PROVINCE OF QUEBEC

FOREST INSECT SURVEY

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INTRODUCTION

Forest Insect Survey activities in Quebec were continued on the same basis as the past five years with the activities related directly to spruce budworm conditions or to specific research projects of the Laboratory. The field season was not particularly favourable for insect development; spring came early but weather remained relatively dry throughout most of the summer with the exception of two weeks in July. Conditions returned to normal in September.

No important change was recorded in the spruce budworm situation and the population level remained low except in certain residual outbreak areas where insect numbers increased markedly. The Swaine jack-pine sawfly was less abundant in several outbreak areas but new increases were recorded in some localities of the Lake St. John region. The larch sawfly is presently the most important forest insect in Quebec; some decrease in numbers was recorded in the western regions but medium to severe infestations are now relatively common in central Quebec. The status of the European spruce sawfly is comparable to that of 1959. In contrast, the fall webworm has increased considerably and was found more commonly south of the St. Lawrence River. The appearance of the gypsy moth in southern Quebec in sufficient numbers to necessitate aerial spraying was also unusual. In 1960, the Quebec Laboratory again participated in a co-operative egg survey in southern Quebec. An area of 2,100 square miles was covered and new areas of infestation were found which may require spraying in 1961.

This report summarizes the various conditions observed by the Survey staff and the research officers of this Laboratory. The information received from the various project leaders is gratefully acknowledged.

IMPORTANT INSECTS

Spruce Budworm, *Choristoneura fumiferana* (Clem.)—Changes in the status of the spruce budworm in 1960 were limited to residual outbreak areas where severe defoliation occurred. This resurgence has been attributed to an abnormally high survival of budworm larvae due to exceptionally favourable developmental conditions. The months of May and June were hot and dry and there was an abundance of staminate flowers on balsam fir and spruce. Increased abundance was reported for several areas in eastern Quebec. On the North Shore of the St. Lawrence River, foci were recorded in the Lower Saguenay watershed and west of the Outardes River in Saguenay County. Observations by Survey staff revealed the same situation in the Shipshaw and HaHa river areas; the light to medium defoliation of previous years became severe in 1960. Other areas where population increases were reported included sectors of the St. Marguerite, Laval, Bersimis, and Outardes watersheds.

In the Lower St. Lawrence and Gaspe regions where population levels have been followed closely for a number of years, a defoliation survey revealed no defoliation except in and around the Kedgwick and Mistigouche infestation

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areas reported in 1959. In the latter areas, larval counts made early in the spring showed the situation to be worse than expected and recommendations for spraying an area of 30 square miles were made in lieu of the 10 square miles anticipated in the fall of 1959.

An egg survey in the fall of 1960 covered an area of approximately 300 square miles. Of the 44 localities sampled, 10 were located inside the sprayed area and 70 per cent gave negative results. Budworm egg masses were found at 62 per cent of the remaining sampling points outside the sprayed area and 26 per cent gave high egg counts. These high counts were located in two different blocks adjacent to the area sprayed in 1960, one of approximately 40 square miles to the east and the other of 55 square miles to the west. Part of these blocks were sprayed in 1954 and 1955. High population levels can be expected in these areas in 1961 and spraying has been recommended.

Swaine Jack-pine Sawfly, *Neodiprion swainei* Midd.—In 1960, special surveys were extended into the accessible jack pine areas east of the St. Maurice watershed not visited since 1956 and 1957. Observations were made at 59 sampling stations previously established and egg cluster counts were made in the moderate and severe infestation areas. In the Saguenay watershed, sawfly collections were restricted to within a 60-mile radius of Lake St. John and all severe infestations were within 30 miles of the Lake. The most important was located in Falardeau Township near Lake Brochet, where spraying experiments with a virus disease were carried out in 1960. The infestation previously recorded in Tremblay Township was much reduced by extensive cutting by settlers, yet an average of 11 colonies were counted on the remaining trees. No extension has been recorded for the Riviere a Mars infestation. Other known outbreaks either collapsed or suffered marked reductions in population level due to extensive clear cutting. The Rat River infestation, which has been active since 1940 in some parts of the watershed, appears to be over. The same conditions prevailed in the long standing infestation along the Ouiatchouanish River.

East of the Saguenay watershed, only small numbers of the jack-pine sawfly were found. New localities where sawfly occurrence has not been reported previously include the Sault au Cochon and Outardes rivers on the North Shore of the St. Lawrence River and St. Alexandre, Kamouraska County, on the South Shore.

