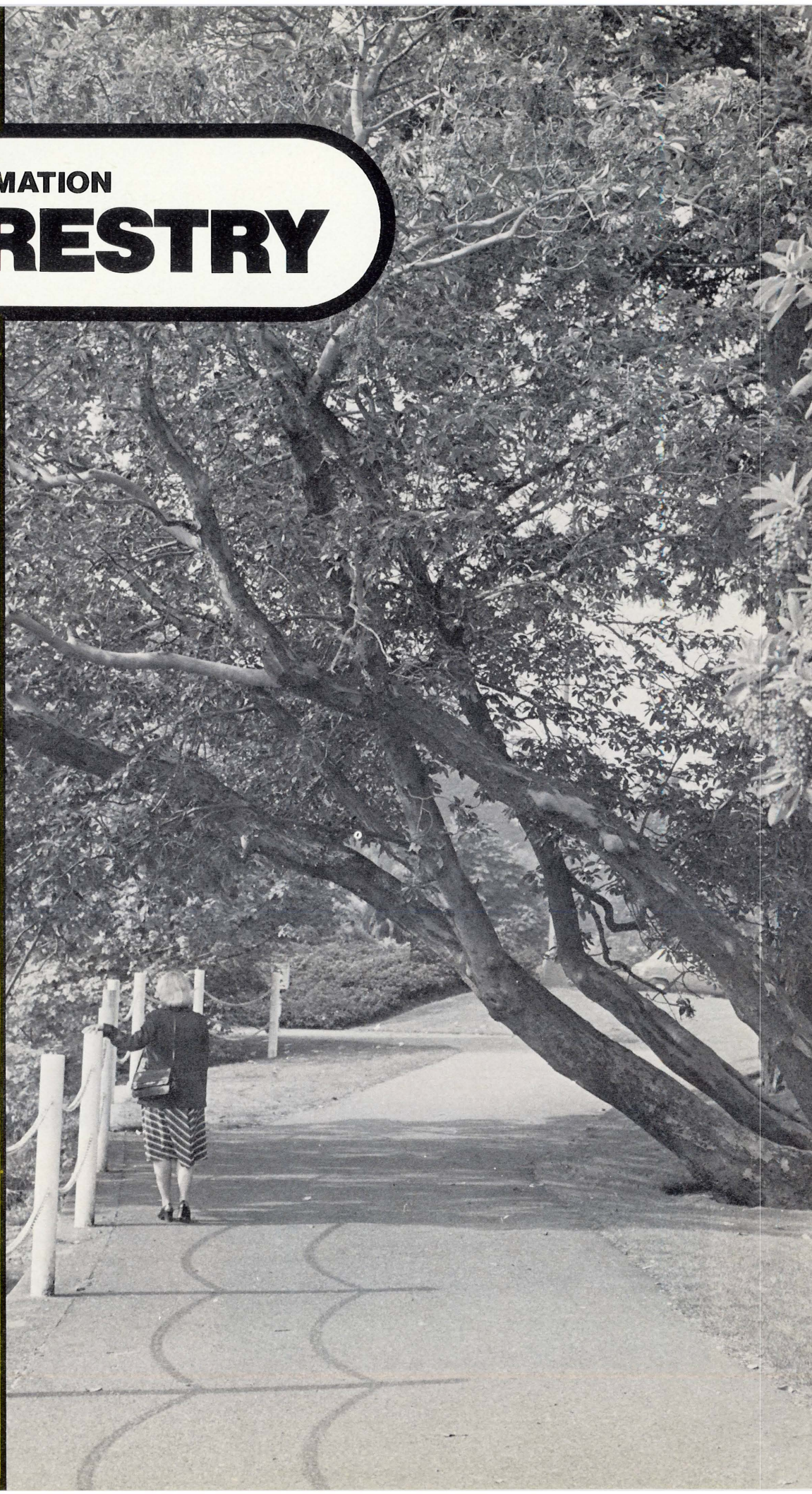


ISSN 0706-9413

INFORMATION  
**FORESTRY**

Pacific Forest Research Centre  
Vol. 9, No. 3, 1982







Prescribed fire was used last fall to burn 110 ha of previously logged forest land at Vedder Mountain near Chilliwack, B.C. PFRC fire specialist, Bruce Lawson, was called in to assist. Top photo shows fire in action while bottom photo shows part of the area burned.



