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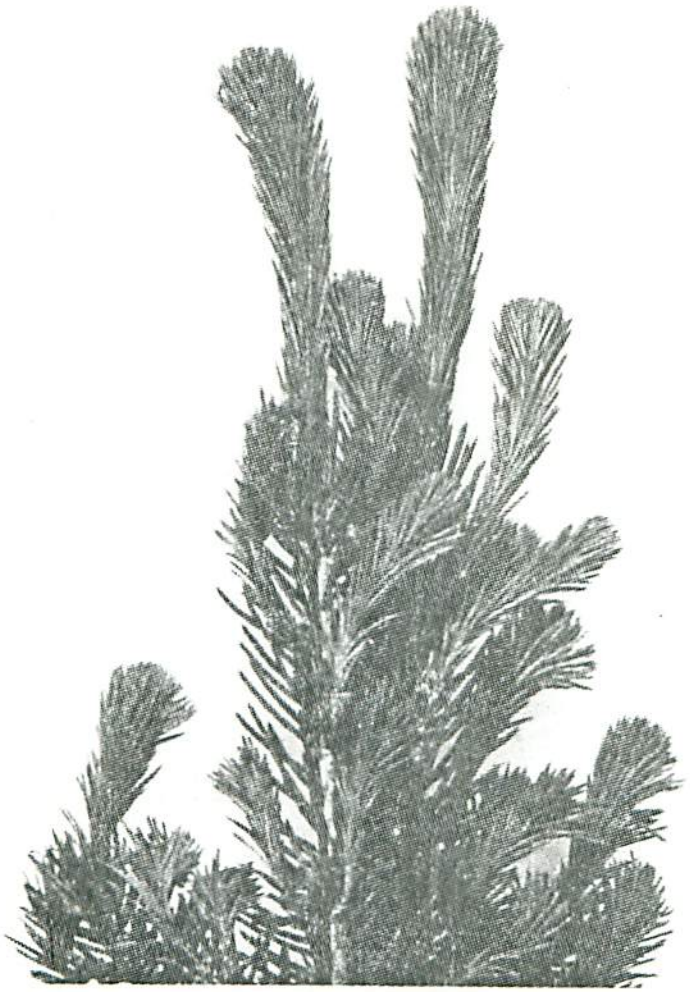
Spring 1979



Pictured above is a white spruce seedling affected by a condition known as multileadering. See page 3 for writeup.

GREAT LAKES FOREST RESEARCH CENTRE
Box 490 • Sault Ste. Marie Ontario

FOREST INSECT AND DISEASE CONDITIONS IN ONTARIO

Spring 1979

This is the first of three bulletins to be issued by the Forest Insect and Disease Survey (FIDS) Unit describing forest pest conditions encountered in 1979. The second issue is planned for the summer and the third for the Fall.

The Unit's field staff, unchanged from 1978, has begun field activities for the new season.

The names and addresses of Survey Field Technicians are listed below.

Region	Technician		
Central and Southwestern	M.J. Applejohn	Box 100, Angus, Ont. L0M 1B0	(705) 424-5721
	D.C. Constable	RR #1, St. Williams, Ont. N0E 1P0	(519) 586-2041
Algonquin and Eastern	H.J. Weir	c/o OMNR, Minden, Ont. K0M 2K0	(705) 286-2650
	V. Jansons	PNFI, Chalk River, Ont. K0J 1J0	(613) 589-2932
	C.A. Barnes	Box 1150, Kemptville, Ont. K0G 1J0	(613) 258-5664
Northeastern	K.C. Hall	Box 490, S.S. Marie, Ont. P6A 5M7	(705) 949-9461
	H. Brodersen	SS #1, Site 5, Box 7, Sudbury, Ont. P3E 1X2	(705) 674-0453
Northern	L.S. MacLeod	Box 267, Temagami, Ont. P0H 2H0	(705) 569-3467
	H.J. Evans	Box 817, Chapleau, Ont. P0M 1K0	(705) 864-1042
	W.A. Ingram	Box 202, Moonbeam, Ont. P0S 1V0	(705) 367-2185
North Central	H.D. Lawrence	RR #6, Postal Station "F", Thunder Bay, Ont. P7C 5N5	(807) 577-8612
	W.D. Biggs	Box 495, Geraldton, Ont. P0T 1M0	(807) 854-1317
Northwestern	M.J. Thomson	RR #1, Site 25, Box 9, Sioux Lookout, Ont. P0V 2T0	(807) 737-3630
	R.J. Sajan	210 Butler Ave., Ft. Frances, Ont. P9A 2N7	(807) 274-6821

