

PROVINCE OF BRITISH COLUMBIA

FOREST DISEASE SURVEY

A. C. MOLNAR

Forest Biology Laboratory, Victoria, B.C.

INTRODUCTION

Foliage diseases continued to be very common for the second consecutive year in British Columbia following three years of reduced abundance. *Elytrodema deformans* (Weir) Darker, *Hypodermella laricis* Tub., and *Rhabdocline pseudotsugae* Syd. were associated with the most widespread and severe damage.

Delayed effects of the severe 1958 drought appeared as increased root-rot mortality, dieback, and top-killing on several species. *Cytospora* sp. was prominent among the several fungi associated with crown damage.

Examinations of exotic plantations brought to light several fungi not previously recorded on these hosts in British Columbia.

Twenty-nine new records for British Columbia are listed in the 'Other Noteworthy Diseases' section of this report. A total of 2,419 disease samples were collected and processed during the 1959 field season and are summarized by host as follows:

Coniferous Trees	Collections	Broad-leaved Trees	Collections
Douglas fir.....	1,368	Alder	
Fir		Red alder.....	26
Alpine fir.....	168	Sitka alder.....	7
Grand fir.....	22	Other alders.....	14
Amabilis fir.....	17		<hr/>
	207	Willow.....	47
Pine		Aspen, trembling.....	31
Lodgepole pine.....	89	Birch, western white.....	18
Ponderosa pine.....	44	Cottonwood, black.....	16
Western white pine.....	29	Maple, broadleaf.....	4
Scots pine.....	18	Arbutus.....	3
Red pine.....	15	Oak, Garry.....	3
	195	Ash, mountain.....	1
Hemlock		Cherry.....	1
Western hemlock.....	103	Total.....	184
Mountain hemlock.....	2		
	105		
Spruce			
White spruce.....	39		
Sitka spruce.....	16		
Black spruce.....	11		
Engelmann spruce.....	10		
Other spruce.....	6		
	82		
Larch			
European larch.....	10		
Western larch.....	2		
Dahurian larch.....	3		
Japanese larch.....	2		
	17		

Coniferous Trees	Collections
Juniper	
Common juniper.....	10
Rocky Mountain juniper.....	2
Creeping juniper.....	1
	13
Cedar	
Western red cedar.....	5
Port Orford cedar.....	4
Yellow cedar.....	1
	10
Yew, western.....	5
Cypress, Monterey.....	1
	6
Total.....	2,003
Miscellaneous or host not specified.....	232
Grand Total.....	2,419

IMPORTANT DISEASES

Weather Injury—Weather injury records in 1959 included the delayed effects of the severe 1958 drought, frost damage, and hail injury.

Continued damage resulting from the past year's severe drought affected several tree species in one form or another. Reports of dieback, sunscald, and mortality of Douglas fir were received both from areas damaged in 1958 as well as from areas which apparently escaped direct injury. Dieback and flagging of pole-sized and older trees and mortality of reproduction was recorded in the Lillooet area, although not reported as affected in 1958. Dieback and top-kill of pole-sized and mature trees on lower Vancouver Island were also ascribed to the delayed effects of this drought. *Cytospora* sp. was commonly associated with killed leaders and branches. Lodgepole pine suffered similar damage in the Prince George and Vanderhoof areas where other species apparently escaped injury. The 1958 drought combined with infection by *Elytroderma deformans* accounted for 25 per cent mortality of yellow pines under 4 inches D.B.H. in a small stand near Clinton. Premature twig cast and top-kill of western red cedar were particularly noticeable in the Interior Wet Belt region.

Winter damage to lodgepole pine at Mile 471 and 481 on the Alaska Highway followed the pattern of previous years with the discolored trees occurring in a belt at about the 4,000-foot elevation.

An unusually severe hail storm took place on August 18 on the north slope of Tabor Mountain in the Prince George District. Alder and aspen trees suffered 80 per cent defoliation while the ground cover was almost completely stripped of foliage. Although bark injury did occur the extent of the damage is unknown.

Root Diseases—An increase in the number of reports of *Armillaria mellea* (Vahl ex Fr.) Quél. both in natural stands and plantations was ascribed to predisposition by the 1958 drought.

Several new infection foci of root rot caused by *Poria weirii* Murr. in Douglas fir stands were recorded in the Okanagan, Arrow, and Slokan Lakes areas. While the fungus has been known in these regions for some years, recent records suggest that damage is more common than early observations suggested. The more frequent reports of this root rot in recent years should, however, be ascribed to a more general recognition of the disease rather than to a sudden increase in its incidence.

