



TECHNICAL NOTE / NOTE TECHNIQUE

RESEARCH AND DEVELOPMENT/RECHERCHE ET DÉVELOPPEMENT

Canada



April 8, 1993

Number 28



SILVICULTURAL CONTROL OF SIROCOCCUS SHOOT BLIGHT IN YOUNG RED PINE PLANTATIONS IN NOVA SCOTIA

Sirococcus shoot blight is a disease caused by the fungus *Sirococcus conigenus*. In Nova Scotia, it is the most serious forest pest problem in red pine plantations. The fungus infects and kills new shoots, then the disease spreads both to other branches on the same tree and to other trees in the plantation. If left unchecked, the disease will kill trees and may ultimately destroy the plantation. Red pine trees of any size may be affected and entire plantations have been killed by this disease in the province.

Losses go far beyond the loss of trees. Investment in site preparation, seedling production, planting and tending, is also lost. As well, the site is occupied for long periods without producing a desired crop.

The disease is more serious in some parts of Nova Scotia than in others but, given time, it will cause losses everywhere if left untreated. Research is under way (by NSDNR) to delineate zones of highest danger. This will help in decision making regarding future plantation establishment, but will not alleviate the need for nurturing existing, often infected, plantations to their full intended rotation.

Even badly infected red pine plantations can be saved or, at least, the damage minimized, if the disease is controlled. The sooner treatment is started after infection is detected, the better the chances of success. Early control also involves less work and, consequently, is more economical.

New infections take place in the spring, shortly after bud break when shoot elongation begins. Research elsewhere (Ostry *et al.*, 1990) indicated that removal (pruning out) of old infected shoots and branches reduced the spore load in affected plantations. This should reduce new infections and slow down the intensification and spread of the disease. Trials were conducted to test and to demonstrate that Sirococcus shoot blight can be controlled by pruning in red pine plantations in Nova Scotia.

Method

Four plantations, each approximately 3.5 ha in size, with tree height of 2.5 - 3.5 m, were selected for the study in 1988. Infection rate was high (63% and 66% of trees infected) in two, medium (37%) in one, and low (19%) in one plantation. The percentage of infected shoots and branches on affected trees varied from 1-15% to 1-70% in the four plantations. A 100-tree plot was established in each plantation. Plot trees were rated for the level of infection (*i.e.*, number of infected shoots and branches) before treatment. One plantation, with high infection rate, was designated as "control", the other three were treated in the fall of 1988. Treatment consisted of pruning, removing, and destroying (burning) all infected shoots and branches on all trees in the plantation.

All plots were assessed annually during the late fall to early spring period from 1989-1992. One plantation, with moderate initial infection rate, was not treated further (*i.e.*, no pruning), while the remaining two (one with high and the other with low initial infection rate) were pruned each year following tree condition assessment.

Results

The results of assessments, summarized in Figure 1, show that:

- * Disease incidence remained high and increased gradually in the untreated "control" plantation (a) throughout the observation period of 1988-1992.
- * single pruning reduced disease incidence the following year by an average of 25% in the three plantations treated (b, c, d). There was a reduction regardless of the initial incidence level (which ranged from 19% to 66% of trees infected), while it stayed virtually unchanged in the "control" plantation (a).
- * Annual pruning further reduced - and almost eliminated - infection in the consistently treated plantations (c, d), while incidence rebounded to the initial level after just one year in the plantation treated only once (b). Infection in this plantation increased gradually, reached, then actually surpassed the level in the untreated "control" plantation (a).

The intensity of infection (the number of damaged shoots and branches) followed a trend similar to the level of incidence (the number of trees infected on the plot). While environmental conditions influenced annual infection rates and caused some annual variation, the number of shoots to be pruned decreased each successive year on the consistently treated plots. Intensity decreased after the first treatment to 1-9 shoots/infected tree and remained very low (1-2 shoots/infected tree) for the rest of the experiment - and, in some years, there was no need to prune at all.

The most dramatic reduction occurred in the plantation with the high initial infection rate. While initially more than 20% of the shoots were damaged on more than a quarter (26%) of the infected trees, 2 years after the treatment started less than 2% of these trees had more than 5% shoot infection and, since then, none of them has had more than 5% shoot infection.

