arbutus foliage in the spring resulted in a large number of enquiries to the laboratory. Damage was recorded throughout the range of the host on the east coast of Vancouver Island, Saanich Peninsula and the adjacent Gulf Islands. The occurrence of browning was patchy and was least apparent at elevations above 800 feet.

The damage was attributed to late frost injury, which occurred during a severe cold spell in March following an unusually mild winter. Fortunately there was very little injury to buds and by late summer, when most of the necrotic foliage had been cast, most of the trees appeared quite normal. Aside from a minor amount of twig dieback there should be little or no permanent injury.

Wind Damage.—An unusually severe windstorm coupled with heavy rainfall in June caused extensive blow-down and wind breakage from Nelson to north of Revelstoke in the Slokan, Arrow Lakes and Kootenay valleys. While the total volume of blow-down is not known it is evident that salvage problems will be considerable. In many areas, root rot caused by *Poria weirii* Murr. contributed materially to the incidence of blow-down. In the Nakusp area a large proportion of the windthrown trees on a timber sale were badly weakened by root rot.

Disease Conditions in Forest Nurseries.—There was very little post-emergence damping-off at the Green Timbers and Campbell River nurseries during the past season. It is probable that the late sowing at these nurseries helped to reduce mortality by damping-off fungi.

At Duncan there was approximately 11 per cent post-emergence damping-off and from 8 to 11 per cent late damping-off.

As in past years the Cranbrook Nursery suffered its greatest loss from damage to emerging seedlings by birds, which this year amounted to nearly 50 per cent. While observations by the nursery staff suggest that there was little post-emergence damping-off, bird damage prevented an accurate measure of disease loss.

OTHER NOTEWORTHY DISEASES

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

Host	Organism	Locality	Remarks
Alder, red.....	<i>Cylindrosporium alni</i> Darn. & Barth.	Union Bay, Sooke, V.I...	Causing leaf spot. First herbarium record.
Fern, ostrich.....	<i>Uredinopsis struthiopteridis</i> Stormer	Aleza Lake.....	Causing balsam fir needle rust. First record for western N. America west of Alberta.
Fern, sword.....	<i>Milesina vogesiaca</i> P. & H. Sydow	Southern V.I.....	Balsam fir needle rust. Only records for N. America outside of Oregon.
Fir, alpine.....	<i>Pucciniastrum epilobii</i> Otth	Central and southern interior regions of B.C., particularly Smithers and Osoyoos.	Balsam fir needle rust. Reported for the first time (in 1955) to reach locally epiphytic intensity.
	<i>Bifusella</i> sp.....	Aleza Lake, Smithers....	An apparently new species causing disease to the living needles of balsam firs.

OTHER NOTEWORTHY DISEASES (concluded)

Host	Organism	Locality	Remarks
Fir, amabilis.....	<i>Limacinia alaskensis</i> Sacc. & Scalia.....	Kitimat; Cowichan Lake Forbidden Pateau, V.I.	Sooty mold fungus, causing damage to foliage of western red cedar, Douglas fir, grand fir, and particularly amabilis fir. Ref: Can. J. Bot. 33: 501-505. 1955.
Fir, Douglas.....	<i>Melampsora occidentalis</i> Jacks.	Wherever the two alternate hosts, Douglas fir and black cottonwood, occur together.	Common and occasionally causing considerable defoliation. Clearly distinguishable from <i>Melampsora albertensis</i> on Douglas fir. Ref: Can. J. Bot. 33: 177-188. 1955.
	<i>Rosellinia herpotrichioides</i> Hepting & Davidson	Duncan, V.I.....	Causing a needle blight of seedlings in forest nursery.
	<i>Valsa abietus</i> Fr.....	Westbank.....	Found associated with dieback. First herbarium record.
Fir, grand.....	<i>Cenangium atropurpureum</i> Cash & Davidson	Courtenay, V.I.....	Found associated with dieback, apparently new record of host and distribution in western N. America.
Mistletoe, dwarf...	<i>Septogloeum gillii</i> Ellis...	Parksville, V.I.....	Hyperparasite of <i>Arceuthobium campylopodum</i> Engelm. f. <i>tsugensis</i> (Rosend.) Gill, growing on lodgepole pine.
	<i>Wallrothiella arceuthobii</i> (Peck) Sacc.	Radium Hot Springs....	Hyperparasite of <i>Arceuthobium americanum</i> Nutt. growing on lodgepole pine.
Spruce, Sitka.....	<i>Chrysomyxa monesis</i> Ziller	Massett, Q.C.I.....	A recently discovered and newly described rust causing damage to spruce cones Ref.: Can. J. Bot. 32: 432-439. 1954.
Willow.....	<i>Diatrype bullata</i> (Hoffm.) Fr.	Campbell River, Royston, V.I.	Associated with dieback. First herbarium record.

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