Frontline

Forestry Research Applications

Canadian Forest Service–Ontario

Technical Note No. 81

FIELD IDENTIFICATION OF SOME COMMON PESTS OF BLACK SPRUCE

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CATEGORY: Pest management
KEY WORDS: Black spruce, spruce budworm, white pine weevil, Armillaria, spruce needle rust, spruce tip moth, spruce coneworm

INTRODUCTION

Insect and disease identification is not a principal responsibility of most forestry personnel. Although these people may spend considerable time in the forest, they may not notice tree health nor be aware of damage-causing insects or diseases. The key to early detection is knowing what symptoms to look for, when, and in what part of the tree.

This technical note presents a brief description of the more common and important pest problems associated with black spruce and provides some tips for identification that would be used by a Forest Insect and Disease Survey (FIDS) ranger (Fig. 1). Table 1 summarizes this information in a convenient format. By increasing the awareness level of forestry personnel to common pest symptoms, this note may help to ensure that serious problems are dealt with as early as possible.

The reader is invited to refer to other technical notes in this series that relate to insect and disease problems of black spruce (*Picea mariana* [Mill.] B.S.P.). For example, Syme (1995) gives complementary information about insects.

EASTERN SPRUCE BUDWORM *Choristoneura fumiferana* (Clem.)

Hosts

Balsam fir (*Abies balsamea* [L.] Mill.), white spruce (*P. glauca* [Moench] Voss), black spruce, and other spruce species are preferred.

Habits

At one time the eastern spruce budworm was primarily regarded as a pest of mature and semimature balsam fir and white spruce, but during heavy infestations black spruce is also susceptible to attack. Concentrations of black spruce, such as plantations, increase the species' susceptibility to infestation.

Field Identification Tips

Spring (bud period)
Larvae are difficult to detect at this time, but close examination can reveal evidence of attack. Look for needle mining in the old foliage and mining of the new swelling buds. Silk in the old needles or at the base of a bud indicates the presence of a larva.

Figure 1. A Forest Insect and Disease Survey ranger inspects a seedling for signs of damage.

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Early summer (shoot elongation period)
Larvae feed on the new shoots as they elongate. Often, they will web shoots together and may be concealed in a loose nest of partially consumed needles, frass (excrement), and other debris. Vigorous shaking of a branch can sometimes indicate how severe the infestation is, because the larvae will drop from the foliage and hang on long silken threads.

Mid summer (new growth complete)
Larvae complete their feeding in mid summer (usually by the end of June), although this period may be longer for black spruce. In some years a high population may completely destroy the buds as they are developing; in another year a similar population may cause heavy defoliation but the shoots will nevertheless elongate. The mature larva ranges from 2.0 to 2.5 cm in length and has a dark brown to black head. The body is dark brown, with prominent cream- to yellow-colored spots on the back; the lower surface is pale cream to yellow.

The characteristic reddish-brown needle color caused by feeding damage is not usually as visible on black spruce as it is on white spruce and balsam fir. There are two reasons for this: (1) black spruce foliage usually develops more slowly than does that of white spruce or balsam fir, so there is less evidence of attack, and (2) the damage is generally not as severe on black spruce. The number of moths present is an indicator of potential damage in the following year. Disturbing a tree branch is a simple way to check for the presence of moths.

Note

Black spruce is most susceptible to attack when it grows in association with balsam fir and/or white spruce. The larvae will also feed on the flowers and developing cones. Egg-mass or early larval sampling of an area, conducted from August to early spring, will provide an accurate forecast of larval populations.

YELLOWHEADED SPRUCE SAWFLY
Pikonema alaskensis (Roh.)

Hosts

All spruce species.

Habits

Prefers open-grown trees 0.5 – 8 m tall and feeds anywhere in the crown.

Field Identification Tips

Early summer (shoot elongation period)
Larvae and damage are very difficult to detect at this time. Look for partially consumed needles in one area of the crown, ragged branch tips, and/or brown needle stubs. One should first identify damage and then examine for the presence of larvae.

Mid summer (shoot elongation advanced or complete)
Affected trees may be partially or entirely defoliated, and appear yellowish-brown from a distance. Larvae reach approximately 2 cm in length when mature (usually by July), are olive green in color, and bear a pair of gray–green longitudinal stripes on the back, a broad stripe beneath this, and a darker one further down. There is a dark spot or line just above the base of each leg. The head is yellowish-orange to chestnut brown.

Note

In later stages, the larval head is more reddish than yellow in color. For control measures to be successful, damage must be identified while larvae are still feeding. The insect often attacks the same tree or nearby trees in successive years. This habit is peculiar to the yellowheaded spruce sawfly and may help in identification and subsequent control.

WHITE PINE WEEVIL
Pissodes strobi (Peck)

Hosts

Pine and spruce species.

Habits

The white pine weevil prefers open-grown juvenile trees. It can infest trees as tall as 10 m or more, but is most damaging to trees 0.5 – 5 m in height. Trees less than 1 m in height may die following an attack.

Field Identification Tips

Spring (bud period)
Just as the snow is leaving the ground adult weevils emerge, feed on the leader for some time, and then mate. The female lays eggs in the feeding punctures on the leader. Close examination may reveal resin droplets exuding from the feeding punctures and the presence of adults. Insecticidal control measures are usually effective only at this time.

