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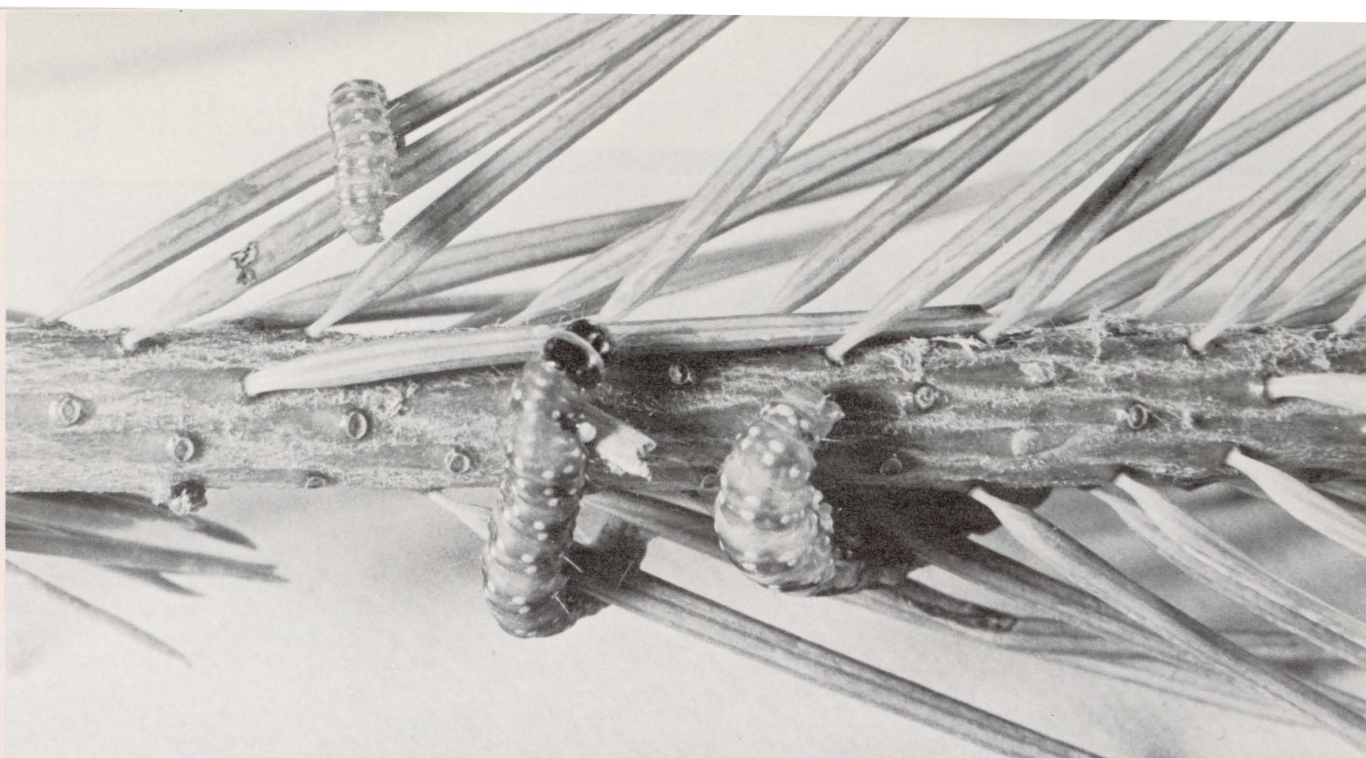
Canadian Forestry Service  
Pacific Forest Research Centre  
506 W. Burnside Rd.  
Victoria, B.C.  
V8Z 1M5.

Vol. 3 No. 2  
Winter 1976-77

**IN THIS ISSUE ....**

- **WHAT'S FORESTRY WORTH ?**
- **PEST CONDITIONS 1976**
- **PEOPLE**





Spruce budworm

# Pest Problems - B.C. - 1976

Root rots, mistletoes, budworms, beetles and loopers wrought havoc in B.C.'s timber stands during 1976 according to the latest insect and disease survey report issued by the Pacific Forest Research Centre.

Officials estimate that at least one million acres of productive forest land has been infested by insects and the annual timber losses to root rots and mistletoe exceed 230 million cubic feet.

The Kamloops forest district is the hardest hit area of the province with infestations of mountain pine beetle, spruce beetle, spruce budworm, conifer sawfly, hemlock looper, black headed budworm, root rots and dwarf mistletoe.

## DISEASES

**Root rots** continue to dominate disease problems. Large infected areas are reported on Vancouver Island and the lower mainland and in young stands in the Kamloops and Nelson forest districts in the Interior. A black stain root disease was detected for the first time in British Columbia in lodgepole pine stands in the Kettle Valley-Beaverdell area. Officials estimate that the annual volume loss to root rots exceeds 80 million cubic feet.

**Moulding diseases** continued to plague millions of tree seedlings, particularly container-grown seedlings and bare root stock being held in cold storage.

**Dwarf mistletoe** is a perennial problem in B.C. forests. Annual losses are estimated at more than 150 million cubic feet. An awareness of the problem by resource managers has had an affect on reducing the spread of the parasite in some areas of the province. Latest surveys indicate the problem persists in 30 per cent of the lodgepole pine stands in the Cariboo, in many hemlock stands on the coast and sporadically in Douglas-fir and larch stands in the Interior.

**Spruce cone rusts** were common in the Prince Rupert and Prince George districts. Twenty per cent of the cones collected from 20 locations were infected and in at least one area near Hazelton, more than 50 per cent of the cones were infected by rusts.

**Needle rusts** on Douglas-fir, hemlock and balsam were more obvious in 1976. In numerous localized areas, up to 60 per cent of the new year's foliage was infected. Officials attributed the increase to the cold wet summer. In the West Kootenay, 70-80 per cent of the old foliage on lodgepole pine was discolored and prematurely defoliated by the disease-**Dothistrome** needle blight.

## SOME GOOD NEWS !



There was a definite collapse of the Douglas-fir tussock moth outbreaks in the Kamloops forest district in 1976. The decrease was attributed to the B.C. Forest Service operational control program and the spread of a natural virus. The infestation had spread over 50,000 acres.



## INSECT PROBLEMS

The **mountain pine beetle** continues to be the single most serious insect problem in the province. The **spruce budworm** has infested vast areas in the Vancouver and Kamloops forest districts; the **western hemlock looper** has caused serious defoliation in 26,000 acres in Wells Gray Park and a **conifer sawfly** is reported infesting lodgepole pine on over 130,000 acres in the Kamloops and Prince Rupert forest districts. The **blackheaded budworm** caused moderate defoliation in western hemlock on over 16,000 acres in three areas near Blue River.

