Forest trees / Arbres forestiers

Crop / Culture: Conifer forest

Name and Agency / Nom et Organisation: D. Doidge and J. Muir
B. C. Ministry of Forests
Cariboo Forest Region
540 Borland Street
Williams Lake, British Columbia

Location / Emplacement: Central British Columbia

Title / Titre: Armillaria root disease snrvey at Williams Lake, B.C.

METHODS:

A survey for armillaria root disease (pathogen: Armillaria ostoyae) was conducted in a 100 ha forest stand of Douglas-fir at Pinnell Creek, 30 km north of Williams Lake. Part of the area was unlogged, part was selectively logged 35 years ago, and part was selectively harvested 10 years ago. A trial of operational root disease control treatments was planned for the area.

The unlogged portion and the portion selectively logged approximately 35 years ago, were surveyed using standard operational timber cruising procedures to obtain volumes of standing trees. Occurrence of root disease was surveyed using traverse lines spaced 100 m apart.

RESULTS AND COMMENTS:

Armillaria root disease was found on 66 ha of the 106 ha surveyed, in both the logged and unlogged portions of the area. No other root disease was found.

In the area logged 10 years ago, 2 to 3% of the total number of the lodgepole pine saplings exhibited root disease symptoms, in infection centers (single or small groups of infected stems) often less than 10 m apart.

In the area selectively logged 35 years ago, disease spread was apparent from infected Douglas-fir stumps into the surroundiug inimature lodgepole pine trees. Scattered residual Douglas-fir trees were also infected. Approximately 1% of the stems in the stand showed symptoms or signs of armillaria root disease infection. However, infection was more apparent than in the recently logged area, with 45 to 50% tree mortality occurring in small areas of 0.5 ha or less.the area.

Approximately one half of the unlogged area was infected with armillaria root disease. Areas infected were readily appareut with trees of all ages showing symptoms of infection. It was estimated that 35 to 50% of the original volume in the stand was lost from root disease induced mortality, resulting in exteusive infectiou centers. Iudividual infection centers were more difficult to detect here than in the other parts of the area because the centers had merged to form large infected areas. Often, within this stand, the distance between consecutive infected trees or groups of trees was 15 m or less.

Mountain pine beetle (Dendroctonus ponderosae) and Douglas-fir bark beetle (D. pseudotsugae) were associated with armillaria root disease-infected trees. In areas where trees were not affected by root disease, ouly scattered, old mountain pine beetle attaek was noted.

Crop / Culture: Douglas fir plantation

Location / Emplacement: Central Interior British Columbia

Title / Titre: Three-year spread of armillaria root disease in a Cariboo Forest Region Douglas-fir plantation.

Name and Agency / Nom et Organisation: R. Reich and J. Muir
B. C. Ministry of Forests
Prince George Forest Region
1011-4th Avenue
Prince George, British Columbia
V2L 3H9

METHODS:

In August 1987, a 5.3 hectare portion of a Douglas-fir plantation established in 1973 in the interior cedar-hemlock(ICHe2) biogeoclimatic subzone in the Horsefly Forest District was surveyed by tallying and assessing all planted Douglas-fir on a 10 x 10 m grid. Symptoms and signs of armillaria root disease were recorded for all Douglas-fir showing root disease crown symptoms.

In August 1990, all trees in the infected portion of the stand in a 2.16 hectare subplot were stem mapped and assessed to determine the rate of spread of the root disease.

RESULTS AND DISCUSSION:

A 2.38 ha portion of the plot on the east side of the road that bisected the area had armillaria root diseased-trees. In 1987, stocking was 1095 stems per hectare (sph) in the uninfected portion, and 782 healthy sph in the infected portion. Eleveu per cent of the trees were infected with armillaria root disease.

In 1990, the incidence of armillaria root disease had increased from 11 to 16%, the proportion of plot area occupied by infected trees had increased from 56 to 64%, and stocking in the infected portion of the plot had decreased from 782 to 682 sph. The infected portion of the plot is now designated "not-satisfactorily-restocked(NSR)" because it has less than 700 stems per hectare.

