canusa
Canada
United States
Spruce Budworms
Program

Newsletter

NUMBER 23, JULY 1982

## Effects of Western Spruce Budworm on Douglas-Fir Growth

Evaluating western spruce budworm impact on trees that are defoliated, but not killed, is complex and must be based on estimates of the reduction in quantity and quality of stemwood that results from budworm feeding. At the Pacific Forest Research Centre, Victoria, British Columbia, we are investigating the reduction in radial growth over the bole of the tree, and the height and volume growth losses in relation to defoliation level.

As a consequence of oviposition, larval dispersal, and feeding behavior, spruce budworm defoliation is most severe at the top of the tree. Terminal buds are destroyed, thus nullifying the height growth and ultimately causing dieback of internodes (top-kill) formed before the start of the outbreak.

Trees of merchantable size show little loss in volume due to top-kill because the dead top usually remains above the merchantable height. The associated radial losses are significant, however. In young trees, top damage is carried over for many years after the infestation has collapsed. The magnitude of its effect, in terms of height and volume losses, depends on whether during the recovery period a defect is produced that will affect the merchantability of the stem. In some trees the dead top breaks off, the wound heals over, and a new top develops. Years later, this top may not be noticeably different from the undamaged portions grown before the infestation. In other cases, a large visible defect develops, often with multiple tops that may render useless any stem growth above the point of injury (fig. 1).

We have not yet established the relationship of defect development to length and diameter of the killed portion, the type of recovery, genetic characteristics, or age and physiological state of the tree. Trees recovering from a large top-kill, where a significant portion of the crown has been killed, nearly always develop a defect, mainly because the diameter of the dead spike is too big and the process of healing may take many years. More commonly, the top-kill will be only 1 or 2 m (3 to 6 ft), and formation of a defect depends more on the type of recovery from the injury. For example, new height growth developed from adventitious buds set on the main stem (fig. 2) is more likely to develop into straight stems than terminals developed from branch-borne buds or from lateral branches that turn up to regain dominance (fig. 3).

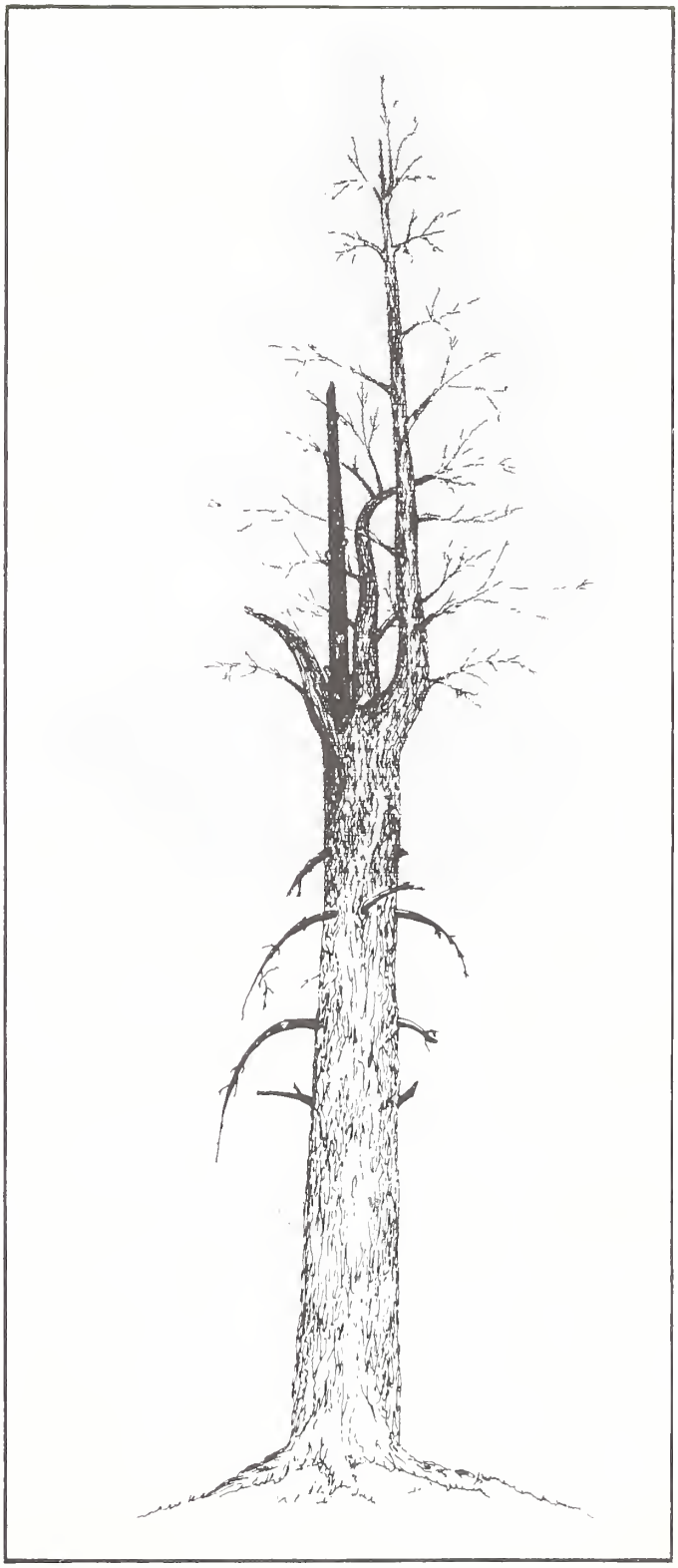

*Figure 1. Diagram of a tree whose severe top-kill has truncated the merchantable height of the tree.*

