



ANNUAL REPORT

of the

FOREST INSECT AND
DISEASE SURVEY

Forestry Branch

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ONTARIO REGION

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INTRODUCTION

The weather in the spring and early summer of 1967 strongly influenced insect and disease conditions. A cool dry May, for example, was responsible for the failure of forest tent caterpillar eggs to hatch in some infestations and for high mortality of young caterpillars in others. Thus, extensive infestations were confined to the Fort Frances and Sault Ste. Marie districts. On the other hand, a warm wet June favored disease organisms including needle rusts, cone rusts, and fire blight, which were much more prevalent than in 1966.

Developments concerning several forest insect problems were of importance. Heavy spruce budworm infestations occurred around Burchell Lake in north-western Ontario on the fringe of extensive spruce-fir stands which have not been heavily defoliated since the 1920's. Egg surveys indicate a major extension of defoliation in this area in 1968. Also in northwestern Ontario, jack-pine budworm infestations extended over approximately 8,500 square miles, mainly in the Kenora District. The European pine sawfly continued its spread eastward on planted pines in southern Ontario, whereas its numbers were greatly reduced on Manitoulin Island by the use of virus sprays. Infestations also occurred in the Ottawa Valley, often within the same or adjoining stands attacked by the spruce budworm, jack-pine budworm, spring cankerworm, red-pine sawfly, and *Neodiprion pratti paradoxicus*. Many more insect species than usual were abundant in this area on all tree and shrub species. The basis for these concurrent outbreaks in a relatively restricted area is unknown.

Important among abiotic tree diseases in 1967 were maple deterioration, which was again prevalent on roadside trees in central and southern Ontario, and salt damage to coniferous trees planted along highways in urban areas. Special surveys were carried out relative to three important biotic disease problems of the Ontario Region, namely, Dutch elm disease, Fomes root rot and Scleroderris canker of pine. A complex problem involving crown deterioration of white and yellow birch in many parts of Ontario was found to be associated with the production of an extremely heavy seed crop. In the laboratory, considerable progress was made in the solution of a number of mycological and disease identification problems.

During the year, the organizational structure of the Insect and Disease Survey Section was greatly strengthened by the consolidation of the Section at one location. In late September, Disease Survey staff and equipment, as well as the regional herbarium, were moved from the Forest Research Laboratory at Maple to Sault Ste. Marie. Recent losses of professional and technical staff were offset by the recruitment of H. L. Gross, as Disease Survey Officer (field), and by the recruitment and training, under M. J. Larsen, of technicians in disease identification and mycology.

Definition by district of the seven forest regions now recognized by the Survey and referred to in this section of the report are, Western Region: Sioux Lookout, Kenora, and Fort Frances districts; Mid-western: Port Arthur, Geraldton, and White River; Northern: Kapuskasing, Cochrane, Swastika; Central: Sault Ste. Marie, Chapleau, Gogama, and Sudbury; South-central: North Bay, Parry Sound, and Pembroke; Southwestern: Lake Huron, Lake Simcoe, and Lake Erie; and Southeastern: Lindsay, Tweed and Kemptville.

Numbers of insect and disease collections, on the principal host trees, received at Sault Ste. Marie and Maple were as follows.

Coniferous trees	Collections		Broad-leaved trees	Collections	
	Insect	Disease		Insect	Disease
Pine			Poplar		
Jack pine.....	526	142	Trembling aspen.....	306	107
Red pine.....	225	102	Balsam poplar.....	79	37
White pine.....	160	111	Large-tooth aspen.....	27	16
Scots pine.....	189	29	Misc.....	19	15
Misc.....	11	12	Elm.....	90	345
Spruce			Birch		
White spruce.....	477	90	White birch.....	314	42
Black spruce.....	79	32	Yellow birch.....	15	10
Misc.....	25	14	Misc.....	11	8
Other conifers			Maple		
Balsam fir.....	287	103	Sugar maple.....	45	39
Tamarack.....	247	18	Red maple.....	17	12
Eastern white cedar.....	84	11	Misc.....	27	50
Hemlock.....	14	2	Oak		
Juniper.....	42	9	Red oak.....	67	17
Misc.....	1	1	White oak.....	31	5
Misc. hosts, or hosts unspecified.....	112	159	Misc.....	31	5
			Willow.....	204	79
			Cherry.....	257	53
			Alder.....	76	12
			Mountain-ash.....	62	27
			Walnut, hickory.....	64	9
			Ash.....	44	8
			Basswood.....	28	2
			Misc. broad-leaved trees..	135	57
TOTAL.....	2,479	835	TOTAL.....	1,949	955
GRAND TOTAL.....					6,218

IMPORTANT FOREST INSECTS

Spruce Budworm, *Choristoneura fumiferana* (Clem.)—Because the spruce budworm is a major forest pest, an annual assessment of populations is made across Ontario, by a comparison of budworm numbers obtained in all collections from spruce and fir and by the measurement of larval populations on spruce and fir trees at designated sampling areas. To ensure prompt detection and definition of isolated infestations, an aerial reconnaissance is made of all spruce-fir forests in early summer, and egg surveys are carried out in and around known infestations each fall.

Evidence of general population increases have been indicated by data collected over the past 3 years, and became increasingly apparent in 1967. Collec-

tions from all sources increased in number as follows: 1964, 35; 1965, 64; 1966, 83; and 1967, 182. Increases of about the same magnitude have been recorded in 42 spruce budworm study areas over the past 4 years.

Aerial and ground reconnaissance revealed three main infestation areas, namely, in the Ottawa Valley, in the Chapleau District, and near Burchell Lake in the Port Arthur District. In the Ottawa Valley, numerous small pockets of light infestation on balsam fir and white spruce were found, beginning near Mattawa in the Pembroke District, and increasing in intensity, down-river, to heavy in Ross, Bromley, and Westmeath townships, with another heavy infestation occurring over an area of 5 square miles in Fitzroy and Huntley townships in the Kemptville District. Three small, but heavy, infestations were also detected in Lanark County in the Tweed District. Based on sequential egg sampling, defoliation of spruce and fir in the Ottawa Valley in 1968 is expected to equal or exceed that of 1967.

In the Chapleau District, a sizeable light infestation recurred, and a small pocket of heavy infestation near the center was detected in the townships of Chewett, McGee, and Cochrane and in parts of adjoining townships. The typical pattern of defoliation was that the loss of foliage on fir was greatest on trees growing in close proximity to large white spruce. This suggests that populations were initially highest on mature spruce trees. The same trend was evident in egg counts at locations in Cochrane and Borden townships where numbers of egg-masses were at least twice as high on spruce as they were on fir. Survey data will be further analysed in the winter of 1967-68, because the role of dominant white spruce trees in the incipient stages of Ontario outbreaks has long been suspected as being significant.

In the Port Arthur District, where a light infestation was detected in 1966 around Burchell Lake, Moss Township, the intensity of attack increased abruptly in 1967 causing moderate to severe defoliation over 40,000 acres. Egg surveys made in the fall revealed a further intensification of defoliation, and an expansion of the area affected to upwards of 300,000 acres may be expected to the east and north in 1968. Extensive stands of spruce-fir forest considered to be susceptible to the spruce budworm extend roughly 30 miles east of Burchell Lake and at least 12 miles north to Lac des Mille Lacs. The present heavy infestation is located in the same general area where the last major Ontario outbreak subsided in 1962, but the surrounding spruce-fir forests in the vicinity of Lac des Mille Lacs were last reported under attack in 1926.

A number of relatively small but important infestations were reported on spruce elsewhere. Defoliation was rated moderate in Lefroy Township in the Sault Ste. Marie District; severe in the Uxbridge Forest and in Essa Township in the Lake Simcoe District; and moderate to severe in patches in two townships at the tip of the Bruce Peninsula in the Lake Huron District. Light infestations or increased numbers of larvae were found in the districts of Fort Frances, Sioux Lookout, Kapuskasing, Cochrane, Gogama, Swastika, North Bay, Parry Sound, Lindsay, and in most districts previously mentioned.

Aerial reconnaissance was somewhat difficult owing to the extremely heavy flowering of spruce and balsam fir. The abundance of staminate flowers and cones and the consequent reduction in foliage produced confusing color patterns which necessitated an unusually large number of ground checks to obtain reliable maps. The coincidence of heavy flowering on fir and spruce, and major population increases, at least in the Burchell Lake infestation, is considered to be significant.

