technology in this field and to develop and test critical components of a trailer system to achieve the transportation goal. Proper technology in this area would be of interest to any Canadian forest company contemplating the integration of limbs and tops into mill processing operations. This tendency would foster the use of approximately 20-30% of the energy biomass now left in the forest and the concentration of the delimbing and topping operations at an industrial complex capable of producing conventional as well as energy products.

According to recent studies, the amount of residue in the form of tops and branches recovered to roadside can vary with the logging method and terrain conditions prevailing under frozen and unfrozen environmental conditions. In February of 1984 FERIC began a study to quantify the biomass, branch or top material attached to the tree stem that was recovered by two harvesting systems in jack pine, as well as the volume of jack pine that may be hauled as full trees in conventional trailers.

Two harvesting systems were examined: a conventional cut and skid operation with full trees skidded to a landing and a fully mechanized system in which trees were cut and transported to the landing by means of a feller forwarder.

In both cases cut trees were weighed at the stump and at the landing to determine biomass loss during transfer. Results showed that the average recovery rate for the cut and skid phase was 68% in the winter study and 76% in the summer study. For the feller forwarder the recovery rate was 43% in the winter and 60% in the summer.

Loading tests using full trees showed that a conventional highway logging trailer could hold only 44% of the merchantable volume that would be contained in a load of tree lengths. It was also demonstrated that the merchantable volume loading could be increased to 87.2% of that for tree lengths by using an oversized trailer and that the hauling cost penalty associated with hauling full trees rather than tree lengths would thereby be greatly reduced.

Many forms of raw forest biomass have a low bulk density and are physically very heterogeneous. As a result, handling, transporting and storing biomass without processing it are very inefficient. The solid volume factor (SVF) of biomass forms such as branches and small-diameter trees (brushwood) can be as low as 10 to 15%. A low SVF will, in most cases, result in transport vehicles that are up to volume capacity before they have reached their maximum allowable gross weight. As well, storing bulky material requires a lot of space, and handling it is slow and difficult with most material-handling equipment.

The most common method of increasing SVF of low bulk-density forest biomass (tops and branches, brushwood, etc.) is comminution by chipping or hogging. Compaction is an alternative method of increasing SVF that offers several advantages over comminution: it can increase the SVF of biomass by using less energy than comminution, and the product (i.e., bale) can be left in the field for drying so that subsequent transportation costs are reduced. As well, compaction allows flexibility in choosing final product characteristics (a bale can be burned as is, chipped, hogged, etc.). A contract awarded to FERIC in December 1984 will investigate the use of compaction systems in conjunction with the harvesting and transportation of forest biomass.

-- B. J. Sutherland

Dorwoth, C.E. 1985

EPIDEMIC OF SCLERODERRIS CANKER IN NEW YORK STATE COINCIDES WITH LONG-RANGE WEATHER CHANGES

The European race of Scleroderris canker causes upper and lower crown dieback of various conifers of all ages, both in North America and in Europe. To date, the North American race has been found only in North America, where it is restricted to pine species and seldom occurs on tissues more than 2 m above ground level. Each race causes extensive damage to forest crops on occasion but damage by the European race is more spectacular and can involve older crops which are of greater value. Complete descriptions of both pathogens are available from the Information Office, Great Lakes Forest Research Centre, Sault Ste. Marie, Ontario.

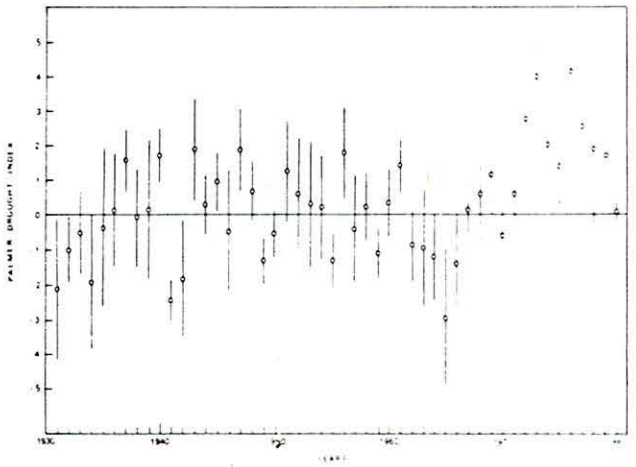
The first major kill of pine by the European race in North America occurred between 1972 and 1974 in upper New York State where trees 20-25 m high died within 2 to 3 years after the disease was noticed. Thereafter, the pathogen was found in other states and in the provinces of Newfoundland, New Brunswick and Quebec. To date, only the North American race has been found west of Quebec.

