

***A Survey for Bronze Leaf Disease
on Poplar and Aspen Species in Alberta
(Year 2)***

**A Research Progress Report Submitted to
The Alberta Professional Horticultural Growers
Congress and Foundation Society**

by

Ron Howard¹, Michael Harding¹, Robert Spencer², Dustin Burke¹,
Larry Kawchuk³, Philip Northover⁴ and Mardi Desjardins⁵

¹Alberta Agriculture and Rural Development
Crop Diversification Centre South
301 Horticultural Station Road East, Brooks, Alberta T1R 1E6

²Alberta Agriculture and Rural Development
Alberta Ag-Info Centre
Postal Bag 600, Stettler, AB T0C 2L0

³Agriculture and Agri-Food Canada
Lethbridge Research Centre
P.O Box 3000, Lethbridge, AB T1J 4B1

⁴Manitoba Agriculture, Food and Rural Initiatives
Crops Knowledge Centre
P.O. Box 1149, Carman, MB R0J 0J0

⁵Manitoba Agriculture, Food and Rural Initiatives
Crop Diagnostic Centre
204 – 545 University Crescent, Winnipeg, MB R3T 5S6

October 15, 2008

Survey Results

A province-wide survey for Bronze Leaf Disease (BLD) was carried out in plantings of Swedish Columnar Aspen and Tower Poplar in 2008. The survey consisted of visits to selected locations by staff of Alberta Agriculture and Rural Development (ARD), as well as investigations done by cooperators in their own areas using a survey kit provided by ARD. The survey kit consisted of a letter of invitation to participate, a survey protocol, and a data collection form (Appendix 1).

Over 100 samples with symptoms of BLD were collected by surveyors at more than 10 geographical locations and sent to CDC South. Upon arrival, the samples were logged in, photographed, and observed for characteristic symptoms of BLD, as well as for evidence of the pathogen *Apioplagiostoma populi* (Appendix 2). After visual analysis, the samples were frozen pending shipment to Dr. L. Kawchuk, Lethbridge Research Centre, for molecular analysis using a new polymerase chain reaction (PCR) test. Presumptive positive samples were obtained from various locations in and around Camrose, Edmonton and Calgary. More samples will likely be diagnosed with BLD once the testing has been completed. The PCR test has been a work in progress and Dr. Kawchuk hopes to complete the analysis of a backlog of samples (>75) later this year.

Development of the PCR Testing Protocol

Bronze leaf disease (BLD) is reported to be caused by a species of *Apioplagiostoma* and has been confirmed to occur in Manitoba. Many samples have been collected throughout Alberta exhibiting putative BLD symptoms over the past two years. Fruiting bodies (perithecia) of *A. populi* have been observed on leaf samples from Manitoba and recently tentatively identified on samples from Alberta.

To develop a diagnostic assay for the confirmation and detection of the pathogen in asymptomatic leaves, universal primers designed to detect all fungi were employed to amplify the ribosomal DNA (rDNA) extracted from infected leaf samples. Amplified DNA was cloned and sequenced to characterize the hypervariable rDNA sequence often used to identify organisms. Sequence was obtained from several infected samples that showed considerable homology to sequences of other related fungi of the Order Diaporthales, which *A. populi* belongs to. Alignment of these sequences facilitated the synthesis of oligonucleotides specific for the putative *A. populi* rDNA.

The synthesized oligonucleotides are being applied in the polymerase chain reaction (PCR) test to screen diseased samples. The assay is sensitive, requiring only a few milligrams of plant tissue, and results may be available within the same day. Preliminary results suggest the assay is effective and experiments are in progress to determine the best quality parameters of the screening. Sequencing will also be performed to determine the heterogeneity of the BLD pathogen if any. The assay will assist in determining the occurrence and epidemiology of *A. populi* in BLD development and assist in disease prevention.

Future Work

As soon as the final validation of the PCR test has been completed, the remaining survey samples will be tested and results reports will be generated and sent to cooperators. A final report will be written for the APHGCS and a color factsheet produced for use by nurserymen, arborists, landscapers, homeowners and others.