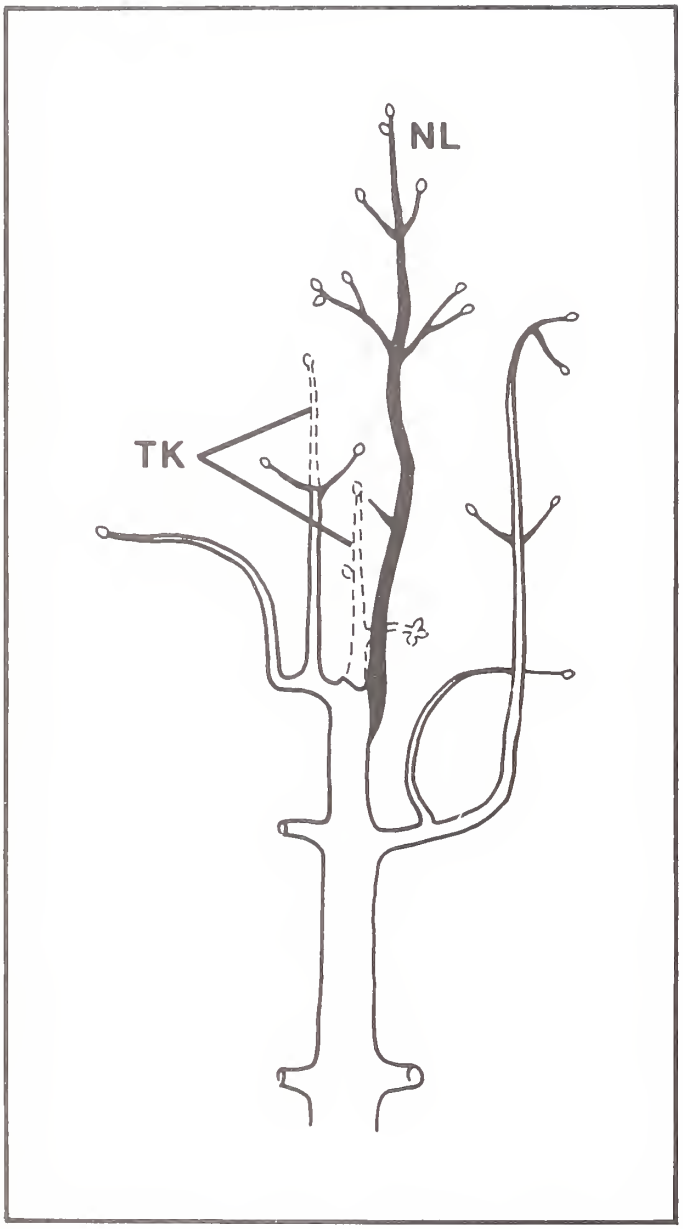


*Figure 2. Diagram of a top-killed (TK) Douglas-fir crown showing a new terminal (NL) developing from an adventitious bud that originated in the main stem of the tree, just below the damaged top.*

In the absence of a whole-stem analysis, tree volume is generally estimated from an equation in which volume is expressed as a function of variables, including height and diameter. This volume equation is actually a reflection of bole form. The stem form of budworm-attacked trees, in which height growth has ceased or lessened due to dieback while the radius is slowly increasing, probably differs from the stem form of unattacked trees.

To measure this change in form, we compared actual volumes of trees sectioned and subjected to thorough stem analysis with volumes estimated using the British Columbia Ministry of Forests volume equation for Douglas-fir applied to the corresponding height and d.b.h. values. Figure 4 shows the ratio of actual volume to estimated volume over the course of the growth of a sample tree that had experienced four budworm outbreaks.

The volume equation closely estimates actual volume as indicated by the ratio close to 1.0, until the time of the first outbreak. At that point, the ratio departs drastically from unity — a factor that suggests that trees have more volume for a given height and diameter than predicted from the equation. After the outbreak, the ratio can be observed to stabilize, and when the second outbreak occurs, a further departure results. The third and fourth outbreaks do not change the ratio significantly. After the final outbreak, the actual volume may exceed the estimated volume by more than 30 percent.

When the same analysis is performed on "potential trees" — trees whose reduced height and radial increment were extrapolated to an estimated "normal" — a much better fit at all ages is found, although the fit is not yet fully satisfactory in all cases. However, both actual and potential volumes include allowances for dieback effects based solely on a preliminary analysis of our data set. When we have fully analyzed the dieback and recovery patterns, we hope to clarify the relationship of the volume ratio to outbreak incidence, and also to improve our estimation of potential growth.

At the present time the analysis clearly indicates two important points:

1) Impact estimates based on volume equations must allow for modification of the equations in budworm-attacked stands.

2) Estimation of the effect of the budworm on form and volume equations, and development of fully satisfactory potential growth estimates will be possible only after detailed study of dieback and height growth recovery patterns.

The above discussion considered only gross volume; economic impact is based on merchantable volume. Apart from the volume losses caused by reduction in growth, the value of a stem can be further reduced, as discussed earlier, by the presence of defects such as creases containing buried dead tops, crooks, and forked tops. This reduction in merchantable value must be considered in relation to the operability limit for the stand: the lowest merchantable value below which the stand cannot be economically harvested. If the cumulative effect of budworm outbreaks in a stand reduces merchantability below the operability limit, the budworm has essentially removed that stand from the harvest schedule, and effectively destroyed the entire volume of the stand.

