Armillaria root rot on urban trees: another perspective to the root rot problem in Newfoundland

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This article is the first record of Armillaria root rot on ornamental and shade trees in Newfoundland. It discusses the distribution, severity and impact of the disease in urban areas, and implication of these findings on the root rot problem in this Region.

Can. Plant Dis. Surv. 63: 1, 3-6, 1983.

Cet article est le premier à mentionner la presence du pourridie-agaric sur les arbres ornementaux et à ombrage de Terre-Neuve. Il discute de la distribution, de la severite et de l'impact de cette maladie en zone urbaine, et de l'implication de ces resultats sur le problème de la pourriture des racines dans cette region.

Introduction

Armillaria or shoe-string root rot, caused by ***Armillaria mellea*** (Vahl ex Fr.) Kummer [= ***Armillariella mellea*** (Vahl ex Fr.) Karst], is an important root disease affecting a variety of forest, shade, ornamental and orchard trees and shrubs in Canada and the United States. In Newfoundland, ***A. mellea*** is island-wide in distribution and has been observed both as a parasite and saprophyte on 66 tree provenances belonging to 22 softwood and hardwood, indigenous and introduced forest tree species growing in a variety of site, stand and plantation conditions (Singh, 1981b). Armillaria root rot is now regarded as the most important disease of living forest trees in this Region but it has been recorded only from natural stands and plantations (Fig. 1). This article records the occurrence of the root rot fungus on ornamental trees in Newfoundland and discusses the implications of this finding on the root rot problem in the Region.

Results

In the summer of 1981, two 6 to 7 year old dead ornamental trees of Scots pine, ***Pinus sylvestris* L.,** in a home garden in St. John's showed the presence of characteristic symptoms and signs of Armillaria root rot (Fig. 2). The fungus was well established on all the primary and secondary roots of the infected trees; a few tertiary roots were also infected. The mycelium under the bark reached as far as 18 cm above ground.

Later in the fall, twenty one more chlorotic and dead trees, showing similar symptoms and signs, were observed in this and eleven more home gardens and landscapes in five recently developed urban areas scattered across the Island (Fig. 1). The infected trees belonged to seven species: Sitka spruce, ***Picea sitchensis*** (Bong.) Carr.; Canada yew, ***Taxus canadensis*** Marsh.; white birch, ***Betula papyrifera*** Marsh.; pin cherry, ***Prunus pensylvanica*** L.F.; American mountain-ash, ***Sorbus americana*** Marsh.; white spruce, ***Picea glauca*** (Moench) Voss; and black spruce, ***Picea mariana*** (Mill.) B.S.P. Examination of these trees and isolation of the pathogen confirmed the presence of ***A. mellea.***

There was no apparent above ground source of infection at any of these locations. The houses were located in the newer housing subdivisions developed on recently harvested softwood forests*. The gardens were underlain by a 1-2 metre of fill containing top soil (TS), soil (S), gravel and stones (St), and the buried plant materials (P), including decaying logs and twigs, stumps and roots from the previous forest (Fig.3). Sample pits dug in the gardens showed that the buried plant material occurred near the surface as well as 1.5 metres deep; it was decayed and infected with ***A. mellea.*** which produced abundant rhizomorphs. Many of these rhizomorphs were traced to the roots of infected ornamental trees. Singh (1977 & 1981a) reported that subterranean rhizomorphs are one of the principal means of the spread of A. ***mellea*** in Newfoundland forests; they being negatively geotropic, grow upwards towards the soil surface and infect roots on the way up. The root systems of the infected trees grew within 0.3 to 1 metre of soil depth.

All the infected trees had been transplanted within the past 5 years. They were growing under normal urban environment and were ranging from 1 to 4 metres in height. Some of these trees were apparently healthy, others were growing under stress and showed symptoms of decline, still others were lightly to moderately defoliated by various insect pests. Wargo and Houston (1973), Wargo (1978 & 1981), Schoeneweiss (1975 & 1981) and Tattar (1978) reported that ornamental and shade trees are generally not growing under optimum natural conditions. Often they are under

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[2] Site conditions of these areas were generally poor and their moisture regime varied from moist to wet [Moisture Regime Scale 4 to 6 (Damman, 1964)]. Prior to housing developments, these sites had supported scrubby black spruce forests.