RESULTS OF SURVEYS FOR THE EUROPEAN RACE OF SCLERODERRIS

Two races of *Gremmeniella abietina* (Lagerb.) Morelet, the fungus that causes Scleroderris diseases of pines, are known to be present in North America. The North American race, which causes Scleroderris canker, has been present in Ontario since the 1950s. Damage by this race appears to be confined to the lower portions of mature trees, and massive shoot mortality kills only small trees under 2 m high. The European race, which causes Scleroderris dieback, has been detected in the northeastern United States and eastern Canada only recently. Dieback spreads quickly through tree crowns, and mortality is not confined to immature trees.

A color brochure describing and illustrating the diseases caused by both races has been prepared by researchers at the Great Lakes Forest Research Centre, and a copy is enclosed with this issue of the Bulletin. If additional copies are required, they are available in limited numbers from the Centre's Information Office.

Surveys to detect the presence of the European race in eastern Canada were conducted in 1977 and 1978 by FIDS Units at the Great Lakes, Maritimes and Laurentian Forest Research Centres. Also, personnel of the Plant Quarantine Division, Agriculture Canada, checked plantings of imported conifers. In 1978, 95 red pine plantations in southern Ontario were examined intensively, and survey technicians were constantly on the alert to detect symptoms of the disease in their travels throughout the summers of 1977 and 1978. No evidence for the presence of the European race of *G. abietina* was detected in Ontario. In Quebec, however, FIDS personnel of the Laurentian Forest Research Centre detected the European race in a plantation near the New York infestation, and in New Brunswick the European race was isolated from diseased pines at two forest nurseries. These areas are being sanitized and the Plant Quarantine Division is enforcing local quarantines.

In Ontario, plans for 1979 are to recheck many of the plantations that were examined and rated disease-free in 1978. Also, general detection for this virulent European race is a high priority activity at all times within the routine work schedules of FIDS field technicians. It is hoped that the illustrated brochure will aid others to identify the disease. Anyone observing symptoms of Scleroderris canker in southern Ontario is urged to contact our survey technicians in the area, principally because these men are experienced in handling virulent pests, and considerable caution must be exercised in collecting and shipping samples that may be infected.

SUGAR MAPLE DECLINE IN SOUTHERN ONTARIO

Decline of sugar maple in the form of crown dieback and mortality has occurred in scattered pockets in parts of the Algonquin, Central and Southwestern regions. It is apparent that the patches of affected trees occur where forest tent caterpillar defoliation was severe in recent years; however, other factors are likely involved as defoliation alone does not explain the scattered distribution of maple decline. Over all in 1978, pockets of mortality totalled more than 25 000 ha. An area of 8 000 ha in the Parry Sound District has been affected, with mortality averaging 25%, and there are numerous places in the area where mortality of sugar maple is complete.

The patchy nature of the maple decline is deceptive. Mortality and dieback are most intense in fairly well defined pockets, but considerable dieback is frequently scattered throughout adjacent stands. A damage survey in the Owen Sound District was conducted in 1978. Sugar maple tree mortality averaged 5% and about 25% of the trees had dieback which resulted in more than 5% crown mortality.

Plots were established to follow the decline or recovery of sugar maples in various dieback classes. Also, starch food reserves were rated for a subsample of the plot trees. The data have not yet been analyzed completely, but it is apparent that trees with over 40% branch mortality can have adequate starch reserves. Data for average starch content by tree dieback class show highly significant differences as illustrated in the following table. Thus far, the data are not sufficiently precise or comprehensive to allow dieback prediction.

The plots and food reserve contents are to be monitored for several years, and it is hoped that salvage guides and tree mortality prediction models can be developed.