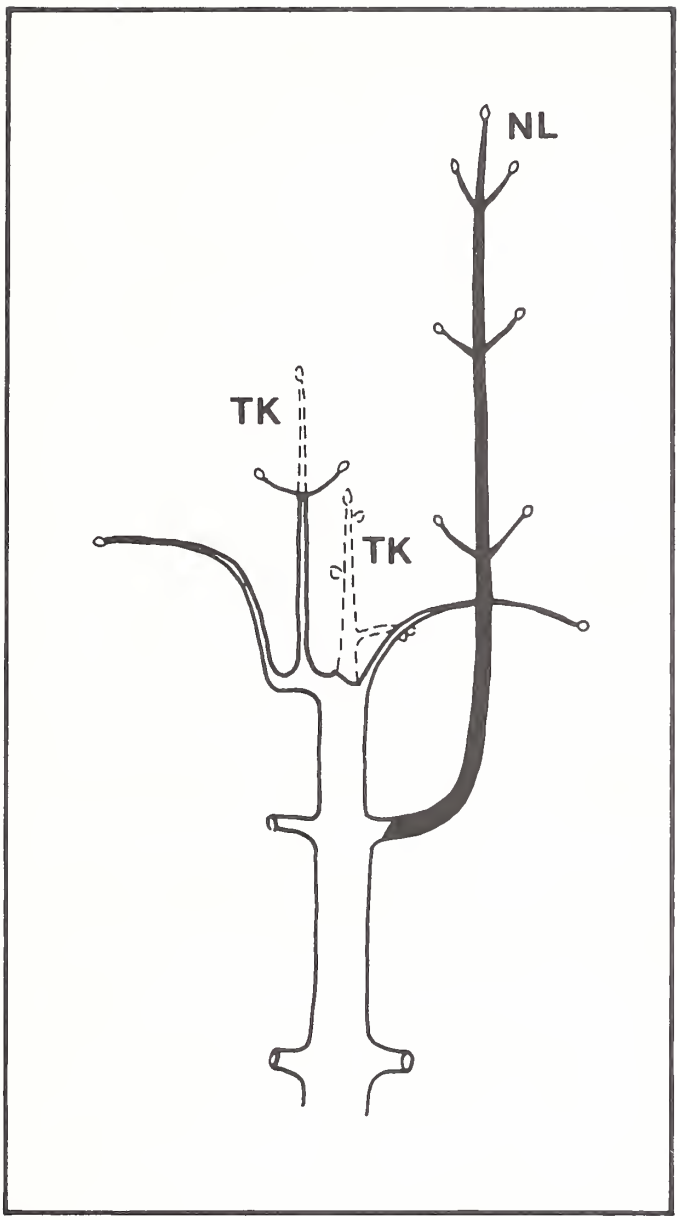


*Figure 3. Diagram of a top-killed (TK) Douglas-fir crown showing a new terminal (NL) developing from a lateral branch that turned up to regain apical dominance.*

Our studies, therefore, include intensive stem analyses to provide us with a detailed understanding of the process of growth reduction and recovery. By combining these with extensive surveys, we will evaluate the relative frequency of different damage types to ultimately analyze budworm impact in the context of stand merchantability and operability. Further, we will show how budworm attack increases the frequency and intensity of tree sampling requirements for growth and yield estimation.

*A.J. Thomson,*
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**In-Flight Microencapsulation: A Novel Approach to Assess Biologically Active Spray Deposits in Forest Pest Control Operations**

To improve efficiency of pesticide sprays, we need to optimize formulation and application techniques, reduce volume to be sprayed, and increase target contact. It is crucial, therefore, to develop target-specific methods of pesticide application so that target contact can be maximized with minimum contamination of nontarget surfaces. The essential steps are (1) define the biological target, (2) determine the mode of pesticide entry, (3) assess the target-specific drop sizes, (4) evaluate the number of drops required for lethal dose, and (5) deliver those drop sizes in the right numbers under field conditions. To achieve this, the measurement of foliar droplets and concentrations is of paramount importance.

A field study was carried out in 1981 by Forest Pest Management Institute scientists to measure foliar drop size spectrum, number of drops, and mass of deposits on spruce foliage. The medium used contained ingredients that mimicked the fenitrothion concentration in the water-based emulsion formulation currently used in New Brunswick for spruce budworm control. The spray was released twice over a plantation forest in Ontario under almost still air conditions, with each spraying at 0.210 kg AI eq/1.5L/ha, using a Cessna 188 aircraft fitted with four Micronair® atomizer units. The spray underwent partial evaporation in flight, so the liquid droplets were microencapsulated before they hit the foliage. The formulation ingredients were so controlled that the polymer wall of the droplets became a soft and tacky, permitting the encapsulated spheres to stick to the foliage. Because spreading and penetration did not occur, the spheres stayed intact for quite a while on the foliage. This phenomenon made accurate droplet assessment feasible. The encapsulation medium facilitated droplet assessment and quantitative solvent extraction of the spheres from the foliage. Droplets were counted and sized, using microscopes under 40 X, 100 X, or 200 X magnification. Mass of the deposits was determined by

