

Protection from diseases, pests and fires

In Canada, where the total annual forest harvest averages 128 400 000 m³, insect losses are estimated at 14 300 000 m³ and forest fires destroy about 10 500 000 m³ annually. Together they account for losses equivalent to nearly 20 per cent of the harvest.

A wide range of forestry protection research programs are conducted by the Canadian Forestry Service at six regional forestry research centres, by two national institutes, provincial forestry agencies, the forest industry and universities.

A few insect species, whose larvae eat tree foliage, stems and cones, are the major source of lost fibre and timber production in Canada. They may destroy trees or merely reduce growth.

The spruce budworm is the most widely distributed and destructive of these insect pests. Outbreaks of spruce budworm infestation occur roughly every 30 years. The larvae feed primarily on balsam fir and on several varieties of spruce (white, red, black and Engelmann) and, occasionally on hemlock and larch. Since 1909 they have killed nearly 300 million Cunits of timber in eastern Canada. The current epidemic covers about 60 000 000 ha of spruce fir forest in eastern North America.

In 1977, Canada and the United States agreed to develop a six-year joint research program aimed at accelerating technology to control this pest. Expenditures in this program will be \$7 to \$8 million annually.

Since 1952, spraying with chemical insecticides has been the main method used to control the spruce budworm. However, when trees are saved with insecticides, the budworm infestations are prolonged since the budworms do not starve as they ordinarily would. There are also public doubts about the long-term hidden effects of spraying. As a result, some provinces have elected not to spray and now more research is directed toward finding alternative methods of control, including biological ones.

Biological control of tree-damaging pests has already proved effective against the European spruce sawfly and the pine sawflies. Biological control agents include bacteria, viruses, parasites and predators, sex attractants and growth-regulating hormones. Unleashing biological controls against specific insect pests leaves non-target species unharmed and causes less disruption of the forest ecosystem.



Spruce budworm eggs (top), larva (middle) and pupa (bottom).