The number and distribution of infection centers were also important. There were approximately 20 infected trees per centre (range 1 to 47). Some centers were beginning to coalesce, while others were still forming. Other centers had no trees in them and were not mapped. Armillaria was detected in some centers without trees based on affected vegetation such as false box. Apparently spread of the root disease is still occurring primarily from Douglas-fir stumps to young regeneration trees, mostly lodgepole pine. The next phase will be spread from tree to tree within the existing regeneration. Presently it is too early to assess tbe tree-to-tree expansion rates of centers.

Because root disease centers were evenly distributed, all healthy trees were no more than 15 m distance from an infected tree, aud most were within 5 to 10m distance. If the fungus spreads along roots or through soil by means of rhizomorphs at a rate of 20 cm per year, we expect that within the next 25 to 30 years, most trees could be infected or dead.

In the surveyed area, the time from expression of root disease symptoms to death of an infected tree was usually one year. Therefore, based on the incidence of symptomatic and dead, infected trees, the anuual rate of tree mortality caused by the root disease was 2%.

Crop / Culture: Elm

Location / Emplacement: Saskatchewan

Title / Titre: First Record of Dutch Elm Disease in Saskatchewan

Name and Agency / Nom et Organisation:

May-Melin, J.
Saskatchewau Agriculture & Food
Soils & Crops Branch, Crop Protection Laboratory
3085 Albert St., Regina, SK., S4S 0B1

and

Walter, B.
Saskatchewan Parks aud Renewable Resources
Forestry Branch, 350 Cheadle Street W.
Swift Current, SK., S9H 4G3

In early August, 1990 two American elm (Ulmus americana) samples from Woodlawn Regional Park, south of Estevan, were found to be infected with Dutch Elm Disease (DED). Subsequent sampling in the area by Saskatchewan Parks and Renewable Resources personnel resulted in 48 additional American elm samples being submitted to the Crop Protection Laboratory. Ophiostoma ulmi (Ceratocystis ulmi) was isolated from 40 of the total 50 samples received from the park area. Thirty-three of the 40 samples with DED came from trees within the park bonndary, five from locations within elm shelterbelts just west of the park and two from locations up to 4 km east of the park. This is the first report of DED from Saskatchewan, except for an isolated tree in Regina in 1981 which was immediately felled and burned.

The elm within the park are part of a natural stand which extends along the Souris River Valley. Dead elm wood is abundant along the valley and within the park and many of the trees are in poor health, suffering from old age and drought. Consequently 3000 elm trees within the park have been marked for removal in efforts to prevent further spread of the disease. Cutting and burning of the 3000 designated trees has begun and completion is expected by March, 1991.

No isolates of O. ulmi were detected from elm samples received in 1990 from the cities of Estevan, Regina and Saskatoon as part of an informal survey which has continued for over 10 years in Saskatchewan.

Crop / Culture: Elm

Location / Emplacement: Manitoba

Title / Titre: Incidence of Dutch Elm Disease in Manitoba in 1990

Name and Agency / Nom et Organisation:

PLATFORD, R. G.
Manitoba Agriculture
Plant Pathology Laboratory
Agricultural Services Complex
201-545 University Crescent
WINNIPEG, Manitoba
R3T 5S6

Methods: Results are based on samples of American elm, Ulmus americana and Siberian elm, Ulmus pumila submitted to the Plant Pathology Laboratory from a survey conducted by the Manitoba Department of Natural Resources. Trees were selected for sampling and submission to the laboratory on the basis of presence of wilted brown leaves and internal brown staining at the cambium. All samples submitted were cultured on potato dextrose agar medium and incubated for 7 days at 20°C. Cultures were identified after 7 days of incubation.

Results: There were 2,286 elm trees showing symptoms of leaf wilt and vascular staining sampled in Manitoba in the 1990 survey. Branch samples were submitted to the Manitoba Agriculture Plant Pathology Laboratory for culturing. The results of the survey are presented in Table 1. Tree removals are also included, as this indicates the real impact of Dutch Elm Disease (DED) in the areas sampled. In many areas where DED is prevalent, only a few samples are taken to confirm presence of DED. Surrounding elms with similar symptoms and trees having more than 50% of the crown dead are marked for removal. The sampling results do not give a full indication of the impact of DED in rural Manitoba as sampling and tree removals are concentrated in cities, towns and municipal parks which have a cost sharing agreement with the Manitoha Department of Natural Resources.