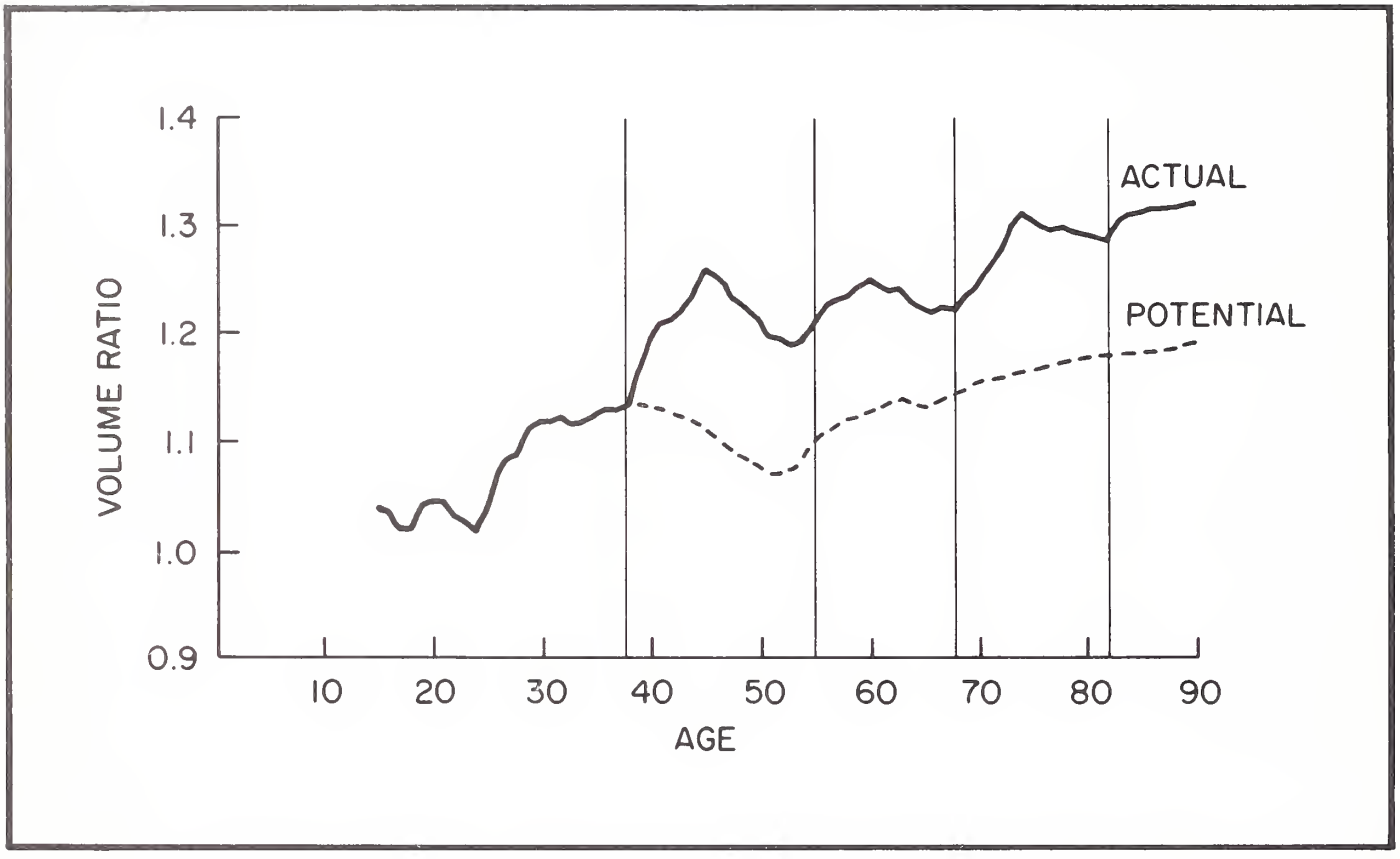


*Figure 4. Ratio of observed volume, obtained by stem analysis, to volume expected from the British Columbia Ministry of Forests equation, for each year of a tree's growth from age 15.*

colorimetry of the tracer dye, Rhodamine B, added to the formulation before spraying. Foliar surface area was determined by measuring the length and cross-section area of the spruce needles used in the droplet assessment. This step aided the evaluation of droplet and deposit data per unit surface area of foliage.

The study, under the conditions of formulation and spray application, provided the following findings:

1. Droplets that impinged on the spruce foliage were generally small in spite of the presence of significant amounts of large droplets in the emitted spray.
2. About 50 percent of the droplets that impacted on the foliage were smaller than 40 microns and 85 percent were smaller than 75 microns.
3. Out of the total spray mass deposited on the foliage, only 5 percent were in drop sizes smaller than 40 microns, and 25 percent were in sizes smaller than 75 microns.
4. The data showed that about 75 percent of the spray mass deposited on the foliage contributed only 15 percent of the droplets, indicating inefficient coverage of the target surface. Obviously, we need to improve current spray atomization techniques to produce target-specific drop sizes necessary for controlled droplet application.
5. The average number of droplets observed on foliage was low, about 0.4/needle.
6. The average number of droplets observed per unit area of foliage was also low - 1.1 drop/$cm^2$.
7. The data indicated that the released spray cloud consisted of large droplets that tended to impact on target by gravity, and consequently contributed little to the target dose.
8. The data also indicated that under almost zero wind-speed conditions, spray applications hit the foliage mainly because of gravity. This causes inefficient impaction of the extremely small droplets that are probably produced during atomization. The low number of droplets observed on the foliage could have resulted from this effect.

The above findings show that further research is needed to develop better ways of spray formulation, atomization, and application.

*A. Sundaram* — Research Scientist
Forest Pest Management Institute
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## CANUSANS at the Western Forest Insect Work Conference

This year's Western Forest Insect Work Conference, held the first week in March at Missoula, Montana, featured a CANUSA Update Workshop moderated by the Program's insect modeler, Kathy Sheehan. Speakers included Nilima Srivastava (Pacific Northwest Forest and Range Experiment Station, Corvallis, Oregon), Al Stage (Intermountain Forest and Range Experiment Station (INT), Moscow, Idaho), Bill Kemp (University of Idaho, Moscow), and Kathy herself. Other CANUSA cooperators spoke at different times during the conference, and in general the audiences showed greater interest in western spruce budworm research this year.