Starch food reserve content for maple decline classes

Decline class	Branch dieback (%)	Starch content (%)
0	0-5	7.5
1	6-20	6.7
2	21-40	5.6
3	41-60	3.9
4	>60	1.8
5	dead trees	0.5

MULTILEADERING--A MAJOR NURSERY PROBLEM IN ONTARIO

Multileadered seedlings, sometimes referred to as cabbage-headed seedlings, seem to result from injuries to shoot terminals. These seedlings develop several terminals rather than the desirable single-leadered form. Apical dominance seems to be impaired as seedlings frequently remain multileadered for at least 3-4 years. A considerable portion of the cull loss experienced by nurseries over the years has been multileadered.

Concern expressed by Ontario Ministry of Natural Resources nursery personnel stimulated several investigations by the Great Lakes Forest Research Centre's FIDS Unit. In 1977 surveys for the incidence of multileadering were included in all routine nursery inspections.

Multileadering was more prevalent for 2-0 and older seedlings (25 to 40% affected) than for 1-0 seedlings (5-10% affected). Spruce species (principally white spruce) were affected the most. In general it appeared that damage in 1977 was about average for this problem, which has fluctuated in intensity since it was first reported in 1961.

The 1977 damage survey provided a good estimate of the magnitude of the multileadering damage. In 1978 several studies were started to investigate possible causes of the problem. Multileadered and single-leadered spruce and pine were planted to follow field survival and form. After one year a large portion of the multileadered seedlings have a single dominant terminal; however, an almost equal portion of the single-leadered trees are now multileadered. This latter trend seems to have been a function of planting stress or damaged terminals. Hence the trend to single-leader form is expected to increase. It has been postulated that springtail insects are one cause of injury. Another possible cause is insecticides. A study was conducted to compare the incidence of multileadering on insecticide-sprayed and unsprayed seedbeds. A considerable number of terminal injuries and average (for 1-0 seedlings) amounts of multileadering occurred in both the sprayed and control areas. Also, trapping data indicate that damaging numbers of springtails (based on experience elsewhere) were not present. Disease-caused injuries were first investigated by staff of the FIDS Unit in 1964 while it was located at Maple, Ontario. Pathogens have not been isolated from affected seedlings; hence it appears that pest-caused injuries play only a minor role in multileadering or terminal injury.

Plots were also established at nurseries to follow the progress of growth and the timing of terminal injuries. A peak period for injuries was the time when seedlings were initiating terminal buds. This period, just before dormancy, was much later in seedbeds than in natural environments.

For 1979, plans are to continue monitoring growth progress and injury occurrence, and to observe the planted-out seedlings. Also, Dr. D.P. Webb, a tree physiologist at the Great Lakes Forest Research Centre, is initiating apical dominance and other physiogenic investigations to develop tools for controlling multileadering.

SPECIAL PEST SURVEY OF WHITE SPRUCE PLANTATIONS

A condition known as "white spruce chlorosis" became evident in two white spruce plantations near Limestone Lake, Nipigon District in 1977. Possible causes of this chlorotic condition were thought to be Armillaria root rot, root mortality, nutrient deficiency, bark beetles, aphids and drought but, in any event, it was felt that these chlorotic trees could be dying. The Resources Branch of the Ontario Ministry of Natural Resources requested the help of the Great Lakes Forest Research Centre's FIDS Unit to determine how widespread the problem was. Consequently, FIDS staff conducted a special survey of white spruce plantations in northern Ontario in 1978.

Initially the survey was designed to determine the incidence and rate the severity of the chlorotic condition in randomly selected white spruce plantations throughout northern Ontario. However, because increased attention has been directed to forest regeneration practices in Ontario in recent years, it was decided to broaden the scope of the survey by gathering data on several species of insects capable of causing damage to young, planted white spruce trees. Hence, the survey, as planned and carried out, was a unique approach for FIDS staff. Through this approach, we have tried to obtain specific information about multi-disciplinary forest pest problems affecting "high-value" areas (white spruce plantations) and to explain the occurrence and impact of chlorosis. It is hoped that this effort will provide forest managers with more useful information, particularly with reference to "high-value" situations.

A total of 39 white spruce plantations were examined by FIDS field technicians throughout northern Ontario as follows: 8 in the Northeastern Region, 13 in the Northern Region, 10 in the North Central Region and 8 in the Northwestern Region. Plantations were examined for the presence and severity of chlorosis and any obvious insect and disease problems. Plantations selected were generally 3 to 15 years of age with trees from .3 to 3.0 m in height.

