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# SURVEY BULLETIN

Forest Insect and Disease Conditions in Ontario  
Spring 1993



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# FOREST INSECT AND DISEASE CONDITIONS IN ONTARIO

Spring 1993

This is the first of three *Survey Bulletins* describing forest insect and disease conditions in Ontario to be issued by the Forest Insect and Disease Survey Unit (FIDS) of Forestry Canada.

## RETIREMENT



Paul D. Syme

Dr. Paul Syme, Research Scientist and FIDS Insect Taxonomist, retired on 31 March 1993. Paul began his career in the public service in 1961 with the Entomology and Pathology Branch of the Department of Forestry, at the Forest Insect Laboratory in Sault Ste. Marie, working on the European pine shoot moth. He moved to the FIDS Unit in 1977 and assumed his present duties in 1980. The duties of Paul's position will be assumed by Kathryn L. Nystrom, who has been FIDS Insect Identification Officer for the past 11 years.



Kathryn L. Nystrom

## DISTRICT ASSIGNMENTS

There were two changes in ranger field assignments this year. David Constable will move from Sault Ste. Marie to Thunder Bay, where he will supervise surveys in the eastern part of Northwest Region. Hugh Evans will move from Thunder Bay to Sault Ste. Marie, where he will supervise surveys in the western part of Central Region.

## SPECIAL SURVEYS IN 1992

### Seed Orchard Surveys

This survey, designed to develop an inventory of insect, disease and abiotic problems in seed orchards, was carried out for the third year in 1992. The program includes six white spruce (*Picea glauca* [Moench] Voss), 11 black spruce (*Picea mariana* [Mill.] B.S.P.), four jack pine (*Pinus banksiana* Lamb.) and one white pine (*Pinus strobus* L.) seed orchard (22 orchards in all). Two visits are made each year, with 150 trees scrutinized in each seed orchard on each visit. The results of 1992's survey are as follows:

**Insects**—The eastern spruce budworm (*Choristoneura fumiferana* [Clem.]) was again the most prevalent insect. It was present in all six white spruce and in 13 of 14 black spruce seed orchards. The proportion of trees attacked ranged from 2.7 to 100%, with corresponding average defoliation ranging from 1 to 20%. The most severe damage was in the Pearson white spruce seed orchard, Thunder Bay District, where 100% of the trees were infested, with 20% average defoliation. The yellowheaded spruce sawfly (*Pikonema alaskensis* [Roh.]) was found in two white spruce and six black spruce seed orchards. The numbers of trees infested varied

from 1.6 to 8% and average defoliation of infested trees ranged from 1 to 10%.

The white pine weevil (*Pissodes strobi* [Peck]) was found in eight black spruce, three white spruce, four jack pine and one white pine seed orchards. The proportion of leaders destroyed ranged from 1.3% in the jack pine seed orchard in Hallam Township, Sudbury District, to 13.3% in a black spruce seed orchard in the Island Lake Tree Improvement area, Chapleau District.

The eastern pine shoot borer (*Eucosma gloriola* Heinr.) was found in all four jack pine orchards and in the single white pine seed orchard. Incidence and damage were low at three of the five

Cover photo: Spruce budworm larvae hatching from an egg mass



locations, but the insect caused serious damage in the jack pine seed orchards in Hallam and Lumsden townships, Sudbury District, where 32.7 and 16.7% of the leaders, respectively, were destroyed. The jack pine budworm (*Choristoneura p. pinus* Free.) was found at the same two locations, infesting 67% of the Hallam Township trees and 4% of those at the Lumsden Township site. Defoliation, however, was very light (2 and 1%) at both locations. Other insects encountered but not causing any significant damage included the jack pine tip beetle (*Conophthorus banksianae* McP.), the northern pitch twig moth (*Petrova albicapitana* [Bsk.]), the spruce coneworm (*Dioryctria reniculelloides* Mut. & Mun.) and the spruce shootworm (*Zeiraphera* spp.)

