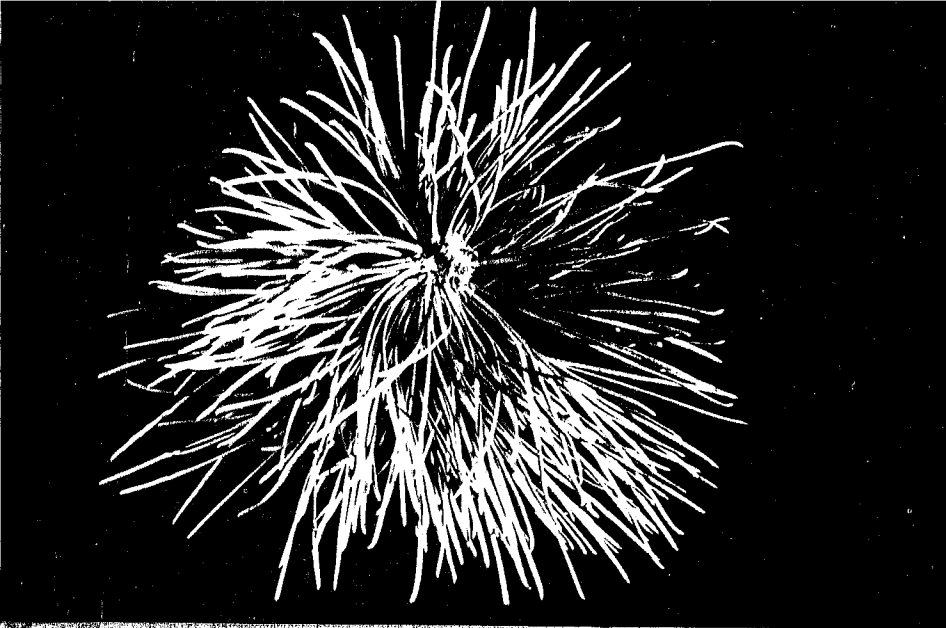


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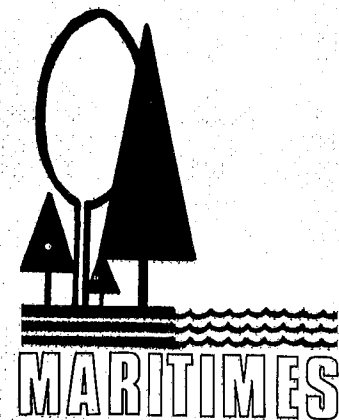
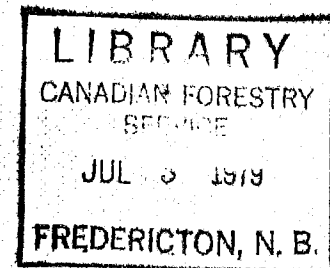
ISSN 0704-769X



SHOULD SCLERODERRIS SCARE US ?

by

L. P. MAGASI



CANADIAN FORESTRY SERVICE

MARITIMES FOREST RESEARCH CENTRE

The Maritimes Forest Research Centre (MFRC) is one of six regional establishments of the Canadian Forestry Service, within Environment Canada. The Centre conducts a program of work directed toward the solution of major forestry problems and the development of more effective forest management techniques for use in the Maritime Provinces.

The program consists of two major elements - research and development, and technical and information services. Most research and development work is undertaken in direct response to the needs of forest management agencies, with the aim of improving the protection, growth, and value of the region's forest resource for a variety of consumptive and non-consumptive uses; studies are often carried out jointly with provincial governments and industry. The Centre's technical and information services are designed to bring research results to the attention of potential users, to demonstrate new and improved forest management techniques, to assist management agencies in solving day-to-day problems, and to keep the public fully informed on the work of the Maritimes Forest Research Centre.

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Fredericton, New Brunswick

Information Report M-X-100

Canadian Forestry Service

Department of the Environment

1979

FOREWORD

This discussion has been prepared in response to requests by numerous individuals concerned about the "Scleroderris situation" which developed after the discovery of the European strain in New Brunswick.

It is not intended as a scientific endeavor and is not an original piece of work. I claim no credit for the content but accept responsibility for possible misinterpretation of some of the information available to me.

I have drawn freely upon information from many sources, published and unpublished alike. In particular, I have relied on Dr. D.D. Skilling, USDA Forest Service who did much of the work in New York State; Dr. C.E. Dorworth, Great Lakes Forest Research Centre who developed the serological test to separate strains of the fungus and who is the leading expert on the disease in Canada; and Dr. A.R. Gottlieb, University of Vermont who modified Dorworth's technique. All three have freely shared their information and knowledge for which I am grateful, and their opinion which I value.

