

# PROVINCE OF BRITISH COLUMBIA

## FOREST DISEASE SURVEY

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### INTRODUCTION

Weather conditions in British Columbia were generally moderate during 1960 and reports of weather damage to trees were uncommon. Foliage diseases, however, flourished and three reached epidemic proportions: Douglas fir needle blight, yellow pine needle blight, and larch needle cast. Foliage rusts were common and a limited outbreak of ink spot of aspen was reported for the first time in several years.

Of special note in 1960 was the detection of two apparently introduced rusts, one on yellow pine seedlings, and the other on cultivated juniper and pears. Willow blight was detected in the Province for the first time since 1941.

The 2,049 collections submitted in 1960 are listed below, according to host:

| Coniferous Trees                         | Collections | Broad-leaved Trees       | Collections |
|--|-------------|--------------------------|-------------|
| Douglas fir.....                         | 820         | Alder..                  |             |
| Fir                                      |             | Red alder.....           | 42          |
| Alpine fir.....                          | 258         | Sitka alder.....         | 6           |
| Grand fir.....                           | 19          | Mountain alder.....      | 2           |
| Amabilis fir.....                        | 18          |                          | 50          |
|  | 295         | Maple                    |             |
| Hemlock, western.....                    | 267         | Douglas maple.....       | 6           |
| Pine                                     |             | Broadleaf maple.....     | 5           |
| Lodgepole pine.....                      | 97          | Vine maple.....          | 1           |
| Western white pine.....                  | 20          | Other maples.....        | 3           |
| Scots pine.....                          | 10          |                          | 15          |
| Ponderosa pine.....                      | 9           | Birch                    |             |
| Red pine.....                            | 2           | Western white birch..... | 4           |
| Other pines.....                         | 11          | Other birches.....       | 9           |
|  | 149         |                          | 13          |
| Spruce                                   |             | Oak                      |             |
| Sitka spruce.....                        | 37          | Garry oak.....           | 4           |
| White spruce.....                        | 27          | Other oaks.....          | 2           |
| Engelmann spruce.....                    | 12          |                          | 6           |
| Black spruce.....                        | 9           | Willow.....              | 55          |
| Other spruces.....                       | 1           | Aspen, trembling.....    | 24          |
|  | 86          | Cottonwood, black.....   | 24          |
| Juniper                                  |             | Cherry.....              | 5           |
| Rocky Mountain.....                      | 10          | Arbutus.....             | 3           |
| Common juniper.....                      | 6           |                          | 195         |
| Other junipers.....                      | 12          | Total.....               |             |
|  | 28          |                          |             |
| Larch                                    |             |                          |             |
| European larch.....                      | 7           |                          |             |
| Western larch.....                       | 4           |                          |             |
| Other larches.....                       | 4           |                          |             |
|  | 15          |                          |             |
| Cedar, western red.....                  | 13          |                          |             |
| Yew, western.....                        | 5           |                          |             |
|  | 1,678       |                          |             |
| Total.....                               | 1,678       |                          |             |
| Miscellaneous or host not specified..... | 176         |                          |             |
| Grand Total.....                         | 2,049       |                          |             |

## IMPORTANT DISEASES

**Weather Injury**—Moderate weather conditions prevailed during 1960 in British Columbia and only two reports of frost damage were received. Alpine firs over about 100 acres on Tabor Mtn., in the Prince George Region, suffered light frost damage, while lodgepole pines over several hundred acres near Bennett, in northeastern British Columbia, suffered more severe damage. The latter report described severe dieback symptoms probably resulting from repeated injury.

The residual effects of the 1958 drought continued to cause mortality and dieback. Douglas fir, one of the tree species most severely damaged by the direct effects of the drought, continued to show progressive dieback and mortality losses in the Lillooet and Pavilion areas and new dieback was reported in the lower Fraser Valley. *Cytospora* sp., found associated with the dieback in 1959, was present on most samples submitted. *Armillaria mellea* (Vahl ex Fr.) Quél. was frequently associated with mortality of Douglas fir as well as other species. Reports of alder dieback and mortality from several regions of the Province including Terrace, Lower Fraser Valley, and Vancouver Island, also suggested drought injury. Some undetermined insect mining and fructifications of *Nectria* sp. were associated with much of the damage.

