



Newsbulletin

Tree Seed Working Group

NO. 8 November 1987

A WORD FROM THE CHAIRMAN

In one of his columns under this heading, Yves Lamontagne urged every researcher or worker in tree seeds or related fields to let others know, through the Newsbulletin, who they are and what they do. I was elected chairman of the Tree Seed Working Group at the business meeting in Truro, N.S., in August, and I feel it is my first duty to respond to our past chairman's urgings and introduce myself.

For many years I have been a faculty member in the Department of Forest Resources, Faculty of Forestry, at the University of New Brunswick (UNB). My interest in tree seeds arose in the 1960s when I was responsible for courses in silviculture. Graduates of UNB of that period may recall labouring through labs on cone analysis and seed quality. Some more recent graduates will have done similarly in an elective course on reproductive development in which they also dissected buds. Fruits, cones, seeds, seedlings, seed-year frequencies, etc., are of course components of the dendrology and silvics, and tree development and structure course I now give.

My interest in tree seed became more specific when in 1964 I began research into the biology of the processes of seed production in conifers. My perspective of the forest changed as for several years I spent a lot of time among the upper crowns of 15-m-tall trees. The biology of seed production is still a major research emphasis, but the emphasis has expanded to trying to understand the intrinsic interrelationships between vegetative and reproductive forms of growth throughout whole crowns. My work (much of it with students) also embraces the cones, fruits, and seeds and their handling, germination of seeds, and development of seedlings.

I therefore have a broad interest in tree seeds and hope that the interest will serve me well, as I try as chairman to attend to the concerns of the Tree Seed Working Group. The Group has a well-defined role within the Canadian Tree Improvement Association (CTIA). It was formed six years ago to promote tree seed science and technology, to promote research from bud initiation to seed utilization, to identify seed problems that relate to silviculture and tree improvement, to advise on implementation of practices, and to promote exchange of information on seed-related problems. I believe that progress has been made in each of these areas. The last especially has come to fruition through the Newsbulletin. Hugh Schooley, the editor is to be commended for the excellent way he has gathered and produced the information. Take a look back over the past issues: they contain a wealth of useful information. I hope I can get to know more of you, the membership, through the items you send in for the Newsbulletin. I also look forward to the next biennial meeting of the CTIA when I hope we will be in a position to conduct a workshop or Group session.

NOTE THESE ADDRESSES

Chairman, TSWG

Graham R. Powell
Dept. Forest Resources
University of New Brunswick
Bag Service #44555
Fredericton, N.B., E2B 6C2

Coordinator, CSIWP

Peter de Groot
Forest Pest Management Institute
Canadian Forestry Service
P.O. Box 490
Sault Ste. Marie, Ontario, P6A 5M7

Editor of Newsbulletin

Hugh O. Schooley
Petawawa National Forestry Institute
Canadian Forestry Service
Chalk River, Ontario, K0J 1J0

Queries, comments, and contributions to the "NEWSBULLETIN" are welcomed by the chairman or the editor.

EDITOR'S NOTES

One of several items to cross my desk while preparing this issue of the NEWSBULLETIN was a summary of a recent 'Indian Seminar on Tropical Forest Seed.' This meeting hosted delegates from 18 Indian Forestry Institutions with a program of 36 papers that covered many topics of importance to seed workers. I found the report of this meeting interesting because it reminded me that the current status of our seed research, and our seed handling and administrative procedures, here in Canada, are comparatively, at a much higher level of development. The seminar identified a number of national needs including greater economy in the use of seed, intensive tree improvement, better seed storage facilities, uniform seed testing procedures, a scheme for certification, more seed production areas and orchards, and studies of seed pests and pathogens --- doesn't all this sound familiar!! The seminar also recommended standardization of criteria for selection and maintenance of plus trees, seed orchards, seed production areas, and for seed storage and treatment. Its clear to me that we should be proud of our accomplishments as seed workers, however, our work is a long way from being trouble free and our development efforts must continue with enthusiasm.

Having acknowledged the accomplishments of seed workers as a group, I am now asking for 'three cheers' for those TSWG members who have demonstrated enthusiasm for their work by contributing items to the Newsbulletin. If all members were similarly inclined and sent in items, this Newsbulletin would have to be shipped to you instead of mailed.