**Diseases** – The most commonly encountered diseases were two spruce needle rusts, *Chrysomyxa ledi* (Alb. & Schwein.) de Bary and *C. ledicola* (Peck) Lagerh., which were found in five black spruce and one white spruce seed orchards. Although the incidence was as high as 100% at two locations, actual foliar damage was 5% or less at all sites. Armillaria root rot (*Armillaria ostoyae* [Romagn.] Herink) was found in four black spruce and one white spruce seed orchards. The incidence was quite low, with the highest count (6.6%) at the Minnesabik black spruce orchard, Kenora District; however, similarly low levels of damage recurring from year to year have a serious cumulative affect on plantations. Diplodia tip blight (*Sphaeropsis sapinea* [Fr.] Dyko & B. Sutton) infected 7.3 and 11.3% of the trees in the Minnesabik and Ulster seed orchards, Kenora District. Other diseases that were observed but which did not cause appreciable damage included spruce cone rust (*Chrysomyxa pirolata* [Körn.] Winter), western gall rust (*Endrocronartium harknessii* [J.P. Moore] Y. Hirats.), white pine blister rust (*Cronartium ribicola* J.C. Fischer), needle cast diseases (*Isthmiella crepidiformis* [Darker] Darker and *Davisomycella ampla* [J. Davis] Darker) and pine

needle rust (*Coleosporium asterum* [Dietel] Sydow).

**Abiotic** – Damage by late-spring frosts was prevalent in all six white spruce seed orchards and in five black spruce and one jack pine seed orchards. The affected spruce plantations were all in northwestern Ontario; the heaviest damage occurred in the Dawe white spruce orchard, Dryden District, and the Partridge Falls black spruce orchard, Thunder Bay District. Incidence rates at these locations were 95.3 and 74.7%, respectively, with accompanying new shoot damage of 13.0 and 19.0%. The single affected jack pine orchard was at Aidie Creek, Kirkland Lake District, where 5% foliar damage was recorded on 1.3% of the trees. Chlorosis (yellowing of foliage), which is usually site-related, was recorded in five black spruce and two jack pine seed orchards. The number of trees affected was quite low in all cases, except for the Aidie Creek jack pine orchard in Kirkland Lake District, where 12.7% of the trees sustained average foliar damage of 30%.

#### White Pine Blister Rust Survey

This survey was a cooperative project between the Ontario Ministry of Natural Resources (OMNR) and the Ontario FIDS Unit to determine the impact of white pine blister rust on white pine plantations in the North Bay and Temagami districts. In all, 20 plantations were examined. These covered a range of establishment techniques (site preparation and planting), and ranged in height from 0.2 to 2.2 m. The presence and density of competing vegetation, including the alternate host (*Ribes* spp.), were measured along with soil depth and texture. Tree heights and slope position (i.e., depression, level, toe, mid and crest) were recorded for each tree. Infection was measured in terms of the presence of stem cankers, severe branch cankers and non-lethal (>46 cm from the stem) branch cankers. The numbers of dead, cankered and non-cankered trees were recorded.

The results of the survey showed that 17 of the 20 plantations contained

infected trees. Infection levels ranged from 0.7 to 20.7% and related mortality ranged from 0 to 3.3%. The most severely affected plantation was in Orlig Township, North Bay District, where 20.7% of the trees were infected, with a mortality rate of 3.3%. The study indicated that a greater percentage of trees in level areas and at the base of slopes were infected compared with locations higher on slopes. However, the sample size for this category (44 samples) was relatively small compared with other categories, which ranged from 135 to 524 samples.

#### SURVEYS PLANNED FOR 1993

##### Northern Ontario Development Agreement (NODA) Projects

Three NODA projects have been undertaken by the FIDS Unit beginning in mid-1992. These include the development of a spruce budworm hazard-rating system for northern Ontario forests, development of management guidelines for the jack pine budworm and a Scleroderris canker disease (*Gremmeniella abietina* [Lagerb.] Morelet) impact project.