A heavy attack by **Douglas-fir needle midges** affected the 1976 crop of Christmas trees, particularly in the Radium area.

### MOUNTAIN PINE BEETLE

This insect has infested more than 115,000 acres of pine stands in the province. All forest districts report outbreaks but the Cariboo with 38,000 acres infested and Kamloops with 30,000 acres, are the hardest hit. Lodgepole pine is the most severely attacked species.

#### Forecast

Fall sampling indicates an overall decline in the number of trees killed. However, entomologists add a word of caution because the beetle flew much later in 1975 and 1976 than usual, and as a result insects suffered higher overwinter mortality. At the time of fall surveys, broods were just becoming established in green attacked trees. In the East Kootenay the wet summer influenced beetle activity. Most of the 1976 beetle broods were 'pitched-out' because of the high moisture content of the trees.

### SPRUCE BUDWORM

Survey officials estimate that at least 500,000 acres of Douglas-fir stands

have been infested, primarily in the Vancouver and Kamloops forest districts. Most areas have had infestations since 1969, but higher insect populations have been reported in recent surveys.

In the Vancouver district, heavy defoliation of Douglas-fir was recorded on over 50,000 acres with an additional 143,000 acres recording a light to moderate defoliation. Most extensive damage



Pine beetle still number one problem.

is in the Fraser and Lillooet River drainages.

#### Forecast

Egg counts in many locations were more than double the 1975 figures. Heavy defoliation is forecast for the Fraser Canyon area and in the Lillooet-Bridge River areas in 1977. Infestations of the two-year cycle spruce budworm (*C. biennis*) are expected to continue in Engelmann spruce and alpine fir stands and as a result heavy defoliation could occur again in 1978.

### WESTERN HEMLOCK LOOPER

Heavy defoliation of western hemlock occurred on about 26,000 acres within Wells Gray Provincial Park. On the basis of the large pupal population, the infestation is expected to continue in 1977 and severe defoliation could result in tree mortality.

### CONIFER SAWFLIES

Another defoliator that feeds on the needles of conifers, the sawfly has infested over 100,000 acres of shore pine in the Prince Rupert district and 30,000 acres of lodgepole pine along the North Thompson in the Kamloops district. The infestation is expected to continue in 1977.

**Spruce beetle** infestations occurred in three areas in the Yalakom P.S.Y.U. Populations appear to be on the increase and forest managers should be alert to damage in susceptible spruce stands.

#### You think you've got problems!

Newfoundland Forest Research Centre reports that more than 6.3 million acres of productive balsam-fir-spruce forests have been infested by the spruce budworm.



# People

The PFRC economic team consists (L-R) Jack Rudd, analyst; Dr. Michael Massie, Program Manager; Dr. Glen Manning, Senior Economist; and Chuck Macklin, statistician.

## RUSSIANS IMPRESSED

They don't burn slash in Russia. That could be the reason a five-man delegation of Russian forestry experts were intrigued by new developments in fire research when they visited the Pacific Forest Research Centre during a recent Canadian tour.

Forest inventory techniques, computer modelling for simulating forest growth and B.C. Forest Service techniques for forest protection and fire fighting also highlighted the Russians' visit to British Columbia.



G. I. Vorobjev

Delegation chief, **G.I. Vorobjev**, who is chairman of the state committee for forestry of the USSR Council of Ministers, said the sharing of knowledge between Canada and the Soviet Union was of mutual benefit and he appreciated the opportunity of seeing, on a one to one basis, what Canadian forestry specialists were doing. ■

## Forest Economics at PFRC

The economics unit of the Pacific Forest Research Centre provides foresters, land managers and other clients, including the general public, with a wide variety of modern analytical techniques and services. The primary objective of the unit is to make available reliable statistical information that will reflect the demands being made on the forest resources. Such information will assist managers in determining where tomorrow's needs will arise and where to direct future research efforts. Land management decisions are becoming increasingly more complex as demands for forest products increase and even greater attention is placed on environmental quality.

To service the needs of the forest community, the economics team performs a variety of basic research roles in addition to providing a statistical information retrieval service.

Completed is the first phase of a major study to evaluate the costs of environmentally improved forest road construction. The second phase of the program, being undertaken in cooperation with MacMillan Bloedel Limited and the Fisheries and Marine Directorate of Environment Canada, is attempting to relate stream sedimentation to specific road-building activities and in turn, relate these factors to the cost of abatement.

## COFI PRESIDENT VISITS PFRC

Mr. Don Lanskaill, President of the Council of Forest Industries of British Columbia, visited the Pacific Forest Research Centre, Victoria, recently where he had the opportunity to review the Centre's research program and have a first hand look at the facilities.

(L-R) Ross Macdonald, Terry Honer, Don Lanskaill and Mike Drinkwater. →



An economic study dealing with the utilization of B.C. hardwood species showed major problems facing the hardwood industry in B.C. are scattered stands of timber and small firms.

Another economic study is attempting to develop a model of forest products, demands and trade flows among Canada, United States and Japan. The study is being undertaken in cooperation with the U.S. Pacific Northwest Forest and Range Experiment Station. ■

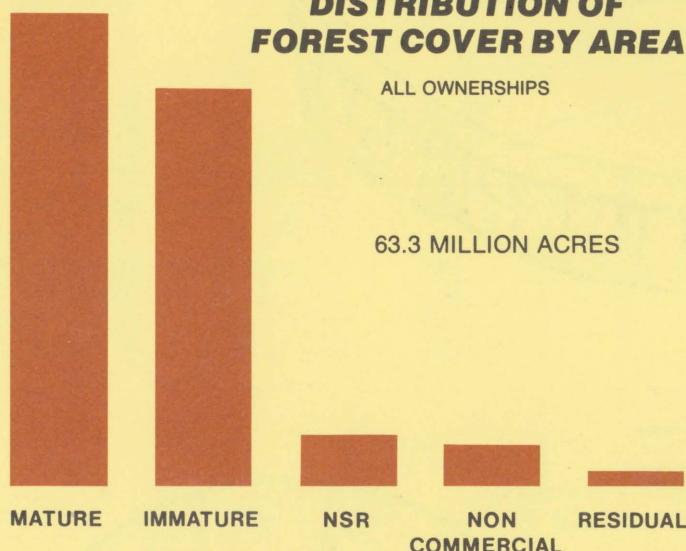


# Forestry Statistics

British  
Columbia

Pull Out Section

## DISTRIBUTION OF FOREST COVER BY AREA



## WHAT'S FORESTRY WORTH?

- In British Columbia, more than 250,000 people are employed in forestry-related industries. To these Canadians forestry means a great deal. To others, forestry means recreation, picnicking, hiking, clean water and fresh air. Have you ever wondered what forestry means to you?
- To help Canadians gain a better appreciation of the true value of our forest resource and to encourage greater use of research results, the PFRC provides a wide variety of statistical information.
- The material in this leaflet has been gathered from a variety of sources to provide you with easy access to a few important forestry facts. Additional information may be obtained by contacting the economics unit at PFRC.