The next issue is due for release in March 1988. Please send me your contributions by mid-February.

LETTER TO THE EDITOR

Dear Hugh:

The news bulletin of Tree Seed Working Group, Canadian Tree Improvement Association, is informative and interesting.

In your No. 7, March 1987 issue, Mr. J.P. Hall reported "The best results were obtained by a July application using 0.8 mg/L (800 ppm) for male flowers and 0.8 or 0.2 mg/L for female flowers" in the article - GA_{4/7} promotes cone production by black spruce. There is a typing error that 800 ppm is 0.8 g/L or 800 mg/L, not 0.8 mg/L, and 0.8 or 0.2 mg/L should read 0.8 or 0.2 g/L.

In our study, foliar spraying onto field-grown trees in black spruce was best in May and June because needle primordia were discernible at the end of June and bud-type differentiation appeared to occur in the second half of June. Optimal concentration was 400 mg/L GA_{4/7}, and 800 mg/L resulted in needle yellowing and needle cast on some trees. In foliar spraying onto 3-year potted grafts, phytotoxicity was observed on grafts sprayed with 400 mg/L GA_{4/7} and the damage increased with the increasing concentration.

Sincerely,

Rong H. Ho

Ontario Tree Improvement and Forest Biomass
Institute, Maple, Ontario, L0J 1E0

SEED-RELATED INFORMATION IN UNB GRADUATE THESES

Much information of considerable value is generated by students in our universities. Whereas some of the major features of this information subsequently appear in published papers and are therefore generally available, the rest of the information tends to lie hidden on the shelves of the libraries of the university and of the personnel involved. Graduate theses are "in the public domain" and therefore are available from the source university or on microfilm. Knowing of their existence is another matter.

In the following are listed those theses or reports that relate in some major way to tree seed, and that were written by graduate students at the University of New Brunswick. Arrangements for borrowing copies of theses of interest can be made through Inter-library loan. Copies of the more recent theses on this list may also be requested from the Coordinator of Continuing Education in Forestry, Faculty of Forestry, University of New Brunswick, Bag Service No. 44555,

Fredericton, N.B., Canada, E3B 6C2. Maybe, this listing will prompt preparation of similar ones for other Canadian Universities.

Amirault, P.A. 1984. An investigation of the cone and seed insects of eastern larch, *Larix laricina* (Du Roi) K. Koch, and attempts to control damage using chemical insecticides. MScF thesis, 63 pp.

Arisman, H. 1984. Cone-collection and seed-handling procedures in relation to maturity of cones and quality of seeds of *Pinus merkusii* Jungh. and de Vriese in Indonesia. MF report, 164 pp.

Barkhouse, G.L. 1970. The seed and cone insects of the spruces of New Brunswick. MScF thesis, 69 pp.

Boyle, T.J.B. 1985. The mating system and population structure of black spruce in central New Brunswick and its influence on tree improvement strategy. PhD thesis, 141 pp.

Caron, G.E. 1987. Development of branch patterns and seed production in young black spruce (*Picea mariana* [Mill.] B.S.P.). PhD thesis, 330 pp.

Coles, J.F. 1974. Inbreeding studies in *Picea glauca* (Moench) Voss. MScF thesis, 81 pp.

Kariuki, E.M. 1986. Production and handling of seeds of *Acacia xanthophloea*, *Brachystegia spiciformis*, and *Trachylobium verrucosum*. MF report, 68 pp.

Kettela, E.G. 1967. The cone and seed insects of balsam fir (*Abies balsamea* [L.] Mill.). MScF thesis, 58 pp.

Mellish, S.B. 1987. The use of prescribed fire for control of the red pine cone beetle (*Conophthorus resinosae* Hopkins) (Coleoptera: Scolytidae) in a New Brunswick red pine (*Pinus resinosa* Aiton) seed production area. MScF thesis, 120 pp.

Moody, B.H. 1971. The cone and seed insects of *Pinus caribaea* var. *hondurensis* B. & G. in British Honduras with brief reference to those infesting *Pinus oocarpa* var. *ochoterenai* Martinez. MScF thesis, 78 pp.