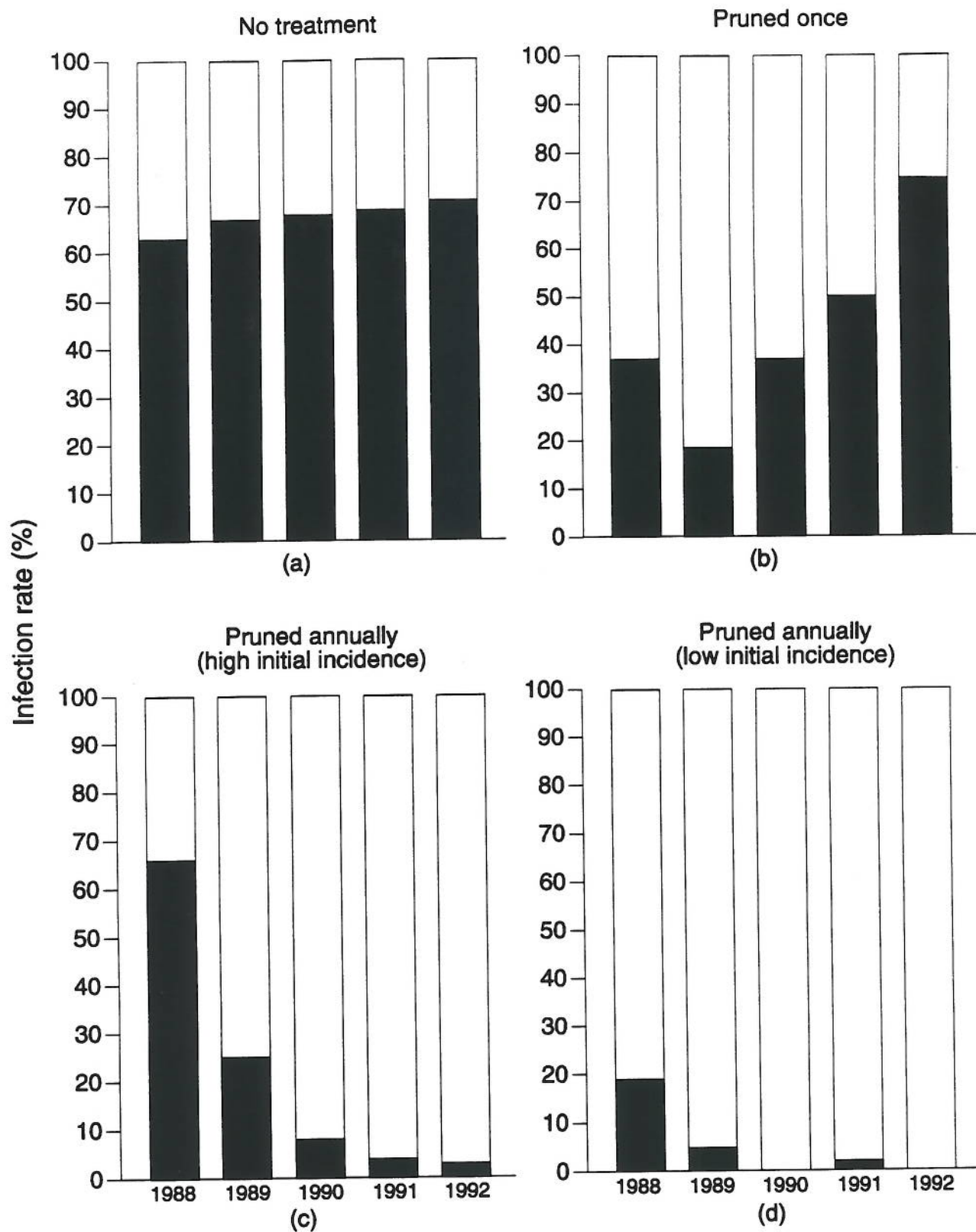


Figure 1 The effect of different pruning regimes on the incidence of *Sirococcus* shoot blight in red pine plantations in Nova Scotia.

Discussion

Sirococcus shoot blight can be controlled, even in seriously infected young red pine plantations, by manual silvicultural intervention. Pruning will reduce infection rate but, to be effective, it must be done consistently over the years. These plantations became infected in the past and it must be assumed that the source of the initial infection still exists. Re-infection is highly probable and, without continued vigilance, the effects of any treatment will likely be lost.

The amount of work necessary to bring the disease under control is directly proportional to the condition of the plantation at the time control begins. Therefore, it is to the advantage of the landowner to regularly inspect plantations and to commence control soon after the disease is noticed. It is much less work, and therefore less expensive, to clip a few dead shoots from a few trees than to have to prune a large number of branches off many trees. Given that plantations in many areas are already infected, some seriously, this may not be a choice and considerable initial effort will be needed to clean up these areas. The alternative to control is tree mortality or even the loss of the plantation.

Because of the biology of the fungus - spores are released and infection takes place during the growing season, especially under high humidity conditions - pruning should be done only from late fall to early spring, definitely before bud break. Pruning during inappropriate times can actually increase infection.

Once it is established that the plantation is affected by Sirococcus shoot blight, the fact that other fungi and some insects also cause symptoms similar to those caused by *S. conigenus* should not be a concern. Managers should err on the side of caution and remove all dead shoots and branches. Other pests can become serious problems in their own right and their removal will improve the overall health of the plantation.

Recommendations

- * Inspect plantations and look for symptoms
- * Start treatment in the early phases of infection - where possible
- * Prune and burn infected shoots and branches
- * Prune only from late fall to early spring
- * Repeat treatment annually

Acknowledgements

The initial work was carried out under a contract from the Canada/Nova Scotia Forest Resource Development Agreement (#01K28-8-0139) by L.J. Coady. The Forest Insect and Disease Survey conducted the annual assessments and carried out re-treatment, with most of the technical assistance provided by FIDS rangers Art Doane and Tom Walsh. We wish to thank them.

Reference

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