Jack-pine Budworm, *Choristoneura pinus pinus* Free.—Jack pine stands in the Western Region have been more persistently infested by the jack-pine bud-

worm than stands elsewhere in the Province (see table). For example, the Kenora District has been free of infestation in only seven of the past 31 years. A 31-year history of jack-pine budworm infestations by forest district in Ontario follows.

Region	Western			Mid-western			Northern			Central				South-central			South-western		
District	Sioux Lookout	Kenora	Fort Frances	Port Arthur	Geraldton	White River	Kapuskasing	Cochrane	Swastika	Chapleau	Gogama	Sault Ste. Marie	Sudbury	North Bay	Parry Sound	Pembroke	Lake Simcoe	Lake Erie	Lake Huron
Year																			
1937.....		M																	
1938.....		M	M																
1939.....	M	M		M												L	L	M	
1940.....	M	L	M	M		L	L										M	M	
1941.....	M	M	M	M						M							M	M	
1942.....		M	M	M		M						M					M		
1943.....		M			M	M													
1944.....		M																	
1945.....	M	M														L	M		
1946.....	M	M																	
1947.....	M	M					L			M									
1948.....	M	M					L			M	L								
1949.....	M	M					L			M									
1950.....		M																	
1951.....																		M	
1952.....																	M		
1953.....		M																	
1954.....	M	M															M		
1955.....	L	L															M		
1956.....	L	L																	
1957.....																			
1958.....																			
1959.....			M															L	
1960.....		M	M															L	
1961.....		M	M														M	M	
1962.....		M	L														L		
1963.....		M																	
1964.....		M																	
1965.....		M																	L
1966.....	M	M	M									M	L				M		
1967.....	M	M	M				M					M	M	M	M	M	M	L	

M—medium to heavy infestation, L—light infestation

Infestations in 1967 were as numerous and widespread as at any time in the past three decades. By far the largest area, about 8,500 square miles, of medium to heavy infestation occurred in western Ontario and extended from Snowshoe Lake along the Ontario-Manitoba boundary, in the Kenora District, southeast to the vicinity of Amesdale on the Canadian National Railway. East of this point a broad boot-shaped area of infestation extended north to Lac Seul. The eastern boundary of the infestation ran along the west side of Lake Wabigoon and south through the Manitou Lakes, and the southern boundary extended through the northern part of the Fort Frances District to Morson Township on Lake of the Woods. This represented a major change in infestation boundaries in the eastern part of the Kenora District and in the Sioux Lookout District, compared with 1966. Trees on dry sites, where heavy flowering of jack pine prevailed, supported particularly high populations.

Jack pine trees are in a poor state of health in areas where moderate to severe defoliation has occurred for two or more consecutive years. Survey records reveal that the oldest area of infestation is located around Upper Lawrence Lake, where varying degrees of defoliation have been reported yearly since 1961 and where some tree mortality has occurred.

Pockets of medium to heavy infestation were reported at many widely-separated locations from the Sault Ste. Marie area east to the North Bay and Cochrane districts, as well as in the Parry Sound, Pembroke, and Lake Simcoe districts in southern Ontario. Numerous light infestations were reported in these and other districts, as shown on the accompanying map.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.—A further decline in the current outbreak was reported in 1967. The widespread infestations which have inundated poplar stands in western Ontario since about 1960 receded from a maximum of 35,000 square miles in 1965 to approximately 3,500 square miles in 1967. Moderate to severe defoliation extended along the southern border of the Fort Frances District from Senn and Devlin townships in the west, to the center of Quetico Park in the east. In central Ontario, a segment of the outbreak in the Sault Ste. Marie District persisted and expanded, causing moderate to severe defoliation of broad-leaved trees over about 200 square miles north of Bruce Mines and almost 800 square miles between Thessalon and Elliot Lake. However, in the South-central and Southeastern regions, infestations declined sharply or were terminated, except for several pockets of severe defoliation in the area immediately east of Lake Nipissing and in Renfrew County in the Pembroke District.

Annual forecasts of forest tent caterpillar defoliation have been made for the past 4 years, based on numbers of egg-bands overwintering on host trees. These forecasts are subject to error since they depend on the occurrence of favorable spring weather for the hatching of eggs and the establishment of young caterpillars on new foliage. The favorable weather failed to develop in most of northern Ontario in the spring of 1963, in northwestern Ontario in 1965 and in 1966, and in the South-central and Southeastern regions in 1967. In each of these years, widespread larval mortality occurred, and some infestations were either decimated or severely restricted in development. The disparity between the 1967 forecasts and actual degrees of defoliation at a number of locations is shown in the following table.

District and locality	Defoliation forecast for 1967	Actual defoliation in 1967
North Bay		
Dunnet Twp.....	S	Nil
Beaucage Twp.....	S	Nil
Parry Sound		
Nipissing.....	S	M
French River.....	S	Nil
Wood Twp.....	S	Nil
Pembroke		
Westmeath Twp.....	S	L
Buchanan Twp.....	S	L
Tweed		
Bangor Twp.....	M	Nil
Radcliffe Twp.....	S	Nil
Kemptville		
Osgoode Twp.....	S	Nil
South Plantagenet Twp.....	S	Nil
Torbolton Twp.....	S	L

S - severe, M - moderate, L - light

Egg counts in the fall of 1967 indicate a potential for recurring moderate to severe defoliation in a large part of the Fort Frances District, in the two areas of infestation in the Sault Ste. Marie District, and around the extreme eastern end of Lake Nipissing.

European Pine Sawfly, *Neodiprion sertifer* (Geoff.)—This insect was prevalent on Scots and red pine throughout most of the Southwestern Forest Region and in the southern part of the Lindsay District. The sawfly was also active in several areas of the Tweed District, and on Manitoulin Island in northern Ontario. Several noteworthy extensions in distribution were reported. In the Lindsay District, the insect spread northward from limits established in 1966, for distances ranging from several miles, in the central part of the district south of Peterborough, to over 20 miles through Mariposa and Eldon townships in Victoria County, in the western part of the district, and 20 miles both north and east to Hastings and Trenton in Northumberland County, in the eastern part of the district. In the Tweed District, the sawfly was found for the first time in the town of Tweed, and its establishment was confirmed at Sand Banks Provincial Park in Prince Edward County.

An intensive survey of all Scots pine plantations on Manitoulin Island was again conducted by survey personnel to search for the insect, and to appraise the effectiveness of virus sprays which were used in 1966 to contain the sawfly. Parts of three plantations, where more than one colony per 10 trees was found, were re-sprayed with virus in co-operation with the Insect Pathology Research Institute, Sault Ste. Marie. Also, members of the survey crews used hand sprayers to apply virus on individual colonies found during the survey. For the most part, populations were reduced by the 1966 virus spraying to less than 0.01 colonies per tree in 1967. This was satisfactory, considering that about 8% of the 1965 cocoon population did not give rise to adults because of a prolonged diapause, and so were not exposed to the spray. The sawfly was discovered in one Scots pine plantation on West Bay, where none had been found in 1966.

Both chemical insecticides and virus have been used widely to keep populations at a tolerable level in parts of southern Ontario. However, untended plantations in some areas constitute a hazard to adjacent plantations.

Larch Sawfly, *Pristiphora erichsonii* (Htg.)—In northwestern Ontario, medium to heavy infestations persisted in the Fort Frances and Kenora districts, in the southern part of the Sioux Lookout District, and in the western part of the Port Arthur District for the second year, and medium infestations developed in the central part of the Geraldton District. In the Northern and Central Forest regions noteworthy increases were reported, with moderate to severe defoliation occurring commonly in the southern part of the Sault Ste. Marie and Sudbury districts, and at numerous points in the Chapleau, Gogama, Kapuskasing and Cochrane districts. There was little or no change in the South-central or Southeastern regions where population levels have been low for the past several years. However, severe defoliation of European larch plantations recurred at numerous locations in the Southwestern Region.

European Pine Shoot Moth, *Rhyacionia buoliana* (Schiff.)—A serious introduced pest of pine plantations in the 1950's, this insect is currently of little consequence, except on roadside, shelterbelt, or ornamental plantings. In 1967, 10-year-old red pine trees at Stoney Point in the Lake Erie District and Scots pine plantings along the MacDonald Cartier Freeway between Belleville and Trenton were heavily infested. Moderate to severe damage also occurred

in a windbreak in Clarke Township in the Lindsay District. There was a further decline in the infestation on Cockburn Island, which represents the most northern persistent population.