Odera, J.A. 1968. A study of the insects occurring in cones of eastern white pine, *Pinus strobus* L. MScF thesis, 84 pp.

Simpson, J.D. 1981. Site selection for black spruce (*Picea mariana* [Mill.] B.S.P.) seedling seed orchards, and management techniques for seed orchards in New Brunswick. MF report, 81 pp.

Tosh, K.J. 1986. Development and distribution of cones, pollination, and yield of seeds in young plantations of tamarack. MScF thesis, 143 pp.

Graham Powell

FERBAM APPROVED FOR USE AGAINST SPRUCE CONE RUST

The fungicide Ferbam (Ferric dimethyldithiocarbamate) 76 WDG (wetable dry granules) has been registered for use against spruce cone rust, a disease which severely damages spruce cone crops in forests throughout Canada. Ferbam has proven most effective in seed orchards, where the cone crops are accessible and where the high value of the crop warrants it.

Don Summers of the B.C. Ministry of Forests and Lands' Silviculture Branch, together with Dr. Jack Sutherland of the Pacific Forestry Centre (PFC), were instrumental in bringing about the registration of Ferbam 76 WDG early in 1987.

Ferbam is marketed under various trade names and can be purchased at pesticide dealers.

For more information on the timing of Ferbam application, refer to Summers, Sutherland, and Woods in the Canadian Journal of Forest Research, Vol. 16, No. 2, April 1986, p. 360-362.

CONE AND SEED PEST UPDATE

This is a report of the Cone and Seed Pest Working Party. It presents brief summaries of cone and seed insect research in Canada. In the next issue of the Bulletin we will report on research of cone and seed pathogens in Canada and provide a list of recent publications concerning cone and seed pests.

Peter de Groot

Petawawa National Forestry Institute, CFS

Insects are responsible for significant seed losses in seed orchards and seed production areas. Work at PNFI has focussed on insect problems in white spruce. Chemical and biological control agents have been evaluated. Data will support "Minor Use" registration of pesticides for spruce seed trees. Sex-attractant lures have been evaluated as monitoring tools in cooperation with FPML. Relationships among cone-infestation rates, seed yields, stand type, and cone crop sizes are being evaluated in a long-term study expected to be completed in 1989. Studies on monitoring of cone crops and insect damage

will continue as part of a study related more specifically to seed orchard management and flower and cone production. Efforts will be made to integrate work with studies relating to seed and cone insects at FPMI. Several reports relative to these studies are being prepared for publication in 1987-88.

W.H. Fogal

Pacific Forestry Centre, CFS

Current research activities at PFC include evaluation of cone slicing as a technique for indexing the numbers of filled and insect-damaged seeds per cone for the commercial conifers in B.C.; development of a sampling technique for estimating numbers of Douglas-fir cone moth eggs per cone; field testing host volatiles as attractants to the Douglas-fir cone moth; and writing manuscripts on the distribution of Douglas-fir cones in crowns of seed orchard trees and factors affecting pheromone trap catches of Douglas-fir cone moth. In addition, the 35 years of records of cone and seed insect damage in B.C. are being summarized for publication.

A Post-doctorate Fellow will be joining PFC's staff in October (1987) to work on cone and seed insects. Emphasis will be on the development of a damage prediction system for use in white and Engelmann spruce seed orchards.

G. Miller

Forest Pest Management Institute, CFS

Jean Turgeon and Peter de Groot have been focussing their field activities on the identification of problems affecting the cone production of black spruce and jack pine. Jean has been working with the FIDS unit of GLFC to organize a general collection of black and white spruce cones across northern Ontario to assess the impact of the spruce cone maggot. Because this maggot cannot be detected by a visual examination of the cones, field experiments designed to assess the potential of colored traps as monitoring tools were conducted. He also initiated studies aimed at the development of sampling schemes that will reflect the density and distribution of the cones and the spruce cone maggot.

By the end of this field season, Peter will have completed his assessment of the damage and importance of the mortality factors of jack pine cones. Studies on the life histories of the jack pine tip beetle

and red pine cone beetle, two insect pests of jack pine cones, are finished and biosystematic studies on the cone beetles is continuing.