Foliage Diseases—The infection level of foliage diseases remained high for the second consecutive year. Needle blight of yellow pine caused by *Elytroderma deformans* was again heavy in most areas severely defoliated in 1958. Several new areas of moderate to severe infection were noted. Lower-branch mortality in heavily infected stands was common and smaller trees showed a marked decline in vigour. There was a notable increase in the incidence of infected lodgepole pine, particularly in the Kamloops and Cariboo regions.

Larch needle cast, caused by *Hypodermella laricis*, was generally more common and severe throughout the range of western larch than in 1958.

Douglas fir needle blight, caused by *Rhabdocline pseudotsugae*, continued at outbreak levels in Christmas tree stands in the East Kootenay Region. Heavy infection levels were also noted in other Douglas fir regions, particularly in young stands on Vancouver Island.

The frequent reports of foliage rusts suggested a favourable year for the development of these parasites.

Melampsora rust of Douglas fir—A rust caused by *Melampsora albertensis* Arth. or *M. occidentalis* Jacks. caused premature shedding of the foliage of Douglas fir and of the alternate hosts, aspen and cottonwood. The disease occurs wherever aspen or cottonwood are growing with Douglas fir.

The following noteworthy observations were made recently:

- (1) *M. occidentalis* may occur beyond the natural range of Douglas fir; it has been collected on eastern cottonwood at Saskatoon, and on black cottonwood at Salvas, B.C., in the Prince Rupert Forest District. Since there is evidence that the fungus does not overwinter on cottonwood in the uredinial state, it may be assumed that infection of the cottonwood was caused by aeciospores, produced on Douglas fir and wind-borne over a distance of nearly 100 miles.
- (2) *Melampsora* rust may cause considerable damage to Douglas fir seedlings in nurseries established beyond the natural range of Douglas fir. This situation exists in a nursery near Terrace, B.C., where *Melampsora occidentalis* caused severe defoliation to both Douglas fir seedlings and black cottonwood trees surrounding the nursery.
- (3) Certain varieties of artificially bred poplar hybrids are alternate hosts of *M. occidentalis*. Thus, even in the absence of the naturally occurring alternate hosts, Douglas fir could become infected where these hybrids are planted. Poplar varieties 'Brooks No. 10' and 'Gelrica' were infected by *M. occidentalis* in a plantation near Nelson, B.C., apparently representing first records of this rust on these two varieties of hybrid poplar.

Comandra Blister Rust in the Yukon—The Comandra blister rust fungus, *Cronartium comandrae* Peck, causes the same symptoms and type of damage on hard pines as white pine blister rust, caused by *C. ribicola* J. C. Fisch., does on white pines. It can be exceedingly destructive to seedlings and saplings, which are frequently killed by girdling the stem near ground level. In the Teslin-Whitehorse area, mortality resulting from *Comandra* blister rust of 5 to 10 per cent was common in sapling lodgepole pines. This damage to young trees in the southern Yukon Territory must be ascribed primarily to the relative abundance of northern comandra, *Geocaulon lividum* (Richards.) Fern., an alternate host of the Comandra blister rust.

Comandra blister rust has been reported previously as causing cankers on the boles of mature lodgepole pine as well as on saplings and seedlings near Kelowna and Fort Babine, British Columbia, but the rust has apparently not been reported from the Yukon and Alaska.

Douglas-fir Decline—A condition of early decline and mortality of Douglas fir was reported from several areas of the Interior Wet Belt Forest by officers of the British Columbia Forest Service. Preliminary reconnaissance indicated decline symptoms of thin foliage, reduced crown length, twig and branch mortality, and marked increment decline for 8 to 20 years before death. Shoestring root rot caused by *Armillaria mellea* was commonly associated with dead and dying trees, but did not appear to be a primary factor. The condition appeared to be confined to trees over 80 years old. The examinations revealed an almost consistent occurrence of needle cast caused by *Rhabdocline pseudotsugae* Syd. This was the first British Columbia record of Rhabdocline infection on trees of this advanced age group. The relation, if any, of the needle cast to the decline was not revealed in the preliminary examinations. A detailed examination of 20 sample plots was carried out during October.