Accepted for publication November 26, 1982

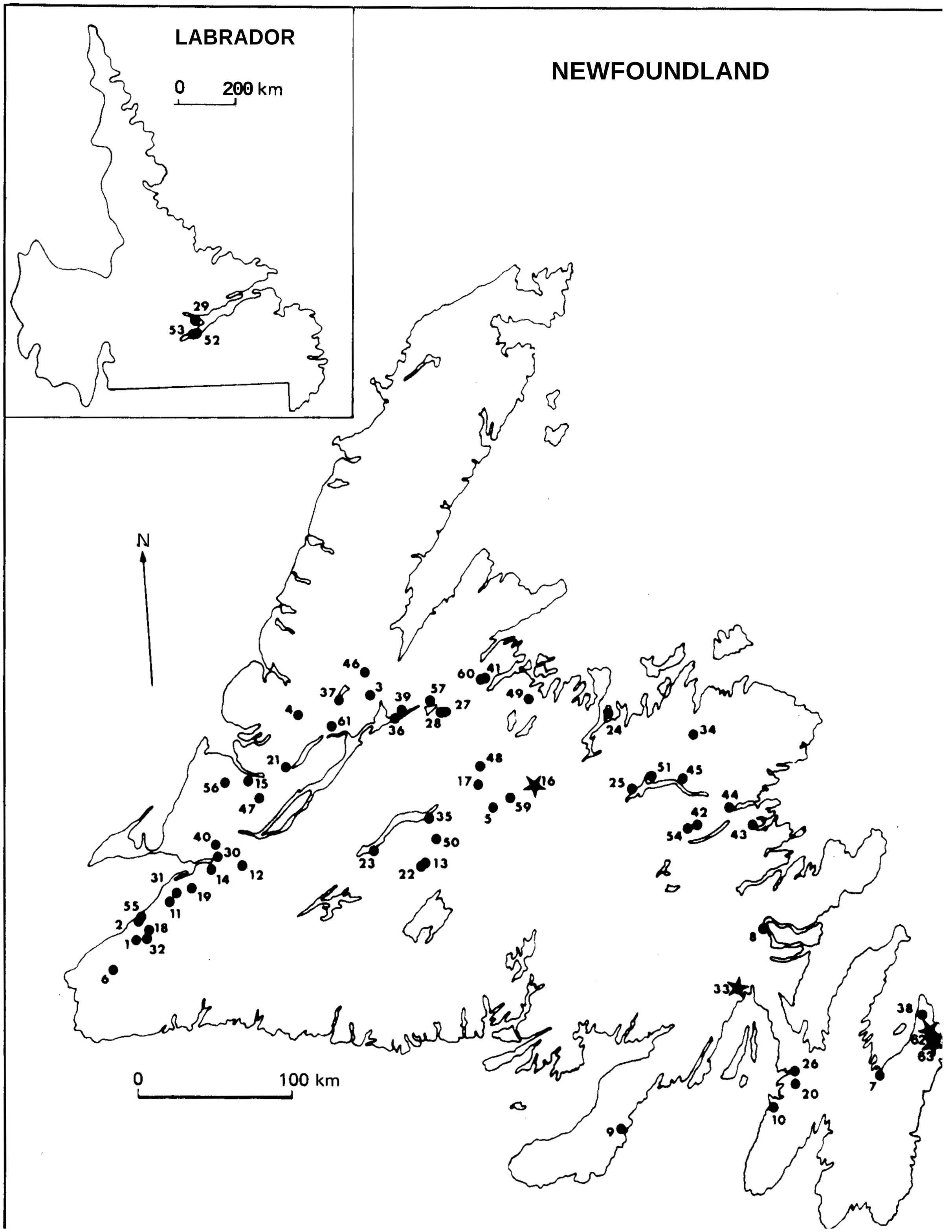

Fig. 1. Distribution of *Armillaria mellea* in Newfoundland and Labrador. Nos. 16, 33, 58, 62 and 63 are the urban areas where the fungus was observed on ornamental trees.