European Spruce Sawfly, *Diprion hercyniae* (Htg.)—This is the most commonly collected insect on white spruce in Ontario, yet seldom has more than light defoliation been reported. The following table indicates consistent increase at all 20 sampling points in the districts of Lake Simcoe, Kemptville, and Tweed, but the significance of this increase will not be known until sampling is repeated in 1968.

Location	Number of larvae per 15 tray sample		Location	Number of larvae per 15 tray sample	
	1966	1967		1966	1967
Lake Simcoe			Tweed		
Vespra Twp.....	3	22	Brougham Twp.....	8	41
Medonte Twp.....	5	62	Faraday Twp.....	3	38
Mara Twp.....	1	18	Herschel Twp.....	15	36
Nottawasaga Twp.....	1	63	Hungerford Twp.....	3	33
Uxbridge.....	4	19	Limerick Twp.....	4	17
Kemptonville			McClure Twp.....	3	41
Beckwith Twp.....	1	15	McNab Twp.....	6	27
Cambridge Twp.....	0	7	Oso Twp.....	5	23
Oxford Twp.....	2	12	Wicklow Twp.....	1	33
Ramsay Twp.....	0	20	Wollaston Twp.....	2	55
South Crosby Twp.....	2	29			

Birch Leaf Miner, *Fenusa pusilla* (Lep.)—This introduced pest of white birch continued to extend its range both north and west in Ontario. In the Fort Frances District, collections from three widely-scattered townships, McCrosson on the western boundary, Dance in the central part of the district, and Hutchinson near the eastern boundary, as well as from the city of Fort Frances, represent the more significant extensions in 1967. Collections from Orient Bay in the Geraldton District, and from MacKlem and Swartman townships in the Cochrane District, revealed a continuing northward extension in these districts. Collections from Noble, Invergarry, and Kelvin townships in the Gogama District represent first records from that area. A collection from the town of Kapuskasing, a first record for the district, resembles the situation in other districts where the first or early records were in cities and towns (Port Arthur, Timmins, Fort Frances) and supports the theory that the use of balled nursery stock from southern Ontario for community plantings has been a major contributing factor in the establishment and spread of this pest in northern Ontario.

Extensive heavy infestations persisted in birch stands east of Ottawa and Gananoque in the Kemptonville District, in Nottawasaga Township in the Lake Simcoe District, and in numerous townships in the Parry Sound, Pembroke, and Sault Ste. Marie districts. Moderate to severe defoliation was widespread on individual birch trees elsewhere throughout the affected area of the Province.

Damage to ornamentals in cities and towns was widespread and resulted in many requests for control. The vigorous growth of cultivated trees probably increases their susceptibility to attack by providing young leaves for oviposition over a long period of time.

Larch Casebearer, *Coleophora laricella* (Hbn.)—As in the past several years, no major change in numbers or in distribution can be reported. Low populations persisted generally in tamarack stands, and the only pockets of medium or heavy infestation reported were in some European larch plantations in Albion and Whitchurch townships in the Lake Simcoe District and near Orono in the Lindsay District. The average number of larvae per 16-branch sample, 2.2 on tamarack and 10.2 on European larch, is a general indication of the current population level.

Red-headed Pine Sawfly, *Neodiprion lecontei* (Fitch)—This sawfly, a chronic pest of red pine plantations in Ontario, was again abundant in several central and southern forest districts. Trees up to 8 feet in height were most susceptible to attack, but in one area 15-foot trees were severely defoliated. In the Sault Ste. Marie and Sudbury districts heavy infestations occurred on numerous highway plantings, in plantations near Garden River, and on Cockburn Island in the North Channel. This latter infestation was effectively controlled by a virus in an experimental operation conducted by the Insect Pathology Research Institute, Sault Ste. Marie. Heavy infestations were also reported in the districts of Parry Sound, Lindsay, Tweed and Kemptville. Chemical control measures were effective in numerous publicly, and some privately owned plantations, but uncontrolled populations in untended plantations constitute a reservoir from which the sawfly may disperse in 1968.

Red-pine Sawfly, *Neodiprion nanulus nanulus* Schedl—Numerous plantations and natural stands of red pine and jack pine in the Pembroke District suffered extensive damage from this sawfly. Where there was severe defoliation of red pine, it was caused by *N. nanulus nanulus*, whereas, where jack pine was heavily damaged, mixed populations of *nanulus* and *N. pratti paradoxicus* were responsible. These infestations will decline in 1968 because egg-cluster counts dropped from an average of 20 per tree in the fall of 1966 to 0.5 in November 1967.

N. nanulus nanulus also infested red pine in Kirkwood Township, east of Sault Ste. Marie, and near Combermere in the Tweed District where 24 and 35 colonies per tree respectively were recorded. Elsewhere in Ontario, the sawfly caused little or no apparent defoliation although it was collected commonly on jack and red pine.

A Sawfly, *Neodiprion pratti paradoxicus* Ross—High populations of this insect persisted at numerous locations in the southeastern part of the Province. Pockets of severe defoliation of jack pine were reported in the southeastern part of the Pembroke District, at numerous locations in the Tweed and Kemptville districts, and in Haldimand Township in the Lindsay District. At one location in South Crosby Township in the Kemptville District, 25-foot jack pine trees were completely defoliated. In contrast, the closely-related black-headed jack-pine sawfly, *N. pratti banksianae* Roh., was present only in low numbers throughout its range.

Red-headed Jack-pine Sawfly, *Neodiprion virginianus* complex—Although the number and intensity of infestations of this sawfly in northern Ontario declined, small pockets of severe defoliation occurred in Maisonville and Tech townships in the Swastika District, and in Groves Township in the Gogama District. Larval colonies were more commonly observed in 1966 in the White

River District. Light to medium infestations were reported at numerous locations in the Pembroke District, representing an increase in population levels. Light infestations occurred in Mara and Oro townships in the Lake Simcoe District.

Balsam-fir Sawfly, *Neodiprion abietis* complex—Populations increased abruptly in the southeastern part of the Pembroke District and in adjacent areas of the Tweed and Kemptville districts, where numerous individual and groups of open-grown balsam fir trees suffered moderate to severe defoliation. In contrast, defoliation was negligible in parts of the Kenora, Fort Frances, and Lake Huron districts, where high populations were reported in 1966. Abrupt changes in numbers from year to year suggest the occurrence of a prolonged or irregular diapause in this species in Ontario.

Yellow-headed Spruce Sawfly, *Pikonema alaskensis* (Roh.)—Pockets of moderate to severe defoliation occurred in all districts except Parry Sound, Lake Simcoe, Lake Huron and Lake Erie. Defoliation was so prevalent and conspicuous on roadside and ornamental spruces that it attracted considerable public attention in towns and cities.

Repeated or severe defoliation was responsible for mortality of trees in plantations in McTavish, Chandos, and Kaladar townships in the Port Arthur, Lindsay, and Tweed districts respectively, and of ornamental white spruce in the town of Chapleau.

Cedar and Juniper Sawflies, *Monoctenus* spp.—Identifications by the Entomology Research Institute, Ottawa, indicate that three host specific species occur on cedar and juniper in Ontario: *M. fulvus* Nort. on eastern white cedar; *M. juniperinus* MacD. on red juniper; and *M. suffusus* (Cr.) on ground juniper. Only small numbers of larvae were present at any collecting point.

A Birch Sawfly, *Dimorphopteryx* sp.—There were no widespread infestations of this sawfly on yellow birch in the Sault Ste. Marie District (see *D. pinguis* in the 1966 Report) in 1967. Most of the sawflies remained dormant in the ground and, except for light defoliation of open-grown trees in the Batchawana-Pancake Bay area, evidence of feeding was lacking in the district. In contrast, infestations on white birch persisted for the third consecutive year in Pic Township in the White River District, and in Township 85 in the Geraldton District, respectively. A new light infestation was found in Fournier Township in the Cochrane District.