## DISTRIBUTION OF FOREST AREA BY OWNERSHIP

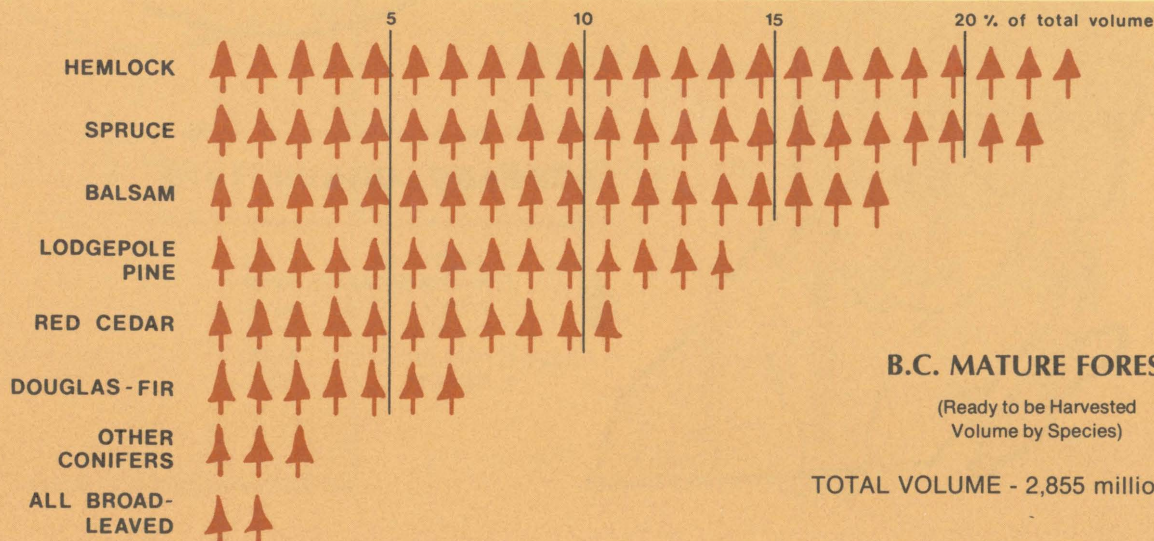
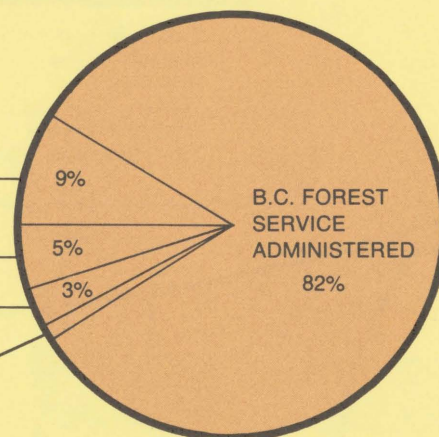
128.7 MILLION ACRES

COMBINED B.C.F.S. AND PRIVATE

PRIVATE OWNERSHIP

OTHER PROVINCIAL ADMINISTRATION

FEDERAL ADMINISTRATION 1%



## B.C. MATURE FORESTS

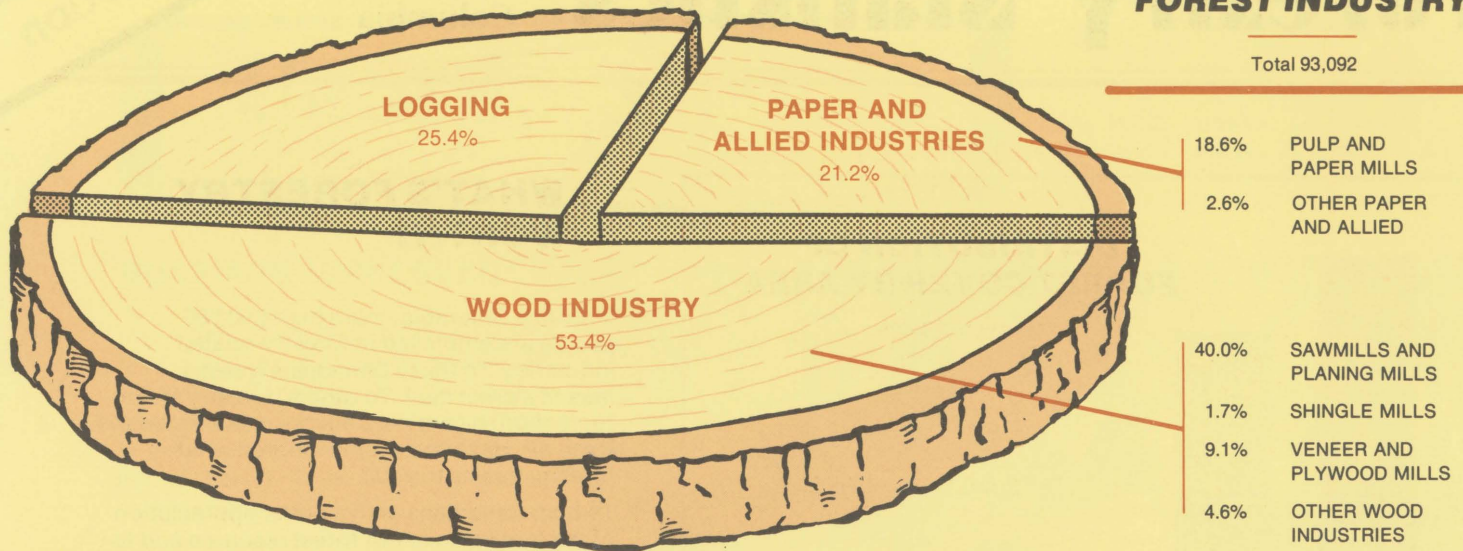
(Ready to be Harvested  
Volume by Species)