# REHABILITATION WITH PRESCRIBED FIRE

Prescription burning is coming of age in British Columbia. It is no longer just a tool for reducing post-logging fire hazards. Prescribed fire is now used to control insects and disease, to prepare sites for planting, and to enhance wildlife habitat. In September of 1981 a relatively new type of prescribed burn was conducted in B.C. The British Columbia Ministry of Forests used prescribed fire to rehabilitate 101 hectares of previously logged and burned forest land at Vedder Mountain near Chilliwack. **Bruce Lawson** and **Brad Hawkes** of the Canadian Forestry Service cooperated with fire research aspects of the project.

## The Problem

The Chilliwack Forest District of the British Columbia Ministry of Forests is attempting to rehabilitate a large area where hardwoods (alder, birch and broadleaf maple) have taken over an excellent growing site for Douglas-fir. The site was burned by wildfire thirty years ago and planted with conifer seedlings seven years after that. During the seven years between burning and planting, however, hardwood trees had established themselves to such an extent that the conifer seedlings could not compete.

The plan to rehabilitate the site had four stages:

- (a) The 101 hectares of mixed hardwood and conifer would be clearcut.
- (b) The slash and shrub foliage left

on the site would be treated with 2,4-D. This is done to desiccate the green vegetation and thereby facilitate ignition and spread of the fire.

- (c) The site would then be burned with a high-intensity fire.
- (d) The burned-over area, now free of hardwood trees and slash, would then be planted with Douglas-fir seedlings.

## The Prescription

The most difficult part of using prescribed fire in any application is to ensure that the right sites are treated with the correct fire at the appropriate time. This has required the development of new technology and new decision-making procedures.

To assist foresters in matching up burning conditions with impact objectives, the Prescribed Fire Predictor (PFP) was developed at the Pacific Forest Research Centre in 1975. The PFP is a decision-making tool that predicts the behavior of a prescribed fire. The user must know what the burn is meant to accomplish and must input certain variables such as weather, fuel characteristics, slope, and so on. Since the PFP was not designed for use with hardwood slash, one of the main reasons for the involvement of the CFS in the Vedder Mountain burn was to find out if the PFP could be adapted for use with a different type of fuel complex than that for which it was designed.