Crown deterioration of birch, which is discussed under Important Forest Diseases, was particularly severe on yellow birch trees which had been heavily infested with *Dimorphopteryx* in 1966. A large proportion of the trees which were completely stripped of foliage in August 1966 bore foliage inside the crown in 1967, leaving bare twigs and branches on the periphery. Extensive branch mortality and other adverse effects are expected. Some changes in cutting plans have been approved by the Ontario Department of Lands and Forests to permit the removal of affected trees before there is further deterioration.

White-pine Weevil, *Pissodes strobi* (Peck)—Damage to pine and spruce by this weevil in northern Ontario was unusually light, and most districts re-

ported fewer damaged leaders than in 1966. The damage level was highest in southern Ontario. The severity of current attack differed on common hosts throughout the Province as follows.

Damage Class	Number of stands affected				
	Eastern white pine	Jack pine	Scots pine	White spruce	Black spruce
Light.....	10	22	3	6	13
Moderate.....	22	8	2	1	1
Severe.....	14	1	3	0	0

Light—5% of trees weevilled, moderate—6-20%, and severe—more than 20%

Pales Weevil, *Hylobius pales* (Hbst.) and **Northern Pine Weevil**, *Pissodes approximatus* Hopk.—A continuing supply of brood material in the form of fresh stumps is conducive to population build-up in southern Ontario. Consequently, twig mortality resulting from adult beetle feeding has been greatest in districts where Scots pine Christmas-tree plantations have been harvested annually for many years. Tree mortality caused by the root collar weevil and the disease pathogen *Scleroderris lagerbergii* Gremmen contributed to the prevalence of these weevils. Moderate shoot damage was reported in Tiny Township in the Lake Simcoe District, Haldimand Township in the Lindsay District, and in Strong and Chaffey townships in the Parry Sound District.

The Smaller European Elm Bark Beetle, *Scolytus multistriatus* (Marsh.)—This important vector of the Dutch elm disease was found for the first time in a narrow band along the north shore of the St. Lawrence River from the Tweed-Kemptville district border to the town of Prescott. In this area, where many elm trees were killed by the Dutch elm disease, *S. multistriatus* was greatly outnumbered by the native elm bark beetle.

Numbers were high in the Lake Erie District, in the southern part of Lake Huron District, and in a wedge-shaped area including the southern half of the Lake Simcoe District and the Lindsay and Tweed districts.

Native Elm Bark Beetle, *Hylurgopinus rufipes* (Eichh.)—This beetle is the only known vector of Dutch elm disease throughout a large part of central and eastern Ontario. Population numbers generally increased in direct proportion to the amount of brood material made available through Dutch elm disease killed trees.

Pine Engraver, *Ips pini* (Say)—Summer drought during the past few years apparently predisposed red pine trees to attack by this bark beetle, especially trees growing on dry sites in parts of the Lake Simcoe and Parry Sound districts. Roadside salt injury, mechanical injury, and infection by *Fomes annosus* also contributed to a build-up of bark beetles on red pine in other parts of southern Ontario. A Colorado spruce windbreak in the Lake Erie District, hit by lightning in 1966, was also attacked.

A Red Pine Needle Mite, *Setoptus jonesi* (Keifer)—This mite was associated with the severe needle droop condition of red pine which appeared in the spring of 1966 and caused considerable tree mortality in parts of the Lindsay, Tweed, Parry Sound and Pembroke districts. The exact involvement of this mite in the

damage could not be determined. In September 1967, the mite was again found in these districts on red pine trees, but no droop symptoms were present. In late September some discoloration was evident on the inner face of the needles inside the sheath, where the mites had been feeding. Stands will be carefully examined in 1968 and the effect of mite feeding will be determined.

A Red Pine Needle Midge, *Thecodiplosis piniresinosae* Kearby—Larvae of this recently-described midge feed inside the fascicle at the base of the current year's needles, where they form pits on the outer needle surface. As many as five larvae may be present in one needle fascicle. Damaged needles, which turn brown, are usually shed by mid-October. In 1965, heavy infestations occurred in five townships in the Lake Simcoe District, but in the following year the infestation collapsed.

In 1967, natural stands of pole-size red pine in the western two-thirds of the Pembroke District were heavily infested, and moderate damage also occurred on red pine in Tarentorus and Thessalon townships in the Sault Ste. Marie District.

Cedar Leaf Miners, *Pulicaria thuiella* Kft., *Argyresthia thuiella* Pack., *A. aureoargentella* Brower, and *A. freyella* Wlshm.—Extensive infestations of this group of miners continued in southern Ontario, and caused severe browning and branch tip mortality in the Lake Huron, Lake Simcoe, and Lindsay districts. Small pockets of heavy infestation were found on eastern white cedar in Portland Township in the Tweed District and in North Elmsley and Osnabruck townships in the Kemptville District. In northern Ontario, low numbers of *A. aureoargentella* were recorded from five townships in the White River District and of *P. thuiella* in the Fort Frances District.

Jack-pine Needle Miner, *Exoteleia pinifoliella* (Cham.)—Reports of severe needle-mining in jack pine plantations were commonplace in southern regions. Although jack pine is the usual host of the insect, there was a heavy infestation on planted Scots pine in Carnarvon Township on Manitoulin Island.

Zimmerman Pine Moth, *Dioryctria zimmermani* (Grt.)—This species again caused two different types of injury to pine trees, depending on whether the stem or shoot was attacked. Stem attack on Scots pine occurred at nodes or at a point of injury to the bole. Infestations were confined to particular plantations, small groups of trees, or individual trees in southern Ontario, but mainly in the Southwestern Region. The second type, shoot attack, occurred only on red pine and primarily in Simcoe and Dufferin counties in the Lake Simcoe District. At one point in Base Borden, large numbers of new shoots of semi-mature red pine trees were bored into and killed.

Spruce Coneworm, *Dioryctria reniculella* (Grt.)—This insect was found commonly on spruce and rarely on balsam fir in most districts in Ontario. Large numbers of larvae were found in the spruce budworm infestations in Uxbridge and Essa townships in the Lake Simcoe District; for example, a count of 121 larvae was made on a total of 20 square-yard mat samples from white spruce in the Uxbridge area.

Saddled Prominent, *Heterocampa guttivitta* Wlk.—Severe defoliation of hardwood stands has been reported only twice in Ontario in the past 30 years. In 1938, two woodlots in Durham and York counties suffered severe defoliation and, in 1954, a woodlot in Wellington County was stripped of foliage. In 1967, outbreaks of moderate to severe intensity were reported in sugar maple

woodlots in Oro Township, as well as adjacent parts of Orillia and Medonte townships in the Lake Simcoe District and in St. Vincent, Keppel, and Eastnor townships in the Lake Huron District. Larvae were also common on Cockburn Island in the North Channel. Experience in both Ontario and in the Lake States suggests that the current outbreak will be short-lived. The occurrence of numerous predators in the duff, and of diseased larvae from which a species of *Beauveria* fungus has been cultured, may explain, in part, why previous outbreaks were of short duration.

Cottony Maple Scale, *Pulvinaria innumerabilis* (Rathv.)—Although this pest of soft maple is believed to be a native insect, survey reports have only occasionally recorded high population levels in Ontario. Infestations have been of short duration apparently because of a rapid build-up in predator numbers. Although heavy attack may cause premature discoloration of the foliage and leaf drop, the most objectionable feature of a heavy infestation on shade trees is the sticky copious excretion.

In 1967, silver maple over an area of 5 square miles in Colchester South Township in the Lake Erie District was severely infested. The conspicuous white cottony egg masses and excretion caused considerable public attention.

Aspen Blotch Miner, *Lithocolletis salicifoliella* Cham.—Recent taxonomic and biological investigations indicate that a complex of species is involved in the *Lithocolletis* leaf miners on poplar and willow. Although population levels on the various hosts remained generally low in the Province, there were some exceptions. A few small pockets of heavy infestation were recorded from willow in Kapuskasing and Gogama districts, and from trembling aspen in Gogama and Chapleau districts. Heavy infestations recurred on trembling aspen and balsam poplar in the Port Arthur District and, in the Western Region, pockets of heavy mining recurred on largetooth and trembling aspen.

An Aspen Petiole Miner, *Nepticula* sp.—This insect has been found in southern Ontario in recent years and appears to be the same species reported from the Quebec Region in 1966. The mining incidence was high at numerous points in the Lake Simcoe District with about 40% of leaf petioles infested at sample points in Reach, Oro, and Orillia townships. Low numbers were found in the southern half of the Lindsay District, and in the Lake Erie and Lake Huron districts. The usual host was trembling aspen, but balsam poplar was also attacked.