While this report was in the final stages of preparation an information pamphlet entitled "Gremmeniella (Scleroderris) Disease of Conifers" became available, issued by Environment Canada and prepared by H.L. Gross and C.E. Dorworth, Great Lakes Forest Research Centre. It discusses and illustrates the disease and its implications for Canada. It is available on request at any of the six Forest Research Centres of the Canadian Forestry Service. This report thus becomes an expansion of that pamphlet as it relates to the Maritimes.

ABSTRACT

The European strain of *Gremmeniella abietina* has been found in New Brunswick and has created a potentially dangerous situation for the forest industry. It is compared to the "old" North American strain already well established in the Province. Difficulties in differentiating between the two strains are stated, the possible implications are discussed. Extensive surveys are necessary before the total situation can be assessed.

RESUME

La souche Européenne de *Gremmeniella abietina* a été retrouvée au Nouveau-Brunswick et présente une situation potentiellement dangereuse pour l'industrie forestière. Elle est comparée à la soi-disante vieille souche Nord-Américaine déjà établie dans la Province. L'auteur discute des problèmes que pose la différenciation des deux souches ainsi que des implications possibles. Il souligne la nécessité d'inspections intensives avant d'en arriver à une évaluation définitive de la situation.

INTRODUCTION

The announcement by the Minister of Natural Resources and by Environment Canada of the isolation of the European strain of *Gremmeniella abietina* (Lagerb.) Morelet in New Brunswick alerted foresters to a new threat to the region's forests. Because "facts" are few, rumors and misinformed speculations have created some unnecessary confusion and concern within forestry circles.

The latest information on the "Scleroderris problem" is presented here. The problem of an outbreak of the European strain of Scleroderris is new to New Brunswick and to North America, and information is scarce and subject to change as more is learned about the disease. From the information reported here, foresters should be able to better understand the situation, as we now know it, and to draw some objective conclusions.

Similarities

Two strains of *G. abietina* are known to exist in North America. They are similar in that both affect pines; both infect young trees; both spread by means of spores (the product of reproductive processes); and both can be isolated on artificial medium on which they look very much alike.

Differences

The "older" so-called North American strain has been known for decades on this continent and was first found in New Brunswick in 1971. In the Maritimes, this strain damages or kills pines, mostly red, jack, and Scots; it affects seedlings and young trees

which are considered out of danger of dying once they reach 2 m in height; it produces two types of spores, airborne spores that aid in long-range spread of the disease and rain-splashed spores that are capable of only short-range spread but help to intensify the disease in a given area.

The "newer" so-called European strain has been known for less than a decade on this continent and was first identified in New Brunswick in two samples collected in 1978. In New York State, it killed a number of stands of red pine and Scots pine, 15-17 m in height, as well as numerous small trees. Studies showed that it readily infected and killed seedlings of all species of pine, although some species showed less susceptibility than others; other conifers such as red, black, white, and Norway spruce, hemlock, and larch were also infected and some were killed. No infection has ever been found on balsam fir. Natural infection of some of these conifers has been observed but damage to the trees was minor. Infection usually takes place on the lower branches where the fungus may "sit" for several years before it "shoots up" higher, probably to the top of the tree and causes branch or tree mortality. The conditions that trigger this move upward on the trees are not known. This strain produces only one type of reproductive structure and spores associated with it are the rain-splash type which normally facilitate only short-range spread.

Identification and separation

It is easy to identify the European strain when infection by *G. abietina* occurs on trees at

heights of more than 2 m or when the fungus is isolated from dying large trees. However, both strains may occupy the lower 1 m of young trees in plantations. Spore producing structures are not always present and are often difficult to find. Similarities between strains in laboratory cultures and natural variation within each strain make separation difficult. A test, developed to separate cultures of the two strains, compares unknown cultures serologically to known isolates (cultures) of the two strains and identifies them as either the North American or the European strain. Intended strictly as a research tool, the test is too time- and labor-intensive for routine testing of large numbers of cultures. A modified technique, being tested, shortens the time for a "reading" but even this "quick" method requires at least two months from "field sample to strain determination".

Distribution

In New Brunswick, a special survey was conducted in 1978 to determine the distribution of Scleroderris canker in pine plantations and to evaluate damage. The disease was found throughout much of the Province and was especially prevalent in the northern areas. Nearly one-third of the plantations surveyed were infected. The incidence (percentage of infected trees) of the disease varied from minimal to severe (over 25%), as did intensity (amount of infection of a given tree). However, roughly half of the infected trees had less than five branches affected. All infections found were at heights less than 1.5 m from the ground.

THE EUROPEAN STRAIN IN NEW BRUNSWICK

Whenever possible, a single *G. abietina* isolate was retained from each infected plantation and tested for strain. Two of the 76 isolates tested proved to be of the European strain.