Observations and information from areas in western Quebec indicate that population levels have decreased considerably. In the St. Maurice infestation area, colony counts declined from 30 to 6 per tree.

Larch sawfly, *Pristiphora erichsonii* (Htg.)—This important pest of larch is now the most abundant forest insect in Quebec. Reports came from all regions and varying degrees of defoliation were observed throughout the more accessible forest areas. The insect was also collected as far north as Mistassini Lake in central Quebec and the 51° 30′ parallel of latitude on the Manicouagan River. A decline in population level was apparent in the Abitibi region of northwestern Quebec where the insect had been very active for a number of years. At the same time, very noticeable increases were recorded in the more recently infested regions of central Quebec. The severity of the attack was often irregular but severely defoliated stands were quite common. New areas of light to medium infestation were observed in eastern Quebec where defoliation had not previously been apparent. Sequential sampling* at the 15 localities reported in 1959 and at 22 new localities in recently invaded areas are presented in the following table.

*Ives, W. G. H. and R. M. Prentice, 1958. A sequential sampling technique for surveys of the larch sawfly. Can. Ent. 90:331-338.

Region	No. Localities Sampled	Degree of Infestation			Trend 1960
		Light	Moderate	Severe	
Abitibi	5	2	1	2	decrease
LaVerendrye Park	2	1	—	1	no change
North Montreal	6	3	1	2	no change
Chibougamau Road	4	3	—	1	increase
Lake St. John-Saguenay	4	1	3	—	increase
Laurentide Park-Charlevoix	4	1	—	3	increase
Quebec area	7	6	—	1	increase
Lower St. Lawrence	5	5	0	0	increase

Two species of parasite have been recovered from the rearings to date, *Mesoleius tenthredinis* Morley and *Bessa harveyi* (Tnsd.). Although parasitism increased during the last two years at sample points in the Abitibi region, it is generally less than 20 per cent. The few samples taken in the areas of newer infestation to the south and east of La Verendrye Park show that parasitism was less than 5 per cent. Dead larvae were observed in areas of reduced population level but no disease organisms were identified.

Gypsy Moth, *Porthetria dispar* (L.)—Males of this insect were captured in southern Quebec during the summer of 1955 and a co-operative egg survey was begun in areas surrounding the positive traps by the Plant Protection Division, Canada Department of Agriculture. This survey has been repeated each fall. One egg-mass was found in 1956 and very small numbers each succeeding year until 1959 when a great increase in egg counts was observed and three infestations were definitely localized. The largest was near St. Clothilde, Chateauguay County. Another was south of St. Chrysostome in the same county and the third was near Havelock Corner, Huntingdon County. As a preventive measure, approximately 2,000 acres covering these three infestations and nearby hazard areas were sprayed with insecticides by aircraft in May, 1960.

Traps were re-established in southern Quebec during the summer of 1960 to cover an area of over 2,100 square miles. Male moths were captured in greater numbers and over a much wider area than in past years. An egg survey in the fall revealed three new infestations which will probably be sprayed in 1961.

European Spruce Sawfly, *Diprion hercyniae* (Htg.)—Larval sampling was much reduced this year and limited to late instar larvae to provide information on larval parasitism. However, these samples showed that larval abundance in 1960 was about the same as in 1959. The insect was easily found on young white spruce trees, but always in low numbers. As in previous years, some larvae died from disease. Larval parasitism was 9 per cent for the first generation and only one species of parasite, *Drino bohemica* Mesn., was obtained. Records for the second generation are not yet complete but a species of *Exenterus* was also recovered. Cage experiments during the last two years have shown that considerable mortality occurs in the egg stage and that a third generation was completed, 20 miles south of Quebec City, during the summer of 1959.

European Pine Shoot Moth, *Rhyacionia buoliana* (Schiff.)—The population level of this pest of Mugho pine remained low in 1960, in spite of comparatively favourable winter conditions. Winter mortality was estimated at approximately 50 per cent, the minimum yet recorded, but parasitism increased

considerably and probably prevented an increase in abundance. Parasitism based on total emergence reached 80 per cent; *Orgilus obscurator* (Nees) and *Temelucha interruptor* Grav., two species of European origin, were the most important parasites.