**Foliage Diseases**—Weather conditions in 1960 apparently favoured the development of foliage diseases in many parts of the Province. A very high level of infection was recorded for several fungi and many others, while not particularly damaging, were more common than usual.

*Elytroderma deformans* (Weir) Darker continued to intensify in yellow pine stands for the third consecutive year and mortality in the suppressed crown classes was noted on several permanent plots. Killing of lower branches on large mature trees was general in areas of very severe infection.

*Hypodermella laricis* Tub., which causes an important needle cast of western larch, attained epidemic levels in the Rock Creek, West Kettle and Upper Kettle areas and along the east side of Upper Arrow Lake. The severe infections common in the Creston area in past years were not present.

*Rhabdocline pseudotsugae* Syd. continued at epidemic levels in Canal Flats—Invermere Douglas fir Christmas tree holding. Heavy infection of individual trees was reported from other areas, particularly on the coast, but on the whole, damage was negligible.

Foliage rusts were more common and generally at higher than average infection levels.

Ink spot disease of trembling aspen caused by *Ciborinia whetzellii* (Seav.) Seav. reached outbreak proportions at Euchu Lake in Tweedsmuir Park and at Tabor Creek near Prince George after being virtually absent for several years.

**Melampsora pinitorqua(?) in North America**—A rust of ponderosa pine seedlings has been noted in a small experimental seedbed at the forest tree nursery of Telkwa. The fructifications of the rust fungus causing this disease indicate that it is a species of *Melampsora*, and a preliminary review of the literature shows that the only *Melampsora* rust of pine known is *M. pinitorqua* Rostr., the pine twist rust of Europe.

Further observations and studies are required to establish whether this is the first introduction of the pine twist rust fungus into North America or is a new species.

**Introduction of Pear-Juniper Rust from Europe**—For several years a rust has caused considerable damage to pear trees near Victoria. Only recently has it been determined that this rust is not *Gymnosporangium clavariiforme* (Pers.) DC., the native pear rust, but is *Gymnosporangium fuscum* DC., the European pear rust. Infections have been recorded in the same area on the alternate host, *Juniperus sabina* L., an introduced ornamental. This is believed to be the first instance where *G. fuscum* has been established outside of Europe and on a perennial basis on both alternate hosts.

**Willow Blight**—Willow blight was reported in British Columbia for the first time at Abbotsford in 1941 (Conners, I. L., McCallum, A. W., and Bier, J. E. 1941. Willow blight in British Columbia. *Phytopathology*, 31: 1056-1058). There have been no further records until the present infection was found at the University of British Columbia Arboretum. The damage was first observed in the summer of 1958 on *Salix* 'June des Ardennes' and has since spread to *Salix amygdalina* L. v. *fragilis*, *S. alba* L. v. *vitellina*, and *S. x fruticosa* Doell. Several native willows, including *S. sitchensis*, standing nearby have not shown any symptoms to date (Bloomberg, W. J. and Funk, A. 1960. Willow blight in British Columbia. *Can. Dept. Agr., For. Biol. Div., Bi-monthly Prog. Rept.*, 16 (5): 3.).

The symptoms characterizing the disease are a blackening of the entire blade of the youngest leaves, followed by a black lesion which encircles and progresses down the shoot, eventually killing the whole branch. In some of the infected trees up to one third of the crown has been destroyed. Suckers emerging from the base of *S. alba* v. *vitellina* have also been blighted.

The causal fungus, *Fusicladium saliciperdum* (All. & Tub.) Tub. has been found on the leaves and small twigs. *Physalospora miyabeana* Fuk., which commonly accompanies or follows *Fusicladium*, has not been observed in the present outbreak in either of the spore states. *Cytospora* sp. occurred abundantly on dead overwintered twigs but it was considered to be strictly saprophytic on the material killed by *Fusicladium*.