##### Maple Health Studies

This work includes monitoring a network of more than one hundred 25-tree maple health plots throughout the range of sugar maple (*Acer saccharum* Marsh.) in Ontario. A number of factors relating to tree health are assessed in each plot. Plots are located in urban, rural-roadside and woodlot-forest situations.

The FIDS Unit also participates in the North American Maple Project, which is a joint Canada-United States study of sugar maple throughout its range on the continent. In all, 24 plots are located in Ontario, of which half are in operating sugar bushes and the other half in undisturbed woodlots. A number of parameters that relate to site and stand conditions are assessed, along with pest conditions and the current crown condition of each tree. The data generated is used to measure the rate of change, if any, in the condition of sugar maple throughout its range.



## Oak Health Study

Rangers in southern Ontario will continue to monitor the health of oak (*Quercus* spp.) within a network of 13 plots of 100 oak trees, which were established in 1977. The plots were originally established to measure the effects of oak leaf shredder (*Croesia semipurpurana* [Kft.]) infestations and have been maintained to chart the long-term health of the trees, mainly red oak (*Quercus rubra* L.). Results of the 1992 evaluations indicated that 61.2% of the trees had light decline symptoms and 19.5% displayed moderate-to-severe decline symptoms. A total of 19% of the original 1,300 trees have died and 2.1% have succumbed to windfall or have been cut.

## Acid Rain National Early Warning System (ARNEWS)

The Ontario portion of the national ARNEWS plot system consists of some 27 widely dispersed plots located in various acid deposition zones, in stands of the major Ontario commercial tree species. In 1993, 11 new plots will be added. The new plots will be located as follows: five plots in Northwest Region, with two in white birch (*Betula papyrifera* Marsh.) stands, two in trembling aspen (*Populus tremuloides* Michx.) stands and one in a spruce or jack pine stand; four plots in Northeast Region, two in white birch and two in trembling aspen stands (two of these stands will be located in the Abitibi model forest); and two plots in Central Region, one each in white birch and red oak stands.

No specific symptoms of acid rain damage were observed in 1992; however, a number of other damaging agents were detected. The eastern spruce budworm caused 70% defoliation of balsam fir (*Abies balsamea* [L.] Mill.) and 12% defoliation of black spruce at one plot in Fowler Township, Thunder Bay District. White spruce in Gloucester Township, Kemptville District, sustained approximately 60% defoliation and defoliation averaged 10% on black spruce in plots at Margo Lake, Geraldton District, and Sandel Lake, Sioux Lookout District.

White pine blister rust was recorded on three trees in the plot in Hungerford Township, Tweed District, and is the main agent responsible for the death of 13 trees in this plot over the past several years. A lack of vigor was evident on white pine in plots in Hungerford Township, Tweed District, and Erin Township, Cambridge District, and on jack pine in Cane Township, Kirkland Lake District. This was evidenced by sparse, small needles and a lack of retention of any foliage for more than 3 years. Light soils and stress from previous years of drought, along with unusually cool weather conditions in 1992, may be the cause of this. Symptoms of oak decline were evident in a plot in Sproule Township, Algonquin Park District, where 70% of the red oak trees had dead branches within the living crowns and two trees died. These conditions resulted from a combination of several years of drought, a poor site and past forest tent caterpillar (*Malacosoma disstria* Hbn.) defoliation.

Armillaria root rot was associated with the death of five white birch trees in a plot in Hymen Township, Sudbury District. A number of other pests such as the gypsy moth (*Lymantria dispar* [L.]), eastern gall rust (*Cronartium* spp.), leaf spot diseases, anthracnoses and needlecast diseases were encountered, but did not cause any significant damage.

## MAJOR INSECT FORECASTS FOR 1993

The infestation forecasts below were printed in the fall 1992 *Survey Bulletin* but are repeated here for the upcoming summer season.