Nilima Srivastava began by describing sampling methods for fourth-instar larvae, which she has developed with Roy Beckwith, Bob Campbell, and Torgy Torgersen. Their crews sampled Douglas-firs and grand firs, primarily in the 7- to 14-m (23- to 46-ft) range, in north-central Washington, central Idaho, eastern Oregon, and western Montana. Within trees, larvae occurred in a consistent vertical pattern, and density on midcrown terminal tips was a good predictor of whole branch density for each crown third. Using a foliage surface area ratio for the crown thirds, Nilima's team found that midcrown terminal tip density could be used to predict whole tree density. Equations derived from tips and branches of trees in this size range successfully predicted density on whole branches from 20- to 30-m (66- to 99-ft) trees. No differences were noted between hosts.

Al Stage reviewed work on the effects of budworm feeding on host trees. Long-range and indirect effects will be evaluated by analyses that use models of affected trees and stands. Separate (though coordinated) studies are measuring effects on: radial increment along the bole, height increment, and top-killing of pole-sized and larger trees; height increment of seedlings and saplings; and subsequent production of buds (vegetative and reproductive) and new foliage. Difficulties posed by long duration of defoliation are being overcome by relating growth and bud production to quantity and condition of remaining foliage rather than to proportion of missing foliage. Photographs of rated examples of defoliation are being prepared to help standardize field operations.

Bill Kemp summarized work done on the influence of weather on the budworm. The importance of incorporating weather into any insect population dynamics work was discussed. Weather can be incorporated into population dynamics models through actual daily observations or through simulations. Daily minimum and maximum temperatures and precipitation may be calculated by a stochastic weather simulator. Budworm and host phenology submodels were also discussed. These models use daily maximum and minimum temperatures to predict synchrony between host and budworm and their developmental rates. Activities currently underway include verification of individual growth models and simulation of developmental variability in both insect and host.

Kathy Sheehan discussed the budworm population model, which will be used in conjunction with the stand prognosis model of Stage and others to predict effects of defoliation by budworm on stand growth and yield. The model has two components: BWFLY, which covers budworms from emergence as adults to oviposition of eggs, and BWMOD, which follows them from egg hatch to adult emergence. Results from many research projects will be integrated into this model. A description of the combined stand prognosis/western spruce budworm model is available from the CANUSA-West office in Portland.

A number of other Program-supported researchers spoke at the Work Conference. Tom Bible (Oregon State University, Corvallis) moderated a panel discussion on the economics of pest management. Bob Campbell (PNW, Corvallis) participated in a workshop on current management strategies for western spruce budworm, moderated by Clint Carlson of the Intermountain Station unit in Missoula. Clint also gave a talk during the panel discussion on silvicultural management of forest insects. Nick Crookston (INT, Moscow, Idaho) participated in a workshop on the use of computer models in pest management. Karel Stoszek (University of Idaho, Moscow) gave a talk during the workshop on hazard-rating systems. Dave Fellin (INT, Missoula) and Al Stage made presentations during the workshop on evaluating treatment effects. CANUSA's silviculturist in Forest Service Region 1, Bill Wulf, moderated that discussion.

## Technology Transfer Workshops in Michigan

CANUSA cooperators Chuck Olson and John Witter, both of the University of Michigan, conducted two identical workshops in Sault Ste. Marie and Norway, Michigan, during April. Lisa Bergelin and Patricia Sacks assisted them in presenting the sessions, entitled Spruce Budworm Risk Rating with 35-mm Air Photos. The talks were intended for practicing foresters in the Lake States area who deal with budworm-damaged stands or susceptible forest stands.

The workshops emphasized the principles of obtaining and interpreting 35-mm color aerial photos for damage assessment and risk rating spruce-fir stands under Lake States conditions. These workshops were the result of CANUSA-sponsored research on budworm impacts in that area and were part of a major technology transfer effort codirected by Witter and Gary Simmons, of Michigan State University.

In covering these seminars for CANUSA-East's "Dear Colleague Letter," Dave Grimble advised readers that Witter and Olson would be willing to bring their show to Maine if the idea generates sufficient interest among forest managers there. Newsletter readers who would like to see the sessions repeated in Maine should contact Program Management in Broomall (215-461-3017). Jerry Williams, of International Paper Company, attended the workshop in Norway and would be a good source of information for Maine residents.

**Spring Meeting of the Eastern Spruce Budworm Council**

The Eastern Spruce Budworm Council held its spring meeting April 13-14, 1982, in Fredericton, New Brunswick, with Don Eldridge, Deputy Minister, Department of Lands and Forests, Nova Scotia, in the chair. Representatives from Newfoundland, Nova Scotia, New Brunswick, Maine, Quebec, Ontario, the USDA Forest Service, and the Canadian Forestry Service were present. A reception and a luncheon were provided by the host, the Department of Natural Resources, New Brunswick.

Each jurisdiction presented a budworm status report and a projection of suppression plans for the 1982 budworm season. Control operations will cover approximately the same total area as in 1981. A report covering the intensity of budworm infestation has already been published in the *Newsletter* (Number 21, March 1982). The Council acknowledged the representation of the USDA Forest Service, now a formal member, and anticipated continued mutual benefits from the association.

Reports of the standardization, spray technology, environmental, and health committees were presented for discussion, with considerable emphasis on revitalizing the health committee. A CANUSA update was also provided.

