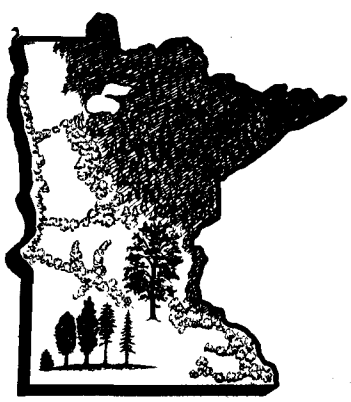
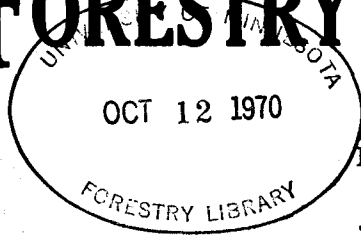


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# MINNESOTA FORESTRY NOTES



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## THE CONTROL OF DWARF MISTLETOE ON BLACK SPRUCE <sup>1)</sup> <sub>2)</sub>

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Dwarf mistletoe (Arceuthobium pusillum Peck) appears to be the most serious cause of disease loss of black spruce (Picea mariana) in Minnesota. It causes the formation of "witches brooms", stem deformation, stunting and death of infected trees. Most of the "brooms" found on black spruce are caused by dwarf mistletoe; their presence is almost certain evidence of infection. The parasite itself is so small and inconspicuous that it can be found only by close examination of "brooms".

Dwarf mistletoe infections generally are concentrated in localized areas ranging in size from very small groups of trees to many acres in extent. Trees elsewhere in the same stand usually are free of infection. Infection centers start as small groups of infected trees and gradually spread outward, destroying the stand in the process. A new stand of spruce, generally more or less uneven-aged and heavily infected, forms as the old stand is destroyed. Infected areas can be classified, therefore, on the basis of the stage of development of the infection, i. e., its size and the extent to which a new stand has developed.

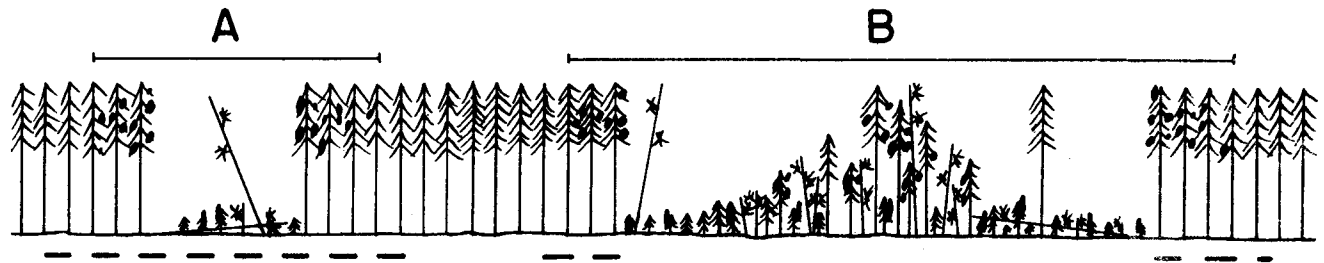
The following recommendations for control, based on known characteristics of the mistletoe and numerous observations, are believed to be the most feasible and practical under present conditions. The parasite's characteristics largely determining the nature of control measures are: (a) its seeds are shot out to a maximum distance of about 30 feet, and any tree within that distance of a broom may become infected, unless shielded by other vegetation; (b) it is slow to develop and new infections may be overlooked; (c) living infected trees are the only source of infection since mistletoe cannot survive on dead trees.

During the initial stages of development of mistletoe in a stand, few trees are infected and no appreciable break in the crown canopy is evident. Under such conditions, the broomed trees should be cut, together with all apparently healthy trees within 40 feet of broomed trees. The eradication of such small centers of infection is very important in otherwise healthy stands since considerable areas of spruce can be protected with relatively little effort.

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- 1) These studies were made under the 1948 and 1949 Minnesota and Ontario Paper Co. Graduate Research Fellowships in Forestry and are part of an unpublished master's thesis by the senior author.
  - 2) Former graduate student and Director, respectively, University of Minnesota School of Forestry.

During the second stage a small opening develops in the stand. This opening is surrounded by heavily broomed and gradually dying trees. (See Fig.) Brooms

### MISTLETOE INFECTION CENTERS IN AN EVEN-AGED STAND OF MERCHANTABLE BLACK SPRUCE



**A** - SECOND STAGE OF INFECTION - A HOLE IN THE STAND HAS BEEN CREATED BY MISTLETOE CAUSED MORTALITY

**B** - LATER STAGE OF INFECTION - A NEW UNEVEN-AGED, HEAVILY INFECTED STAND HAS BECOME ESTABLISHED IN THE HOLE CREATED BY MISTLETOE

— — — AREAS THAT SHOULD BE CLEAR CUT FOR CONTROL

● - LIVE MISTLETOE BROOM ON LIVING TREE

\* - DEAD MISTLETOE BROOM ON DEAD TREE

usually are not found much more than a chain back into the stand from these openings. The interior of the opening typically supports small, infected reproduction plus a few survivors from the original stand. The opening will be up to about three chains in diameter at this stage. In such small pockets the entire infected area plus a one-chain strip extending outward from observed broomed trees should be clear-cut. The cutting should remove all black spruce, including culls and reproduction.

In larger areas of infection a new stand of spruce is ordinarily well established within the hole created in the old stand. (See Fig.) This new stand is invariably heavily infected, more or less uneven-aged and ragged in appearance. A zone near the edge next to the old stand normally contains only small reproduction. In such larger areas the infected part of the surrounding old stand together with a strip one chain wide lying outside of observed broomed trees should be completely clear-cut to protect the remaining healthy stand.

Control is more difficult in the new stand that lies within such larger areas, as is also true in cases where entire stands, or the greater part of them, are infected. In more valuable stands it may be feasible to eradicate or reduce infection by marking and cutting all broomed merchantable trees. To be effective, this must be accompanied by the cutting or pruning of broomed non-merchantable trees, including young growth. Such areas should be inspected at three- to five-year intervals to remove any new infections which appear. This re-eradication will be relatively inexpensive if the interval is not more than five years.

Brooms on older, taller trees are apparently a more serious source of infection than those on reproduction. Consequently, their elimination should reduce damage where it is not feasible to eradicate mistletoe.

A series of experimental plots to check the effectiveness of these control recommendations have been established in cooperation with the Division of Forestry, Dept. of Conservation, but it will be several years before results are available. It is recommended that the above control measures be employed for the present.