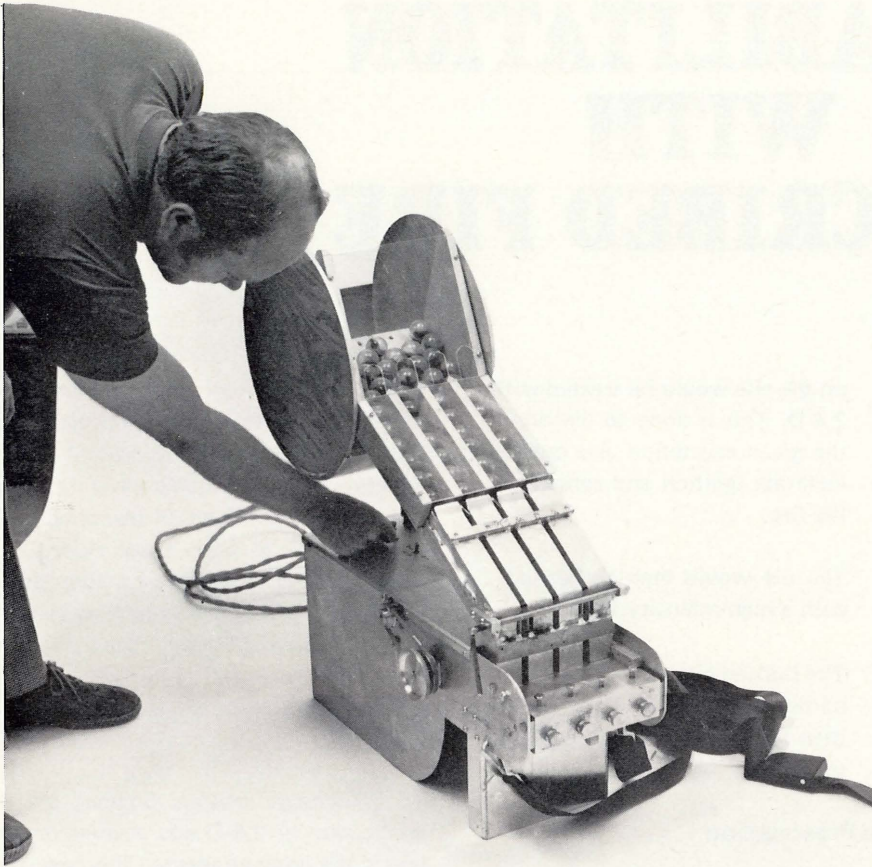
The selection of an appropriate prescription was particularly difficult at the Vedder Mountain site because of the variety of fuel and topography. The area to be burned consisted of two benches dropping off to fairly steep slopes. Hardwoods occupied the benches; but the slopes were occupied by a mixture of hardwood and conifer. The benches had a light fuel loading; but the slopes were covered with heavy continuous slash.

To complicate matters further, the application of 2,4-D was delayed until late in the growing season. This caused the burn to be postponed from spring or early summer until September.

Fire behavior can also be greatly influenced by the speed and pattern of ignition. It is important to choose an ignition system that is appropriate to the local conditions and to the objectives of the prescribed burn.

Two types of aerial ignition systems, the Flying Drip Torch and the PFRS Aerial Ignition System (popularly known as the Ping-Pong Ball Machine or AID Dispenser), were developed by the fire research group at the Pacific Forest Research Centre in the 1970's. Both of these systems are now used extensively across Canada and in the United States. Private companies now offer several versions of both kinds of ignition system. The aerial ignition system, considered most appropriate to the rehabilitation problem at hand, was the gelled gasoline helitorch, a fairly new modification of the original Flying Drip Torch concept.





Aerial Ignition Device (AID) dispenses polystyrene balls filled with potassium permanganate at a rate of up to 240 per minute, depending on the ignition requirement. Ethylene glycol is injected just prior to release, causing the balls to burst into flames within seconds.

## Burn Day

On the morning of the burn there was dew on the slash, which reversed the recent drying trend. This caused some concern that ignition would prove difficult. The decision was made to proceed with the burn because the weather was expected to break and conditions, although not ideal, were as close to the desired prescription as could be expected for the rest of the year.

Ignition at first did prove difficult due to the higher morning fine fuel moisture

content and to poor fuel continuity on the benches. Problems with the gelling consistency of the helitorch fuel also caused temporary breakdowns in continuity of ignition, which can cause control problems in prescribed burning. These difficulties were eventually overcome and the fire spread well during the afternoon, resulting in almost complete coverage of the site.

As expected, the fire did behave differently on different parts of the site. On the slopes, where there was heavy continuous slash and a significant Douglas-fir component, the fire was

extremely intense and spread quickly. On the benches, where there was only light slash and no conifer component, the fire was less intense and did not spread rapidly.

## Objectives Met

The objectives of the prescribed burn at Vedder Mountain were to temporarily reduce shrub and herbaceous competition and create a plantable site. These objectives were met over 80% of the site. The other 20%, the upper bench, was left with patches of slash remaining and the brush competition was not significantly reduced, although enough plantable spots were created to meet plantation objectives over the entire block.

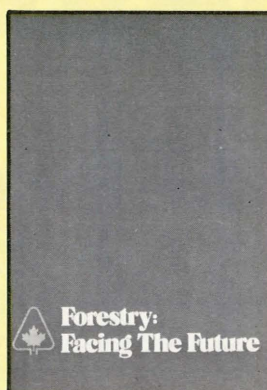
The site was planted with Douglas-fir seedlings in the spring of 1982, and followup studies will be conducted over the next few years to gauge the effectiveness of the burn.

