

INFORMATION
FORESTRY

**NEW STUMP
TREATMENT**

(see page 6)

Canadian Forestry Service
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506 W. Burnside Rd.
Victoria, B.C.
V8Z 1M5.

Vol 4 No. 1
Summer 1977



Fisheries
and Environment
Canada

Forestry
Service

Pêches
et Environnement
Canada

Service
des forêts

Red Dogging A Smokeless Fire

'HANG OVER' fires, a perennial problem associated with fall slash burning may be a thing of the past. At least the threat of such fires can be significantly reduced with the introduction of an infrared fire detection system successfully tested, on an operational basis, by the PFRC fire research team of Bruce Lawson, Glen Robertson and

Bill Cave, in cooperation with BCFS protection officials.

Bruce Lawson, study leader, said the infrared system is a significant improvement in fire detection capability and is now operationally available to the forest industry and B.C. Forest Service in all regions of the province.

BEST CURE IS PREVENTION

"Hangovers" are a costly source of spring and summer fires that can be reduced through joint efforts by the industry and B.C. Forest Service to improve prevention and detection. Prevention of landing hangover fires can be aided by industrial operators doing a better job of piling and a more complete job of burning the piles in the fall. The key to prevention of fall landing burns hanging over into the spring is keeping the piles clean and free of duff and mineral soil which encourages long-duration smouldering combustion. "Chunking in" by machine while the piles are being burned will further improve completeness of combustion.



Good piling of slash on landing prior to burning. No duff and soil mixed with fuel to contribute to hangover potential.



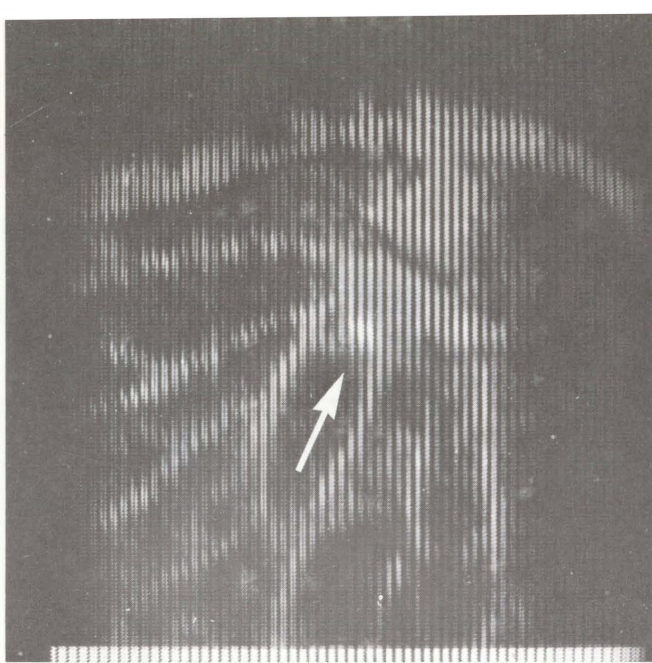
Poor piling to same pine fuel type. Duff and soil mixed with slash will favor smouldering over winter.

IMPROVED DETECTION WILL HELP

Even with improved burning practices, however, in some fuel types landing hangovers will still occur. This is where improved fire detection capability comes in. Hangovers can easily escape visual detection by airborne patrols as the hangovers are usually smokeless most of the time, even though they can quickly come to life in a hot windy afternoon and escape as a spreading wildfire through adjacent unburned slash or standing timber. Infrared scanners in the patrol aircraft can detect which landings are holding invisible fire and the responsible operators can be notified so they can take appropriate mop-up action before problems occur.

PROOF POSITIVE

Joint PFRC/BCFS operational tests in the Cariboo and Kamloops Forest Districts in 1977 found 54 'hot' landings that had escaped detection by ground crews. Using the AGA Thermovision System 680 infrared scanner in a Bell Jet Ranger, 35 hot spots were found in about 550 landings checked in the Chase, Kamloops and Merritt ranger



IR image of a hangover detected from a 300 m pass in helicopter with AGA thermovision. Hot area (white spot) is easily seen.



Standard photographic view of same landing. Burned pile at timber edge shows no smoke to the unaided eye, but it allowed to smoulder, could escape into adjacent timber as a wildfire.

districts. Eighteen 'hot' landings were found in the 450 landings checked in the Cariboo Forest District. The research team confirmed three hang over fires out of the 17 prescribed burns checked along with Ranger Staff in the Nelson Forest District on May 17.