The potential problem associated with the European race has caused concern among many Ontario forest managers. Others have suggested that the difference in overall climate between upper New York State and southern Ontario explains the apparent lack of infection in the latter area. No objective choice between the two opinions can be made on the basis of present information. Furthermore, researchers are constrained by personal ethics and by statute from experimenting to gain specific information because such experimentation would necessitate bringing the pathogen into southern Ontario in order to gauge its effects--an action that would contravene the Federal Plant Quarantine statutes.

Consequently, researchers draw information from all available sources and consolidate it to form the basis for decision-making by forest managers. In this way, expenditures on unwarranted control efforts can be avoided on the one hand, and on the other, the pathogen can be prevented from gaining a foothold. The Canadian Forestry Service in Ontario not only conducts carefully controlled laboratory experiments with this pathogen but also keeps track of pertinent information from studies conducted by researchers elsewhere. The following example illustrates how results from one research study can be applied to another.

Professor John D. Castello of Syracuse University, Syracuse, New York, has pointed out that changes in the extent of ash dieback in New York State are not correlated with long-term changes in overall moisture levels shown by the Palmer Drought Index (Palmer.

W.C. 1965. U.S. Department of Commerce, Research Paper 45). According to Palmer, PDI values between 0.49 and -.49 indicate normal moisture conditions, -0.5 to -0.99 = incipient drought, -1.0 to -1.99 = mild drought, -2.0 to -2.99 = moderate drought, -3.0 to -3.99 = severe drought and > -4.0 = extreme drought. PDI values of 0.5 to 0.99 = incipient wet spell, 1.0 to 1.99 = slight wet spell, 2.0 to 2.99 = moderate wet spell, 3.0 to 3.99 = severe wet spell and > 4.0 = extreme wet spell. Professor Castello notes, however, that the sudden and extreme rise in PDI readings (see graph), which indicates very high moisture levels, occurred about the same time that the outbreak of the European race of Scleroderris canker reached epidemic proportions in the area. Earlier reports had revealed that an unknown race of Scleroderris was present in upper New York State in the early 1960s.



Palmer drought index.

Forest reaction to climatic extremes may persist over several years, but it cannot be said in retrospect that the drought conditions in the mid-1960s necessarily predisposed red pines to increased infection by Scleroderris canker. Likewise, the pronounced rise in moisture levels during the early 1970s and the Scleroderris canker epidemic that caused so much damage and concern at the same time may have been purely coincidental. Conversely, the mean PDI values illustrated in the graph are for April, May and June -- periods of major infection for Scleroderris canker. The North American race, at least, requires moisture both for spore dispersal and for infection. Efficiency of these activities increases as free water increases. Furthermore, the disease often reaches epidemic proportions in Europe but with intervening periods of low disease intensity of 10 to 30 years. Again, data are insufficient to warrant a direct correlation between incidence of Scleroderris canker and long-range changes in weather pattern at this time.

There is no doubt that the wet period in the 1970s was an unusual event, in view of the total time involved (see graph). Because of the time required to produce a crop of pines, two such events each century, properly spaced, would be sufficient to preclude the use of pine as a plantation crop.

All of the evidence on Scleroderris canker is not yet in. The importance of the information cited above should not be overestimated, but such information should be included in forest management considerations. Under no circumstances should vigilance be relaxed against introduction of the European race of Scleroderris into regions in which it does not now occur.