TOTAL VOLUME - 2,855 million cunits



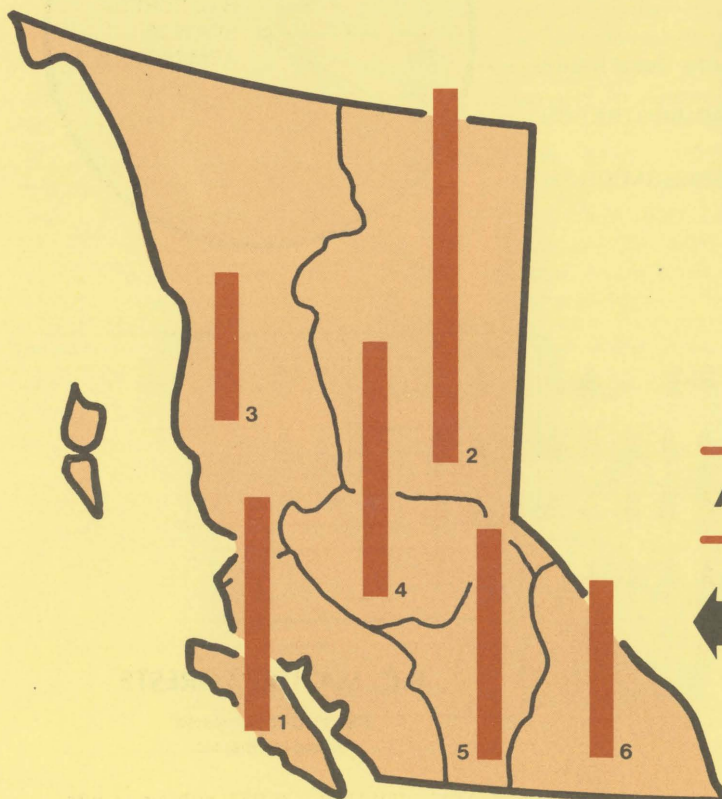
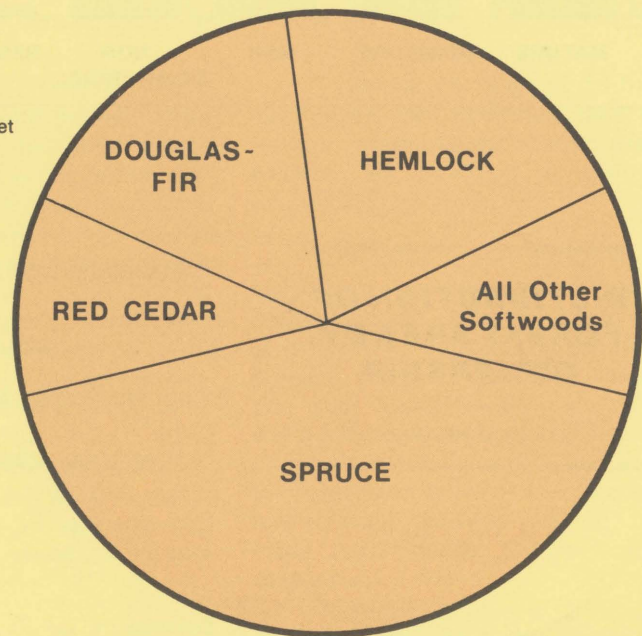
## EMPLOYMENT IN THE FOREST INDUSTRY

Total 93,092



## PRODUCTION OF LUMBER BY SPECIES - 1975

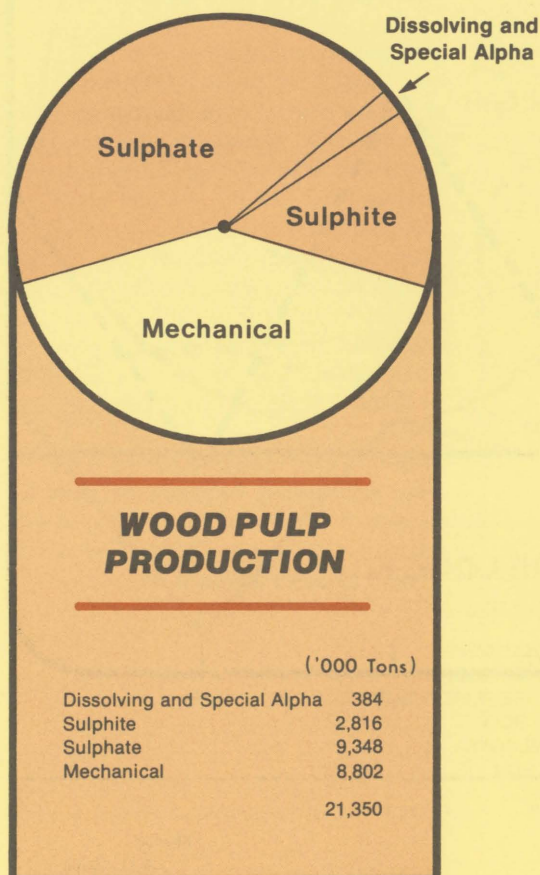
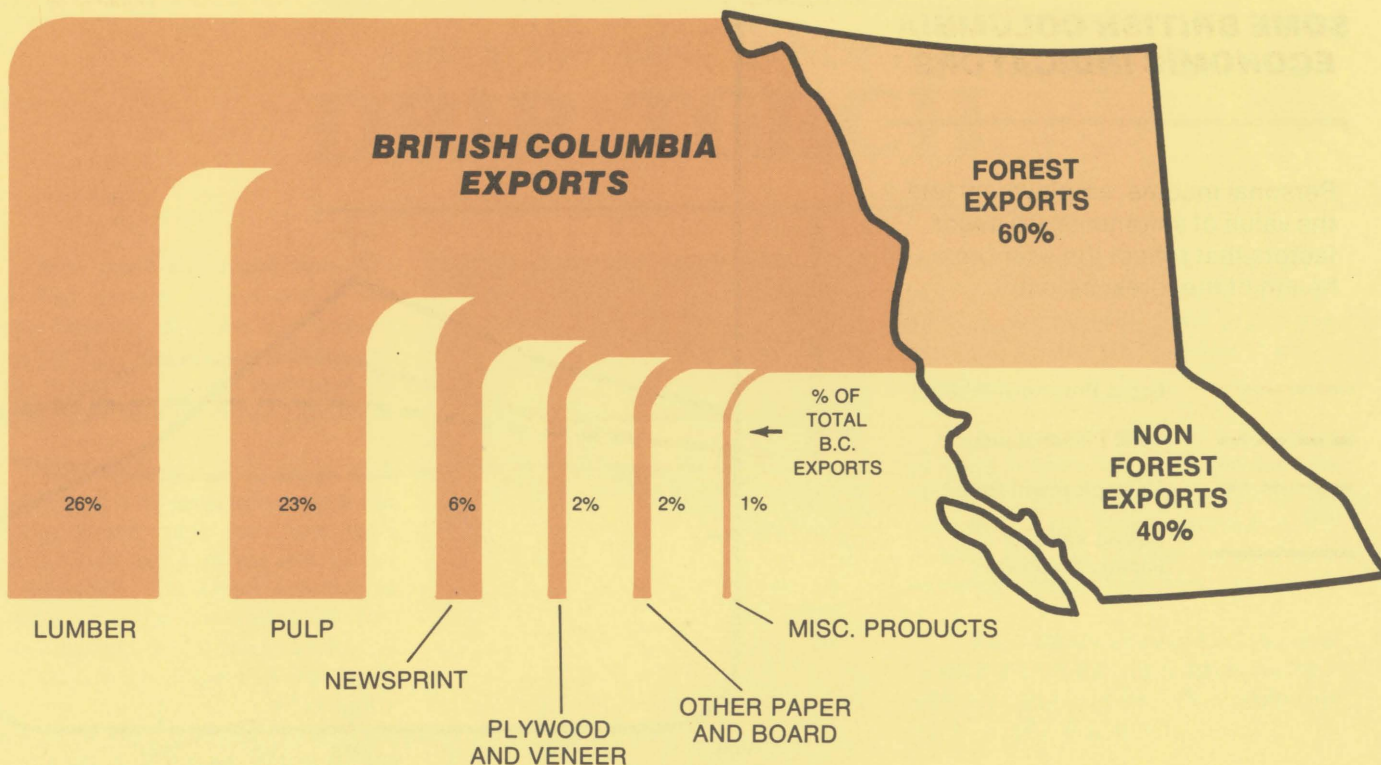
Douglas-fir	1,174,000,000	Board Feet
Hemlock	1,498,000,000	
Red Cedar	746,000,000	
Spruce	3,187,000,000	
All other Softwoods	863,000,000	
Total Hardwoods	1,000,000	