The B.C. Forest Service has purchased one AGA system 750, and 6 Hughes Probeye 650 units - one for each forest district.

The 1977 operational tests were designed to prove the effectiveness of IR scanners for this particular fire management application, and to familiarize BCFS district staff with the new IR equipment.

PAST TRIALS

The PFRC fire research team participated by describing past tests that included operational IR trials in May 1976 with the B.C. Forest Service Protection Division, Victoria, and with the Cariboo and Kamloops Forest Districts. Several types of IR scanners were evaluated in several Ranger Districts surrounding Williams Lake and Kamloops. Use of scanners in both fixed-wing aircraft and helicopters was compared. The 1976 trials were successful. Few hangovers were detected on

the hundreds of landings checked, although one Williams Lake operator had nine hot landings out of the 100 checked in a complete surveillance flight of all landings burned. However, the importance of thoroughness of an IR surveillance program was pointed out to the researchers as a couple of landings not scanned in May did later escape to become wildfires.



Hughes Probeye 650 hand-held IR scanner.



AG 750 IR scanner in Bell G3 helicopter

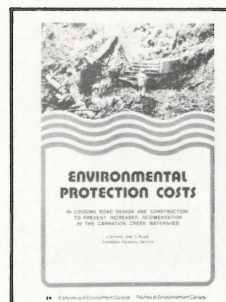
HELICOPTERS BEST

Use of the IR gear from helicopters was found to be superior to, although more expensive than, fixed-wing aircraft. One very small landing hot spot was missed in a fixed-wing IR pass but detected later with the IR gear helicopter mounted. The helicopter is superior because it can fly lower, slower and maneuver better in tight turns.

IR landing surveillance can be done by helicopter at reasonable cost, providing flight routes are carefully planned to minimize ferry time and a navigator with local knowledge and current maps takes charge. Costs on operations ranged from about \$6.00 per landing for flying time in the Cariboo District to \$8.00 per landing in the Kamloops District.

PFRC research and liaison in the application of IR to hangover fire detection will be completed this year. The industry and B.C. Forest Service now have a tool in their hands which has been shown to be effective. Better landing burning practices coupled with this new technique of detecting potential problems earlier than was possible before should save a substantial number of costly and damaging wildfires in the future. ■

New Publications



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1. **ENVIRONMENTAL PROTECTION COSTS -**
In Logging Road Design and Construction to Prevent Increased Sedimentation in the Carnation Creek Watershed.--J. Ottens and J. Rudd. BC-X-155--January, 1977.

The report states that although data gathered for the study was insufficient to determine definite relationships between sedimentation from logging road construction and damage prevention costs, the information and experience gained may serve to illustrate a possible approach to achieving least cost sedimentation prevention and the critical data gaps.

The publication will interest resource managers and other researchers.

2. **FOREST TREE SEED CERTIFICATION UNDER THE O.E.C.D. SCHEME**--British Columbia and the Yukon Territory.--R.F. Piesch. BC-X-156 Jan. 1977.

In 1970, the Canadian Forestry Service implemented the O.E.C.D. Scheme for the control of forest reproductive material moving in international trade. The report describes the O.E.C.D. Scheme and what certification involves. The value of seeds certified from 1970-75 is estimated at \$520,000.

3. **ANNUAL REPORTS. Forest Insect and Disease Conditions 1976 for the Yukon Territories and the six forest districts in British Columbia:**

Vancouver Forest District	BC-X-157
Nelson Forest District	BC-X-158
Kamloops Forest District	BC-X-159
Prince George Forest District	BC-X-160
Prince Rupert Forest District	BC-X-161
Cariboo Forest District	BC-X-162
Yukon Territory	BC-X-163

4. **FOREST PEST LEAFLETS**-- reprints

- No. 6 Cooley Spruce Gall Aphid--Colin Wood
- No. 12 Larch Sawfly--R.D. Erickson and D.A. Ross
- No. 14 Douglas-fir Beetle in British Columbia--L.H. McMullen
- No. 37 Stem Rusts of Pine in Western Canada--D.P. Lowe and W.G. Ziller
- No. 52 Lophodermium Needle Cast of Pines in Nurseries and Plantations--W.G. Ziller and R.S. Hunt.

