Forestry Leaflet 28: Oak decline
Text: M. Allen and G. Kuta
Illustration: D. Lee

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Natural Resources Canada
Canadian Forest Service
Northwest Region
Northern Forestry Centre
5320 – 122 Street
Edmonton, Alberta
T6H 3S5

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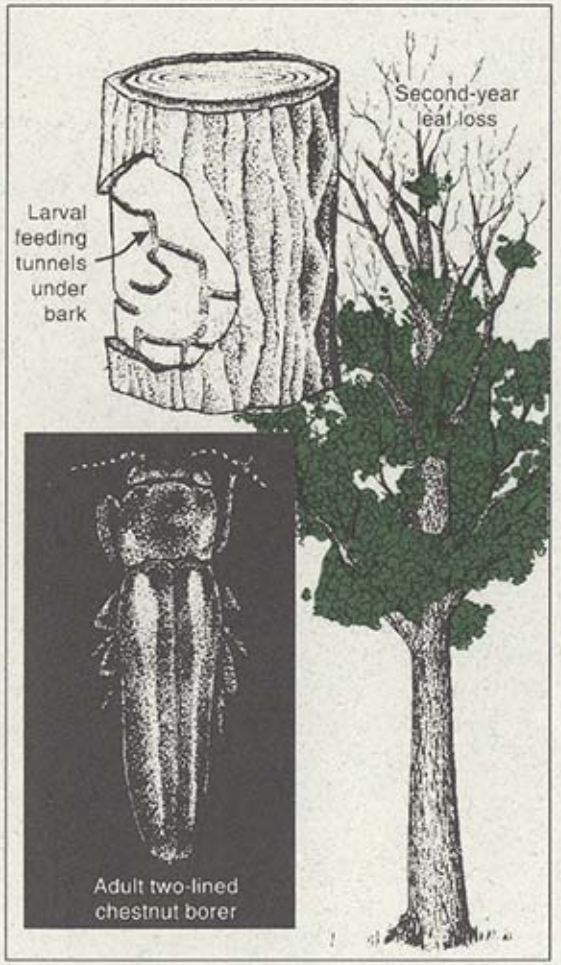
Canada

Oak decline



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Distribution and Host

The bur oak, *Quercus macrocarpa* (Michx.), is a very important native prairie landscape tree in Manitoba. It is found on well-drained soils in natural mixed stands that include aspen. Difficult to transplant, the bur oak has traditionally been incorporated into urban landscape plans by constructing buildings between established trees. Since 1986, bur oak trees in southern Manitoba have experienced environmental stress and related dieback, resulting in considerable damage to landscape, ornamental, and natural stand groupings.

Symptoms and Damage

Typically, bur oak tree foliage wilts from the top downward, turns brown, and usually remains on the branches after dieback for about 1 year. Initial oak decline due to stress starts a cycle of further deterioration involving the two-lined chestnut borer (*Agrilus bilineatus* [Weber]). This insect gains importance as the cycle of decline progresses, causing branch dieback and eventual tree mortality after 3–4 years.

Causal Agents

Bur oaks are extremely sensitive to small changes in their growing environment. They are often placed under great stress or killed by grade changes, compaction of soil around the root zone, acute injury during nearby construction, or changes in the air-to-moisture ratio in soil. The 1988 drought greatly weakened and stressed thousands of oaks in Manitoba, causing them to become more vulnerable to insect and disease problems. Bur oaks in this condition are usually killed by the two-lined chestnut borer.

The adult borer is a slender, dark-colored winged beetle, approximately 8–12 mm long, with two yellow stripes along its back. In late May and throughout July the adult borers emerge through D-shaped holes in the bark and feed on foliage. When a large population develops, some fly to nearby trees to feed. After mating, the females lay eggs in crevices in the bark. When the young worm-like larvae have hatched 2 weeks later, they bore through the bark into the cambium and phloem (nutrient-conducting tissue), where they construct meandering tunnels. These tunnels eventually cut off the flow of water and nutrients from the roots to the leaves. This results in the branch dieback that is often first noticed in August and September. Heavy infestations of tunneling larvae will kill the tree. Mature larvae grow to a length of 25–30 mm. The two-lined chestnut borer has a 2-year life cycle on the prairies.

Prevention and Control

Maintaining bur oak trees in a healthy condition requires control measures: a comprehensive program of watering and fertilizing during periods of dry weather, and general tree maintenance that includes removal of dead wood by proper pruning methods. Dead limbs that are infested with the borer must be pruned 0.5–1.0 m into healthy wood to ensure that the borers are removed. Trees that have been killed by these insects should also be removed. All pruning and tree removal should take place in late summer, fall, or winter, as soon as dead wood is noticed. It is important to prevent overwintering larvae from emerging in the spring as adult beetles and thereby infecting other oaks.

Deep root feeding with a fertilizer high in potassium should take place during or immediately after drought periods; this will help to promote and stimulate feeder root growth. This is particularly important if a dry period has caused the fine fibrous root system to die back. Healthy oak trees may withstand borer attack by developing new conducting tissue to compensate for injury caused by the borer.

Within an already infested area, oak firewood and lumber containing the borers can easily be the source of future infestations. If the wood is transported to another area, borers can initiate a new infestation. Oak firewood control is an important method of preventing the adult beetles from emerging in the spring. Control options include burying the wood at sanitary landfill sites; debarking the wood in late summer or fall; completely covering the oak wood pile from early May to the end of July to reduce the number of emerging borers; and chipping all branches and smaller logs.

In an infested area, large populations of borers can damage healthy trees; therefore, the timely removal of dead wood and trees to eliminate high borer populations is the most practical control strategy.

At this time there are no approved chemical controls for the two-lined chestnut borer. Insecticides will not prevent the borers from attacking and killing bur oaks as long as these trees remain weakened. Tree condition and borer population control are the deciding factors in maintaining healthy bur oaks.