The Vedder Mountain burn provided valuable experience in tailoring fire prescriptions and the Prescribed Fire Predictor to the requirements of site rehabilitation. The role of prescribed fire in site rehabilitation will have to grow enormously if intensive forest management objectives are to be achieved. The present 5-year plan of the British Columbia Ministry of Forests calls for the rehabilitation of over 5 000 hectares of previously logged forest land each year by 1986-87 in the Vancouver Forest Region alone, an area which presently includes 30 000 hectares of productive forest land occupied by brush, alder and other undesirable species.

The fire research group at the Pacific Forest Research Centre will continue to cooperate with other government agencies and with private industry in the research and operational trials necessary to realize the potential of prescribed fire as a silvicultural tool. ●



# New Publications



## FORESTRY: FACING THE FUTURE

A small descriptive brochure, illustrated with color photographs, outlining the roles and responsibilities of the Canadian Forestry Service and the programs of each of the eight establishments.

## A REVIEW OF MOUNTAIN PINE BEETLE PROBLEMS IN CANADA

G.H. Manning, Editor

This discussion paper, in addition to evaluating the potential physical, economic, and social impacts of the current mountain pine beetle outbreak, suggests possible management and research strategy to deal with the problems.



## OUTER GULF ISLANDS

S. Eis and D. Craigdallie

Fold-up map format with short descriptions and maps of six islands. Based on a larger report by authors "Gulf Islands of British Columbia, A Landscape Analysis".

## FOREST INSECT AND DISEASE CONDITIONS IN CANADA, 1981

This document contains a national overview of major forest insects and diseases with available data on damage and loss. Of particular interest to those involved in forest management.

## Oldies but Goodies

Offered once again for those who missed when first issued.

## THE LIFE HISTORY OF DOUGLAS-FIR

George S. Allen and John N. Owens  
(1972, not revised, original publication)

Describes in detail, accompanied with color and black and white illustrations, the life history of Douglas-fir, with a comprehensive account of the reproductive cycle of Douglas-fir, from initiation of seed- and pollen-cone buds to shedding of the mature seed.



## THE REPRODUCTIVE CYCLE OF DOUGLAS-FIR

John N. Owens

A brief and less technical account of the reproductive cycle based on "The Life History of Douglas-fir", for use by students of forestry and biology, as well as foresters.



# IT'S WAR!

## Us Against the Beetles

In the last few months, the Pacific Forest Research Centre (PFRC) has signed contracts with two organizations in a continuing effort to find a way to control the number one insect problem in western North America—the mountain pine beetle.

Latest figures show the mountain pine beetle accounts for a loss of about three percent of British Columbia's average annual cut. In 1981, over 32 million trees were killed—enough timber to build about 60,000 homes.

The first contract signed was with Safer Agro Chem. Ltd. of Victoria, to establish the potential of pine oil formulations as a repellent for bark beetles.

The contract is in the amount of \$132,000 and is to be matched by Safer Agro Chem. Ltd. It was awarded under the federal government's Program for Industry/Laboratory Project (PILP), a technology transfer program designed to encourage industry to take basic government research and conduct product development and market studies.

Research conducted at PFRC during the past five years has indicated that pine oil formulations, derived as by-products recovered from the sulphate pulping process, are effective in prevention of attack by ambrosia and bark beetles. The protection from attack is achieved by the pine oil acting as a masking and/or repellent agent when applied to trees. A government patent is currently being processed with royalties to be paid to the federal government, once a product has been marketed.

Under the terms of the contract, the company will commence studies to test application techniques of the pine oil formulations in semi-operational field trials, as well as to conduct toxicological and other tests to satisfy registration requirements. Should an effective, marketable product result, company officials are confident it could be used effectively against bark beetles in Europe and the United States, as well as Canada, where marketing studies will be conducted.