### Eastern Spruce Budworm *Choristoneura fumiferana* (Clem.)

The gross area of moderate-to-severe defoliation by the eastern spruce budworm increased by 529,981 ha, to 9,595,762 ha, in 1992. This was the fourth consecutive year of increase. The bulk of the defoliation occurred in northwestern Ontario from the Manitoba border eastward to the Pagwa

River (about halfway between Hearst and Geraldton on Highway 11). There were increases, however, in north-eastern Ontario, particularly in the Wawa, Hearst and Moosonee districts.

Increases also occurred in the central part of the province, particularly in Algonquin Park District, and small pockets of defoliation occurred in white spruce plantations in southern Ontario.

Spruce budworm egg-mass sampling in 1992 showed an overall decline of about 7% in egg-mass densities. Despite this, egg-mass densities remain high enough to cause moderate-to-severe defoliation in most areas infested last year. New infestations may develop in southern Fort Frances District, whereas declines may continue in the southern parts of the Thunder Bay and Nipigon districts. Infestations in the Hearst and Wawa districts will likely persist and may expand eastward. Infestations in the Sudbury, Sault Ste. Marie, North Bay and Algonquin Park districts could expand and new pockets of defoliation could also be found in the Central and Southern regions.

### Jack Pine Budworm *Choristoneura p. pinus* Free.

In 1992, the provincewide total of moderate-to-severe defoliation by the jack pine budworm increased by 25,086 ha, to 158,704 ha. Infestations in the northwestern part of the province virtually collapsed, declining from 75,514 ha to 693 ha, whereas those in Central Region increased markedly, from 61,104 ha to 157,478 ha. Expanded or new infestations were recorded in the Parry Sound, Pembroke, North Bay, Bancroft, Algonquin Park and Sudbury districts. A single new infestation (533 ha) was found in Sheffield Township of Tweed District, Southern Region.

Egg-mass surveys indicate that 1993 populations levels in northwestern Ontario will remain quite low. Populations and, consequently, the area of defoliation will likely increase in Central Region, particularly in the Sudbury, Sault Ste. Marie and Pembroke districts.



Defoliation will probably persist in Parry Sound District, but 1993 will be the fourth year of infestation in this area and population collapses could occur.

#### **Forest Tent Caterpillar** *Malacosoma disstria* Hbn.

Forest tent caterpillar populations began to decline in 1992, with the total area of moderate-to-severe defoliation reduced from 18,870,508 ha to 16,051,424 ha. Large declines that occurred in the Fort Frances, Dryden, Kenora and Sioux Lookout districts were somewhat offset by increases in the Geraldton, Nipigon, Hearst, Wawa and Cochrane districts. Large declines were apparent in the Central and Southern regions, but pockets of defoliation persisted in the Sudbury, North Bay, Parry Sound, Algonquin Park and

Bancroft districts of Central Region. Pockets of defoliation were also recorded in the Tweed, Kemptville and Midhurst districts of Southern Region.

The outlook for 1993 indicates that populations will probably continue to decline or even collapse. Pockets of defoliation may persist in the Red Lake, Sioux Lookout, Nipigon, Geraldton, Hearst, Cochrane and Wawa districts. Little or no defoliation is likely to occur in the Central or Southern regions.

#### **Gypsy Moth** *Lymantria dispar* (L.)

Gypsy moth populations declined in Southern Region and in most of Central Region in 1992. The province-wide total of moderate-to-severe defoliation stood at 34,460 ha, down from the 347,415 ha of the previous year.

Populations declined in most areas except Sudbury District, where infestations discovered in 1991 expanded substantially. Small pockets of new defoliation were detected along the north channel of Lake Huron in Sault Ste. Marie District.

Since egg-mass surveys were very limited, it is not possible to make detailed gypsy moth forecasts for 1993. However, based on past experience, populations will likely continue to expand along the leading edge of the insect's range. This means that populations in the Sudbury and Sault Ste. Marie districts will continue to expand while those in the remainder of southern Ontario, which is considered to be generally infested, could remain relatively low.

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