5. **WORKSHOPS ON ROOT ROTS IN CONIFER STANDS**--G.W. Wallis and D.J. Morrison. BC-P-13. Feb. 1977.

The report describes the planning and execution of conducting a workshop. A workshop that considers the serious threat of root rots to British Columbia's forests and explains the results of research. Authors Wallis and Morrison held 13 workshops in coastal British Columbia in the first phase of a technology transfer program. The second phase will be held in the British Columbia interior in May and June.

6. **WESTERN SPRUCE BUDWORM ON DOUGLAS-FIR**--D.A. Ross. March, 1977.

An illustrated leaflet that describes a forest pest that is epidemic in Douglas-fir forests in the Vancouver and Kamloops Forest Districts in British Columbia.

7. **PESTICIDE PHYTOTOXICITY**--Studies with seeds, germinants and seedlings of British Columbia Conifers.--J. Sutherland, T.A.D. Woods. and S. Ilnytsky. BC-X-165. April, 1977.

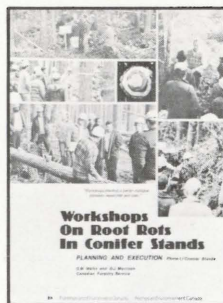
Greenhouse and field experiments were made to determine possible phytotoxic effects of a variety



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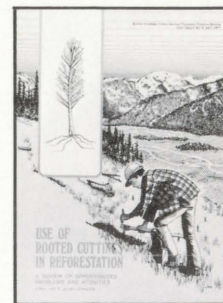
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of petroleum weed killers, insecticides and fungicides on the developing stages (seeds to seedlings) of Douglas-fir, Sitka spruce, white spruce, western hemlock and lodgepole pine. Results are summarized in a table.

8. **USE OF ROOTED CUTTINGS IN REFORESTATION.** A review of opportunities, problems and activities.--H. Brix and R. van den Driessche. Joint BCFS/CFS Report No. 6. April, 1977.

Interest in the use of rooted cuttings for reforestation has increased in many parts of the world. This report considers the opportunities and the disadvantages that must be considered. The authors provide a list of research studies required before long-term benefits and problems of using cuttings in reforestation can be fully evaluated. Ninety-five references are cited. This review and problem analysis is intended primarily for researchers, research managers and foresters concerned with reforestation and tree improvement in British Columbia. Copies of this report are available from both the B.C. Forest Service, Victoria and the Pacific Forest Research Centre, Victoria, B.C.

9. **FIRE WEATHER INDEX** - Special descriptive brochure on 35 mm slide - audio tape program-B.D. Lawson BC-P-17. See following article
10. **Ecoregions of the Yukon** - E.T. Oswald and J.P. Senyk BC-X-164 June 1977.

The report describes a reconnaissance level biophysical survey of the Yukon Territory. Well illustrated with colour and B & W photographs, the 150 page publication recognizes twenty-two ecoregions and describes the biophysical data that was collected during the survey or from literature reviewed. The primary feature used to segregate and describe the ecoregions was the vegetation on different landforms under a regional climate.

The authors commented that research of a more intensive nature is necessary to establish further and more detailed correlations. ■

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.



SPECIAL SOAPS CLEAN OUT BUGS

A PFRC scientist has discovered that soap is effective for controlling insects which damage trees. Dr. Puritch,

a tree physiologist, tested a variety of soaps and found that they were very successful in stopping the balsam woolly aphid, that attacks fir trees, and the spruce gall aphid which hit spruce and fir. The soaps were also effective on other types of aphids that attack roses and agriculture crops.

Dr. Puritch said it wasn't an ordinary household soap he used but a special pure soap that is not readily available. He found the fatty acids of

soap affect the nervous system of insects as well as their membranes. He began experimenting by combining fatty acids from a number of plants to produce soap. Some forms of soap were more effective than others, depending on the origin of the fatty acids.

He said, scientists between 1900 and 1930 had been working to produce insecticide soap but their work was discontinued in later years with the introduction of chemical controls. ■



Spray must be applied to new stumps

New Zinc Chloride Treatment

FALLERS AND FORESTRY CREWS USE NEW TREATMENT FOR PREVENTING ROOT ROT INFECTION.

A new zinc chloride treatment may be the answer to reducing the spread of root rot spores in young conifer stands in British Columbia, according to Dr. Duncan Morrison, a Pacific Forest Research Centre forest pathologist.