Eighty-nine percent (89%) of elms sampled were infected with DED caused by Ophiostoma ulmi (Geratocystis ulmi). There were 1,097 trees in Winnipeg which were either confirmed in the laboratory as having DED or were highly suspect of being diseased. In addition, 10,105 trees were classified as hazard trees (more than half dead). The 11,202 trees marked for removal in 1990, is almost the same number as marked for removal in 1989 (10,860), or an increase of less than 4%.

There were fewer trees marked for removal in the Brandon (-27%), Interlake (-17%) and Central regions (-21.4%) in 1990. However there was an increase in the trees marked for removal in the Eastern (+390.4%) and Western regions (+44.9%). DED is now almost completely co-existent with the range of native American elm in Manitoba, except for elm trees in the northwest part of the province north of Dauphin. The native range of American elm in Manitoba extends to The Pas. Dothiorella dieback (Dothiorella ulmi) was found in 76 samples of American elm and verticillium wilt (Verticillium spp.) was found in 32 samples of American elm.

In addition to confirming the presence of DED in Manitoba trees, the laboratory confirmed Opthiostoma ulmi (Ceratocystis ulmi) in 2 cultures submitted from Saskatchewan. The infected trees were found near Estevan.

The 1990 results presented in this article differ from previous results submitted in October at the Western Committee on Plant Disease Control conference, as the final totals were not available at that time.

Table 1. INCIDENCE OF DUTCH ELM DISEASE IN MANITOBA IN 1990

AREA	TREES SAMPLED 1989	TREES SAMPLED 1990	TREES DISEASED[a] 1989	TREES DISEASED[a] 1990	% INFECTED 1989	% INFECTED 1990	TREES MARKED FOR REMOVAL 1989	TREES MARKED FOR REMOVAL 1990	PERCENT CHANGE
Winnipeg	1261	1097	1156	979	92	89	10860	11202	+3.2
Brandon	151	129	126	114	80	88	2579	1881	-27.0
Interlake[1]	128	146	103	135	80	92	863	714	-17.3
Central[2]	418	603	346	534	83	89	8932	6023	-21.4
Eastern[3]	32	115	20	88	63	77	429	2004	+390.4
Western[4]	128	50	82	41	64	82	1464	2121	+44.9
Totals	2118	2286	1833	1891	77*	86*	25127	23945	

(a) Based on confirmation of presence of Ophiostoma ulmi (Ceratocystis ulmi) in laboratory cultures

(1) Interlake region includes the City of Selkirk and all area north of Winnipeg between Lake Manitoba and Lake Winnipeg.

(2) Central region includes the town of Portage la Prairie and the area south to the United States border and east to the Red River

(3) Eastern region includes all area east of the Red River to the Ontario border.

(4) Western region includes area west of Portage la Prairie to the Saskatchewan border excluding the City of Brandon

* Figures represent average percent infected in 1989 and 1990

Crop / Culture: Lodgepole pine

Location / Emplacement: Central British Columbia

Title / Titre: Incidence of western gall rust and blister rusts on young lodgepole pine in the Cariboo Forest Region.

Name and Agency / Nom et Organisation: D. Doidge, J. Richmond and J. Muir
B.C. Ministry of Forests
Cariboo Forest Region
540 Borland Street
Williams Lake, British Columbia
V2G 1RB

METHODS:

In 1989, at 31 sites in the Cariboo Forest Region, young lodgepole pine (Pinus contorta var. latifolia) trees were surveyed for incidence of stem rusts (western gall rust Endocronartium harknessii, stalactiform blister rust, Cronartium coleosporiodes, and comandra blister rust, C. comandrae). Plantations of 10 to 20 years age, spaced stands, and natural stands scheduled to be spaced were surveyed.

Within each stand we ran parallel transects at 100 m spacing, and established circnlar plots (radius 3.99m) at 50 m intervals. All pine trees within the plots were counted and examined.

Where trees were infected with western gall rust, the location on the tree and type of infection were noted. The age of galls was determined by counting the whorls from the top of the tree down to the gall.

Because of the similarity of stalactiform and comandra blister rust cankers, we recorded these rust diseases as "blister rust". For trees infected with blister rust, the position and size of the infected area were recorded.

Incidence (per cent trees infected) was compared per rust, stand treatment, stand density, and biogeoclimatic zone. In planted stands, the age of stem galls was compared to the overall age of the stand to estimate the incidence of gall rust on nnrsery stock.