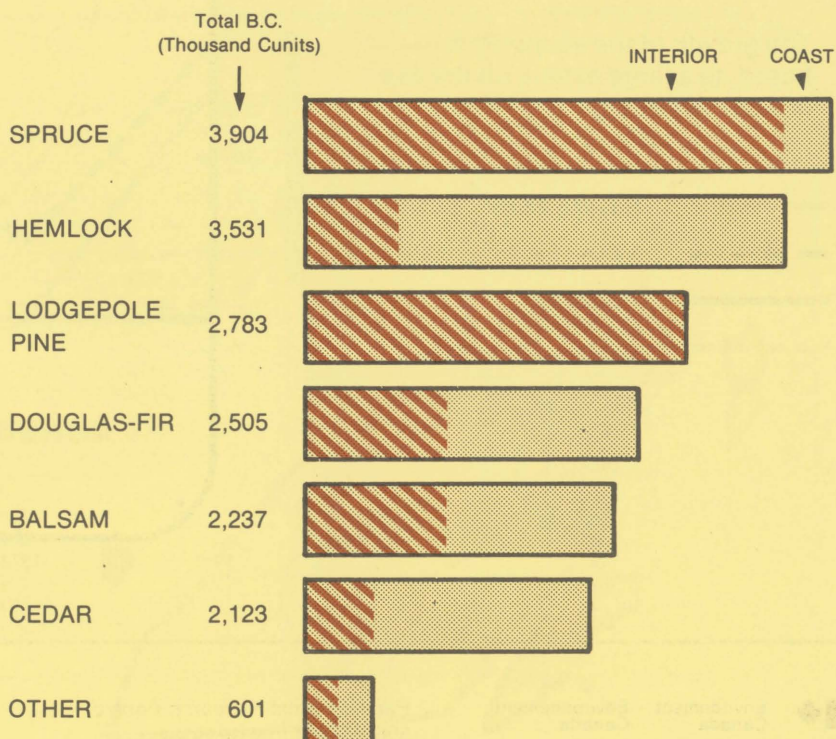
## ACREAGE LOGGED - 1975

1. VANCOUVER	49,593
2. PRINCE GEORGE	78,337
3. PRINCE RUPERT	30,104
4. CARIBOO	53,099
5. KAMLOOPS	47,635
6. NELSON	36,687





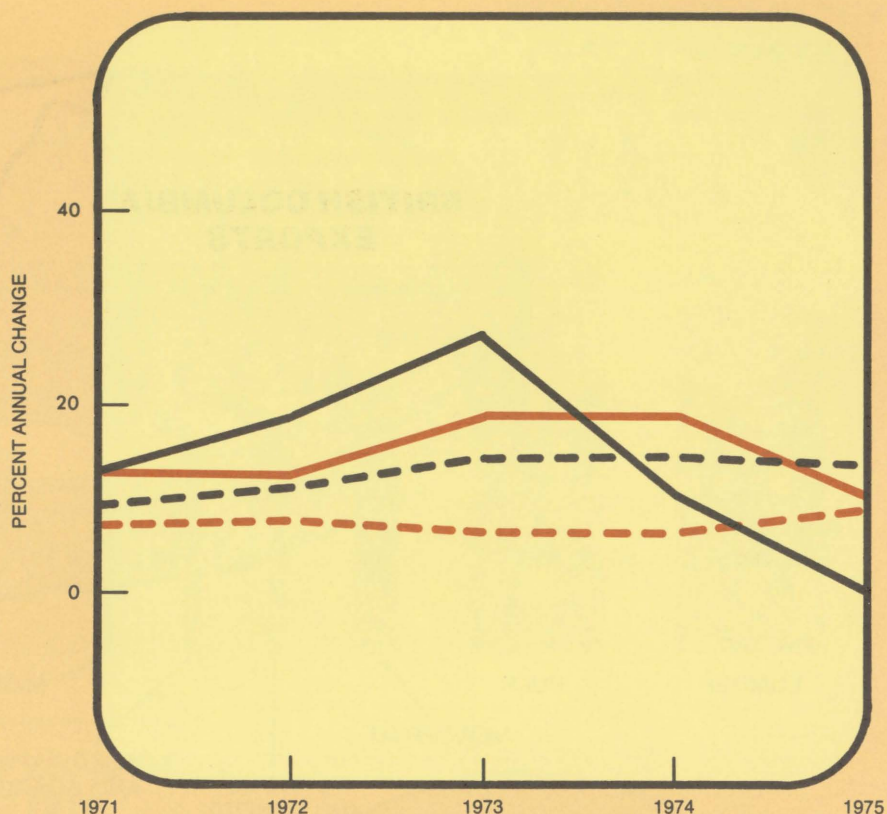
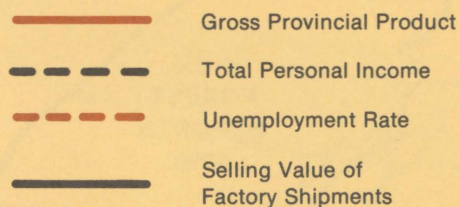
### SPECIES HARVESTED - 1975