### The Mechanical Approach

A second contract was signed with the Forest Engineering Research Institute (FERIC), Western Division, in the amount of \$59,328 to develop a machine to assist in the control of the mountain pine beetle.

Researchers at PFRC, in consultation with FERIC officials, have been testing European equipment designed for pruning trees, with a view to potential application in the control of mountain pine beetle.



Stu Whitney, PFRC pathologist working on the machine approach to the mountain pine beetle problem, checks out the debarking feature of the European machine.

During trials, PFRC researchers became interested in the debarking feature, as the immature broods (e.g., eggs, larvae) of mountain pine beetle perish if their habitat, the intact bark on the stem of a pine tree, is destroyed. Under the terms of the one-year contract, FERIC will design and fabricate a prototype machine in Vancouver to meet North American requirements.

An epidemic of mountain pine beetle is currently causing immense losses in mature lodgepole pine stands of interior British Columbia and southwestern Alberta. Studies indicate that early detection and removal of incipient populations of mountain pine beetle can slow, if not prevent, epidemics of the pest and, subsequently, drastically reduce the losses attributed to the present epidemic. Forest managers are searching for alternatives to felling and burning in these hot spots as a means of preventing the spread of mountain pine beetle. This technique could be very useful in provincial and national parks where park policy encourages control methods environmentally compatible with park uses.

The project will be jointly funded by PFRC and the federal Department of Supply and Services, in amounts of \$15,000 and \$44,328, respectively. If the prototype machine is successful in field trials, Canadian equipment manufacturers will be encouraged to build production models for use as a supplement to existing salvage programs. ●



## Tree Growth Studies Get a Boost

With the acquisition of a new computerized tree ring-measuring instrument, tree growth studies at PFRC will get a "shot in the arm".

The whole system, worth \$25,000, consists of a measuring table, a Motorola microprocessor and an APPLE II microcomputer, with direct linkage to the PFRC mainframe PDP II computer.

With this instrument, **Dr. Rene Alfaro**, in charge of PFRC's damage appraisal project, is attempting to determine the impact of pests on tree growth by quantifying losses in terms of stand volume. More specifically, he is carrying out an evaluation of the 1977 spruce budworm infestation in the Fraser Canyon and Manning Park area.

### How It Works

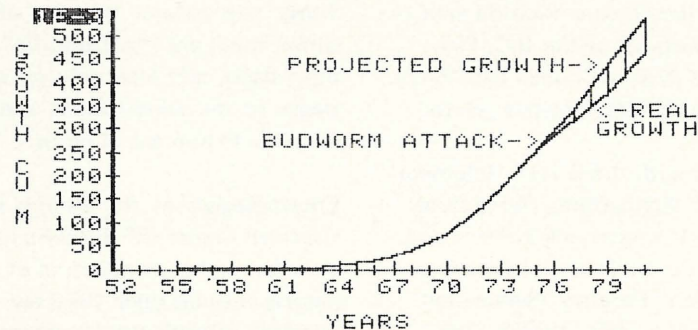
A tree disc is placed on the measuring table and tree rings are measured and

stored in the microprocessor until the whole radius has been measured. Once the ring sequence reading is complete, the information is transferred to and stored in the APPLE, where checking and editing of data takes place. Satisfactory ring sequences for one or more trees are then assembled and transmitted to the large PDP II computer, where the bulk of the "number crunching", including extrapolation to

potential growth rates under no-pest assumption, is performed. Digested information is brought back to the APPLE for final summarization and graphics (see Figure 1).

Other scientists at PFRC studying tree growth responses to various treatments will find this a time-saving and useful tool, bringing PFRC tree growth studies into the computer age. ●

TOTAL TREE VOLUME



## Forestry Assistance Program Underway

The \$40 million federal/provincial Employment Bridging Assistance Program got underway in mid June when 11 projects were the first approved, creating 117 temporary jobs in the Nelson, Prince Rupert and Vancouver forest regions, for an estimated value of \$523,326.