The results of this special survey showed that about half of the plantations examined had chlorotic symptoms, although none were as severely affected as the Limestone Lake plantations. It is believed that moisture stress may be related to the level of chlorotic symptoms detected by this survey and that plantations with a high proportion of chlorotic spruce were on sites or portions thereof that were not good spruce sites. Armillaria root rot was present on most yellow chlorotic spruce; however, this is normal. Frost damage was common in 1978 but this did not seem to affect the color of the foliage of recovering shoots.

The prevalence of major insect pests in plantations examined for chlorosis was also determined. The pests found were yellowheaded spruce sawfly, white pine weevil and spruce budworm. Yellowheaded spruce sawfly damage was found at 7 of the 39 locations examined and, with the exception of one location involving windbreak trees, the percentage of trees damaged ranged from 6 to 18% where the sawfly was present. In the windbreak plot, which has a history of sawfly infestation, about 85% of the trees were affected. White pine weevil was present in only four of the plantations. The percentage of leaders attacked was high at one location (33%) but very low at the other three.

Most of the trees in the white spruce plantations checked in the Northern Region were infested with spruce budworm. However, the amount of defoliation was generally low: it ranged from 5 to 15% and exceeded 20% in only one instance. Plantations in the Northeastern Region were relatively unaffected by the spruce budworm and there was no evidence of feeding damage in plantations in the other two regions. Frost was the most destructive agent affecting foliage in 1978 in the white spruce plantations, especially in the Northeastern and Northern regions, and 20-25% defoliation was common.

It is not a simple task to translate this information gathered by the special survey into a general statement concerning impact on white spruce plantings. Nevertheless, it would appear that, at least in 1978, there were no major pest or abiotic problems--with the possible exception of frost--that would bring current white spruce regeneration practices into question. One should keep in mind that much of the Northern and Northeastern regions has been infested by spruce budworm for many years, yet in most cases the white spruce plantings were not even moderately infested, growth appeared normal and no significant amounts of recent tree mortality were found. Quite likely, some plantations have been affected to some degree by budworm, for example, in terms of reduced growth, but under the circumstances the overall situation seems reasonably good. Since the most common destructive agent affecting foliage was frost, selection of late-flushing white spruce provenances (if available) for future plantings might prove worthwhile. In several cases, moisture stress appears to be a factor, and pest problems which would ordinarily be secondary in nature can have greater impact. Care in matching species to be planted with the site could prevent problems of this type. For example, it was noted that for some dry sites where chlorotic symptoms of white spruce were prevalent, jack pine may have been a better choice. In the single instance where white pine weeviling was high, it is probably not a coincidence that a nearby white pine planting was heavily infested with weevils and was probably the source of the problem in the white spruce planting. In this case direct control

of the weevils (spraying, leader clipping) could prove useful. Generally speaking, planting white pine and white spruce in close proximity to each other should be avoided, if possible. In any event, this survey has provided baseline information that enables us to get a better perspective on the overall situation. It is our intention to repeat this survey in 1980 or 1981 to determine if changes or new problems have occurred.

A more detailed report describing this special survey of white spruce plantations has been prepared and will be included as a supplement with the results of forest pest surveys conducted in 1978 by FIDS for each region in northern Ontario. The regional pest reports will be mailed shortly. Additional copies of "Results of a Special Survey of White Spruce Plantations in Northern Ontario, 1978" may be obtained by contacting the Information Office or the Head, Forest Insect and Disease Survey Unit at the Great Lakes Forest Research Centre, Box 490, Sault Ste. Marie, Ontario. P6A 5M7.

INSECTS OF EASTERN SPRUCES, FIR AND HEMLOCK

A handbook entitled "Insects of Eastern Spruces, Fir and Hemlock" is now available. This handbook, which is Volume 2 of a series, was prepared by A.H. Rose and O.H. Lindquist of the FIDS staff at the Great Lakes Forest Research Centre. An order form for the handbook is enclosed with this issue of the Survey Bulletin.