A Poplar Leaf Roller, *Pseudexentera oregonana* Wlshm.—A general population decline which began in 1966 continued in 1967. Small pockets of heavy infestation were confined to the Sudbury, North Bay, and Kemptville districts, but light to moderate infestations occurred widely in northeastern and southern Ontario.

Amber-marked Birch Leaf Miner, *Profenusa thomsoni* (Konow)—Heavy infestations on white birch were common in northern Ontario from Geraldton east to the Ontario-Quebec border and extending south to Sudbury and Pembroke. As in 1966, numbers were especially high in the White River District where, in eight townships between White River and Hemlo, surveys revealed that 78 to 92% of the leaves were mined.

Fall Cankerworm, *Alsophila pometaria* (Harr.)—Infestations over the past 20 years have been restricted to southern Ontario and to the Western Forest Region, where numbers have fluctuated widely. Numbers of fall cankerworm in general collections decreased each year from 1961 to 1965, but since then have

increased. In 1967, Manitoba maple, lilac and deciduous hedges were heavily infested in the town of Dryden, the first record of this pest in the Kenora District since 1957. A general upsurge in numbers of larvae was indicated in the South-eastern Region with heavy new infestations reported in the southern half of the Tweed District and in Goulbourn Township in the Kemptville District. Elm was the principal host tree in eastern Ontario.

A Tortricid on Oak, *Croesia semipurpurana* (Kft.)—Heavy infestations of this pseudo leaf roller persisted in Vespra, Oro, and Uxbridge townships and a medium infestation was reported in Mulmur Township, in the Lake Simcoe District. Heavy infestations were also recorded in Carnarvon Township on Manitoulin Island and in Plummer and Johnson townships in the Sault Ste. Marie District. Moth flights were observed during the first week of July in the Lake Simcoe District, and on July 25 west of New Liskeard, hundreds of miles from the nearest known heavy infestation.

Eastern Tent Caterpillar, *Malacosoma americanum* (F.)—There was a marked decline in numbers of colonies on cherry and roadside shrubs throughout this insect's range in Ontario, particularly in the Southwestern Region. High population levels persisted only in parts of the Sault Ste. Marie, Pembroke, Tweed and Kemptville districts.

OTHER NOTEWORTHY INSECTS

Insect	Host(s)	Locality	Remarks
<i>Abgralaspis ithacae</i> Ferris A scale insect	Fir, balsam	Pembroke District	First record for Ontario.
<i>Acleris variana</i> (Fern.) Black-headed budworm	Spruce, white and black	All districts	Very low numbers.
<i>Anisota senatoria</i> J. E. Smith Orange-striped oakworm	Oak, bur	Sidney and Ameliasburgh twps., Tweed District	Pockets of severe defoliation.
<i>Aphrophora parallela</i> (Say) Pine spittlebug	Pine, Scots and eastern white	Fort Frances and Pembroke districts	Pockets of heavy infestation.
<i>Arge pectoralis</i> (Leach) Birch sawfly	Birch, white	Bromley and Ross twps., Pembroke District	Pockets of severe defoliation.
<i>Bucculatrix canadensisella</i> Cham. Birch skeletonizer	Birch, white and yellow	Northern Ontario	Very low populations.
<i>Cecidomyia reeksi</i> Vock. Jack-pine resin midge	Pine, jack	Lake Simcoe and Lake Erie districts	Pockets of heavy infestation.
<i>Cytinus alternatus</i> Say A pill beetle	Pine, red	Gogama District nursery	Heavy damage to 2-0 seedlings.
<i>Datana integerrima</i> G. & R. Walnut caterpillar	Walnut Hickory	Southern regions	Single and groups of trees severely defoliated.
<i>Datana ministra</i> (Drury) Yellow-necked caterpillar	Elm	Near Ajax, Lake Simcoe District	Moderate defoliation of roadside trees.
<i>Dioryctria disclusa</i> Heinr. Rusty pine-cone moth	Pine, jack, red and Scots	Lake Huron and Lake Simcoe districts	Pockets of heavy infestation.
<i>Diprion similis</i> (Htg.) Introduced pine sawfly	Pine, Scots	Pickering, Reach and Mono twps., Lake Simcoe District	Sharp population increase, but damage still light.
<i>Diprion frutetorum</i> F. Nursery pine sawfly	Pine, Scots	Reach Twp., Lake Simcoe District	Sharp population increase, but damage still light.

OTHER NOTEWORTHY INSECTS—Concluded

Insect	Host(s)	Locality	Remarks
<i>Epinotia aceriella</i> Clem. Maple trumpet skeletonizer	Maple, sugar	Near Goderich, Ontario	Medium infestation of this uncommon species in a woodlot.
<i>Eucosma gloriola</i> Heinr. Pine-shoot moth	Pine, all species	Most districts	Low numbers.
<i>Exoteleia dodecella</i> Linn. Pine bud moth	Pine, jack and Scots	South half of Tweed District	Increasing numbers, with up to 20% of buds destroyed.
<i>Fenusini</i> sp. A birch leaf miner	Birch, white	Tweed, Lindsay and Lake Simcoe districts	Scattered light infestations of an unknown species.
<i>Gracillaria</i> sp. A birch leaf roller	Birch, white	Six twps. in Cochrane and Kapuskasing districts	Heavy infestations.
<i>Lithocolletis</i> spp. Oak leaf miners	Oak, white, bur, and red	Kemptville and Lindsay districts	Severe browning of foliage.
<i>Malacosoma pluviale</i> Dyar Western tent caterpillar	Cherry Willow	Central and northern Ontario	Generally low populations.
<i>Neodiprion swaini</i> Midd. Swaine jack-pine sawfly	Pine, jack	Two islands in Temagami and Rabbit lakes, North Bay District	Heavy infestations.
<i>Nymphalis antiopa</i> (L.) Mourning-cloak butterfly	Aspen, trembling	White River District	Pocket of heavy infestation.
<i>Okanagana rimosa</i> Say A cicada	Aspen, trembling	Plummer, Haughton and Rose twps., Sault Ste. Marie District	Severe damage as a result of oviposition.
<i>Operophtera bruceata</i> (Hulst) Bruce spanworm	Maple, sugar	Sullivan and Holland twps., Lake Huron District	Only two small collections received.
<i>Paleacrita vernata</i> (Peck) Spring cankerworm	Hardwoods	Goulbourn Twp., Kemptville District	Sharp increase to heavy infestation.
<i>Petrova albicapitana</i> (Busck) Pitch nodule maker	Pine, jack	Gurney Twp., Kapuskasing District	Heavy infestation in plantation average 12 nodules per tree.
<i>Petrova comstockiana</i> Fern. Pitch twig moth	Pine, pitch	Escott and Front of Yonge twps., Kemptville District	A first record in Ontario.
<i>Phenacaspis pinifoliae</i> (Fitch) Pine needle scale	Fir, balsam	Pembroke and Kemptville districts	First records on this host.
<i>Phratora hudsonia</i> Brown Birch leaf beetle	Birch, white	Rosspoint, Geraldton District	Light infestation of this rare species.
<i>Prionoxystus macmurtrei</i> Guer. Little carpenterworm	Oak, red	Meredith Twp., Sault Ste. Marie District	New distribution record.
<i>Profenusa lucifex</i> Ross Oak leaf-mining sawfly	Oak, bur	Pickering and Hamilton twps. in Lake Simcoe and Lindsay districts respectively	Heavy infestations.
<i>Pyrrhia</i> sp. prob. <i>exprimens</i> Wlk. A noctuid	Spruce, white	Twp. 32 and Chapleau, Chapleau District	Severe damage to tubelings planted following a fire in spring of 1967.
<i>Tetralopha robustella</i> Zell. Pine webworm	Pine, jack and pitch	Lake Simcoe, Pembroke, and Kemptville districts	Widely scattered collections of an uncommon species.
<i>Zeiraphera canadensis</i> Mut. & Free. (=ratzeburgiana) Spruce bud moth	Spruce, white	Central and southern Ontario	Pockets of medium to heavy infestation.