Dr. Morrison said zinc chloride is a fungicide that is successful in preventing stump infection by Fomes annosus, a fungus that helps rob British Columbia of \$35 million annually because of damage to second-growth stands in coastal British Columbia.

Powdered borax was used in the past to control stump infection by spores, but borax wasn't effective in wet weather. Three years of field testing has shown that zinc chloride, applied to the stump surface as a 10 per cent water solution, overcomes the disadvantage of borax by being effective in wet weather.

SPORES

Fresh stumps of most coastal species, except red and yellow cedar, are susceptible to infection by Fomes annosus spores. Spores from fruiting bodies travel for several miles and can be found in high numbers in the air throughout the year. Spores deposited on fresh stumps germinate and mycelium grows into and decays the stumps and roots. Once established, the fungus grows up to 30 inches per year through the wood. The disease spreads when infected roots come in contact with the roots of the second-growth trees.

Dr. Morrison said that the Control Products Section of Agriculture Canada has issued an experimental permit that allows the use of the zinc chloride as a stump protectant against Fomes annosus by the logging industry and the provincial Forest Service. The permit is granted for 1977 and will be renewed pending completion of the registration procedure. The quantity of zinc chloride used in 1977 must not exceed 800 lbs.

Use of the zinc chloride must be approved by the B.C. Interdepartmental Pesticide Committee.

DIRECTIONS FOR USE

Mix 1 lb. of zinc chloride crystals in 1 gal. of water (1 kg/10 l); add rhodamine b. dye. Store in plastic container. For the prevention of stump infection of conifers (Douglas fir, spruce, abies spp. Pine spp. hemlock) by Fomes annosus, wet the cut surface and any exposed area on the stump sides, with solution as soon as possible, preferably immediately, after cutting. Apply solution using a plastic squeeze bottle or pressure sprayer.

Regulations state that a descriptive label, as approved by the Pest Control Products Act, must be attached to containers of the treating solution. Labels are available from the Pacific Forest Research Centre, 506 West Burnside Road, Victoria, B.C. V8Z 1M5. Scientists at the Centre would like to monitor the use of the treatment, and as a result, are prepared to supply labels and any further information if required. ■

The Canadian fire danger system used by forest agencies in British Columbia is the subject of a new 35mm slide-audio tape program prepared by the Fire Research Group of the Pacific Forest Research Centre.

Bruce Lawson, fire research officer, said the presentation is designed to improve the understanding of the basis for fire danger rating in British Columbia. The Canadian Forest Fire Weather Index was introduced by the Canadian Forestry Service in 1969-70, as a stage in an on-going development program of a Canadian Forest Fire Danger Rating System.

The British Columbia Forest Service has applied the Index, along with the other CFS guides in fire behaviour and fire use, in a package of fire management decision aids.

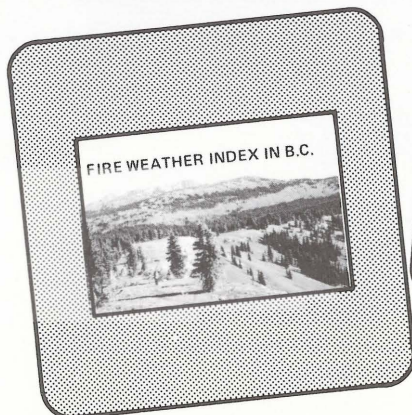
The slide-tape program introduces the basic components of these fire management decision aids, with particular emphasis on the Fire Weather Index, for students and fire managers who will be taking additional training courses or who want a simplified overview of the material.



The presentation is available in four short sections with a total running time of 55 minutes.

Section 1. Scope of Canadian Forest

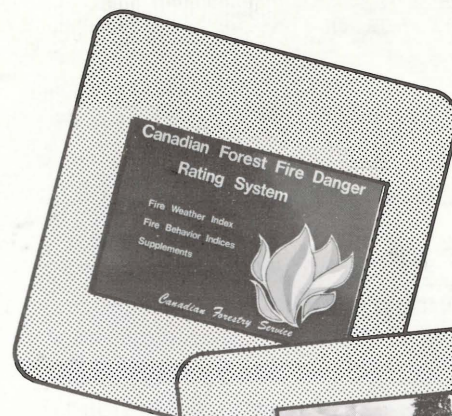
Pictures Tell The Tale



Fire Danger Rating System; Moisture Codes of the Fire Weather Index.