Red-headed Jack-pine Sawfly, *Neodiprion virginianus* complex—This insect was recorded in several new localities in the Lake St. John region in 1960, often associated with *N. swainei*. This sawfly was also common near Lake McLaren on the St. Maurice watershed. In the previously known Settrington Township infestation, the population level decreased considerably in 1960. Approximately 30 per cent of the trees were affected and only 5 per cent had more than one colony per tree. Defoliation was noticeable only by careful observation.

Egg mortality was important again this year and parasitism was generally high. Seven species of larval parasites were recovered in 1959, *Spathimeigenia* sp. being the most important. Experiments with planted cocoons also showed that a considerable number are destroyed through predation by small mammals. Partial emergence of a second generation was observed and some of the larvae produced completed their development this fall.

Larch Casebearer, *Coleophora laricella* (Hbn.)—Sequential sampling* in in the spring of 1960 showed slight decreases in population level throughout the Plains of the St. Lawrence River and the Eastern Townships. The degree of infestation varied from 'trace' to 'light'. The casebearer was found throughout central Quebec as far north as Senneterre, Abitibi County, and the Lake St. John region. In these northern regions, population levels were extremely low. Parasitism based on total emergence, ranged from 6 to 58 per cent for 18 localities. The most important parasites were *Agathis pumila* (Ratz.) and *Epilampsis laricinellae* (Ratz.). *A. pumila* was found in the Abitibi region in spite of the low host numbers. Bird predation on overwintering larvae also appears as an important control factor especially in the Eastern Townships.

Maple Leaf Cutter, *Paraclemensia acerifoliella* (Fitch)—Reports of damage by this insect were less abundant this year. The infestations reported in Brome and Stanstead counties in 1959 continued; the level of infestation varied considerably but no severe defoliation was observed. In the sugar maple stands of St. Benoit du Lac reported as heavily infested in 1959, the insect was abundant only on the margin of the stands. Fifty per cent of the leaves were affected and most of them had only one case.

Poplar Sawfly, *Trichiocampus viminalis* (Fall.)—The population level of the poplar sawfly in the Quebec City area in 1960 was found to be extremely low for the third consecutive year. Appreciable numbers were found in only one locality, Montmorency Falls (Quebec County), on Lombardy poplar. However, numbers declined considerably in early August owing to the virus disease observed in previous years. This insect occurs widely throughout eastern Quebec and has recently been collected at St. Felicien, Roberval County, and at Batiscan, Champlain County. No infestations are known at present; apparently the disease is the main control factor.

Poplar Leaf Miner, *Phytagromyza populicola* (Hal.)—Special sampling for this species was extended in 1960 to many localities within a 100-mile radius of Quebec City. The records show that the insect was present throughout the area and as far north as Lake St. John. The percentage of leaves affected, based on

*Webb, F. E., 1957. Sampling techniques for the overwintering stage of the larch casebearer. Bi-Mon. Prog. Rept. Div. For. Biol., Dept. Agr., Can. 13 (4).

samples taken from the lower crowns of Lombardy poplar, varied from 20 to 55 with the highest counts coming from the Plains of Three Rivers Region.

Fall Webworm, *Hyphantria cunea* (Drury)—The fall webworm was more common in 1960 than in previous years. Nests were conspicuous along roadsides particularly south of the St. Lawrence River and west of the Chaudière River. Webs were observed on various tree species and especially on elm, alder, pin cherry, and willow. Several nest tallies were made in southern Quebec and the highest concentrations were found in Levis and Lotbinière counties. The average number of nests per mile of road in this region was 36 and the maximum 61.

Bruce Spanworm, *Operophtera bruceata* (Hulst)—The Bruce spanworm was reported from a hardwood stand near St. Aubert, L'Islet County, in the fall of 1960. The degree of infestation was light on the basis of the number of males seen in flight and the females observed on the trunks of sugar maple and trembling aspen trees.

Pitch Nodule Maker, *Petrova albicapitana* (Busck)—Information on the pitch nodule maker was obtained along with the records of the jack-pine sawfly. The insect was observed throughout the range of jack pine sampled to date. No important damage was found except on Grand Calumet Island, Pontiac County, where injured twigs were recorded as being very abundant in 1957. A slight decrease occurred in 1960.

Pine Needle Scale, *Phenacaspis pinifoliae* (Fitch)—Several samples of this pest of ornamental spruce were received during 1960, especially from localities in the St. Lawrence Valley between Montreal and Tadoussac. White spruce trees at St. Nicolas, moderately infested a few years ago, were sampled in 1960 to obtain adults of *Chilocorus stigma* (Say) a coccinellid predator of scale insects. Intensive sampling produced only one adult specimen.

