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FOREST INSECT AND DISEASE NOTES

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THE LODGEPOLE TERMINAL WEEVIL

by

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Description:

The lodgepole terminal weevil (LTW), Pissodes terminalis Hopping, is one of the most important insects that attack and kill leaders of young lodgepole pine and jack pine in the prairie provinces and the Northwest Territories. The LTW adult is a beetle with a mottled, yellowish brown color that is 6-8 mm long. The unique characteristic of all weevils is that the mouthparts form an elongated snout. Mature larvae are white, legless grubs 8-19 mm long. The LTW is very similar in appearance to the white pine weevil, Pissodes strobi (Peck), which attacks terminals of spruces and several pines (red, Scots, jack). However, it's biology and the damage it causes differ from that of LTW.

Life Cycle:

The life cycle of the LTW differs slightly in lodgepole pine and jack pine. Adult weevils generally emerge in late spring or early summer and fly to trees where they feed and lay eggs on the current year's leader. Lateral branches are rarely used. Recent evidence suggests that the LTW can successfully utilize the boles of trees weakened by other agents for reproduction. Eggs soon hatch and the larvae tunnel upward through the phloem and cambium leaving the outer bark intact. Larval feeding occurs throughout July and early August. Mature larvae construct pupal chambers in the outer xylem and the pith. The chambers constructed in the outer wood are often called "chip cocoons" because they are lined with shredded wood.

The time of pupation of the LTW is variable throughout its range. In central Saskatchewan, pupation is completed by late summer or early autumn and adults tunnel from the pupation chamber to the outer surface of the leader leaving a circular emergence hole. These adults feed on the terminals and then enter the duff to over-winter. However, in the Alberta foothills most LTW appear to over-winter as mature larvae in the terminal and pupation occurs the following spring. On average 2-3, but as many as five, adults emerge from each terminal. Adult LTW may live and reproduce for two or more years.

To feed, an adult weevil inserts its elongated mouthparts (snout) through the bark into the succulent inner tissues. The feeding punctures are concentrated mainly in the lower half of the elongating terminal.

Symptoms of Attack:

The presence of adult weevils and beads of resin oozing from feeding punctures on the terminals in late May and early June are the first signs of attack. Larval feeding cuts off the water supply to the terminal and causes it to fade to yellow by late June or early July and to red or rust by late summer. Most terminals of jack pine attacked by LTW develop a characteristic "shepherd's crook", whereas infested lodgepole pine terminals usually remain erect. Leaders are susceptible to wind breakage when the pith is mined extensively and after the pupal chambers are excavated.

After the leader dies, one or more of the branches at the node below the terminal assumes leadership. Repeated attacks on the same tree causes a crooked or forked

stem and bushy crowns. Nursery stock and Christmas trees may be rendered worthless with one or more attacks.

Incidence:

The LTW is common in stands of lodgepole pine in western Alberta and in jack pine throughout the prairies. Up to 87% of trees in some lodgepole pine stands and up to 32% in some jack pine stands in Alberta have been attacked by LTW. Trees 1.5 to 7 m tall tend to sustain a higher incidence of attacks than other size classes. Generally, the incidence of LTW attacks is greatest in open or thinned stands, but trees around the margins of, and dominant trees within densely stocked stands may also be attacked. Within stands, weevils appear to prefer to oviposit on the thickest terminals.

Control:

Several species of parasites have been reared from LTW in the prairie provinces but these appear to have no significant effect on weevil populations, nor do other natural control agents such as predators, birds and small rodents. High mortality of eggs and small larvae often occurs, presumably from excessive resin flow.

Damage by the LTW can be controlled by removing and destroying the infested terminals. During pruning all but the strongest shoot of the topmost whorl should be removed to promote growth of a new leader. In natural stands and plantations, trees most severely damaged should be removed to encourage faster growth of those trees undamaged or lightly damaged.

No insecticides are currently registered for control of LTW. However, methoxychlor is registered for control of P. strobi. Chemical control of this species has not been very successful.

NoFC Research:

Recently, a study of the taxonomy and ecology of Pissodes weevils (including LTW) was initiated at NoFC. Research is aimed at investigating the relationship of various Pissodes species to each other and to their hosts. The aim of this work is to gain a better understanding of the biology and impact of the LTW and P. strobi and to look for more effective control strategies.

SPRUCE NEEDLE RUSTS

by

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Eight species of rust fungi are known to cause diseases on spruce needles. All of these species, except one rare species in the Rocky Mountains (Chrysomyxa weirii), have heteroecious or host alternating life cycles. These fungi need a second group of plants, other than spruce, to complete their life cycles.