RE: Survey for Bronze Leaf Disease on Cultivated Poplar and Aspen Trees

To Whom It May Concern:

Alberta's nursery industry has become increasingly aware of Bronze Leaf Disease (BLD), a new and potentially serious fungal disease that affects a range of poplar and aspen species, particularly Swedish Columnar Aspen and Tower Poplar. Over the past five years, BLD has been steadily spreading and causing substantial damage to these two types of trees throughout southern Manitoba. The potential for this disease to move into Alberta is significant and it may already be present here at low levels in nurseries, shelterbelts and/or urban landscapes. Poplar and aspen species have been extensively planted throughout Alberta over the past 100 years and, if BLD becomes established, tree mortality and the associated costs of managing the disease could be significant.

There have been scattered reports of suspected BLD infections at various locations in central Alberta over the past five years. Samples collected during a survey in 2007 tested positive using a new molecular (PCR) test developed at the Lethbridge Research Centre. In order to validate these preliminary test results, a survey of poplar and aspen plantings at representative locations across Alberta will be carried out again in 2008. The results of this survey will be used to increase the awareness of tree owners and the nursery industry and to recommend strategies to manage this disease, thus minimizing the spread of this disease and associated tree losses.

The Landscape Alberta Nursery Trades Association supports having Alberta Agriculture and Rural Development staff undertake a systematic survey for Bronze Leaf Disease in selected aspen and poplar plantings across Alberta.

For more information on the survey, please review the accompanying information. If you have any questions, feel free to contact one of the following people:

Ron Howard, Ph.D., P.Ag.
Plant Pathology Research Scientist
Alberta Agriculture and Rural Development
Crop Diversification Centre South
301 Horticultural Station Road East
Brooks, Alberta, Canada T1R 1E6
Ph.: (403) 362-1328; Fax: (403) 362-1326
Email: ron.howard@gov.ab.ca

Robert Spencer, B.S.A., M.Sc., P.Ag.
Irrigated & Specialty Crops Specialist
Alberta Agriculture and Rural Development
Alberta Ag-Info Centre
Postal Bag 600
Stettler, Alberta, Canada T0C 2L0
Ph.: (403) 742-7901; Fax: (403) 742-7527
Email: robert.spencer@gov.ab.ca

Assessing the Incidence and Severity of Bronze Leaf Disease on Poplar and Aspen Species in Alberta in 2008

Background

Bronze leaf disease (BLD) is caused by the fungus *Apioplagiostoma populi*. It can infect a number of aspen and poplar tree species, particularly Swedish Columnar Aspen and Tower Poplar. Infected trees usually die back within 3 to 5 years and must be removed, with a significant cost incurred.

BLD is common in Ontario, Quebec and the northeastern United States, and was found in southern Manitoba in 2003 in nurseries, rural shelterbelts and urban amenity plantings. Reports from Manitoba suggest that diseased trees now outnumber healthy ones in some areas, and it is possible that both Swedish Aspen and Tower Poplar may be lost from the local landscape. There has been significant movement of trees from Manitoba to Alberta nurseries and garden centers in recent years, thus providing an opportunity for introduction of the disease.

Some of the samples collected during the BLD survey carried out in 2007 tested positive using a molecular (PCR) test. Additional material needs to be collected and tested in 2008 in order to validate these results.

Purpose of the Survey

- 1) To determine the geographical distribution and potential economic impact of BLD in cultivated plantings of poplar and aspen species in Alberta.
- 2) To work with nurseries, parks staff, landscapers, tree owners and other concerned individuals to help them eradicate or contain the disease, where and when it may occur.