The Employment Bridging Assistance Program is aimed at creating job opportunities in intensive forest management projects, to allow forestry-dependent communities to retain their skilled workers, maintain their forestry payroll and sustain their communities' social and economic vigor.

Costs of the program will be covered

by: \$24 million from the Unemployment Fund, Canada Employment and Immigration Commission; more than \$7 million contributed by the Canadian Forestry Service, Environment Canada, to cover administrative costs; and \$10 million from the government of British Columbia as a new initiative under the Employment Development Act.

Participation in this program is voluntary. To qualify, a worker must be receiving Unemployment Insurance benefits. Participating workers will receive \$300 a week, plus a substantial benefit package.

All projects will involve intensive forestry work that is not on the

sponsoring company's regular forestry plan of action.

The most costly single project of the first 11 approved is valued at \$233,722 and will put 20 people to work for 40 weeks, improving the Canadian Forestry Association's Evans Lake demonstration forest in the Squamish area.

Others approved include projects such as juvenile spacing, construction of dispersed-use recreation sites, forest road maintenance, brushing and weeding plantations, rehabilitation of flooded areas, etc. ●



## Winter Moth Control Program Shows Positive Signs

The federal/provincial government winter moth control program, initiated in 1979 in the Greater Victoria area under the auspices of the B.C. Plant Protection Advisory Council (BCPPAC), is beginning to show positive results.

Researchers with the British Columbia Ministry of Agriculture, Agriculture Canada, the University of Victoria and the Pacific Forest Research Centre of the Canadian Forestry Service—all cooperators in this project—are encouraged with the results.

Between 1979 and 1981, natural enemies of the winter moth—a parasitic wasp (*Agryponclavellatum*) and a parasitic fly (*Czyzenis albicans*)—were imported from Europe and Nova Scotia. Under contract from the B.C. Ministry of Agriculture, Professional Ecological Services of Victoria released over 17,000 tiny parasitic flies and over 10,000 parasitic wasps at various

locations in the Greater Victoria area.

These two natural enemies of the winter moth are "host specific", that is, they attack and feed only on various stages of the winter moth and are harmless to humans or crops.

Entomologists at the Pacific Forest Research Centre (PFRC) who have been monitoring the introduction of the two natural enemies since 1979 say that the numbers of both species recovered in 1982 indicate they have established themselves on Vancouver Island. They predict that there will be a marked reduction of the winter moth population in one or two years.

The winter moth and its imported natural enemies will continue to be monitored cooperatively by the B.C. Ministry of Agriculture and the Pacific Forest Research Centre under the direction of Dr. Imre S. Otvos, an

entomologist at PFRC.

The release of the parasitic natural enemies on Vancouver Island was modelled after the program in Nova Scotia where the same two species were introduced in the mid 1950's from Europe to that province to control the winter moth. The outbreak of the insect had been brought under control by 1963 and although the winter moth still occurs in small numbers in Nova Scotia in commercial orchards, it is no longer considered to be a problem.

Biological control has been the main thrust of the program against the winter moth. Control techniques using chemicals have been developed and are being used in conjunction with the bio-control program. These include the use of insecticidal soap combined with petrochemical insecticides and sticky traps to capture the flightless females in the fall. ●



### Western Canada Hosts Chinese Delegation

A seven-member survey group from Heilongjiang, China, recently spent several weeks in western Canada at the invitation of T.M. Thomson of T.M. Thomson and Associates of Victoria, studying logging and hauling operations in western Canada.

Y. Jim Lee (third from left), a research scientist specializing in remote sensing at PFRC and a recently returned lecturer from China, acted as interpreter for the group during their visit in British Columbia. ●

### INFORMATION FORESTRY

Published quarterly by:

Environment Canada  
Canadian Forestry Service  
Pacific Forest Research Centre  
506 West Burnside Road  
Victoria, British Columbia  
V8Z 1M5

388-3811, local 119

Editor . . . . . Elaine Teske  
Design . . . . . John Wiens  
Distribution . . . . Blanche Page