The Council approved the Chairmanship of Hal Stanley, Deputy Minister, Department of Resources and Lands, Newfoundland, for the 1982-83 term, and Jean-Claude Mercier as the Chairman-elect for 1983-84. Both plan to attend the Joint Policy and Program Council meeting in Sault Ste. Marie, Ontario, August 18-19, 1982.

**Symposium on Environmental Monitoring**

On April 20 and 21, 1982, at Edmonton, Alberta, the Alberta Society of Professional Biologists hosted the sixth annual symposium dealing with current topics of concern to the biology community. The topic was Environmental Monitoring. Previous topics were Environmental Impact Assessment (1977); Biology, Science Policy, and the Public (1978); Biological Issues in Energy Development (1979); Environmental Management Strategies: Past, Present, and Future (1980); and Biological and Social Issues in Water Management (1981).

The recent symposium examined the question of why environmental monitoring is required, its design basis, practical aspects of conducting it, the results of existing programs, and the value of biomonitoring. The symposium featured four major sessions: Perspectives, from the standpoints of the public, the research community, and the regulatory agencies; Concepts and Philosophy - terrestrial, aquatic, and atmospheric; Application and Design relative to statistical consideration, monitoring networks, and biomonitoring; and Results as exemplified by a case history. An Oxford-style debate (Resolved: Biomonitoring is an environmentalist boondoggle) enlivened the final afternoon and ensured a full-house audience. It was refreshing to note that, in spite of the seriousness of the symposium topic, the participating biologists could see the humorous side of their natures and ideals. The symposium was well-balanced and presented the topic in an organized and enlightened manner.

Proceedings of the Symposium on Environmental Monitoring (1982) as well as the previous five symposia have been published. For further information, write

The Secretary
Alberta Society of Professional Biologists
P.O. Box 566, Edmonton, Alberta
T5J 2K8

or telephone Don Thompson, Secretary, (403) 429-9110.

**Report of the Annual General Meeting of the NRC Associate Committee on Agricultural and Forestry Aviation**

The National Research Council (NRC) Associate Committee on Agricultural and Forestry Aviation (ACAFA) held its annual general meeting April 27 and 28, 1982, at the National Aeronautical Establishment at Uplands Air Centre, Ottawa. Representatives from Agriculture Canada, Canadian Forestry Service, NRC, Transport Canada, the aviation industry, and Provincial resource and environmental agencies were present. Bob Taylor, Bill Varty, "Bud" Irving, and Chuck Buckner, all involved in the CANUSA Program, participated in the discussions which covered such wide-ranging topics as herbicide application and usage, regulations governing pesticide applicators, the medical aspects of aerial spraying, and recent research developments. Bob Taylor provided a synopsis of the acts of the various Federal and Provincial governments pertaining to pesticide application, and a taping of a recent radio broadcast documentary that expressed concerns about aerial spraying for budworms. Considerable time was spent planning the proposed symposium to take place in Saskatoon, Saskatchewan, in October 1983.

**Toxic Chemicals Management Centre: Toxic Chemicals Workshop**

The Toxic Chemicals Management Centre of Environment Canada's Environmental Protection Service (EPS) sponsored a 2-day workshop for Environmental Non-Government Organizations (ENGO), May 3-4, 1982, in Ottawa. The spruce budworm control operation in New Brunswick was the focus for discussion for half of one morning. Elizabeth May of the Cape Breton Landowners Association, and Cathy Richards, of Concerned Parents, presented the position paper for ENGO. Errol Caldwell (Agriculture Canada), Claire Franklin (Canada National Health and Welfare), Rod MacDonald (EPS), and Chuck Buckner (CANUSA Program) responded. Several of the major recommendations presented in the ENGO brief could not be met for practical reasons. The participants agreed that the meeting was worthwhile and opened the door for further discussions.

**Easterners, Send Dan Your Dead Bugs**

Dan Jennings, father of the *Spruce Budworms Bibliography* and researcher at the Northeastern Forest Experiment Station in Orono, Maine, is compiling a list of known predators of the spruce budworm. Although numerous predators have already been identified — including spiders, ants, and coccinellid and ground beetles — Dan needs the help of *Newsletter* readers in making the list more complete.

When you see predators feeding on budworm eggs, larvae, pupae, or adults in the field, please take a few extra minutes to collect these predators along with their prey, and send them to Dan. Softbodied specimens, such as spiders, should be preserved in vials containing 70- to 80-percent ethanol. Beetles and dragonflies should be pinned or shipped fresh.

Please include data labels with date, locality, prey life stage, host tree (balsam fir, white spruce, etc.), and collector. All contributions will be acknowledged, and eventually this information will find its way into the USDA Agriculture Handbook that Dan is writing on this subject for CANUSA-East.

Send specimens and information to Daniel T. Jennings, Northeastern Forest Experiment Station, USDA Building, University of Maine, Orono, ME 04469.

**"Worm Gun" Aids Toxicologists**

What size spray droplet is required to kill a spruce budworm larva? This question posed a challenge to insect toxicologists at the Forest Pest Management Institute and to spray physicists at the National Research Council's National Aeronautical Establishment. Scientists at the latter responded by devising a droplet generator capable of producing a single droplet of any given formulation to specifications from 300 microns to 30 microns. Tested at 80 microns the "worm gun," as the scientists have dubbed it, is capable of hitting a fifth-instar larva on every "shot." This gives us a means of measuring droplet contact toxicity of insecticides to a very fine level of accuracy and provides a scientific basis for prescriptions of spray cloud characteristics. It also provides one more piece in the puzzle of improving efficacy of spray technology.