J. Turgeon & P. de Groot

Research is proceeding through collaborative studies on the identification of sex pheromones and their use for monitoring populations of several cone and seed pests. Among the species under study are the spruce coneworm, the fir coneworm, the spruce seed moth, the white pine cone borer, and the red pine cone borer. Recently a description of the use of the sex pheromone of the spruce coneworm was published (Environ. Entomol. 16: 905-907, 1987).

G.G. Grant

Newfoundland Forestry Centre, CFS

The red squirrel, *Tamiasciurus hudsonicus*, was introduced to insular Newfoundland in the 1960s and has since become well established. Research on its effect on cone crops of black spruce began at NeFC in 1984 and is continuing. Sizable cone losses to squirrels occur once cones mature and early harvesting is recommended as a means of obtaining maximum yields. In 1987 a new site was used for trapping to obtain additional squirrel density measurements and seven sample plots were established across the Island. Cones on selected black spruce from the latter were counted in July, September, and October to provide estimates of cone losses to squirrels in several locations.

Stem implants of acephate (Acccaps^R - Creative Sales, Inc.) were inserted into the trunks of 20-25 year old black spruce in June 1986 when conelets were just past the pollination stage. Trees implanted with 'blank' implants and trees without any implants were used as controls. Cones were harvested in late August 1986 to avoid major losses to squirrels, examined for external damage and processed individually for seed extraction. After extraction cones were bisected and examined for internal damage. Extracted seeds were held for germination in a seed germinator for three weeks. Seeds which did not germinate were dissected for seed insects.

Trees implanted with Acccaps had significantly less damage by externally feeding lepidoptera and the cone maggot. Populations of the cone seedworm, seed midge, cone axis midge, and other insects were too low in the controls to indicate any effect of acephate implants for these insects. The second year effect of the acecap implants is under evaluation.

In cooperation with FPMI, pheromone blends supplied by Dr. Gary Grant have been field-tested in Newfoundland for the spruce seedworm (*Cydia strobilella*), spruce conworm (*Dioryctria reniculelloides*) and fir conworm (*D. abietivorella*) since 1985. Good trap catches for 1985-86 were made for the seedworm and spruce conworm but little success thus far has been achieved for the fir conworm. A poor cone crop occurred in 1987 and few moths were trapped.

Seed yields are reduced by a failure of the cone to release seed and a failure of the seed to germinate. The effect of cone insects on the extraction and germination of seed of black spruce has been under investigation since 1985. Cones are processed individually in order that a particular insect species or permutation or several species can be identified as causing a quantifiable seed loss.

R.J. West

NEW CHECKLIST FOR CONE AND SEED INSECTS

I wish to bring to the attention of the readership the availability of a recent publication by Harry O. Yates, 'Checklist of Insect and Mite Species Attacking Cone and Seeds of World Conifers,' J. Entomol. Sci. 21(2) 142-168 (1986). This list is valuable in that it presents the most current latin names of cone and seed insects as well as all known synonyms. There are 90 references provided. It is important to use the correct latin names to know precisely what species is being dealt with.

In recent literature on cone and seed insects of spruce, the latin name *Delia anthracina* (Czerny) has appeared to refer to the spruce cone maggot. This latin name is incorrect. This insect has been known as *Hylemyia anthracina* (Czerny) and more recently as *Lasiomma anthracine* (Czerny). If the Yates checklist is verified one can see that *Delia anthracina* has never been a synonym of *L. anthracina*. This misnomer probably stems from an error in the list of insect names of Canada, Nomenclature Insectorum Canadensium, by P. Benoit 1985. The author has been notified.

Another verification of the Yates check list provides a new latin name for the spruce cone maggot, that is *L. anthracinum* (Czerny). This is the correct latin name. A taxonomic revision was done of the Anthomyiidae (to which the spruce cone maggot belongs) by W.

Hennig in 1976 and this insect was renamed *L. anthracinum* (Czerny). It has taken several years for this information to filter down; the revision was done in German!! The complete reference is: Hennig, W. 1976. 63a. Anthomyiidae. pp. 921-974 in: Lindner, E. (ed.) Die Fliegen der palaearktischen Region. Vol. 7 Stuttgart, E. Schweizerbart'sche Verlagsbuchhandlung. 974 pp. The pages which deal with *Lasiomma* are 943-946.