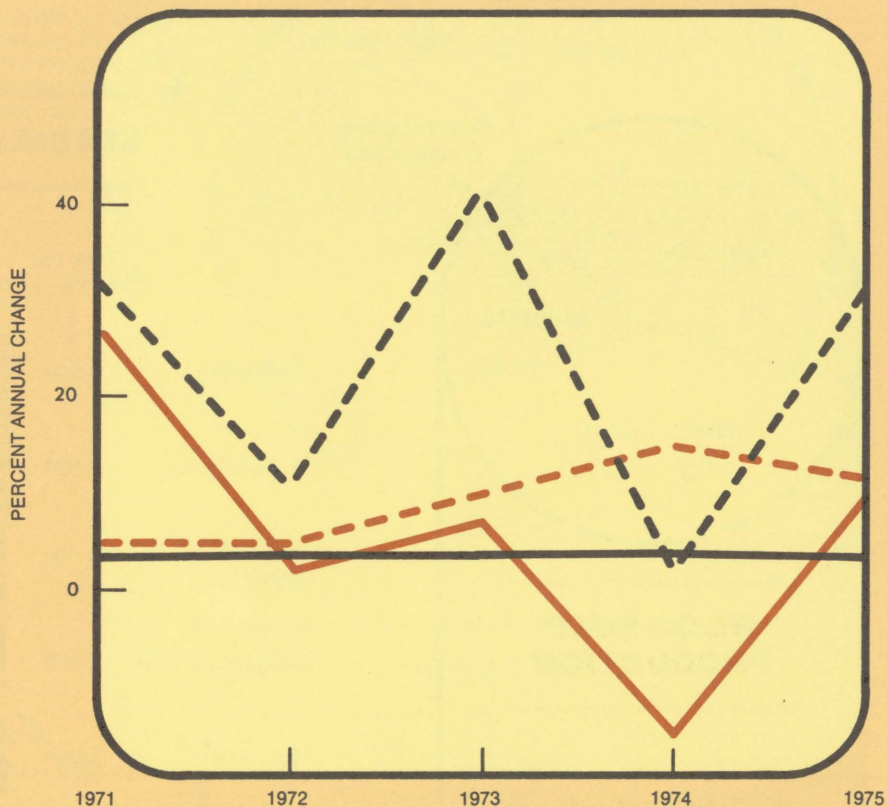
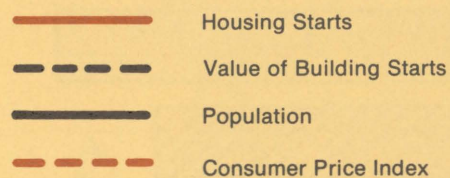


## SOME BRITISH COLUMBIA ECONOMIC INDICATORS

Personal income, employment and the value of shipments are major factors that reflect the economic health of the forest industry.



The growth of the economy is based, to a large extent, on the use of wood products.



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Source

- B.C. Govt.  
- Stats Canada  
- CPPA



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## EASIER AND MORE EFFICIENT DRIP TORCH

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"It's much easier and more efficient than using a ground crew," said **Wayne Coombs**, B.C. Forest Products divisional forester, in describing the 'flying drip torch', a new technique for igniting slash fires in British Columbia.

The 'drip torch' is a simple tool. It consists of a 45-gallon drum that has a vapour locked spout for dispensing a mixture of 40 per cent gas and 60 per cent diesel oil. The drum is bolted to a cradle which is suspended 20 feet below a helicopter. For best results, the torch should be suspended 15 to 20 feet above the slash, from a helicopter flown at 15 to 20 knots. The recent design changes by **John Young** of the B.C. Forest Service, and Okanagan Helicopters, allows increased operational altitudes and an easier fuel flow control using a motorized gate valve and electrical ignition system for in-flight ignition.

The drip torch technique provides an economic method of lighting-up large burns in areas where access is difficult and manpower is expensive. The technique was initially developed by **John Muraro**, PFRC fire research specialist, in cooperation with Northwood and Northern Mountain Helicopters. Muraro said the technique helps achieve one of the basic objectives of slash burning; that is, to ignite the entire area in one burning period and to complete the burn as quickly as possible.

In one BCFP burn, over 250 acres of slash were burned in two days using the drip torch technique. An average of 70 acres per hour were ignited which under normal conditions would require a 6 to 8-man ground crew to achieve the same results.

The first prototype of the flying drip torch was demonstrated on an operational basis in 1973 on a 200-acre slash burn near Summit Lake in the Prince George Forest District. Later,



Best height is 15 to 20 feet above slash.

Northwood burned approximately 2200 acres in record time, taking only 30 minutes to prescribe burn a 250-acre block for a direct ignition cost of about 35c per acre.

At present, there are more than 15 units in operation in the province. In 1976, the technique was used on 80 per cent of the acreage burned in the Interior and on 20 per cent of the acreage burned on the Coast.

Also, we understand that the New Zealand Forest Service is having success with the 'Sting' a modified version of the B.C. aerial drip torch.

Forestry officials feel that the drip torch is the most efficient, safest and versatile ignition tool available to meet B.C. criteria; i.e., cost, safety and availability of material.

Working drawings are available from the Protection Division, B.C. Forest Service, Victoria, B.C. V8V 1X5. ■

Worried about the gasoline shortage? Put a tree in your tank, says Nobel Prize winner **Dr. Melvin Calvin**. Dr. Calvin was honoured in 1961 for his work in discovering the chemistry of photosynthesis. He believes that crude oil and gasoline may be produced easily from a gopher plant and its cousin, the Avoloz, which grow in California. These two plants are like the rubber tree—they produce hydrocarbons. Crude oil is mostly hydrocarbon. Scientists in Brazil already are using sugar cane to produce alcohol fuel for cars, and Dr. Calvin believes it will be only a matter of a few years before the U.S. turns to "gasoline trees" to replace dwindling stocks of fossil fuel.