Disease of Non-indigenous Trees—Physiological diseases and animal damage continued to be the most important damaging influences in exotic plantations but a number of fungi have been found associated with diseases of several species in 1959.

Several European larch 6 to 12 feet high were recently killed by root rot on southern Vancouver Island. *Armillaria mellea* was isolated in pure culture from the roots. Young Scots pines and red pine seedlings were similarly infected on the northern part of the Island.

Two varieties of hybrid poplar, 'Grandis' and 'Regenerata', were found infected with yellow leaf blisters caused by *Taphrina populina* Fr. This disease has previously been reported as infecting Lombardy poplar, but infection of these two hybrids may be a new world host record.

Disease Conditions in Forest Nurseries—Damage from damping off remained at endemic levels at the Cranbrook, Green Timbers, and Duncan nurseries. For the first time since its establishment, late damping off in the Quinsam nursery reached substantial damage levels. Losses up to 25 per cent were sustained in a few of the beds.

Infections of grey mould blight, caused by *Botrytis cinerea* Pers. ex Fr. resulted in losses in the more densely stocked beds of 2-0 Douglas fir at Green Timbers. Damage resulted from mortality and killing of the current year's shoots. Since damaged seedlings must be culled, top damage is just as serious as mortality. Damage was more severe at Duncan where losses up to 14 per cent were sustained in densely stocked beds.

OTHER NOTEWORTHY DISEASES

Host	Organism	Locality	Remarks
Bearberry, alpine	<i>Pucciniastrum sparsum</i> (Wint.) E. Fisch.	Dawson, Y.T.	Aerial state causes a needle rust of spruce in Europe. Apparently surviving as a parasite of bearberry without completing its full life cycle on spruce. First record for Yukon, although known to occur in B.C. and Alaska.
Cottonwood, black	<i>Marssonina populi</i> (Lib.) Sacc.	Queen Charlotte City	Causing leaf spot disease and general browning of upper leaf surface; also occurs on trembling aspen.
Fir, alpine	<i>Arceuthobium campylopodum</i> Engelm.	Cranbrook and Fife	Causing fusiform swellings of branches. Apparently an infection from dwarf mistletoe on western larch growing in close proximity. Reported from Montana and Oregon by L. S. Gill (1935).

OTHER NOTEWORTHY DISEASES—Continued

Host	Organism	Locality	Remarks
Fir, alpine (Con't)	<i>Ascocalyx abietis</i> Naumov	Chase and Smithers	Associated with the dying of branches.
	<i>Cytospora</i> sp.	Augier Lake	Associated with dieback of branches accompanied by resinosis.
	<i>Dermea</i> sp.	Babine Lake and Walcott	Associated with dieback of leaders accompanied by resinosis.
	<i>Phomopsis</i> sp.	Greenwood	Associated with dieback of branches. Isolated in pure culture: producing the so-called "a" and "b" spores characteristic for <i>Phomopsis</i> .
	<i>Scleroderris abieticola</i> Zeller & Goodding	Wells	Fruiting from needle scars; associated with dying ("flagging") of small branches. Isolated in culture.
Fir, amabilis	<i>Arceuthobium campylopodum</i> Engelm.	Port Moody	Causing witches' brooms and fusiform swellings of branches. Recorded previously from Oregon and Washington but apparently not from Canada on amabilis fir.
Fir, Douglas	<i>Botrytis cinerea</i> Pers. ex Fr.	Duncan	Causing gray mould blight of seedlings in forest nursery.
	<i>Cytospora</i> sp.	Sooke	Associated with a dieback disease of the leaders of young trees, probably subsequent to frost damage.
	<i>Flammula decorata</i> Murr.	Saanich	A gill fungus, apparently causing decay in branches.
	<i>Hendersonia</i> sp.	Castle Rock, Isle Pierre, Invermere, Williams Lake	A virulent and still unidentified parasite killing and fruiting on the buds of young Douglas fir. Under observation since its discovery in B.C. in 1955.
	<i>Phacidium infestans</i> Karst.	Peachland	Causing snow blight of Douglas fir in natural forest. Known to cause damage to snow-covered foliage of conifers in nurseries in Iowa, Oregon, B.C., and particularly in Europe. First herbarium record.
Fir, grand	<i>Naematoloma fasciculare</i> (Huds. ex Fr.) Karst.	Cordova Bay	Causing decay in butt log of pole-size tree cut two years previously.
Hemlock, mountain	<i>Melampsora epitea</i> Thüm. f. sp. <i>tsugae</i> Ziller (<i>Caecoma dubium</i> C. A. Ludwig)	Victoria	Causing a needle rust disease of hemlock. Obtained by inoculating hemlock needles with basidiospores produced by the fungus on leaves of Scouler willow.
Hemlock, western	<i>Dermea</i> sp.	Robertson River Valley	Associated with a dieback of the leaders of young trees.
	<i>Melampsora epitea</i> Thüm. f. sp. <i>tsugae</i> Ziller (<i>Caecoma dubium</i> C. A. Ludwig)	Victoria	See remarks for the same organism under mountain hemlock, above.
Larch, European	<i>Armillaria mellea</i> (Vahl ex Fr.) Quél.	Robertson River and Sayward	Causing root- and butt-rot and apparently killing trees 6-12 feet high in plantations. Douglas fir affected in the same manner. Identified from isolations in pure culture, no fruiting observed.
Maple, broadleaf	<i>Naematoloma fasciculare</i> (Huds. ex Fr.) Karst.	Cameron	Causing decay in stump. Reported on the same host from Oregon.
Pine, lodgepole	<i>Cenangium ferruginosum</i> Fr. ex Fr.	Houston	Associated with dieback of branches. Frequently occurring on ponderosa pine but not known to be reported on lodgepole pine in B.C.
	<i>Retinocylus abietis</i> (Crouan) Groves & Wells	Jordan River	Associated with resinous cankers. Reported in 1957 as causing similar symptoms in Engelmann, Sitka, and white spruce, and in alpine and Douglas fir.