Early summer (shoot elongation period)
The first sign of attack is excessive pitch flow from the feeding punctures on last year's leader. The new leader on the attacked tree will begin to discolor when partially extended.

Mid summer (shoot elongation advanced or complete)
By this time the new leader will droop, eventually turn brown, and die. As well, it becomes distorted and wilted and takes on a shepherd's crook shape. Mature larvae (white maggots about 7 mm long) are present in the leader.

Late summer
Particularly when dealing with spruce, that portion of the tree attacked becomes brittle and the needles dry and are shed. Adult exit holes can usually be found midway down the previous year's leader. The insect emerges in the latter part of the summer as an adult and overwinters in this form.

Note

To control this pest the leader must be clipped while larvae are still feeding inside. Larvae destroy the previous year's leader, therefore the current year's leader does not develop and at least two years of terminal growth are lost.

ARMILLARIA ROOT ROT
Armillaria ostoyea (Romagnesi) Kerink

Hosts

All conifers and most hardwoods are susceptible.

Habits

All sizes of trees, both in plantations and natural stands, can be attacked. The disease can occur on a single tree or in pockets of a number of trees.

Field Identification Tips

The earliest symptom of attack is slightly chlorotic (off-color) foliage. This is accompanied by a pronounced droopiness, if dealing with spruce foliage. A more definite yellowish tint becomes evident as the disease progresses and in the later stages the foliage turns a reddish color. Discoloration can occur at any time during the growing season. Abnormal resin flow occurs in the root collar area.

Positive identification for Armillaria root rot can be made by locating white mycelium at the base of the tree under the bark. Black rhizomorphs (shoestring-like), which spread the disease from stumps to living trees, can often be found as well. In the late summer and fall the fruiting body, a brown-colored mushroom, can be found near infected trees. Clusters of these fruiting bodies can also be found on stumps and near dead and dying trees.

Note

The red foliage stage is of short duration on black spruce, as compared with balsam fir and pine.

SPRUCE NEEDLE RUST
Chrysomyxa ledi Alb. & Schaein and *C. ledicola* Lagerh

Hosts

All spruce species.

Habits

The rust affects the new foliage only.

Field Identification Tips

Mid summer (shoot elongation advanced or complete)
Spots that appear on infected foliage progress to an orange color as the fruiting bodies rupture. Thus, heavily infected trees are easily recognizable at this time because of their bright orange coloration.

Table 1. Guide for field identification of pests.

	Location and type of damage to look for by species					
Period of year	Eastern spruce budworm	Yellowheaded spruce sawfly	White pine weevil	Armillaria root rot	Spruce needle rust	Frost damage
April–May	needle and bud mining activity; presence of silk is evidence of larvae	previous year's defoliation visible	adult feeding punctures visible in last year's leader	previous year's damage present	N/A[a]	N/A
June–early July	larvae in new buds and shoots are partially hidden	ragged tips on new growth; larvae in semi-colonial stage	excessive pitch flow on old leader	off-color foliage on the whole tree; droopy foliage	fruiting stage on alternate hosts; wind-borne spores infect spruce foliage	most susceptible time occurs when new shoots are only partially developed
July	reddish-brown color to damaged foliage; odd larva, pupae, and moths present	defoliation leads to a yellowish - brown color; larvae are now feeding singly	Shepherds' crook; larvae present in leader	yellowish foliage over entire tree	blisters visible on current foliage	N/A
August–early September	damaged foliage present; color deteriorates with time	residual defoliation visible	Shepherds' crook; adult exit holes visible	reddish-colored foliage over entire tree; mushrooms present	infected needles prematurely defoliated	N/A
September–March	residual defoliation visible	residual defoliation visible	leader damage present	mushrooms present; attacked trees have now lost all foliage	rust overwinters on alternate hosts	N/A

[a] N/A = not applicable.

Late summer
The orange color gives way to a whitish color and infected needles are prematurely defoliated.

Autumn/winter
The rust overwinters on the alternate hosts, leather leaf (*Chamaedaphne calyculata* [L.] Moench) and Labrador tea (*Ledum groenlandicum* Oeder).

Note

These rusts are much more common and cause considerably more damage in low-lying areas because of the proximity of their alternate hosts, which grow on wet sites. For the same reason, the lower branches often sustain much heavier damage than the upper portions of the tree. High value plantings should be located away from the alternate hosts.

Incidence of the rust is highly variable from one year to the next.

FROST DAMAGE

Hosts

All coniferous and deciduous species can be affected.

Habits

Open-grown trees are the most susceptible to frost damage. Freezing temperatures cause a sudden curling and reddening of the buds or new shoots.

The frost only affects new foliage; however, this can range from the bud stage to an almost fully extended shoot.

Field Identification Tips

Late spring/early summer (shoot elongation period)
Damaged shoots turn reddish-brown. The whole tree may be affected or the damage may occur in a band. Often only the lower branches are affected, or more rarely only the tree tops. Frost is rarely a problem in natural stands where trees have grown beyond the sapling stage. Some low-lying areas can be affected by frost almost every year. These are called "frost pockets".

Note

Damage may occur at any time of the year for some species. However, depending on location, the most damaging time for black spruce is late spring and early summer (from late May to early July). Freezing temperatures at this time can damage the new growth.

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The preparation of this note was funded under the Northern Ontario Development Agreement's Northern Forestry Program.

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Catalogue No. Fo 29–29/81E
ISBN 0–662–22606–2
ISSN 1183–2762

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