IMPORTANT FOREST DISEASES

Deterioration of Roadside Maple—This condition was most apparent in the Sault Ste. Marie District and throughout southern Ontario. No major changes in intensity or occurrence were observed, except in the Lake Simcoe District where a decline in incidence was noted when compared to 1966. Trees in various stages of decline were associated with hard surfaced roads, winter salting of roads, heavy motor-vehicle traffic, and disturbed drainage. Tree mortality in most areas of southern Ontario ranged from 0 to 10%, reached 18% in Blenheim Township, Lake Huron District, and was as high as 86% at one location in Yarmouth Township, Lake Erie District.

Salt Damage—Foliar mortality and discoloration, and limited twig and branch dieback of conifers was again evident along roadsides where salt had been applied. This type of injury was most prevalent in southern Ontario, but was frequently observed in the northern parts of the Province as well, especially in urban areas. Tree mortality attributed to this cause was recorded from Horton and McNab townships, Tweed District, and from areas in the Lindsay District.

Winter Drying of Conifers—This condition was again observed throughout the Province, and apparently was more severe in most districts than in previous years. Red pine, Scots pine and eastern white pine were the species most frequently affected, while cedars and spruce were less severely affected. All trees in a red pine plantation in Boyd Township, Pembroke District, were affected, and virtually all young red pine in shelterbelts at the Kimberly-Clark Nursery, Geraldton District, were severely damaged. Mortality attributed to winter drying was recorded in the Kenora and Sioux Lookout districts.

Frost Injury—Frost injury was localized in 1967. Heavy damage to spruce plantations was noted in the Larose Forest, Kemptonville District; and in parts of the Gogama District damage was notable on jack pine, white spruce and balsam fir.

Crown Deterioration of Birch—Many hardwood tree species, particularly white and yellow birch, produced large amounts of seed in 1967. In many areas across Ontario, a heavy crop of birch cones and seed was produced, apparently at the expense of foliage production and shoot growth. Foliage was both dwarfed and sparse, and shoot growth was negligible in the fruiting portions of tree crowns. The cambium and inner bark of the branches appeared near normal in November 1967, but some dying back of the twigs in the outer extremity of tree crowns had begun. In addition, bud production on affected branches in 1967 was low, and buds were about one-half normal size. Foliar development, shoot growth, and bud production was normal in non-fruiting portions of tree crowns and in trees supporting a light crop of seed. The deterioration of birch was greatly accentuated in parts of the Sault Ste. Marie District, where a birch sawfly had caused severe defoliation of yellow birch in 1966 (see account on *Dimorphopteryx* sp. under 'Important Forest Insects') and conditions will be watched closely in 1968.

Eastern Dwarf Mistletoe, *Arceuthobium pusillum* Peck—This parasite is reportedly the only mistletoe that occurs on conifers in northeastern North America, and past survey records indicate that it is distributed throughout the range of spruce in Ontario. In the 1955 Annual Report, *Arceuthobium americanum* Nutt. was reported as occurring on jack pine from White Otter Lake, Kenora District, and cited as the "first known record for Ontario". A re-examination of the specimen representing this record indicated that it was *A. pusillum* and not *A. americanum*. Additional samples of dwarf mistletoe on jack pine were collected

from the same area during the 1967 field season, and all were *A. pusillum*. Dr. J. Kuijt of the University of British Columbia and Mr. J. Laut of the Forest Research Laboratory, Winnipeg, have confirmed the identification of this parasite on jack pine. These records constitute the second known host cross-over of *A. pusillum* from spruce to a 2-needled pine in eastern North America.

Dutch Elm Disease, *Ceratocystis ulmi* (Buism.) C. Moreau—The recovery of this pathogen from diseased white elm trees in the Sault Ste. Marie District provided a significant western extension of the known range of the disease in central Ontario (see map). Cultures of the causal fungus were obtained from diseased trees at four different areas within the city of Sault Ste. Marie and from trees near Dunns Valley 30 miles to the east. The native elm bark beetle, *Hylurgopinus rufipes* (Eichh.), was frequently collected within the area of infection, and is considered to be the only vector of the disease in these parts.

Infection and mortality levels generally increased throughout the remainder of the known range of the disease. Mortality was highest in southern Ontario, where the disease has been present for many years. Data from random sampling, given in the following table, provide an index to disease incidence in various forest districts.

Region	District	No. sample locations	No. trees examined	Incidence (%)
Southwestern.....	Lake Erie Lake Simcoe Lake Huron	81	5,881	51
South-central.....	Pembroke Parry Sound North Bay	14	1,368	23
Southeastern.....	Kemptville Tweed Lindsay	6	600	8

Hypoxylon Canker of Poplar, *Hypoxylon mammatum* (Wahl.) Miller—Cankering caused by *H. mammatum* was again observed throughout the range of aspen. Quantitative data from plots located throughout the Province indicated that infection levels rarely exceed 5%. However, the incidence of infection was rated at 9% and 11% in parts of the Parry Sound and Kemptville districts, respectively, and as shown in the following table, the incidence of infection and resulting tree mortality at two locations in the White River District was considerably higher.

Location	Cumulative incidence (%)			Cumulative mortality (%)		
	1964	1965	1967	1964	1965	1967
Hunt Twp.....	12	33	48	9	18	23
Twp. 74.....	18	24	27	11	18	33

Ink Spot of Poplar, *Ciborinia whetzellii* (Seaver) Seaver—This disease was recorded on trembling aspen and largetooth aspen in most districts throughout the Province, but low levels of incidence continued, as in 1966. Some localized areas of heavy infections were noted, however, in the Gogama, Kemptville and Pembroke districts.

Leaf and Twig Blight of Poplar, *Pollaccia radiosa* (Lib.) Bald. & Cif. and *Pollaccia elegans* Serv.—Infections of *P. radiosa* were again frequent throughout the Province on trembling aspen. Largetooth aspen was noticeably affected in some areas, but the incidence of infection on this species was consistently low. Again, as in 1966, regeneration aspen was most susceptible, and open sites, such as areas of clear-cutting and along roadsides, appeared to be most favorable for disease development. No tree mortality was observed that could be attributed to this disease.

Pollaccia elegans was confined to balsam poplar and incidences of infection were generally lower than in previous years. The heaviest infections were in the Cochrane, Gogama and Pembroke districts.

White Pine Blister Rust, *Cronartium ribicola* J. C. Fischer—The status of white pine blister rust remained unchanged in 1967. Although the levels of infection and mortality were rated at less than 10% in most districts, higher levels of infection were reported from three adjoining districts in northeastern Ontario. In the Pembroke District, seedlings were severely attacked in Maria and Wylie townships, where counts indicated an incidence of 42% and 29%, respectively, and 39% of the eastern white pine shade trees in Deep River exhibited symptoms of attack. Incidences in the range of 10 to 17% were reported from five other areas; two in Pembroke, two in North Bay, and one in Swastika District.

Stem and Branch Rusts of Pine—Previous surveys for sweetfern blister rust, *Cronartium comptoniae* Arth., have indicated the presence of infection centers in six districts, namely; Cochrane, Swastika, North Bay, Sudbury, Gogama and Chapleau. No significant change in the general level of incidence was reported from these areas in 1967. However, in Sheraton Township in the Cochrane District, mortality in a sample plot has now increased from 0 to 18% over a 3-year period. In the Kemptville District, light infections in a natural stand of young jack pine near Constance Bay constituted the first record of the rust from that part of the Province. Also, the telial state of the causal organism was found on the alternate host, sweet gale, in Colter Township in the Geraldton District.

Peridermium sp. again caused globose galls on branches of hard pines in Ontario. In 1967, the incidence and severity of infection were generally low on trees of all sizes with the exception of pole-sized jack pine. Galls were conspicuous along the Dog River Road in the Port Arthur District, where trees felled in pulping operations were examined in several stands and were found to have an average of between 25 and 35 galls per tree. In the White River District, counts averaged about 20 galls per tree in a small stand in Township 64. In the Pembroke District, 81% of trees were infected and considerable branch mortality was found at one location in Clara Township. In McArthur Township, Cochrane District, 78 galls were counted on two trees in the 3- to 4-inch diameter class, although the intensity of infection was low on other trees in the stand. Lower infection incidences were reported on jack and Scots pine at several locations elsewhere in the Province.