Survey Procedures

- 1) Potential surveyors and/or survey locations will be contacted by telephone or email. The rationale for the survey will be explained and preliminary arrangements will be made with those who are willing to participate.
- 2) Each surveyor will receive a survey protocol (this document), a survey form to collect background information on survey locations, and a factsheet describing the symptoms, disease cycle and management of BLD on poplar and aspen species.
- 3) Surveyors are asked to examine plantings of Swedish Columnar Aspen and Tower Poplar in urban and rural areas across Alberta that represent a variety of habitats, e.g. amenity plantings, parks, boulevards, nurseries, natural areas, arboreta, shelterbelts, farmsteads, etc.
- 4) Surveyors should examine as many trees as possible for symptoms of BLD. The more plants that are surveyed, the more representative and useful the survey data will be.
- 5) Surveys should be carried out in the early spring and/or late fall when symptoms of BLD are likely to be the most conspicuous.
- 6) Surveyors should walk up and down both sides of rows or around individual trees to check for characteristic symptoms, e.g. wilted branches, bronze-coloured leaves and branch dieback.
- 7) Surveyors should rate the incidence (% trees infected out of the total number examined) and severity (proportion of branches with wilt or dieback symptoms on a scale of 0-4, where 0 = no BLD symptoms, 1 = < 10% of the tree canopy with BLD symptoms, 2 = 10-25% canopy symptoms, 3 = 26-50% canopy symptoms, and 4 = >50% canopy symptoms).

- 8) Wilt and dieback caused by things other than BLD, e.g. frost cankers, mechanical injury, cytophora canker, etc., should not be included in the survey tally; however, they should be mentioned in the “Other Notes, Observations or Comments” section of the survey form.
- 9) Surveyors should complete an individual survey form for each major site visited. Forms can be separated and individual pages copied if more are needed.
- 10) Surveyors should take digital or film pictures of good examples of any infected plantings that they may find. These will be used in publications and presentations concerning the survey.
- 11) Surveyors should collect two or three samples of symptomatic branches per survey location for laboratory analysis. Samples should be placed in an envelope labelled with the type or species of poplar or aspen examined, along with the surveyor’s name, date and the location where the sample was taken.
- 12) Please send completed survey forms, branch samples and/or photographs to:

Dr. Ron Howard
Plant Pathology Research Scientist
Crop Diversification Centre South
Alberta Agriculture and Rural Development
301 Horticultural Station Road East
Brooks, AB T1R 1E6
Phone: (403) 362-1328; Fax: (403) 362-1326
Email: ron.howard@gov.ab.ca

More Information or Questions

For more information on the survey or for questions, please contact:

Mr. Robert Spencer
Irrigated and Specialty Crop Specialist
Ag-Info Centre
Alberta Agriculture and Rural Development
Provincial Building
4920 – 51 Street
Postal Bag 600
Stettler, AB T4N 6K8
Phone: 310-FARM (3276) or 1-866-882-7677 or (403) 742-7901
Fax: (403) 742-7527
Email: robert.spencer@gov.ab.ca

Thank you for your assistance with this survey!

Bronze Leaf Disease Survey – 2008

Surveyor Information

Name(s): _____

Mailing Address: _____

Phone: _____ Fax: _____

Email: _____

Survey Site Information

Date of Survey: _____

Location of Site Surveyed: _____

Grower/Landowner Name: _____

Mailing Address: _____

Phone: _____ Fax: _____

Email: _____

Cultural Information

Previous Crop/Plant History at the Survey Site: _____

Disease Management Practices Used (if any): _____

Bronze Leaf Disease Incidence and Severity Data*

Poplar or Aspen Species	Number of Trees	Estimated Age (yr)	Disease Severity (0-4)				
			0	1	2	3	4
Example: Tower poplar	15	5	8	2	0	3	2
Tower poplar	21	22	8	4	9	0	0
Swedish aspen	66	16	59	7	0	0	0
Swedish aspen	7	8	7	0	0	0	0

*Disease severity (DS) refers to the proportion of branches with wilt or dieback symptoms. DS should be rated on a scale of 0-4, where 0 = no BLD symptoms, 1 = < 10% of the tree canopy with BLD symptoms, 2 = 10-25% of the tree canopy with symptoms, 3 = 26-50% of the tree canopy with symptoms, and 4 = >50% of the tree canopy with symptoms.

Map of Survey Site(s):