**FRASS Newsletter**

Economists tell us there is no free lunch. But if you need to feed laboratory-reared insects, you might want to subscribe to the free newsletter known as *FRASS*. It was created in 1975, to encourage communication and cooperation between scientists who culture or use lab-reared insects in their research.

Typical issues have included descriptions of rearing methods, inquiries and comments from readers, a rearing-materials exchange, an update on current sources and costs of standard rearing materials, employment ads, and an annual list of subscribers.

*FRASS* is published twice a year and sent to approximately 700 subscribers in 25 countries. To subscribe, write R.E. Wheeler at the address given below.

Most of the material in *FRASS* is printed as submitted, which keeps editorial and production costs down. However, this situation puts pressure on contributors to keep their writing concise and accurate. If you would like to submit an article or news item for publication, send it to the regional coordinator nearest you:

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David Akey is the editor for 1982.

**New Quarterly Newsletter Announced**

G.W. Green, Director of the Forest Pest Management Institute, announces the publication of a quarterly FPMI *Newsletter*. It is designed for people involved in the specialized field of forest pest control, with the object of providing readers with recent developments in pesticide research, registration, legislation, and use. Each issue will feature a topical lead article, highlights of recent and planned research in pest management, timely briefs by FPMI scientists and cooperators, and news items extracted from various current sources. Volume 1, Number 1 was published in March 1982, and the planned publication dates are March, June, September, and December. To be included on the mailing list, contact.

Information Services
Forest Pest Management Institute
Canadian Forestry Service
1219 Queen St.E., P.O. Box 490
Sault Ste. Marie, Ont. P6A 5M7

**Membership Changes on the Joint Policy and Program Council**

As of July 1, 1982, Carl H. Winget, Director General, Research and Technical Services, Canadian Forestry Service replaced James H. Cayford as Cochairman of the Joint Policy and Program Council. Jim will remain as advisor until Carl becomes familiar with the duties and personnel associated with his new post.

In April 1982, Hal Stanley replaced Don Eldridge as Chairman of the Eastern Spruce Budworm Council, and consequently becomes the ESBC representative on the JPPC.

**Addendum**

In the May 1982 issue, in the article Controlling Spruce Budworm on Seed Trees by W.H. Fogal, readers were asked to contact G.M. Howse at GLFRC, Sault Ste. Marie, Ontario, if they wanted more information on aerial application of insecticides to seed production areas. We have since been advised by the author of the article that J.R. Carrow, Pest Control Section, Ontario Ministry of Natural Resources, Maple, Ont. L0J 1E0, can also be contacted for the same information.

**Erratum**

In the January 1982 issue, we incorrectly identified CANUSA-West's new insect modeler as Kathleen Sheehan. Kathy is, of course, Katherine. The real "Kathleen" in this story is Kathleen Resburg, Program secretary in the Portland office.

*Figure 5. Carl Winget, newly appointed as Director General, Research and Technical Services, Canadian Forestry Service, Ottawa.*

**Personnel**

Jim Cayford, who has been Acting Director General, Research and Technical Services at the Headquarters of the Canadian Forestry Service, has now returned to his post as Director of the Great Lakes Forest Research Centre at Sault Ste. Marie, Ontario. During his 2-year tenure in Ottawa, Jim was a sympathetic supporter of the CANUSA Program and was able to effectively assist in the financial upgrading of a number of important program elements. The entire CANUSA Program thanks you, Jim, for your active participation in CANUSA affairs. Besides presiding as cochairman of the Joint Policy and Program Council of the CANUSA senior management, Jim also led the CFS delegation to the Eastern Spruce Budworm Council. In his capacity as Director, GLFRC, he will still be influential in spruce budworm activities. We look forward to your continued association with the Program, Jim.

Carl Winget, formerly Director of the Laurentian Forest Research Centre, Ste. Foy, Quebec, is Jim's replacement as Director General, Research and Technical Services. Carl is no stranger to "budwormology," having been coached by his two senior budworm scientists, Bob Blais and Wladimir Smirnoff. Carl has been active in promoting relationships between LFRC and the Ministry of Lands and Forests, Quebec, in the arena of budworm research and management. This experience will provide the CANUSA Program necessary continuity during the transition period.

Chandra Nigam, formerly toxicologist at the Forest Pest Management Institute, Sault Ste. Marie, Ontario, has transferred to and is now resident at the Maritimes Forest Research Centre. Chandra has been an active participant in the CANUSA Program, not only in his area of research, but also in a leadership role in the CFS activities relating to pesticide use and development, and as coleader of the control methods CANUSA working group. Chandra will continue to participate in his responsibilities in the CANUSA Program. Best wishes, Chandra, in your new position.

**Items from the Press**

Study clears budworm spray as Reye's syndrome cause. — A special task force set up by the New Brunswick government said yesterday it found no link between the province's controversial spruce budworm spray program and Reye's syndrome, a rare and sometimes fatal children's disease.

But the nine-member scientific task force recommended that the government study the effects of insecticides in relation to cancer and human reproduction.

While no evidence of any danger had been found, "we think it requires the same degree of attention we've given Reye's syndrome," said task force member Dr. Michael Kramer, a pediatrics professor at Montreal's McGill University.

The group suggested the New Brunswick government take further precautions, such as limiting the use of insecticides and changing the budworm spray formulation to get rid of questionable emulsifier.

The task force was appointed by provincial Health Minister Brenda Robertson in February, shortly after Halifax microbiologist Dr. Ken Rozee published research findings linking emulsifiers in the spray with Reye's syndrome, a rare illness that sometimes develops in children following the onset of such viral diseases as influenza and chicken pox.