**Dying of Weeping Willow**—During June and July, 1960, a large number of ornamental weeping willows throughout the central part of the Kamloops Forest District exhibited severe crown symptoms and some appeared to be dead or dying. The symptoms started with yellowing and thinning of the foliage on part or all of the crown. Closer examination revealed longitudinal cracks in the bark and large lesions partly or completely girdling the affected branches or trunk. The long, orange, spore-tendrils of *Cytospora* sp., probably *Cytospora chrysosperma* (Pers.) Fr., were commonly found on the diseased bark.

Of 1,400 trees examined throughout Kamloops, Savona, Cache Creek, Ashcroft, Lytton, and Merritt, 44 per cent were affected and 8 per cent had lost more than one half of the crown or died. The damage was apparently confined to the Babylon weeping willow, *Salix babylonica* L. Wisconsin weeping willow, *Salix blanda* Anders, which is nearly as common, seemed to be resistant.

No virulent organism was detected and the cause of the damage, therefore, could not be determined with certainty. It is probable that trees weakened by adverse environment became susceptible to infection by the relatively weak parasite *Cytospora* sp. The wide distribution of damage suggested that predisposition was probably the result of adverse weather conditions rather than local site factors. A severe frost, recorded during early November, 1959, may have been implicated.

**Melampsora Rust of Douglas Fir and Poplar**—The incidence of leaf rust (*Melampsora occidentalis* Jacks.) on wild and cultivated black cottonwood at a nursery near Terrace was reduced drastically by removing all Douglas fir

seedlings from the nursery beds. The rust had in the past caused serious damage to the Douglas fir as well as the cottonwood. Several varieties of hybrid poplars, such as *Populus X canadensis* 'Grandis', *P. X canadensis* 'Robusta Bachelieri', *P. X canadensis* 'Serotina', *P. X Generosa* Henry, and others, appeared to be immune to the rust.

The nursery is located approximately 50 miles north of the natural range of Douglas fir.

**Diseases of Non-indigenous Trees**—No new or unusual reports resulted from the annual examination of exotic plantations with the exception of a root rot problem in a plantation of hybrid poplars near Terrace and several new host-fungus combinations included under "Other Noteworthy Diseases" below. Twenty-five per cent of the trees in a plantation of hybrid varieties 'Robusta' and 'Grandis' had dead roots and shoots and 75 per cent had basal cankers caused by *Armillaria mellea*. There was a strong suggestion of a site problem, possibly prolonged spring flooding. These same varieties were quite vigorous and free from root rot in the nursery in Terrace from which the diseased trees originated.

**Disease Conditions in Forest Nurseries**—Late damping-off was at an endemic level at the Quinsam and Green Timbers nurseries. At the Duncan nursery, however, infection levels reached epidemic proportions. In a badly infected bed sampling showed 42 per cent mortality while samples from randomly selected beds showed a loss of 29 per cent.

#### OTHER NOTEWORTHY DISEASES

| Host                 | Organism  | Locality  | Remarks  |
|----------------------|---|---|--|
| Alder, Sitka.....    | <i>Gnomonia setacea</i> (Pers. ex Fr.)<br>Ces. & de Not.<br><i>Mycosphaerella punctiformis</i><br>(Pers.) Schroet.<br><i>Mycosphaerella</i> sp.   | Dawson, Y.T.<br>Haines Highway,<br>B.C.<br>Dawson, Y.T. | Associated with tip blight of branches.<br>Associated with tip blight of branches.<br>An unidentified parasite close to <i>Sphaerella alni</i> (Cooke) Sacc., apparently causing tip blight of branches.   |
| Birch, European..... | <i>Melampsorium betulinum</i> (Fr.)<br>Kleb.  | Yarrow  | Heavy infection of leaves of young trees in nursery; probably the first record of this rust disease on <i>Betula pendula</i> Roth. in North America.   |
| Comandra, northern.  | Virus   | Teslin Lake, Y.T.                                       | Common throughout the area; may be a factor in comandra blister rust control, northern comandra being the principal telial host of <i>Cronartium comandrae</i> Peck in the Yukon.  |
| Fir, Douglas         | <i>Trichothecium roseum</i> (Pers.)<br>Link   | Duncan  | Causing pink mould on cones stored at the forest nursery.  |
| Fir, grand.....      | <i>Darlucia flum</i> (Biv.-Bern. ex Fr.)<br>Cast. and <i>Tuberculina persicina</i> Sacc.<br><br><i>Odontia bicolor</i> (Alb. & Schw. ex Fr.) Bres.<br><br><i>Pholiota aurivella</i> Fr. | Union Bay<br><br>Victoria<br><br>Langford               | Well known parasites inhibiting the spore formation of rust fungi; believed to be the first record of parasitism on the rust fungus <i>Peridermium pseudo-balsameum</i> (Diet. & Holw.) Arth. & Kern. "... the cause of an important butt rot in various species of coniferous and broadleaved trees in Canada." (Can. J. Bot. 31, 745-749, 1953.) First record on grand fir.<br>Causing trunk rot; new record on conifer. |
| Hemlock, western.... | <i>Flammula alnicola</i> (Fr.) Quél.  | Terrace   | Isolated in pure culture from wood rot.  |