Balsam Shoot-boring Sawfly, *Pleroneura borealis* Felt—This insect was common on the new shoots of balsam fir near St. Roch de Mekinac, Laviolette County, and between Nicolet and Sorel along the St. Lawrence River. It was also recorded at Charlesbourg near Quebec City.

Green Spruce Leaf Miner, *Epinotia nanana* Treit.—This imported pest of spruce has been common in the Berthierville area for a number of years. The population level has increased considerably since 1957 and reached a maximum in 1959. It was again abundant in 1960 but a reduction was apparent. Only small numbers of a few species of parasites were recovered from rearings.

Oak Defoliators—Light to medium defoliation was again observed in red oak stands in St. Foy and Cap Rouge near Quebec City. Defoliation varied considerably between trees ranging from 'trace' to approximately 40 per cent. Several insects were responsible for the damage but only two were identified to species i.e. *Argyrotoxa semipurpurana* Kft. and *Argyrotaenia quercifoliana* Fitch. The former represented 80 per cent of the total insect population.

Cicada on White Spruce. *Tibicen canicularis* Harr.—An outbreak of this insect was reported in a white spruce plantation near Grand' Mère in 1960. Nymphal skins were noted near the base of dead and dying trees in poor white spruce areas. No signs of insects were found in better stands or in any of the nearby Scots or jack pine plantations. The nymph population level was estimated at approximately four per square foot in the outbreak areas. Nymphal skins were observed in 1958 and 1959 in another section of the plantation but were considerably less abundant.

OTHER NOTEWORTHY INSECTS

Insect	Hosts	Locality	Remarks
Adelges cooleyi (Gill.)	Spruce, blue	St. Anne, Chicoutimi Co.	Moderate infestation in Gagnon nursery.
Altica ulmi Woods	Elm	Seigniory Club, Papineau Co.	Several trees severely defoliated.
Archips cerasivoranus Fitch	Cherry, choke	Eastern Townships and Quebec area	Moderate to severe infestation in several counties.
Cyllene robiniae Forster	Locust	Sillery, Quebec	Many ornamental trees seriously affected.
Diprion frutetorum (F.)	Pine, Scots	Shawinigan, St. Maurice Co.	Low incidence.
Diprion similis (Htg.)	Pine, Mugho	St. Therese, Terrebonne Co.	Trace; last recorded on same species at Montreal Botanical Garden in 1956.
Dioryctria abietivorella (Grote)	Pine, Mugho	Chicoutimi	Moderate infestation in nursery stock.
Eriosoma lanigerum Hausm.	Elm, white	Quebec area	Fairly common throughout Greater Quebec.
Eriocampa ovata (Linn.)	Alder	St. Augustin, Portneuf Co.	Light infestation.
Evagora piceaella Kft.	Spruce, white	Berthierville, Berthier Co.	Pockets of severe infestations.
Fenusa pusilla (Lep.)	Birch, white and grey	Central and western Quebec	Common throughout the district.
Itonida ocellaris (O.S.)	Maple, red	Quebec City and Thetford Mines	Ocellate gall commonly found.
Neodiprion pratti banksianae Roh.	Pine, jack	Chateau d'Eau, Montmorency Co.	Again present in area reported in 1959.
Phyllophaga anxia Lec.	Pine, red	Metabetchouan, Roberval Co.	Root injury on young transplants.
Phyllophaga drakei Kby.	Spruce, white	Grand'Mère, St. Mauricie Co.	Fairly abundant in 30-year-old plantation.
Pineus strobi (Htg.)	Pine, white	Cap Rouge, Quebec Co.	On pines infected with blister rust
Pissodes approximatus Hopk.	Spruce, blue	Cowansville, Missisquoi Co.	Serious damage on several 20-year-old ornamental trees.
Ropalopus sanguinicollis (Horn)	Cherry, pin	St. Jean Port-Joli, L'Islet Co.	Moderate to severe infestation.
		Quebec City area	Light infestation.
Zeiraphera fortunana Kft.	Spruce, white	Charlevoix County, Lower St. Lawrence and Gaspe	Common with pockets of light to moderate infestation.
Zeiraphera ratzeburgiana Ratz.	Spruce, white	Gaspe Peninsula	Very common.