Needle Rusts—The prevalence of *Pucciniastrum epilobii* Othl on new shoots of balsam fir increased noticeably in northwestern Ontario. In the Western Region, the incidence of infected shoots averaged 60% at eight locations (range 25-95%). In the Port Arthur District, the incidence of infected shoots was rated at 10 to 20% in most stands along Highway 11 from Shabaqua west to the district border, along the Armstrong Road, at scattered locations along Highway 17 west, and at sampling points in Soper and Blackwell townships.

Further east, localized heavy infections were reported from townships 28 and 71 in the White River District, and along the Diversion Channel Road in the Geraldton District. Elsewhere in the Province, infections were mostly light.

The importance of the spruce needle rusts, *Chrysomyxa ledi* de Bary and *C. ledicola* Lagh., remained unchanged. All heavy infections occurred on black spruce. In the Sioux Lookout District, the heavy infection which occurred in 1966 along Highway 599 declined, but there was severe browning at Savant Lake which extended towards Pickle Lake. Regeneration was severely attacked in Miscampbell and Burriss townships in the Fort Frances District. Along the Graham Road in the Port Arthur District, numerous small trees were severely browned, while larger trees in the same area were only lightly infected. Heavy infections were observed in Colter Township in the Geraldton District, and in Heighington Township in the Cochrane District. In the Pembroke District, the current foliage of immature trees was severely damaged in Alice and Wilberforce townships, and moderately damaged white spruce was observed in Nightingale Township. White spruce was also moderately infected at Mile-26 on the Ranger Lake Road in the Sault Ste. Marie District, and at Ivanhoe Provincial Park in the Gogama District. Infection levels were low elsewhere in the Province.

Low infection levels of *Coleosporium asterum* (Diet.) Syd. on pines were reported for 1967. In the Kapuskasing District, the lower branches of planted jack pine were severely infected along strip roads in Township 238, and a heavy infection was reported on young jack pine in Tisdale Township in the Cochrane District. In the Pembroke District, incidence was rated at 7% on red pine seedlings in Buchanan Township. Light infections were observed on jack and red pines at several locations elsewhere in the Province. Varying degrees of infection were observed on the alternate hosts, goldenrod and aster, at widely-separated points. *Coleosporium pinicola* (Arth.) Arth., another foliar rust of pine, was not found in 1967.

Cone Rusts—Localized epiphytotics of *Chrysomyxa pirolata* Wint. occurred on white spruce in the Geraldton and White River districts in northern Ontario, where the organism was not found last year. The incidence of cone damage at various locations in these two districts is given in the following table.

District and locality	Cones infected %
White River	
Gertrude Twp.....	79
Pic Twp.....	63
Matthews.....	88
Geraldton	
Twp. 82.....	41
Twp. 83.....	36
Twp. 88.....	34
Diversion Channel.....	14

In the Port Arthur District, where incidence was considerably lower than either Geraldton or White River, the highest count was recorded at Batwing Lake, where 13% of the cones were damaged. At all other sampling points in northern Ontario the incidence was rated at less than 10%. Black spruce cones were lightly infected at two locations in both the Port Arthur and Sioux Lookout districts.

Thirteen collections of *Pucciniastrum* sp. on cones of balsam fir were submitted, compared with none in 1966. The rust occurred most commonly along the Diversion Channel Road in the Geraldton District, where cone infection was as high as 42%. At Wintering Lake, in the same general vicinity, 9% of the cones were attacked. In the Port Arthur District, incidence at Batwing Lake was 22%. Elsewhere in the district, as in the western and northern regions, less than 10% of the cones were infected.

There was a severe infection of *Melampsora abietis-canadensis* Ludwig ex Arth. in a small uneven-aged stand of hemlock near Baxter in the Lake Simcoe District, where 75% of the cones were affected. Light cone damage was found near Angus, and trace infections were observed in Albion and Whitby townships. For the second consecutive year, the organism was not collected in the Parry Sound District, where the first Ontario record was established.

Scleroderris Canker of Pine, *Scleroderris lagerbergii* Gremmen—Continued and intensified field surveys produced little change in the known distribution of this disease. No major extensions to the west were observed, but the disease was recorded for the first time in the Tweed and Lindsay districts of southern Ontario. In a 3-acre plantation in Huntington Township, Tweed District, composed of 80% Scots pine and 20% red pine, eight Scots pine trees were dead and eleven more exhibited characteristic symptoms of the disease, while the red pine apparently remained unaffected. In the Lindsay District, light infections were observed on shelterbelt red pine in Haliburton County. In addition, eight new infection centers were found in Cochrane, two in Gogama, and one in the Sault Ste. Marie District.

No intensification of the disease was observed in the Sudbury District, where tree mortality was noted in 1966. In the Pembroke District, however, disease symptoms and mortality were again noted, but fruiting bodies of *S. lagerbergii* were not found. Surveys of pine in the Parry Sound, Lake Simcoe, Lake Huron and Lake Erie districts for evidence of the disease were negative.

Mortality from the disease declined in some plantations in the Cochrane and Swastika districts. However, high levels of mortality were recorded in plantations in the Geraldton (Pic Township 86%, Hillsport Jct. 24%, and Kowkash 25%) and White River districts (Hunt Township 15% and Heron Bay South 19%).

In the Cochrane District, planted white spruce exhibited symptoms typical of the disease, but *S. lagerbergii* was not confirmed as the causal agent.

Root Rot Fungi—The known distribution of *Fomes annosus* (Fr.) Cke. in Ontario did not change appreciably, but extensions of the disease to areas adjoining older infections again caused concern to plantation managers. The known distribution of infection centers and the principal hosts affected are summarized as follows.

District and Location	Host(s)	Remarks
Lake Erie: St. Williams Forest Nursery	Red pine	Plantation. No appreciable expansion of infection locus.
Lake Erie: Norfolk County Forest	Red pine	Plantation. No change in two infection loci.
Lindsay: Northumberland County Forest	Red pine	Plantation. Noticeable expansion in the past year of two known infection loci.
Lindsay: Cartwright Twp., Durham Co.	Red, Scots, and jack pine	Plantation. Numerous observations of fruiting bodies and tree mortality.
Lake Simcoe: Flos Twp., Orr Lake Forest	Red pine	Plantation. Some mortality. Fruiting bodies outside control trench dug previously. Fruiting observed on an elm stump in vicinity.
Lake Simcoe: Medonte Twp., Orr Lake Forest	Red pine	Plantation. New infection locus 1-1½ mi. east of older locus.
Lake Simcoe: Vivian Forest	Red pine	Plantation. Mortality noted. Fruiting bodies noted on exposed roots of wind blown white pine in vicinity.
Lake Simcoe: Brock Twp.	Red pine	Plantation. New infection locus 20 mi. northeast of Vivian Forest.

Polyporus tomentosus Fr. was again observed in association with mortality of several large white spruce trees in shelterbelts in the Midhurst Nursery, Lake Simcoe District. Fruiting bodies of the fungus were noted on the roots of infected trees.

Polyporus schweinitzii Fr. was found in association with white spruce mortality near Wolfe Lake in the Sault Ste. Marie District.

Needle Droop of Pine—This condition, which is characterized by a needle droop followed by browning of the affected foliage, has been observed on red, jack, Scots and eastern white pine for many years. However, the condition has been increasing in severity in various plantations in southern Ontario, especially in the Lindsay and Pembroke districts. A few natural stands of young trees were also affected. The causal complex is not known, but a mite was often found associated with this condition (see 'A Red Pine Needle Mite' under 'Important Forest Insects'), and the fungus *Aureobasidium pullulans* (de Bary) Arnaud has been frequently isolated from the needle-sheath area of drooped needles.

OTHER NOTEWORTHY DISEASES

Organism and Disease	Host(s)	Locality	Remarks
Box-elder blight	Maple, Manitoba	Most noticeable in southern regions	Chlorosis and dwarfing of leaves, and early termination of apical growth. Presumably herbicide damage.
<i>Cenangium atropurpureum</i> Cash & Davidson Branch dieback	Pine, jack	Wicksteed Twp., Kapuskasing District	First herbarium record.
<i>Chrysomyxa arctostaphyli</i> Diet. Yellow witches' broom	Spruce, black	Chapleau, Geraldton and Kapuskasing districts	Light infections noted.