Dr. Y.H. Prévost

CFS TREE SEED TESTING WORKSHOP

The first of four planned CFS tree seed testing workshops to be conducted at various locations across the country was held at Petawawa National Forestry Institute (PNFI), September 29-October 1, 1987. There were 34 participants including 33 from the Ontario Ministry of Natural Resources and one from PNFI.

In terms of its objectives the workshop was a success. These objectives, as outlined in the CFS Announcement, are to review basic seed testing technology, to improve the methodology used by seed testing agencies, extraction plants, and commercial and provincial nurseries, to improve standards and abilities to interpret seed test results in relation to nursery stock production, and to reduce utilization in efficiency and waste. The 3-day program covered sampling, purity analysis, seed weight and moisture determination, germination, and viability testing with emphasis on hands-on exercises. The instructors of the workshop were Dr. George Edwards of the Pacific Forestry Centre, Dr. Carole Leadem of the B.C. Forest Service, and myself. One of the germination exercises resulted in the development of a set of provisional guidelines for cold stratification treatment for Ontario nurseries.

Ben Wang

WOOD QUALITY NEWS BULLETIN

News Bulletin #2 of the Wood Quality Working Group of the CTIA dated May 1987 was received by your editor. This issue contains several interesting articles and a membership list. TSWG members who are also interested in wood quality and are not already members of the Wood Quality Working Group should contact R.M. Kellogg, Forintek Canada Corp., 6620 N.W. Marine Drive, Vancouver, B.C., V6T 1X2.

DEVELOPMENT OF BRANCH PATTERNS AND SEED PRODUCTION IN YOUNG BLACK SPRUCE (*PICEA* *MARIANA* [MILL.] B.S.P.)

The following is an abstract of a Ph.D. thesis, by TSWG member Guy Caron accepted by the University of New Brunswick. Congratulations Guy. (Editor)

This thesis describes morphological and developmental changes associated with tree-maturation, branch-maturation, and seed-production phenomena in young black spruce (*Picea mariana* [Mill.] B.S.P.). Developmental patterning is related to production (megastrobili and microstrobili and, hence, to initiation and continuation of seed production. The information was gathered from 6- to 18-year-old, plantation-grown trees in northwestern New Brunswick from 1980 to 1983.

The amount, duration, and complexity of branch development followed patterns related to the initial position of the branch on the main stem. Change from the initial vegetative state to a fully reproductive state was progressive and covered a span of up to three years. Megastrobili and microstrobili were first recorded on 7- and 10-year-old trees, respectively. Numbers of these structures increased with tree age but with biennial fluctuations. The megastrobilus and microstrobilus zones fluctuated in size as their production fluctuated. Position of strobili on shoots was associated with shoot length and location within strobilus zones. Their production influenced a concomitant, and subsequent, reduction of shoot production, which reduced the potential number of sites for strobilus production in the subsequent year. Large quantities of strobili were negatively associated with numbers of buds initiated, time of shoot-bud flushing, amount of sexual differentiation, lengths of shoots, and numbers of ovuliferous scales per megastrobilus during the seed-bearing year, and with lengths of megastrobili the following season. Therefore, large numbers of strobili were involved in maintenance of biennially fluctuating levels of production. Seed yield per cone increased with increases in numbers of both kinds of reproductive structures. Seed potential was generally high for megastrobili on the young trees but seed yield per cone was at times low and was associated with relatively small numbers of microstrobili and small quantities of pollen.

This investigation demonstrated the existence of distinct structural patterns associated with fluctuating

seed production. This information is of value in developing procedures to enhance or otherwise control strobilus production, in explaining resource production and allocation within the crown, and in elucidating the physiological bases for strobilus differentiation.

Guy E. Caron
(École de sciences forestières, Université de Moncton,
165 boul Hébert, Edmundston, N.-B., E3V 2S8)

MORE SEED ORCHARD SEED COLLECTED IN NEW BRUNSWICK!