In a tree nursery at Juniper, one lower branch of a red pine windbreak tree yielded the European isolate. The sample was collected in mid-June 1978, identified shortly after as *G. abietina*, and the European strain determination was confirmed at the end of March 1979. To control the North American strain, all windbreak trees have been pruned to about 1 m from the ground and the brush was burned in July 1978. Seedlings in the vicinity were destroyed shortly after *G. abietina* was found in the area. In 1979, all seedlings slated for planting were tested from pre-lift samples and all plantations established with seedlings from this nursery will be under close surveillance for two years. In addition, a regular spray schedule was started in the early summer of 1978 and is continuing.

The other isolate of the European strain originated from a red pine plantation at Butte d'Or, near Pacquetville. The plantation of over 30 ha was destroyed and the trees were burned shortly after the European strain was identified in early May 1979. Intensive sampling was carried out, combined with cruises, in an attempt to determine the "mix" of the two strains and to collect data for an analysis of the situation when the cultures become available.

THE IMPLICATIONS

The discovery of the European strain of the disease in New Brunswick has created a potentially dangerous situation which could - if the disease lives up to the worst expectations - have far reaching effects on our forest industry. However, the danger at present is only potential and several factors must be considered before an assessment can be made. Some of these factors cause us to be somewhat optimistic, there is a silver lining in some of the clouds.

Organisms depend on climatic and other factors for their growth and the damage they cause is closely related to the virulence they have in their "home" areas. The European strain of the fungus could be less damaging in the Maritimes than it is in New York State. It could also be just as damaging, but this will have to be determined.

Researchers are finding that all is not necessarily lost when the European strain appears. In some areas, the fungus has not gone "right to the top" of the trees but stopped, at least temporarily, part-way up the crown, and the trees are still alive. In some cases, the fungus "lies low" for years without moving up the trees.

Local conditions seem to play a big role. In some areas underplanted trees were completely "wiped out", while in other areas the same species is surviving quite well under infected large trees.

Conifers other than pines, although susceptible to infection, are unlikely to suffer much damage. However, the fungus can be carried on these hosts to areas free of the European strain where

pinus may be affected. There may be an implication for quarantines here if we don't define our situation carefully.

The European strain apparently lacks the airborne type spores and its natural spread is expected to be slower than the North American strain. This should enhance the chances of containing isolated pockets of infection. Surveys must be carried out to determine the distribution of the European strain in New Brunswick. Are we dealing with a few isolated cases or with a widespread problem? Surveys in pine plantations on Crown land and on a number of privately owned areas started when symptom development reached the easily-recognized stage. The period during which surveys can be conducted is relatively short and results will be delayed because of the involved laboratory procedures. Companies and others concerned with forestry could assist greatly if they surveyed their own plantations. Survey- and sampling-instructions for anyone interested are available from the Forest Insect and Disease Survey, Maritimes Forest Research Centre.

In New Brunswick, red pine was the host, in both cases, of the European strain and it is red pine in nurseries that, to date, have had all the problems. It would be wise to reassess red pine production for the next few years or until we know more about the disease. One nursery decided to produce no red pine, in another all pine will be grown in greenhouses where the chances of infection are minimal. This does not mean the end of red pine in New Brunswick, only a temporary halt in production.

Scleroderris can be controlled in nurseries by spraying with chemicals registered in Canada for

this purpose. Last year's spray program was not an unqualified success. Biology and regulated nursery practices did not quite come together. Nursery routines dictate regular spraying schedules, but the biology of Scleroderris dictates that spraying should occur after each rain when spores are released. This year we are conducting studies (assistance courtesy of J.D. Irving Ltd.) to try to find some simple way of correlating spore release with the need for spraying.

The serological technique was developed to distinguish between the different strains. Its importance as it relates to virulence is by implication, based on the behavior of the European strain in both Europe and in the United States. We have some indication that at Pacquetville most, if not all, of the damage may have been caused by the North American strain, and that the situation there is far from "normal". However, the serological test is the only test available to separate strains, and isolates identified as the European strain must be treated as such. The possible consequences of ignoring test results just because everything doesn't "fit" is too great to allow complacency.

SUMMARY

There are more questions than answers regarding the European strain in New Brunswick. The situation is potentially dangerous and must be taken seriously. Surveys are the first priority. We need a good "handle" on the situation before an assessment can be made. It need not be the end of pines.

Facts are needed now, to make forest management decisions affecting the future, and it is frustrating not to have them. However, in many biological situations the organisms involved rather than the need for answers dictate the speed with which the answers can be obtained. We will endeavor to respond to questions and answer them based on the most recent information available at the time.

Should Scleroderris scare us? Not into panic, but we should certainly be aware of the possible implications of the situation - if everything goes wrong.