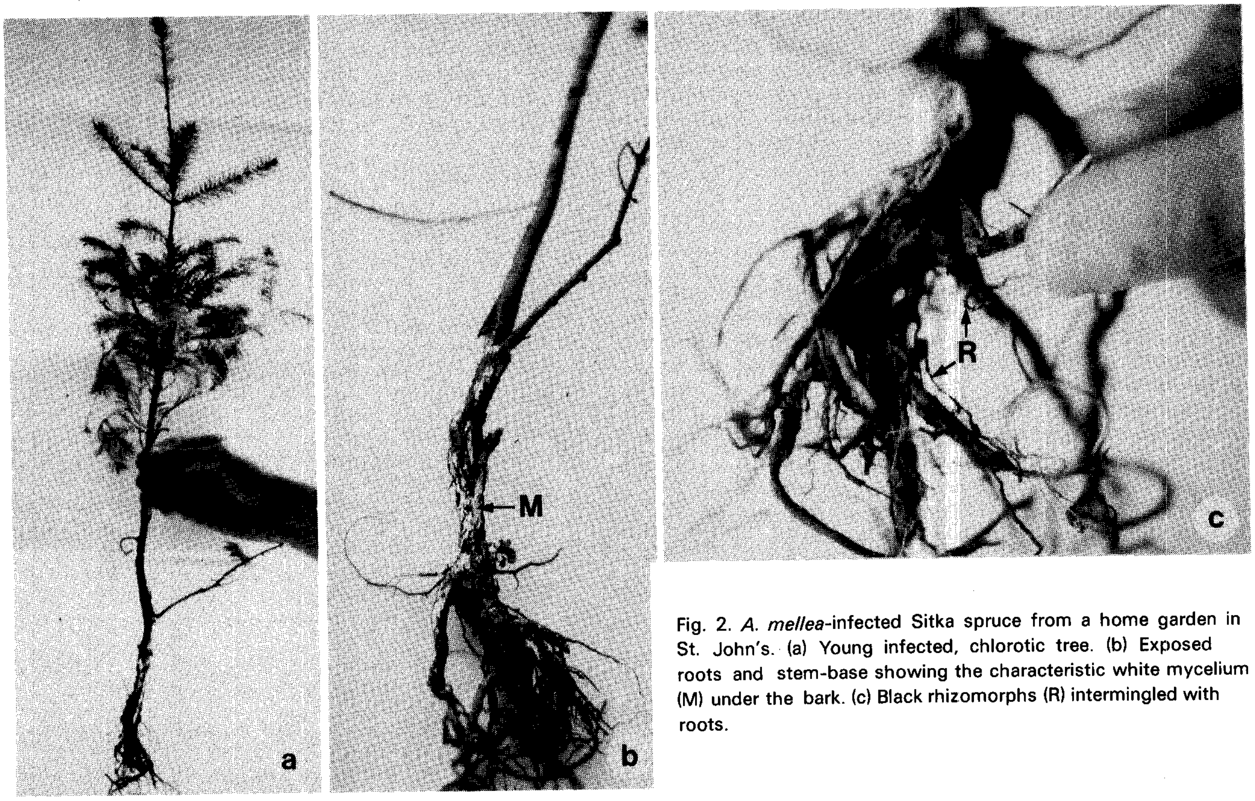

Fig. 2. *A. mellea*-infected Sitka spruce from a home garden in St. John's. (a) Young infected, chlorotic tree. (b) Exposed roots and stem-base showing the characteristic white mycelium (M) under the bark. (c) Black rhizomorphs (R) intermingled with roots.