Following the formation of the New Brunswick Tree Improvement Council, the first jack pine seedling seed orchards were established in 1979. The first cones were collected from these in 1984. In 1986, a second crop of cones was collected as well as a first crop from one six-year-old orchard. These cones collections yielded about 9 300 000 seed! Over 30 hL of cones were collected with cone size ranging from 75 to 100 cones/L and sound seed/cone ranging from 30 to 43. At one of the older orchards, an average of 14 cones per tree were produced. The older orchards have been rogued once.

Some cones were also collected from 7- and 8-year-old black spruce seedling seed orchards. Although some pollen was produced by orchard trees, seed production ranged from 6 to 14 sound seed per cone. This was the first time cones were collected from black spruce orchards.

Dale Simpson

CIP INC. HARRINGTON SEED ORCHARD NEARS COMPLETION

The CIP Inc., Seed Orchard development program was initiated in 1984. It will be completed in the spring of 1988, with the establishment of a 6 ha white spruce clonal seed orchard. Orchard establishment figures and seed production objectives are shown below:

- Jack Pine Seedling Orchard
Area 12 ha: 480 families
Established 1984-85
Annual production 5-6 million seed
- Black Spruce Seedling Orchard
Area 16.6 ha: 440 families
Established 1985-86
Annual production 8-9 million seed

- White Spruce Clonal Orchard
Area 6 ha: 65 clones
Established 1987-88
Annual production 3 million seed
- Norway Spruce Clonal Orchard
Area 1.6 ha: 120 clones
Established 1984-86
Annual production 1 million seed

All the orchards are located on agriculture land near the CIP Harrington, Nature Centre a few kilometres north of Montreal. Clonal archives for the jack pine and black spruce breeding programs are also established at the same location. Most of the families in the orchards are represented in the clonal archive. Grafting of scions from plus trees selected during a 6 year period was done in a greenhouse at Harrington from 1980 to 1984.

A breeding program leading towards improved generations will be undertaken as soon as family test data become available in 1990.

Gregory Crook

SEED STORAGE

Scandinavian scientists have set up a gene bank in the Arctic wastes of Spitzbergen. The bank, a 1.8 x 1.8 x 3.6 m metal container in a cave 183 m below a mountain, contains test tubes filled with seeds of about 50 000 plants (edible, non-edible, and ornamental) native to Scandinavia. The scientists believe that the bank will help any nuclear war survivors to restart agricultural and horticultural production. Every test tube is labelled with the name and specification of the seeds inside. An existing gene bank set up about 7 years ago in southern Sweden was considered to be too exposed as a severe power failure could destroy years of work and millions of seeds stored in freezers. The new store is considered to be free from the effects of nuclear weapons and from power failures -- the latter because of the inherent cold of the location. The container is locked with an ordinary simple padlock and chain.

ASEAN-CANADA FOREST TREE SEED CENTRE, MUAKEK, THAILAND

At CIDA's request, Dr. C.W. Yeatman and Ben Wang visited the ASEAN-Canada Tree Seed

Centre on September 9-10, 1987, and discussed program development for the interim phase with the Director and scientists of the Centre.

At present, the Centre has 14 professional staff of which three are on education leave at the University of British Columbia, Vancouver, two just returned from Edmonton after completing their Master's degree at the University of Alberta, and five have gone through short-term practical training in Canada. Our general impression of the Centre is good, the potential of the scientific staff is high, and the Director is ably managing the Centre in the best interest, its objectives. The centre is well equipped to conduct research and development and has made progress on seed source establishment, provenance and population effects in tropical species, conservation of genetic resources, seed production, pollen management, microtechniques, seed collection, handling, processing, germination, storage, x-radiography, and vegetative propagation techniques.

As a result of our visit and subsequent discussions with CIDA, a program for the interim phase of the Centre was designed and will be carried out until the startup of the second phase program in 1988.

The interim program includes providing Canadian advisors in tree propagation, genetic resources and electro-phoretic analysis; short term training of four of the Centre's scientific staff in Canada; and provision of some equipment and services. Dr. C.W. Yeatman, a geneticist from Petawawa National Forestry Institute and Peter Etheridge, a reforestation manager of Irving Company's Sussex Nursery are scheduled to leave Canada for Thailand on November 6, 1987.

