

Forest Health

by Judy Loo & Tannis Beardmore

Butternut May Be Doomed

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) announced their recommendation that butternut (*Juglans cinerea*) be listed as an endangered species in November 2003. This designation is significant because it is the first time that a relatively widespread tree species has been listed as endangered in Canada. Butternut is native to three provinces in Canada: Ontario, Quebec and New Brunswick. Although it is not an important timber species, it does have high value locally, both economically and ecologically. Butternut lumber is valued for furniture, paneling, and specialty products and its nuts are valued primarily for stains and for human and wildlife consumption. Historically, the nuts were prized by Aboriginals and early settlers.



Photo by Ed Hurley, Atlantic Forestry Centre, showing crown dieback in a diseased butternut tree.

The species is endangered because of a fungus, *Sirococcus clavigignenti-juglandacearum*, which is presumed to have been introduced from Asia; it causes multiple cankers in the crown and bole, resulting in the death of susceptible trees. To date, control measures for this disease do not exist. Butternut canker has spread rapidly, since the fungus was first identified as the causal agent in 1967, from the southern and western areas of the species range in Tennessee and Wisconsin, northward and eastward. The fungal spores causing butternut

canker are thought to be spread by rain, and possibly by insects or birds. The spores grow, usually appearing first in the fine branches of the crown. Spores are carried down the trunk by rainfall and cankers typically form on the trunk after the crown begins to die back. The first visual sign of butternut canker is often a thinning of the canopy and death of small branches in the crown. Unfortunately, a number of diseases cause similar symptoms, and without a close inspection of the small branches, it is impossible to be sure that observed dieback is caused by butternut canker. When the more readily identified cankers appear on the trunk, the disease is usually already well established in the crown. Cankers are longitudinal and have the appearance of dark cracks in the bark. Trees are eventually killed when the cankers become so numerous that they girdle the trunk.

Butternut canker kills trees of all sizes and ages. Unlike Dutch elm disease and beech bark disease, both of which preferentially kill large trees with the result that many trees reach reproductive age before dying, butternut canker kills small trees first, because a small bole requires fewer cankers to complete the girdling. Large trees may survive for many years before succumbing to the canker simply because it takes time for cankers to form, side by side around the trunk, girdling and killing the tree.

Fungal spores causing butternut canker may be carried on nursery stock and even on the surface of or inside the nuts. It is essential to avoid moving seeds or seedlings from an infected area into an area that is still free of the disease. This will help slow down the spread of the canker. Unfortunately, it appears that only small pockets remain disease free within the natural range of the species. Butternut may go the way of American chestnut over the next few decades. In fact, that scenario is highly probable

unless genetic resistance to the disease already exists in natural butternut populations. There is some evidence for the presence of partial genetic resistance occurring at low frequency in natural populations, but this has not yet been proven. If such resistance exists, it is important to find and propagate the trees, in order to maintain a base of resistant genotypes that is as diverse as possible. This means that trees should not be cut at the first signs of disease, because this valuable germplasm may be lost. Natural selection will operate by killing susceptible trees and those trees remaining after all trees are exposed may exhibit partial or complete resistance to the fungus. A resistance breeding program could then be implemented to develop material to restore butternut to the landscape.



Photo by K.J. Harrison, Atlantic Forestry Centre, showing the form of butternut canker on an exposed root.

In the absence of genetic resistance to the canker, butternut is doomed. If it exists, genetic resistance may save butternut from extinction, but only with help from landowners, who must refrain from cutting the trees at the first sign of canker.

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