## OTHER NOTEWORTHY DISEASES—Continued

| Host   | Organism  | Locality  | Remarks  |
|--|---|---|--|
| Labrador tea<br>( <i>Ledum</i> spp.)                             | <i>Chrysomyxa woroninii</i> Tranz.                                      | Fort Nelson, B.C.,<br>Dawson, Y.T., and<br>Dawson Junction,<br>Alaska | Causing witches' brooms of Labrador tea and shoot rust of spruce; new host records for British Columbia and Yukon Territory.   |
| Maple, Douglas . . . . .   | <i>Taphrina darkeri</i> Mix   | Cordova Bay   | Causing leaf-blisters and -necrosis; first record of its occurrence on Douglas maple.  |
| Oak, Garry . . . . .   | <i>Taphrina caeruleascens</i> (Desm.)<br>Tulasne                        | Langford  | Causing leaf-blisters and -necrosis; first record of its occurrence on Garry oak, although 44 other species of oak are listed as hosts occurring in Japan, Europe, and North America by A. J. Mix. |
| Pine, Scots . . . . .  | <i>Ganoderma applanatum</i> (Pers. ex<br>Wallr.) Pat.                   | Haney   | Causing white mottled rot; first host record for North America.  |
| Poplar, balsam . . . . .   | <i>Fomes fomentarius</i> (L. ex Fr.)<br>Kickx                           | Fort Nelson   | Causing white mottled rot; believed to be the first published record of its occurrence on balsam poplar.   |
| Poplar, hybrid ( <i>P. X canadensis</i><br>'Grandis')            | <i>Armillaria mellea</i> (Vahl ex Fr.)<br>Quél.                         | Exstew  | Causing root rot in plantations; black cottonwood not affected.  |
| Poplar, hybrid ( <i>P. X canadensis</i> 'Robusta<br>Bachelieri') | <i>Taphrina populina</i> Fr.  | Vancouver (Univ. of<br>B.C. forest)                                   | Causing yellow leaf-blisters and -necrosis; previously reported on <i>Populus nigra</i> , and varieties 'Grandis' and 'Regenerata' of <i>P. X canadensis</i> .                                     |
| Spruce, Engelmann . . . . .                                      | <i>Arceuthobium campylopodum</i> Engelm. f. <i>laricis</i> (Piper) Gill | Fauquier  | Lower branches of tree infected from mistletoe in an overstory of western larch; first herbarium record.   |
| Spruce, white . . . . .  | <i>Flammula alnicola</i> (Fr.) Quél.                                    | Summit Lake   | Isolated in pure culture from wood rot; new herbarium record.  |
| Willow . . . . .   | <i>Trameles odora</i> (Sommerf. ex Fr.)<br>Fr.                          | Cinema, Isle St. Pierre,<br>Myrddale,<br>Quesnel                      | Causing trunk- and butt rot of living, mature trees; often mistaken for <i>T. suaveolens</i> (L. ex Fr.) Fr. New record for western Canada.  |