XVITH INTERNATIONAL CONGRESS OF GENETICS

The XVIth International Congress of Genetics will be held at the Metropolitan Toronto Convention Centre, August 20-27, 1988. The Congress is sponsored by the International Genetics Federation, the Genetics Society of Canada, the National Research Council, the Royal Society of Canada and the Biological Council of Canada. The theme of the Congress will be "Genetics and the Unity of Biology". The program will consist of approximately 45 invited symposia emphasizing the most recent and exciting developments in genetics and allied sciences. In addition, there will be poster presentations,

workshops, specialized pre- and post-Congress meetings, a large commercial exhibition, and an interesting and varied social program. It is the aim of the Organizing Committee to make the Congress. Program as ecumenical as possible. Thus, it should be of interest to a broad range of scientists whose primary interest may not be in genetics itself.

The program will be subdivided into four main areas as follows:

- I. Genes and Chromosomes
- II. Genomes and Organisms
- III. Populations and Evolution
- IV. Genetics and Society

If you are interested in attending the Congress, and wish to have your name on the mailing list for Congress announcements, please write

Mr. Laurier Forget,
Office of Conference Service
National Res. Council of Canada
Ottawa, Ontario, K1A 0R6

RECENT PUBLICATIONS

Borkenhagen, J.; Marty, T.; Guries, R. 1987. Relationships between cone and seed parameters for red pine. University of Wisconsin-Madison, Forestry Research Notes; No. 271, 6 p.

Chrosiewicz, Z. 1987. Evaluation of post burn seeding of jack pine in central Saskatchewan. Canadian Forestry Service, Northern Forestry Centre, Edmonton Forest Management Note 41.

Clausen, R.W. 1986. Ecological energetics of Douglas-fir cone and seed insects in Idaho. Ph.D. Dissertation, University Idaho, Moscow, Idaho.

Edwards, I.K. Review of literature on fertilizer and conifer seed production. Canadian Forestry Service, Northern Forestry Centre, Forest Management Note 40.

Elkassaby, Y.A.; Ritland, K. 1986. The relation of outcrossing and contamination to reproductive phenology and supplemental mass pollination in a Douglas-fir seed orchard. *Silvae Genetica* 35(5+6): 240-244.

Libby, William J. 1987. Do we really want taller trees? Adaptation and allocation as tree-improvement strategies, University of British Columbia, H.R. MacMillan Lectureship in Forestry, 16 p.

Lines, R. 1987. Choice of seed origins for the main forest species in Britain. Forestry Commission Bulletin 66, 61 p.

Marty, T.L.; Guries, R.P.; Camp, R. 1987. Early performance of a black walnut seedling seed orchard. University of Wisconsin-Madison, Forestry Research Notes, No. 273.

Owens, J.N.; Simpson, S.J.; Caron, G.E. 1987. The pollination mechanism of Engelmann spruce (*Picea engelmannii*). *Can. J. Bot.* 65: 1439-1458.

Rudolph, T.D.; Wheeler, N.C.; Dhir, N.K. 1986. Cone clusters in jack pine. *Can. J. For. Res.* 16(6): 1180-1184.

Schoen, D.J.; Denti, D.; Stewart, S.C. 1986. Strobilus production in a clonal white spruce seed orchard - evidence for unbalanced mating. *Silvae Genetica* 35(5): 201-204.

Strong, T.F.; Grigal, D.F. 1987. Site and seed source influence jack pine yields in the Lake States. *Can. J. For. Res.* 17: 705-711.

Thomson, T.A.; Lester, D.T.; Martin, J.A. 1987. Marginal analysis and cost effectiveness in seed orchard management. *Can. J. Forest Res.* 17(6): 510-514.

Van Haverbeke, D.F. 1986. Crown shape in a *Pinus sylvestris* clonal seed orchard. *Silvae Genetica* 35(5-6): 236-239.

Young, J.A.; Young, C.G. 1986. Collecting, processing, and germinating seeds of wildland plants. Portland, Ore. Timber Press. 236 p.

We thank Petawawa National Forestry Institute for their assistance in the production of this Newsbulletin.