The most conspicuous spruce needle rust is "yellow witches' broom" caused by Chrysomyxa arctostaphyli. These witches' brooms vary in size and can often be recognized from some distance particularly when the yellow colored spores are produced. Another spruce needle rust fungus, Chrysomyxa woroninii, attacks only newly formed

buds. The buds are abnormally small, and cone shaped. Although these two rusts have conspicuous and interesting symptoms, they do not cause economically significant damage to spruce trees.

Six other species of rusts attack the current year's needles and cause early defoliation. Two of them, Chrysomyxa ledicola and C. ledi, are the most important and prevalent species in the prairie provinces. The alternate host for both species is Labrador tea (Ledum spp.). Rust spores produced on the spruce only infect leaves of Labrador tea. The fungi over-winter in the Labrador tea leaves, produce spores in the spring that infect newly produced spruce needles.

Heavy needle rust fungi infections, affecting nearly all of the current year's needles, can cause needles to drop prematurely. Heavy infections seldom occur in successive years. Trees do not seem to be damaged significantly from one year of heavy infection. Commercial value will be significantly reduced when heavy infections occur on ornamental and Christmas trees.

Control:

No fungicides are currently registered for the control of spruce needle rusts. Eradication of alternate hosts (Labrador tea) in and around the high value plantings such as seed orchards, nurseries, ornamental or Christmas tree plantations should be considered.

Further Reading:

Hiratsuka, Y. 1987. Forest tree diseases of the prairie provinces. Can. For. Serv., North. For. Cent., Edmonton, Alberta. Inf. Rept. NOR-X-286

SYNOPSIS OF TWO MAJOR INSECT PESTS IN THE REGION - 1988

by
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SPRUCE BUDWORM
Choristoneura fumiferana (Clem.)

Alberta

In 1988, a marked increase of defoliation in white spruce stands was reported within the Footner Lake Forest along the Chinchaga River. A total of 68,107 ha of light-to-moderate defoliation was mapped in this area in 1988 compared to 9,090 ha reported in 1987. In the Grande Prairie Forest, approximately 650 ha of moderate-to-severe defoliation was noted in spruce stands along the Peace River north of Eaglesham. In the Lac La Biche Forest, light and moderate defoliation was evident in a 200 ha area of white spruce near the confluence of the Athabasca and House rivers.

Saskatchewan

Spruce budworm infestations remained fairly static in the Porcupine Hills and near Red Earth in 1988. Within both of these outbreaks, a total of 31,600 ha of varying degrees of defoliation occurred.

Manitoba

In 1988, spruce budworm outbreak areas approximately doubled in size over that reported in 1987. A total of 30,821 ha of moderate-to-severe defoliation was mapped in 1988 compared to the 15,540 ha mapped in 1987. This type of injury was most evident in the white spruce/balsam fir mixes in the Whiteshell

Provincial Park and near Lake Wanipigow. Light defoliation was noted in the other infestation areas examined in the province.

Northwest Territories

Spruce budworm infestations expanded slightly in 1988 over that reported in 1987. A total of 14,350 ha of defoliation was mapped in 1988 compared to 11,200 ha reported in 1987. The largest infestation occurred throughout the Liard River valley south to the B.C. border. In this generalized outbreak area, varying degrees of injury were evident. Light-to-moderate injury was evident in white spruce stands north of Fort Smith along the Slave River, near the mouth of the Salt River and in the vicinity of Long Island.

FOREST TENT CATERPILLAR
Malacosoma disstria Hubner

The forest tent caterpillar continued to be the major defoliator of aspen in the Region during 1988. The total estimated area of defoliation that was reported was approximately 3,750,876 ha compared to the 1,576,543 ha reported in 1987.

Alberta

The total estimated area of defoliation in 1988 was approximately 2,766,000 ha of aspen forests and woodlands. This is a 100 % increase in defoliation over that that occurred in 1987. The main infestation again occurred throughout the central part of the province with the approximate boundary points listed as follows; along the Saskatchewan border from Grande Centre south to Provost, west of Provost through to Red Deer and Rocky Mountain House, north of Rocky Mountain House to Edson, from Edson north to the Lesser Slave Lake area and east to Grande Centre. Throughout this area varying degrees of defoliation prevailed. Smaller infestations of moderate-to-severe defoliation were present in the Grande Prairie - Fairview districts and in the Waterton Lakes and Beauvais Lake areas.