Dr. Walter Spitzer, chairman of the task force and a professor of epidemiology at McGill University, said the group was asked to investigate Rozee's research, including the suggestion New Brunswick has an unusually high incidence of Reye's syndrome.

The task force found that between 1972 and 1981 there were 12 confirmed cases of the disease and four probable cases in New Brunswick.

"The frequency of Reye's syndrome in the province is not unusual and in fact is lower than everywhere else it has been measured," Spitzer said.

Catherine Richards, a researcher for the New Brunswick Concerned Parents Group, which opposes the spray program, said her group will continue to fight the government's use of pesticides.

Natural Resources Minister J.W. Bird told reporters he is "relieved that there appears to be a complete rejection of any connection between Reye's syndrome and the spray program."

Bird credits the spray program with saving the province's lucrative forestry industry.

(The Gazette — April 29, 1982)
Montreal

Forest group upset with CBC program. — New Brunswick's Forest Products Association wants equal time to rebut "deceitful" and "inaccurate" statements made in a Canadian Broadcasting Corporation radio program aired Jan. 3.

The radio documentary, entitled "The Poison Mist" is to be repeated locally on Saturday after the conclusion of Liberal Leadership convention.

"As an investigation, this program is not factual, and in accordance with the CRTC mandate requiring all sides of a question to be reported we demand equal time," Don Lockhart, executive director of the association said in a Feb. 24 telex to CBC President A.W. Johnson.

"This program is dishonest and inaccurate," Mr. Lockhart said. "It attempts to prove a cause and effect relationship between budworm spray and health problems."

The program contains alarmist statements, Mr. Lockhart said. For example, it quotes an "unfounded statement by an unidentified person . . . "I know there's more cancer around," Mr. Lockhart said.

"We find it very strange and frightening that the CBC would stoop to this level of inaccurate reporting and we think it not unreasonable to demand equal time with the same network coverage."

"I think there is a proper story to be told about forest management in this province," Mr. Lockhart added.

(Daily Gleaner — Feb. 26, 1982)
Fredericton

Chemical disrupts "budworm cycle". — Application of an artificial pheromone, or sex-attractant, can disrupt the mating of spruce budworms that plague forests on the east coast, research at the University of New Brunswick suggests. Chemist Zdenek Valenta and biologist William Seabrook report that in trials in cages filled with budworm moths, the artificial pheromone was 77 per cent effective in suppressing mating. Dr. Seabrook found that overexposure to the chemical temporarily shut down the males' receptors, making them unresponsive to females. Gordon Baskerville formerly a professor of forestry and now provincial assistant deputy minister for natural resources says he supports the work because spraying of pesticides has had virtually no impact on the budworm population.

(Globe & Mail — Mar. 1, 1982)
Toronto

**Recent Publications**

From the Northeastern Forest Experiment Station, 370 Reed Road, Broomall, PA 19008, you may request a copy of:

Kucera, D.R., and P.W. Orr. 1981. "Spruce budworm in the Eastern United States." For. Insect Dis. Leafl. 160. U.S. Department of Agriculture, Forest Service, Northeastern Area, State and Private Forestry, Broomall, Pennsylvania.

The School of Forest Resources, University of Maine, Orono, ME 04469, can supply:

Lawrence, R.K., and M.W. Houseweart. 1981. "Impact of the spruce budworm in the Maine spruce-fir region, 1975-1979." Misc. Rep. 250, CFRU Res. Bull. 3, School of Forest Resources, University of Maine at Orono. 106 p.

Big spenders with an interest in pheromones may be willing to part with $59.50 for "Management of Insect Pests with Semiochemicals — Concepts and Practice." This 514-page book, edited by E.R. Mitchell, was published in 1981 by Plenum (New York). Included are sections by these CANUSA cooperators:

Elkington, J.S., and R.T. Cardé. The use of pheromone traps to monitor distribution and population trends of the gypsy moth.

Sanders, C.J. Sex attractant traps: their role in the management of spruce budworm.

Sanders, C.J. Disruption of spruce budworm mating — state of the art.

If you missed the "Spruce Budworms Bibliography: Supplement 1," distributed early in 1982, you can order a copy ($13.50 paper, $4.00 microfiche) from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161. Ask for code number PB 82-172529.

CANUSA-East has just distributed another set of Data Fact Sheets, their one-page technology transfer "quickies." Titles in this group include "Estimating Spruce Budworm Spray Costs," "Rating Fir Vulnerability to Budworm Attack in Eastern Canada," "Pole Pruner Sampling of Budworm Larvae: Are Baskets Necessary?" "Deposit Assessment Techniques for B.t.," and "Prediction of Timing and Amount of Budworm-Caused Mortality in Fir-Spruce Stands."

To receive any of these, and to get on the Broomall mailing list for future fact sheets, write Dave Grimble, Applications Coordinator, CANUSA, Northeastern Forest Experiment Station, 370 Reed Road, Broomall, PA 19008.

The Forest Pest Management Institute, Box 490, Sault Ste. Marie, Ont. P6A 5M7, announces the publication of:

Kreutzweiser, D.P. 1981. "The effects of permethrin on the invertebrate fauna of a Quebec forest." Information Report FPM-X-50.

Kingsbury, P.D., B.B. McLeod, and D.P. Kreutzweiser. 1981. "Environmental impact studies in the Icewater Creek Watershed: A progress report for 1981." File Report No. 27.

An interesting report by D.A. MacLean has recently appeared bearing the title "Vulnerability ratings of forests in New Brunswick and Nova Scotia to budworm attack." Copies may be obtained from the Maritimes Forest Research Centre, Fredericton, N.B., E3B 5P7. Ask for Information Report M-X-132.