### GASOLINE TREES





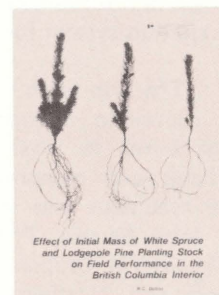
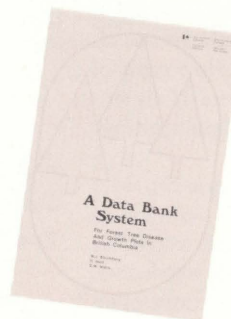
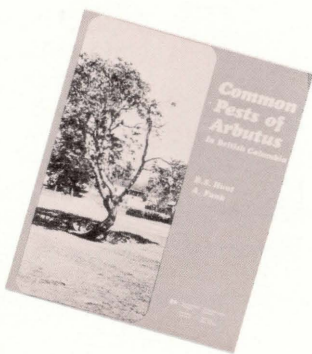
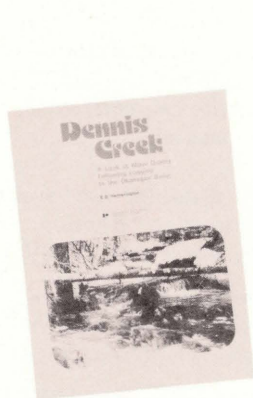
## New Publications

1. DENNIS CREEK - A look at water quality following logging in the Okanagan Basin. BC-X-147.

Author **Dr. Eugene Hetherington**, Pacific Forest Research Centre forest hydrologist, describes water quality of a high elevation tributary of Penticton Creek in the Okanagan Valley. With the exception of colour, values of all parameters remained well within desirable drinking water standard limits.

2. COMMON PESTS OF ARBUTUS -- FPL No. 63.

Authors, **Drs. Richard Hunt and Alvin Funk**, have produced an 8-page leaflet that describes a variety of ailments that affect the arbutus. Some controls are specified.



3. LARCH CASEBEARER--A FOLIAGE FEEDER. **Dr. D.A. Ross.**

Casebearer feeding has produced spectacular foliage discoloration in the larch forests of southern British Columbia during the past few years. This leaflet gives a brief description of the problem, damage and the work that the Canadian Forestry Service is doing to find satisfactory controls.

4. A DATA BANK SYSTEM--For Forest Tree Diseases and Growth Plots In British Columbia. BC-X-143. **W.J. Bloomberg, D. Hunt, G.W. Wallis.**

This report describes a system for rapid data retrieval by using standard formatting, sequential ordering and cross-indexing of data files. Procedures for using the system are described.

5. DOUGLAS-FIR BEETLE IN B.C. BCP 16. - **Dr. L.H. McMullen.** A four-page leaflet that describes the insect and lists recommendations for preventing and controlling damage. The publication was prepared for participants of special workshops conducted by the author.

6. ADVANCE AMABILIS-FIR REGENERATION IN THE VANCOUVER FOREST DISTRICT. BCFS/CFS Joint Report No. 5 by **L.J. Herring and D.E. Etheridge.**

The report describes a completed study of decay status and post-logging growth responses of advance amabilis-fir regeneration. Research results, together with other observations concerning the potential use of amabilis-fir as a restocking component is presented.

7. EFFECT OF INITIAL MASS OF WHITE SPRUCE AND LODGEPOLE PINE PLANTING STOCK ON FIELD PERFORMANCE IN THE BRITISH COLUMBIA INTERIOR. BC-X-149 **R.C. Dobbs.**

At the end of three growing seasons, survival, total height, height increment, stem diameter and dry mass were assessed and related to initial size class within each species and stock type. Generally, large seedlings

or transplants outperformed small seedlings. Seedlings on scarified plots outperformed those on untreated plots. Pine outperformed spruce.

8. THE BRITISH COLUMBIA PULP INDUSTRY: Present Importance and Future Growth. - BC-X-150, **Dr. G.H. Manning.**

World woodpulp demand increase about six percent per year. Analysis of the impact of this demand on B.C. forest resources indicates that this growth cannot be sustained under present utilization standard. ■

Copies of the above reports may be obtained by filling out the enclosed card and returning it to the Information Office PFRC - 506 W. Burnside Rd. Victoria, B.C. V8Z 1M5.

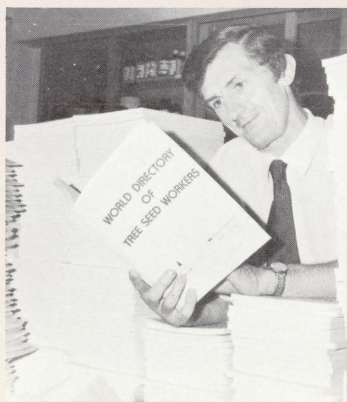


# JOURNAL ARTICLES OF INTEREST

Only limited copies of these reprints are available. Anyone wishing a copy should first contact their own library or the Journal cited, before directing a request to the Pacific Forest Research Centre.