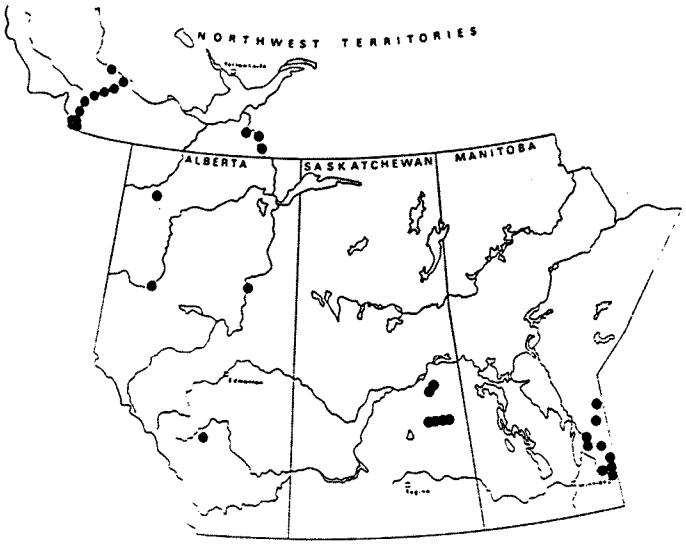
Saskatchewan

The total area of aspen defoliation in 1988 was estimated at 932,040 ha, a marked increase over the 250,000 ha reported in 1987. A further extension of the previously reported infestations (1987), into forested areas accounted for much of the increased tent caterpillar activity. In the western part of the province, moderate-to-severe defoliation was evident from the Meadow Lake area south to Macklin, east of Macklin to Wilkie and Speers and north of Speers to Dore Lake. In eastern Saskatchewan, the same degree of injury was most evident in the following areas; the Fort a la Corne Provincial Forest near Smeaton and east to Squaw Rapids, southeast to Hudson Bay and westwards along the southern part of the Pasquia Hills to Tobin Lake. Other areas of significant defoliation were reported southeast of Greenwater Lake Provincial Park, near Endeavor and Swan Plain, Prince Albert, Wadena, Montreal and White Swan lakes and in Duck Mountain Provincial Park.

Manitoba

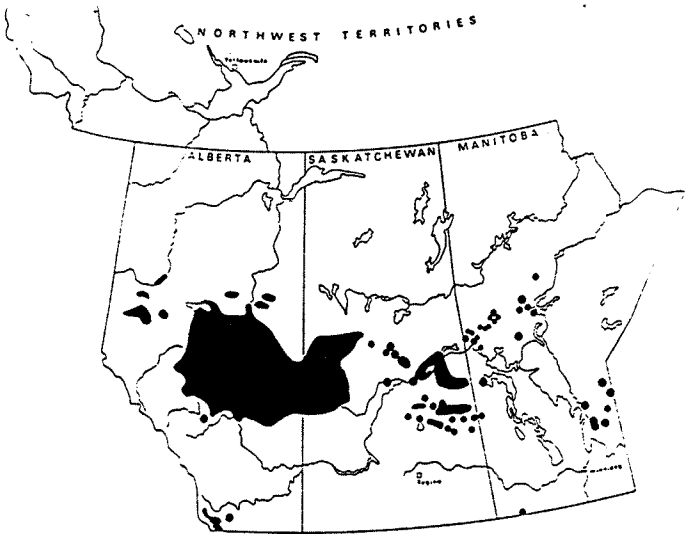
A significant increase in the amount of defoliation was reported during the past season. A total of 52,836 ha of moderate-to-severe damage was evident in 1988 compared to 4,403 ha reported in 1987. The areas in which the majority of infestations increased in size and intensity were as follows; The Pas-Flin Flon-Snow Lake triangle, near Wabowden and Jenpeg, south of Ponton and in the Dawson Bay area. Light defoliation was reported in some

areas of the Turtle Mountains.



LOCATIONS OF MODERATE-SEVERE DEFOLIATION CAUSED BY SPRUCE BUDWORM IN 1988

Forest Insect and Disease Survey
Canadian Forestry Service, NoFC



AREAS OF MODERATE-SEVERE DEFOLIATION OF ASPEN STANDS, CAUSED MAINLY BY FOREST TENT CATERPILLAR IN 1988

Forest Insect and Disease Survey
Canadian Forestry Service, NoFC

NEW PUBLICATIONS

Hiratsuka, Y.; Powell, J.M.; Van Sickle, G.A. 1988. Impact of pine stem rusts of hard pines in Alberta and the Northwest Territories. Can. For. Serv., North. For. Cent., Edmonton, Alberta. NOR-X-299

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