

Cytospora canker on spruce

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Cover photos:

Figure 1. *Cytospora* canker on a lower branch of a spruce.
Figure 2. Resin soaked bark at the site of canker infection.

Resinosis on trunks and branches of spruce (*Picea* spp.) samples submitted for diagnosis to the Laurentian Forest Research Centre (LFRC) were often identified as cytospora cankers. The disease has existed in North America for more than 50 years. It is gradually spreading among ornamental and plantation trees and also in some areas of the natural forest. It is present throughout Quebec particularly on poor growing sites. Infection spreads from a branch to the whole tree if protective measures are not taken. In some plantations, up to 30 percent of the trees have cytospora cankers.

HOSTS

In Quebec, cytospora canker is common on several ornamental varieties of blue (*Picea pungens* vars), black (*Picea mariana* (Mill.) B.S.P.), and white spruce (*Picea glauca* (Moench) Voss), and to a lesser degree, on other species of spruce. It is sometimes found on white pine (*Pinus strobus* L.), fir (*Abies* Mill.), hemlock (*Tsuga* (Endl.) Carr.), and on different species of larch (*Larix* Mill.). In plantations, trees 10-years-old or more with a diameter over 5 cm are affected by the disease more often than others. On ornamentals, the disease is more active on trees over 20 years old.



Figure 3. During wet periods, yellow filaments loaded with spores, grow out of the *Cytospora* fruiting bodies. (Photo: R. Gagnon).

DISEASE-CAUSING AGENT

A microscopic fungus, *Cytospora kunzei* Sacc. causes the cytospora canker on spruce. Several other species of the genus *Cytospora* can also induce a similar canker. The perfect stage of the fungus (*Valsa* or *Leucostoma*) is an ascomycete of the Sphaeriales family. Any bark injury can open the way to fungus establishment. It is generally considered as a weakness pathogen but its progress is more significant when the host tree is in poor condition. Poor soil, dryness, freezing rain, and frost are the major factors encouraging development of the disease.

SYMPTOMS

The common name “canker” refers to a localized area on a tree where the bark is diseased or dead. The living tissue surrounding it (*callus*) often looks swollen.

First, the tree oozes resin from small sunken areas on the branches or trunk. The oozing resin is dirty white, greyish, or bluish and it forms droplets or large blotches on the bark.

Lower branches at the base of the crown are usually affected first; later the infection progresses upward. Occasionally, this first infection is on higher branches. The canker often appears underneath a branch.



Figure 4. The canker reaches the trunk of spruce trees within a few years.

After resin has started oozing, the canker develops and finally girdles the affected branch. The branch dies and the needles usually turn yellow, red, or brown contrasting with the rest of the crown. Blue spruce needles turn pinkish and then brown. At this stage the disease can be detected. The first needles to be affected are those at the end of branches; mortality spreads from outside in towards the trunk. The discolored spruce needles may fall immediately after the branch dies or they may remain on the tree for about a year. Twigs become dry and brittle after the needles fall. A careful examination of the dead branch reveals the fungal fruiting bodies. These small black spherical outgrowths insure survival and multiplication of the fungus. During wet periods, yellowish filaments grow out of the fruiting bodies. The filaments are water-soluble and contain millions of spores of the fungus. Spores (reproductive bodies) are spread by raindrops or can also be carried by insects or birds. Spores penetrate the tree at the site of various wounds such as those caused by bird pecking, twigs or branches broken by natural accidents, or man's actions.

Cankers may remain on a trunk for several years, progressing or healing depending on conditions; such reactions deform the tree.

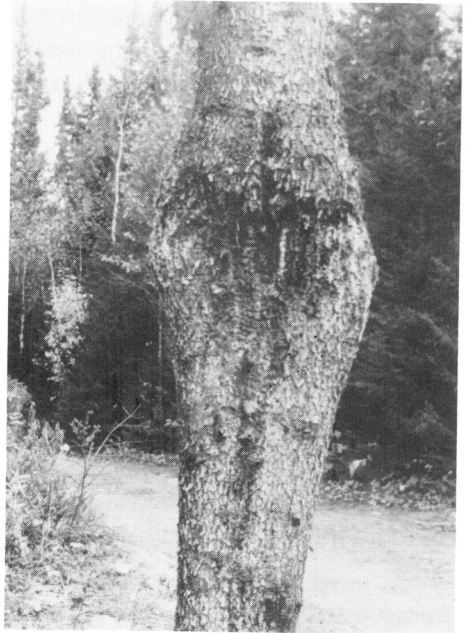


Figure 5. On black spruce cankered for many years a significant trunk malformation can result. (Photo: R. Blais)

CONTROL

Winter is the best season to carry out control measures. Parts already dried out must be sacrificed. Affected branches should be cut off and burned before infection reaches the trunk. You must sterilize pruning shears in a solution of 70 percent methyl alcohol for several minutes after each cut. If control is carried out in summer, wet periods should be avoided; pruning then would encourage spores to spread. On ornamentals, if less than half the girth of the trunk is affected by the canker, infected bark can be removed. The diseased bark is dark and resin soaked; the healthy tissue is paler and surrounds the bark area to be removed. The wound may be treated with a protective dressing. However, several arboriculturists and specialists no longer use these products as their effectiveness has not been demonstrated. Brushing over the wound with methyl alcohol or diluted (1-1) shellac is simpler and sufficient. After affected branches have been removed, you may spray surrounding healthy branches with a copper-based fungicide but there is no evidence that this treatment will prevent further infections.

You must ensure that trees to be preserved remain vigorous by avoiding injuries to the branches and the trunk, however it is difficult to prevent damage caused by frost and hail. The soil around ornamental trees could be fertilized every two years with organic or chemical fertilizers (for example, 10-10-10) at the rate

of 4 kg/10 m². Other fertilizers, such as 10-6-4 and 8-5-3, could be applied at the rate of 0.4 kg/cm of trunk circumference; these treatments will help the production of new foliage. Trees should be watered frequently during dry periods.

In plantations, thinning before the tree cover reaches maximum density is the most effective way of preventing cytospora canker. Diseased trunks should be removed to reduce infections.