-- C.E. Dorworth

THE ACCOMPLISHMENTS OF THE FOREST MANAGEMENT SUBSIDIARY AGREEMENT

As the activities carried out under the Forest Management Subsidiary Agreement (FMSA) wind down, both the provincial and federal governments are pleased with the accomplishments of this jointly funded program. Forest access roads have been built, nursery facilities upgraded, silvicultural camps constructed, soil surveys and research studies carried out, and forest renewal operations conducted.

The $71.5 million, 5-year agreement was signed by the province of Ontario and the government of Canada on 8 December 1978. Technically, the agreement expired on 31 March 1984, but two pay-out years were provided for the completion of projects started before that date. The cooperating agencies involved in the development and implementation of the FMSA were the Department of Regional Economic Expansion (DREE), the Canadian Forestry Service, and the Ministries of Natural Resources, Northern Affairs, and Treasury and Economics.

The major objectives of the agreement, which included measures to enhance forest management activity and accelerate reforestation, have been achieved. The various components of the agreement were designed to address specific areas of concern relating to the maintenance of long-term wood supplies.

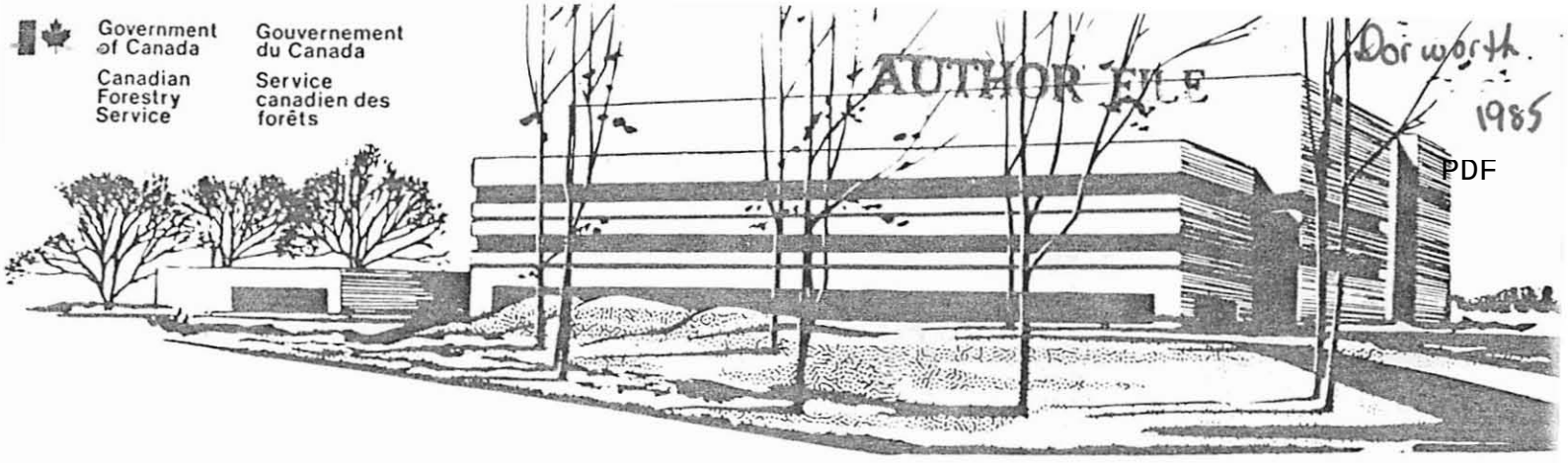
FOREST ACCESS ROADS

This program received the bulk of the funding, $54.5 million, as access to mature and overmature timber was a pressing priority. Before the expiration of the agreement on 31 March 1986, 693 km of new road will be constructed. Salvage roads built to access timber damaged by fire or budworm will account for 44 km of this total. An additional 185 km of road will be reconstructed, 30 new bridges will be built and one bridge will be reconstructed. Two railway crossings will also be constructed as part of this program.

These newly created road networks have improved forest protection and provided for the implementation of modified harvesting systems, reforestation and other silvicultural treatments. Improved access for mineral exploration, fishing, trapping and public recreation has been an added bonus.

Government of Canada
Canadian Forestry Service

Gouvernement du Canada
Service canadien des forêts



FORESTRY NEWSLETTER

Spring 1985