2. Fire behaviour components of the Fire Weather Index.
3. Fire Weather Index as a fire danger index.
4. Guides for site-specific fire management decisions, including Wildfire Behaviour Indices and Prescribed Fire Predictor.

The cassette tapes have a 1000 hz signal recorded on one track and the text on the other track, so that automatic slide changing projectors can be used in conjunction with compatible tape players.



Copies of the slide tape presentation have been placed in offices of the B.C. Forest Service District Foresters at Kamloops, Nelson, Vancouver, Prince Rupert, Prince George, and Cariboo.

Limited copies are available on a loan basis, from the Pacific Forest Research Centre, 506 West Burnside Road, Victoria, B.C. V8Z 1M5.

A special illustrated publication has been prepared for individuals unable to take advantage of the slide tape program, or those wanting a permanent record for further reference. The publication (BC-P-17) contains illustrations of the slides and a description narration. Copies are available in quantity from the Pacific Forest Research Centre. ■

SHOULD B.C. FORESTERS BE USING ROOTED CUTTINGS FOR PRODUCTION REFORESTATION?

It's questionable at this time according to PFRC's Dr. Holger Brix and B.C. Forest Service researcher, Dr. Robert van den Driessche, co-authors of a review that considered the opportunities and problems associated with the use of rooted cuttings for reforestation in British Columbia.

The interest in using rooted cuttings for outplanting stock has increased in many parts of the world. In Japan, rooted cuttings have been used extensively since about 1400. In 1966/67 Japan planted over 120 million rooted cuttings in their reforestation program. The practice of using cuttings is expanding in other countries like Germany, and in New Zealand, Finland, Denmark, and the United States considerable research on the subject is underway.

The lack of existing information on the performance of British Columbia species, is the biggest drawback to implementing the technique in this province, according to the authors. They stated that several important questions must be answered before any large scale rooted cutting reforestation programs are undertaken.

BENEFITS

Rooted cuttings can be used in reforestation to supplement scarce seed supplies and as a means of tree improvement. The authors stated that seed shortages may justify the use of cuttings on a short-term basis. However, the cost of producing rooted cuttings is likely to remain considerably higher than it is for seedlings--lowest estimate is 30 per cent higher on a mass production scale.

Using cuttings for tree improvement has the advantage that they retain all genetic qualities. Also an advantage is that genetically improved stock can be mass propagated and utilized quickly. It was calculated that one Douglas-fir seedling can produce ½ million cuttings in 5 years. This compares

Rooted Cuttings



Holger Brix tests success of rooted hemlock cutting.

with the 15 years it takes before commercial quantities of seeds can be produced in a seed orchard.

Drs. Brix and van den Driessche said that high priority must be assigned to studies of heritability, which will also be needed for evaluating other aspects of tree improvement programs. Clones produced by cuttings can produce a genetically more uniform population which, in addition to having growth superiority, may have advantage in wood utilization.

DISADVANTAGES

Disadvantages associated with using rooted cuttings in addition to higher costs, include poor or inconsistent rooting potential for many species with all but very young parents, and inherent poor growth and form may result when cuttings are taken from trees beyond the juvenile stage.

Opportunities for successfully using rooted cuttings in reforestation are present, but lack of knowledge dictates caution. Much research is needed before more than small pilot-scale outplanting trials should be considered. ■

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.

JOURNAL ARTICLES OF INTEREST

- MYCORRHIZAE-PLANT RELATIONSHIPS. Dangerfield, J.A. 1977. Proc. of the Intern. Plant Propagators Soc. Vol. 25. pp. 105-111.
- ASSESSMENT OF THE IMPACT OF PHEROMONE-BAITED TREES ON A SPRUCE BEETLE POPULATION (Coleoptera: Scolytidae). Dyer, E.D.A. and L. Safranyik 1977. Can. Ent. 109: pp. 77-80.
- EVALUATION OF CHEMICALLY CONTROLLING THE COLLEMBOLAN *Bourletiella hortensis* ON GERMINATING SITKA SPRUCE AND WESTERN HEMLOCK IN THE NURSERY. Marshall, V.G. and S. Illytzyk 1976. Can. J. For. Res. Vol. 6(4): pp. 467-474.
- TERRAIN ANALYSIS FROM LANDSAT IMAGERY. Oswald, 1976. The For. Chron. Vol. 52(6): pp. 274-282.