OTHER NOTEWORTHY DISEASES—Concluded

Host	Organism	Locality	Remarks
Pine, red and Scots	<i>Armillaria mellea</i> (Vahl ex Fr.) Quél.	Bowser and Tsolum	Causing root- and butt-rot, and killing seedlings in plantations. Not fruiting; identified from isolations in pure culture.
Poplar, hybrid; <i>P. X canadensis</i> 'Grandis'	<i>Taphrina populina</i> Fr.	Chilliwack	Causing yellow leaf blister; previously reported on Lombardy poplar in 1958. Possibly a new world host record.
<i>P. X canadensis</i> 'Regenerata'	<i>Taphrina populina</i> Fr.	Haney	Same remarks as for <i>T. populina</i> on <i>P. X canadensis</i> 'Grandis'.
Poplar, silver	<i>Neofabraea populi</i> Thompson	Revelstoke	Apparently a virulent parasite, causing sunken-bark cankers and killing large and small branches.
Spruce, black	<i>Chrysomyxa ledicola</i> Lagerh.	Whitehorse, Y.T.	Causing needle-rust and -cast. Apparently not previously reported on black spruce from Yukon Territory, although known from B.C. and Alaska, where it may cause severe defoliation.
	<i>Chrysomyxa woronini</i> Tranz.	Dawson, Y.T.	Causing considerable damage to the current year's shoots of black and white spruce at high elevations (above 3,000 feet). First record on spruce for Yukon Territory.
Spruce, Sitka	<i>Retinocyclus abietis</i> (Crouan) Groves & Wells	Terrace	Associated with branch cankers of living trees. In 1957 found associated with canker and dieback damage in stems and branches of living spruce, Douglas fir, and alpine fir.
	<i>Tryblidiopsis pinastri</i> (Fr.) Karst.	Babine Lake	Associated with dieback of lower branches.
Spruce, white	<i>Chrysomyxa woronini</i> Tranz.	Dawson, Y.T.	See remarks under <i>C. woronini</i> on black spruce, above.
	<i>Tryblidiopsis pinastri</i> (Fr.) Karst.	Smithers	Associated with dieback of lower branches of mature trees.
Tamarack	<i>Melampsora medusae</i> Thüm.	Fort Nelson	Causing rust and premature shedding of needles. Apparently not previously reported on tamarack in western North America.
Willow, Scouler and Sitka	<i>Melampsora epitea</i> Thüm. f. sp. <i>tsuaga</i> Ziller	Cordova Bay and Victoria	Causing a leaf rust disease of willow. Obtained by inoculating the willow leaves with aeciospores of <i>Cecoma dubium</i> C. A. Ludwig, known to cause a needle rust disease of western hemlock.
Willow	<i>Diplodina salicis</i> Westd.	Cordova Bay	Associated with a dieback disease of willow.