The survey was undertaken as a Biology Co-operative Student program between Simon Fraser University and the British Columbia Ministry of Forests.

RESULTS AND COMMENTS:

Incidence of western gall rust was higher in planted stands at 14 per cent (%), than in spaced stands (5.5%), or in natural stands (4.5%). Branch galls were more prevalent in the spaced stands, on 71% of trees, than in planted stands (54%) and in natural stands (52%). These results suggested that incidence of western gall rust increased with decreasing stand density.

Tree mortality associated with stem galls was 8.5% in 11 of the 31 stands surveyed. For all stands, mortality associated with western gall rust was 3.75%. Mortality was greater in natural stands (1.2%) than in planted stands (0.75%). Incidence of gall rust appeared higher in the moister, cooler biogeoclimatic zones than in the very dry to dry zones.

The overall incidence of blister rust was 0.51%. Incidence was highest in spaced stands (0.95%), followed by natural stands (0.47%), and planted stands (0.37%). In contrast to western gall rust, the majority of infections were on the bole . The average length of bole lesions was 24 cm.

Blister rust incidence appeared slightly higher in the dry to moist zones, but did not differ noticeably with differences in stand density.

The higher incidence (14%) of western gall rust in planted stands might be attributed to a variety of factors such as faster growth and more susceptible shoot tissue, or to planting of trees that are genetically more susceptible.

In the spaced, natural stands, gall rust incidence was similar to that in unspaced natural stands, but the fewer stem infections in the spaced stands indicated that the spacing had removed some stem infected trees.

Although stem infection and tree mortality were noticeably greater in natural stands, the effects should be minimal because these stands have more stems per hectare, and losses probably will have little effect on stand yield at harvest time.

The low incidence of blister rust (0.51%) could be attributed to a low occurrence of the alternate hosts, Indian paintbrush (Castilleja spp.) and comandra (Comandra spp.)

Although the levels of blister rust were too low to discern any definite trends, the higher incidence in spaced stands was similar to that reported by previous authors (e.g. van der Kamp and Spence, 1986. Stem diseases of lodgepole pine in the British Columbia interior following juvenile spacing. Forestry Chronicle 63:334-339)

Crop / Culture: Paper birch

Location / Emplacement: Northwestern Ontario

Name and Agency / Nom et Organisation: E. Setliff and J. McLaughlin
School of Forestry
Lakehead University
Thunder Bay, Ontario P7B 5E1

Title / Titre: PRELIMINARY ASSESSMENT OF *CHONDROSTEREUM PURPUREUM* ASSOCIATED WITH POST-LOGGING DECADENCE

METHODS: The site studied was located on the Jack Haggerty Forest near Thunder Bay. The area was harvested of timber except for paper birch (*Betula papyrifera* Marsh.) during the winter of 1986/87. All of the standing birch trees that remained within about a 0.4 ha area were surveyed for the presence of *Chondrostereum purpureum* (Pers.:Fr.)Pouz. basidiocarps in association with logging injuries to the trunks and roots. Increment cores were taken at DBH for subsequent measurement of growth ring widths. A total of 22 stems were examined as solitary trees or as clumps of trees. The wounds ranged in size from about 0.05 m - 0.1 m to 0.2 m - 0.9 m.

RESULTS: The trees were in various stages of decline and many were dead; thus the area represented a classical demonstration of post-logging decadence in birch. Sixteen of a total of 22 trees examined were wounded. *Chondrostereum purpureum* basidiocarps were associated with 75% of the wounded trees. Fruiting mostly occurred at the margins of the wounds; however some fruiting developed through lenticels and sapsucker injuries in the vicinity of the wounds. In one tree, basidiocarps were present at a skidding injury on top of a major root near the root crown. Additional fruiting bodies extended up the trunk from this root. Very little or no callus formation developed around wounds with *C. purpureum* basidiocarps. Substantial callusing was present around wounds in living trees without indications of *C. purpureum* infection. Broken branches and decline symptoms also were noted in the canopies of many birch trees in both the harvested area and in the surrounding forest. Examination of the last five years of growth for each of the trees revealed irregular patterns of growth among the trees. Studies of living trees in the surrounding forest in relation to trees in different stages of decline in the harvested area has yet to be done.