OTHER NOTEWORTHY DISEASES—Continued

Organism and Disease	Host(s)	Locality	Remarks
<i>Chrysomyxa weirii</i> Jacks. Needle rust	Spruce, white	Drummond Twp., Kemptville District	Light infection on non-current needles.
<i>Coccomyces strobil</i> Reid & Cain	Pine, eastern white	Sault Ste. Marie and White River districts	Found on dead branches of suppressed eastern white pine in former district.
<i>Corynespora olivacea</i> (Wallr.) M.B. Ellis Branch dieback	Basswood	Tweed and Kemptville districts	Previously reported as <i>Exo- sporium liliae</i> Lk. Associated with branch mortality.
<i>Coryneum rhoinum</i> (Dearn. & Barth.) Hughes	Sumac, smooth	Sioux Narrows, Kenora District	Associated with dead twigs.
<i>Cronartium comandrae</i> Pk.	Pine, jack	Geraldton District	Branch cankers found at two locations.
<i>Cucurbitaria pithyophila</i> (Fr.) de N.	Pine, eastern white	Inwood Twp., Port Arthur District	First herbarium record. Associated with branch mortality.
<i>Cytospora kunzei</i> Sacc. Branch and stem canker	Spruce, white and Norway	Lindsay, Lake Simcoe and Kemptville districts	Found on windbreak trees in nurseries and plantations.
<i>Davisiomyella ampla</i> (Davis) Darker Needle cast	Pine, jack	Sault Ste. Marie District	Severe needle cast observed in eastern part of district.
<i>Dibotryon morbosum</i> (Schw.) Theiss. & Syd. Black knot	Cherry	Throughout Province	Generally moderate to severe in open-growth situations.
<i>Discella strobilina</i> Died.	Spruce, black	Longlac, Geraldton District	Fruiting bodies on cone scales.
<i>Dothiorella advena</i> (Cke. & Ell.) Sacc.	Oak, red	Carleton Twp., Kemptville District	Fruiting on dead branches.
<i>Dothiorella populnea</i> Thuem.	Aspen, trembling Poplar, Carolina	Malahide and Bertie twps., Lake Erie District	First herbarium records.
<i>Erwinia amylovora</i> (Burr.) Winsl. et al. Fire blight	Mountain-ash	Toronto area, Lake Simcoe District	First host record. Conspicuous exudations on ornamentals.
<i>Fomes everhartii</i> (Ell. & Gall.) Schrenk & Spauld.	Oak, red	Bosanquet Twp., Lake Erie District	One infected tree at Pinery Camp.
<i>Fusarium lateritium</i> var. <i>mori</i> Desm.	Mountain-ash	McMaster Twp., Port Arthur District	Associated with recently killed branch tips.
<i>Gymnosporangium cornutum</i> Arth. ex Kern Leaf rust	Mountain-ash	Western and Mid- western Regions	Light to moderate infections. First herbarium records.
<i>Gymnosporangium globosum</i> Farl. Rust	Juniper	Tweed and Lake Simcoe districts	Common throughout Tweed District. First herbarium records on this host. Localized.
<i>Gymnosporangium juniperi- virginianae</i> Schw. Rust	Juniper	Lake Erie and Kemptville districts	Medium infection at one location. Has been confused with <i>G. globosum</i> in past.
<i>Hemimyriangium betulae</i> Reid & Pirozynski	Birch, white	Fort Frances, Kenora, and White River districts	Fruiting bodies on resin-like exudations.
<i>Isthmiella crepidiformis</i> (Darker) Darker Needle cast	Spruce, black	Kapuskasing, Sault Ste. Marie and Chapleau districts	Areas of light to moderate infection.

OTHER NOTEWORTHY DISEASES—Continued

Organism and Disease	Host(s)	Locality	Remarks
<i>Isthmiella faullii</i> (Darker) Darker Needle cast	Fir, balsam	Sioux Lookout and Kenora districts	Widespread throughout these two districts.
<i>Lachnella wilkommii</i> Hartig Branch decay	Tamarack	Michipicoten Harbour, White River District	First herbarium record. Fruiting on dead lower branches.
<i>Melampsora epitea</i> Thuem. Leaf rust	Willow	Cochrane, Sault Ste. Marie, Sioux Lookout, and Kenora districts.	Wide distribution throughout Province, but particularly severe at several locations in the districts mentioned.
<i>Melampsorella caryophyllacearum</i> Schroet. Yellow witches' broom	Fir, balsam	Cochrane, Sault Ste. Marie, Sioux Lookout, and Kenora districts	Light to heavy infections observed throughout districts mentioned.
<i>Melanconium bicolor</i> Nees Branch dieback	Birch, white	Southern and central Ontario	Associated with branch mortality.
<i>Ocellaria ocellata</i> (Pers.) Schroet.	Willow	Pardee Twp., Port Arthur District	Fruiting on dead branches of living hosts.
<i>Peniophora duplex</i> Burt Branch decay	Pine, jack	Manvers Twp., District of Lindsay	First herbarium record.
<i>Pestalotia funerea</i> Desm. Tip blight	Cedar, eastern white	Ormsby, Tweed District	Associated with dead tips of foliage.
<i>Podosphaera clandestina</i> (Wallr. ex Fr.) Lév. Powdery mildew	Cherry	Lake Huron and Kenora districts	Isolated infections. First herbarium records.
<i>Polyporus minusculoides</i> (Pilát) Lowe	Birch	Maple, Lake Simcoe District	First herbarium record.
<i>Puccinia bolleyana</i> Sacc.	Elder	Kapuskasing, Geraldton, Chapleau districts	Low incidence at few locations.
<i>Rhabdospora salicella</i> Sacc.	Willow	Marathon, Geraldton District	First herbarium record. Associated with dead twigs.
<i>Rhizina undulata</i> Fr. ex Fr.	On ground in burned area	Hudson, Sioux Lookout District	First herbarium record. Potential root rot organism.
<i>Rhytisma acerinum</i> Pers. ex Fr. Tar spot	Maple, sugar and red	Throughout distribution of hosts	Light to moderate infections.
<i>Rhytisma punctatum</i> Pers. ex Fr. Speckled tar spot	Maple, mountain and Manitoba	Province wide	Light to moderate infections.
<i>Rhytisma salicinum</i> (Pers.) Fr. Tar spot	Willow	Province wide	Light to moderate infections.
(?) <i>Sclerophoma pithya</i> (Thuem.) Hoehn. Tip blight	Pine	Southwestern Region, Cochrane and Kemptville districts	Considerable branch tip mortality of eastern white pine, particularly in Lake Huron District.
<i>Scolecnectria cucurbitula</i> (Tode ex Fr.) Booth	Pine	Most districts	Commonly associated with branch mortality. Previously reported as <i>Ophionectria cylindrospora</i> (Sollm.) Berl. & Vogl.
<i>Septoria betulae</i> (Lib.) West. Leaf spot	Birch, yellow	Huff Lake, Sault Ste. Marie District	First herbarium record. Found commonly in area. Associated with crown deterioration of birch.

OTHER NOTEWORTHY DISEASES—Concluded

Organism and Disease	Host(s)	Locality	Remarks
<i>Septoria musiva</i> Pk. Leaf spot	Poplar, balsam	Perry Twp., Parry Sound District	Common on small open-grown trees.
<i>Septoria sorbi</i> Lasch Leaf spot	Mountain-ash, European	Kemptville, Kemptville District	Moderate leaf-spotting in one nursery bed, First herbarium record.
<i>Stegonosporium ovatum</i> (Pers. ex Merát) Hughes Branch dieback	Maple, sugar	Southern regions	Commonly associated with twig mortality.
<i>Stigmina negundinis</i> (Berk. & Curt.) M.B. Ellis Twig Canker	Maple, Manitoba	Cochrane, Geraldton, and Swastika districts	Associated with branch tip mortality.
<i>Therrya fuckelii</i> (Rehm) Kujala	Pine, Scots	Mulmur Twp., Lake Simcoe District	Associated with dead branches.
<i>Trichothecium roseum</i> (Pers.) Lk. ex Fr.	<i>Dibotryon morbosum</i>	Bosanquet Twp., Lake Erie District	Possibly a hyperparasite.
<i>Tubercularia nigricans</i> (Bull.) Lk. ex Fr. Branch dieback	Elm, Chinese	Toronto, Lake Simcoe District	Moderate branch tip mortality on several roadside trees. First herbarium record.
<i>Valsa insitiva</i> Ces. & de N.	Birch, yellow	Sullivan Twp., Lake Huron District	Light branch mortality on scattered trees.