- DYNAMICS AND SIMULATED YIELD OF DOUGLAS-FIR. Mitchell, Kenneth J. 1975. For. Sc. Vol. 21: No. 4: For. Sc. Monograph 17: 39 pp.
- A NEW TISSUE ESSENTIAL TO NECROPHYLACTIC PERIDERM FORMATION IN THE BARK OF FOUR CONIFERS. Mullick, D.B. 1975. Can. J. of Bot. Vol. 53: No. 21. pp. 2443-2457.
- BUD DEVELOPMENT IN SITKA SPRUCE. I. ANNUAL GROWTH CYCLE OF VEGETATIVE BUDS AND SHOOTS. Owens, John W. and Marje Molder. 1976. Can. J. of Bot. Vol. 54. No. 3 & 4. 1976.
- THE TOXIC EFFECTS OF FATTY ACIDS AND THEIR SALTS ON THE BALSAM WOOLLY APHID. Puritch, George S. 1975. Can. J. of For. Res. Vol. 5, No. 4.
- FUNGICIDE TREATMENT OF SEEDS FOR DAMPING-OFF CONTROL IN B.C. FOREST NURSERIES. Lock, W., Jack Sutherland and L.J. Sluggett. 1975. Tree Planters' Notes Vol. 26, No. 3.
- RELIABILITY OF ESTIMATING CLEAR-CUT AND UNCUT MATURE TIMBER AREAS USING LANDSAT IMAGERY. Lee, Y. Jim. 1976. Excerpt from the 3rd Can. Symposium on Remote Sensing. Edmonton, Alta.
- THE CANADIAN SOFTWOOD LUMBER INDUSTRY: A MODEL. Manning, Glenn H. 1975. Can. J. of For. Res. Vol. 5. No. 3.
- EFFECT OF WATER STRESS ON THE RATE OF NON-SUBERIZED IMPERVIOUS TISSUE FORMATION FOLLOWING WOUNDING IN ABIES GRANDIS. Puritch, George S. and D. Bir Mullick. 1975. Jour. of Exper. Bot. Vol. 26:(95): 903-910.
- PARKERELLA, A NEW GENUS OF CORONOPHORALES. Funk, A. 1976. Can. J. of Bot. 54(9): 868-871.
- FOMES ANNOSUS STUMP COLONIZATION AND FUNGUS DEVELOPMENT IN THE CALIFORNIA MIXED-CONIFER TYPES. Hunt, Richard S., Fields, W. Cobb, Jr., & John R. Parmeter, Jr. 1976. Can. J. of For. Res. Vol. 6(2): 159-165.
- FIELD EVALUATION OF ECOLOGICAL DIFFERENTIATION OF DWARF MISTLETOE ON SHORE PINE AND WESTERN HEMLOCK. Smith, R.B. & E.F. Wass. 1976. Can. J. of For. Res. Vol. 6(2): 225-228.
- A MODEL OF FOREGUT ACTIVITY IN THE BLOWFLY PHORMIA REGINA MEIGEN. III. ANALYSIS OF CROP-VALUE FUNCTION DURING THE CROP EMPTYING PROCESS. Thomson, A.J. and C.S. Holling. 1976. Can. J. of Zoology. Vol. 54(7): 1140-1142.
- GROWTH CHARACTERISTICS OF PHELLINUS (PORIA) WEIRII IN SOIL AND ON ROOT AND OTHER SURFACES. Wallis, G.W. 1976. Can. J. of For. Res. Vol. 6(2): 229-232.
- VERTICAL DISTRIBUTION OF ARMILLARIA MELLEAE RHIZOMORPHS IN SOIL. Morrison, D.J. 1976. Trans. Br. Mycol. Soc. 66(3): 393-399.
- BALANCE SHEET OF RECOVERED <sup>15</sup>N-LABELLED UREA IN A POT TRIAL WITH PSEUDOTSUGA MENZIESII. Marshall, V.G. and E.E. McMullan. 1976. Can. J. of Soil Science 56: 311-314.
- TETRACANTHELLA PACIFIC SP. N. (COLLEMBOLA: ISOTOMIDAE) FROM BRITISH COLUMBIA. Rusek, J. & V.G. Marshall. 1976. Can. Ent. Vol. 108: 759-765. ■

## World Directory of Tree Seed Workers



Dr. D.G.W. Edwards

More than 770 researchers are listed in a new directory of tree seed workers just issued by the Canadian Forestry Service in cooperation with the International Union of Forestry Research Organization.

The 134 page directory lists the names, addresses and special interests of scientists concerned with the many problems of seed production and procurement for reforestation and replenishment of the world's forest resource.

The compiler of the directory,

Dr. D.G.W. Edwards, Pacific Forest Research Centre silviculturist, said, the purpose of the directory was to encourage better communications between the hundreds of researchers that are involved in solving the perplexing tree seed problems. Representatives from more than 100 countries are listed.

Libraries may obtain copies of the directory by contacting Dr. D.G.W. Edwards at the Pacific Forest Research Centre, 506 West Burnside Road, Victoria, B.C. V8Z 1M5.





PFRC'S Al Funk and Howard Barker identify mushrooms for Victoria collectors.

## Mushroom Clinic

Helping people identify mushrooms is one of the more enjoyable tasks performed each Fall by **Dr. Al Funk**, a mycologist with the PFRC. Mycology is the study of fungi. Dr. Funk's regular work as a scientist is with fungi that attack trees. Mushrooms are fungi.

Dr. Funk assumed the role of helping save people from poisoning themselves when local expert **Dr. Adam Szczawinski**, curator of botany at the Provincial Museum, retired.

Unfortunately, there is no easy rule of thumb for separating lethal from edible mushrooms, according to Dr. Funk. Poisonous mushrooms all have white gills, but so do some of the edible ones. ■

## THE WORKSHOP

"It has to be one of the better methods of communicating with the practising forester", is the way **David Wallinger** described a recent forestry workshop. Webster describes the workshop as a meeting where emphasis is placed on free discussion.

Workshops have been used effectively during past years by Pacific Forest Research Centre researchers to describe a variety of ailments that affect B.C.'s vast forest resources. The workshops have also been used to encourage greater use of research results and to develop a better dialogue between researcher and user.

Recently the technique was used successfully to describe the impact of root rots on the young coniferous forests on the B.C. coast. **Drs. Gordon Wallis** and **Duncan Morrison**, PFRC forest pathologists, collaborated with the B.C. Forest Service and industrial companies to explain the seriousness of root rots and to discuss the various alternatives available for managing infected stands.

More than 230 forestry representatives--chief foresters, divisional foresters, rangers and forestry crews, attended the 13 one-day root rot workshops held at Cowichan Lake (7) Squamish (2) Woss (2) Alberni and Campbell River. Originally only seven workshops were scheduled, but once resource managers

were made aware of the seriousness of the problem, the organizers were asked to hold additional sessions to accommodate forestry crews.

Dr. Wallis said that there was excellent involvement by the participants, particularly field personnel who could see that root rots had a direct influence on spacing and thinning programs. In many cases foresters were unaware that their own stands were infected.

**Ross Macdonald**, PFRC Deputy Director and program manager responsible for insect and disease research said that because root rots are also a major problem in the Interior, particularly in the Kamloops and Nelson Forest Districts, similar workshops are scheduled for Interior forestry personnel.

In addition to the thirteen root rot sessions and the recent series of mountain pine beetle workshops, **Dr. Les McMullen**, PFRC entomologist, held workshops in Williams Lake and Kamloops that dealt with the continuing threat of the Douglas-fir bark beetle. Forest insect and disease specialists held a special workshop for Yalakum PSYU operators who were concerned with infestations of the spruce budworm, mountain pine beetle and the spruce beetle. ■

Field demonstration part of root rot workshop.