SPECIAL SURVEYS PLANNED FOR 1979

FIDS staff will conduct special surveys in 1979 of "high value" red pine and jack pine stands in southern and northern Ontario, respectively. These multidisciplinary surveys will determine the extent, prevalence and impact of pest organisms in pine plantations or managed pine stands and should provide us with baseline data on specific problems similar to data gathered for white spruce plantations. The status of the following pests in pine plantations or "high value" stands will be determined: insects on red pine in southern Ontario - European pine sawfly, root collar weevil, redheaded pine sawfly, pine false webworm and European pine shoot moth; insects on jack pine in northern Ontario - white pine weevil, eastern pine shoot borer, jack pine tip beetle, Swaine jack pine sawfly and feeding damage by adult sawyer beetles; diseases of red pine in southern Ontario - needle rust, Scleroderris canker, Verticicladiella sp., needle cast and Armillaria; diseases of jack pine in northern Ontario - needle cast, gall rust, stem rust and Armillaria. Any recent tree mortality, even if the cause is unknown, will be recorded. In addition, if any pest or abiotic problems not listed above are found in the survey and appear significant, they will be assessed.

FOREST INSECTS

Spruce Budworm, *Choristoneura fumiferana* (Clem.)

Infestation forecasts for 1979 as detailed in last fall's Survey Bulletin are summarized as follows:

In southern Ontario forecasts call for a situation in 1979 generally similar to that of 1978, with defoliation occurring in numerous small pockets, primarily throughout the Algonquin Region. There will likely be new or expanded infestations in the Parry Sound and Bracebridge districts; elsewhere, populations will generally be higher this year than in 1978. In northeastern Ontario, some expansion will likely occur along the western and northwestern boundaries of the outbreak whereas reduced infestations are expected from the southern part of Wawa District to the east as far as the general vicinity of Sudbury. In north central Ontario, egg-mass counts are high in the eastern part of Geraldton District and the infestation in Clavet and Boyce townships will likely expand considerably. Infestations present in 1978 in Terrace Bay and White River districts will likely recur in 1979, and will be accompanied, perhaps, by new scattered pockets of defoliation. Although egg-mass counts increased considerably in northwestern Ontario, it appears likely that infestations in 1979 will generally remain confined to those areas infested and defoliated in 1978.

The generally cool weather that has prevailed during April and May, 1979 has held back budworm activity throughout the province. The Ontario Ministry of Natural Resources plans to protect some 17 700 ha in the Northern and North Central regions by aerial spraying. These operations, employing Matacil, Orthene and *Bacillus thuringiensis* (Thuricide and Novabac), should begin shortly.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

A generalized forecast for 1979 based on the number of over-wintering egg-masses is summarized as follows. These predictions assume that weather conditions and other environmental factors will be relatively normal.

A decline in populations is expected throughout the eastern half of the Red Lake District to the Manitoba border and in part of the Kenora District; otherwise, high populations are again forecast for essentially the same areas infected in 1978 in the Northwestern Region.

In the North Central Region heavy infestations will continue in the Thunder Bay and Atikokan districts. Infestations are again expected in the Hearst, Kapuskasing and Cochrane districts, although populations are expected to decline in parts of the Hearst and Kapuskasing districts. Elsewhere in the Northern Region a new area of severe defoliation is expected in Garrison Township in the Kirkland Lake District. In the Northeastern Region high populations are expected at a few locations east of Sault Ste. Marie in the Sault Ste. Marie District and in parts of the Espanola, Sudbury and North Bay districts. With the exception of a few scattered, small areas of moderate-to-high populations in the Eastern Region and in the Owen Sound area of the Southwestern Region, no infestations are predicted for southern Ontario.

Hemlock Looper, *Lambdina fiscellaria fiscellaria* Gn.

Infestations of this insect that caused some 600 ha of defoliation in 1978 in the townships of Cavendish and Harvey in the Minden District and Anstruther and Burleigh townships in the Bancroft District are expected to collapse or at most show only light defoliation in 1979. This forecast is based on the high incidence of larval parasitism and low egg counts in the fall of 1978.

Oak Leaf Shredder, *Croesia semipurpurana* (Kft.)

High populations of this insect were forecast for various locations in the Huronia and Niagara districts where egg counts were taken in the fall of 1978. Egg hatch occurred during the second week of May and populations materialized as forecast. Some 325 ha of oak stands in the Huronia District were aerially sprayed with Orthene by the Ontario Ministry of Natural Resources from 15 to 17 May, 1979 in order to suppress discrete infestations and protect foliage.

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Material concerning Scleroderris, maple decline and multileadering prepared by H.L. Gross, Pathologist, FIDS Unit.

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