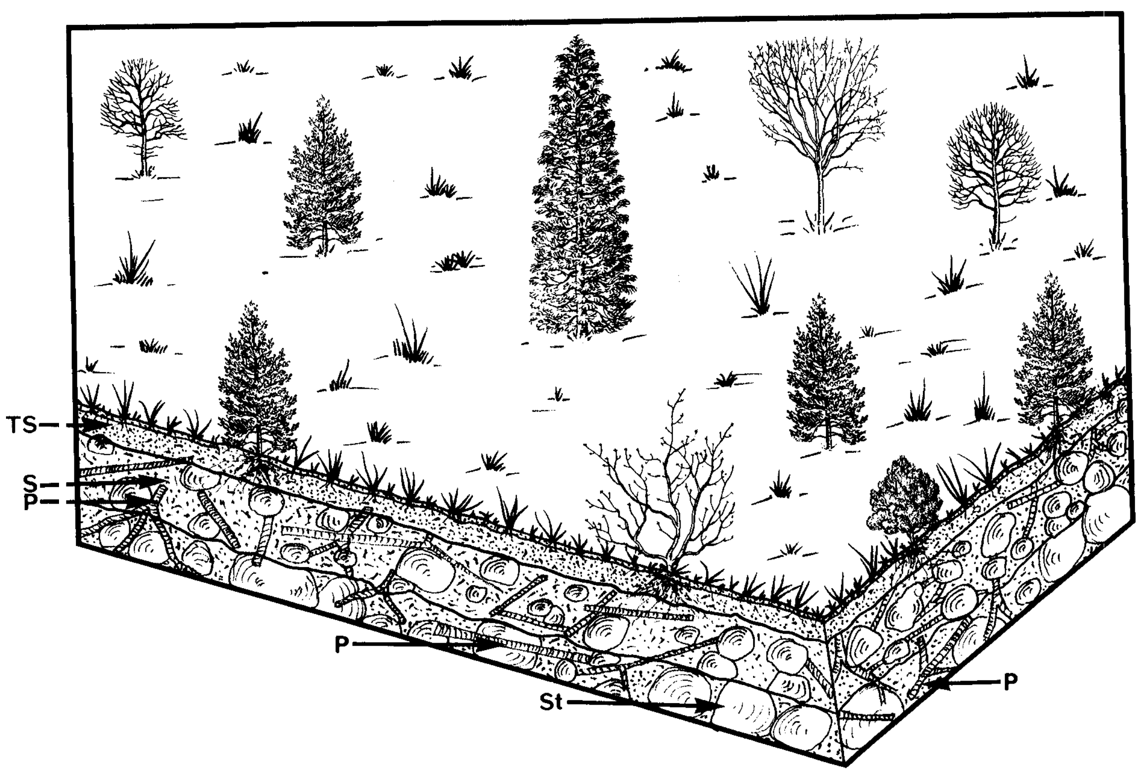

Fig. 3. Schematic diagram of **a portion of a home garden showing trees and underground constituents** of **the fill (Top soil – TS, soil – S, gravel and stones (St), and buried plant materials (P).**

various types of stress, such as improper site; drought, frost, poor drainage; driveway, sidewalk and road salting; site changes as a result of construction or fill; urban environment pollutants; severe or repeated defoliation by insects or leaf diseases. These stress factors predispose trees, reduce their vigour and make them more susceptible to the lethal attack of A. mellea.

Prospects and control strategies

The record of A. mellea on urban trees in Newfoundland is rare and scattered, but has added another perspective to the root rot problem. The pathogen may also threaten trees in home gardens and landscapes developed on cutovers and where A. *mellea*-infected stumps, roots and other plant remains have been buried in the fill; the fungus can survive for several years in such roots and stumps (Singh-unpublished data). Interest in urban trees and shrubs and their management have increased with expanding urbanization, but with increasing variety of stress factors, this disease may become more important in the future.

The following recommendations are offered to developers, homeowners and landscape horticulturists to prevent or minimize damage: (i) Avoid the use of infected stumps, roots and other plant remains in the fill. (ii) Avoid the use of tree species which are susceptible to urban stresses. Tattar (1978) recommended a selection of smaller and slower-growing trees which adapt more effectively to stress and demand less of their site. (iii) Keep the newly planted trees in good health and vigorous growth through proper planting and adequate fertilizer and water supply. (iv) Avoid or alleviate the effects of stress, disturbance or injury during planting or later stages, which may reduce the vigour of the tree. (v) Prevent defoliation by spray with chemical or biological pesticides (Wargo, 1978 & 1981).

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