



# Newsbulletin

## Tree Seed Working Group

NO. 6 November 1986

### A WORD FROM THE CHAIRMAN

In the last issue (March 1986) of the Newsbulletin, I asked for suggestions on the theme for the seed workshop to take place in conjunction with the CTIA meeting in Nova Scotia in the summer of 1987. No suggestions have so far been received either by the Editor or by the Chairman. If suggestions do not arrive soon, the executive will have to decide upon a theme that will hopefully be useful to most of tree seed workers. The theme, along with all other pertinent information, will be presented in the next issue of the Newsbulletin.

About three weeks before starting to assemble this issue of the Newsbulletin, only three contributions were sent to the Editor. Can this be interpreted as a lack of interest, a lack of time for writing, or indifference? The interest seemed to be much greater when the Tree Seed Working Group was formed at the Toronto meeting in 1983. The Newsbulletin and the working group will not survive if the participation of the members is lacking. The Editor is doing his best and really succeeds in gathering contributions but I am sure he would like a greater participation from the members. By doing so, the Newsbulletin will become more and more informative about what is going on all across Canada and even

and even abroad. Remember! Your contribution, even if it is short, will surely be very interesting to others.

Yves Lamontagne

### NOTE THESE ADDRESSES

#### Chairman, TSWG (new address)

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

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### EDITOR'S NOTES

Have you seen a copy of the recently initiated "Journal of the New Forest". Watch for the new magazine called SILVICULTURE and read it if you get a chance. It contains some very interesting material. Vol. 1, #3, page 34 offers a 'Did You Know' section in which the following statement is made

By 1995, all black spruce and jack pine seedlings and container stock that go into the ground in Ontario will be from superior seed from seed-orchard stock. By the year 2000, the same will be true for white pine and white spruce".

My first thought when I read this was - You must be dreaming - but after mulling it over for a while I know its possible. It's certain that a lot of people must do a lot of work and soon to make it possible, I'm sure we all would like to know how Ontario plans to accomplish such a worth while goal. Can anyone enlighten us? I certainly would welcome the opportunity to examine Ontario's seed orchard development plans in the next issue of our Newsbulletin. Does anyone have the necessary information? Does anyone have any comments?

I'm disappointed, and you should be also, that I didn't get any response to my formal request for Newbulletin articles from anyone/everyone across the country who has been planting orchards. Does this mean no one is planting? No, there has been lots of planting activity. I suspect, no one is willing to write a few sentences and contribute an article because they haven't thought about the advantages of doing so. Please note, this Newsbulletin is capable of not only passing on the useful information you contribute but it can also get you some help if you have a problem. For example, in our last issue, Rick West from Newfoundland, in his article on cone losses to squirrels, expressed an interest in

corresponding with anyone also working on squirrel problems. Believe it or not someone contracted him and as a reward for his article he was provided access to a long list of references on squirrel damage. Who knows what else may develop from the correspondence his article initiated. All reasonable pleas for help or requests correspondence will be printed - free of charge.

Again let me say thanks for your contributions - few as they are - with your participation our Bulletin will be better than ever.

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Hugh Schooley

### WQWG NEWSBULLETIN #1

The first Newsbulletin of the CTIA Wood Quality Working Group was circulated in February. This group was formed at the last CTIA meeting with a mandate to:

1. Serve as a source of technical information on wood quality required by tree improvement programs.
2. Standardize and coordinate methods of sampling and measuring wood quality characteristics in order to insure compatibility and comparability of measurements.

Group Chairman is Robert M. Kellogg, Forintek Canada Corp., Vice-Chairman, Alvin Yanchuk, Alberta Forest Service, and Secretary, Jean Polinquin, Laval University. If you are interested in this Group, contact the Secretary. The proceedings of this Group's first meeting, "Wood quality in tree improvement programs" was published as Report SP-513E by Forintek Canada Corp., 800 Montreal Rd., Ottawa, Ontario, Canada, K1G 3Z5.

Editor

## CONE AND SEED PEST WORKING GROUP NEWS

Cone and seed pest research is essential to the development of pest management strategies in seed orchard management. In keeping with the objective of the TSWG News Bulletin the Cone and Seed Pest Working Party will provide an update of current research activities by its members. We hope to make this update a regular feature of the News Bulletin. To start off this series, I will summarize some of the research that I and my colleague, Dr. Jean Turgeon, are conducting at the Forest Pest Management Institute in Sault Ste. Marie.

The objective of our project is to develop protection strategies for insect pests of seed orchards. Fundamental to insect pest management is a knowledge of the insect pests' life history, and economic significance and insect sampling procedures to evaluate the efficacy of various pest management tactics. Because we felt that there was a need for additional data on the identity, life history and significance of insect pests on jack pine and black spruce (two of the important species in seed orchard production) we decided to use a life table approach to study the mortality factors of the reproductive structures. Essentially the life table is an accounting procedure whereby individual strobili are regularly examined for mortality from time of flowering through to the time of seed maturity. The life table studies were initiated in 1985 for jack pine and in 1986 for black spruce.

Preliminary analysis of the jack pine data indicate that flower and conelet losses are about 27% of the crop. Abortion accounted for nearly one half of these losses while less than 1% died as the result of insect feeding. Cone losses from late May to early September were nearly 40% of which three quarters was due to harvesting by the red squirrel. Less than 6% of these cones were destroyed by insects and most of these losses were due to a cone resin midge. Only one third of the flower crop survived to cone maturity.

Preliminary analyses of the black spruce life table has not been completed; however, abortion, the eastern spruce budworm and the red squirrel all contribute significantly to the mortality of cones and seeds.

Additional studies that are in progress or planned include: the assessment of chemical insecticides for control of the cone beetles (*Conophthorus* spp.); the development of a sampling procedure to assess cone and seed mortality of jack pine; the time of seed maturity in black spruce; and the development of non-destructive cone sampling methods.

Peter De Groot

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## NEW SEED CENTRE IN COSTA RICA

The Costa Rican Forest Service (Direccion General Forestal) has announced the establishment of a seed bank and seed testing lab. A building has been constructed to house office and meeting space, areas for processing and drying seeds, laboratories for seed testing, and a cold storage room. Gamaliel Alvarado, Research Head and Gilberto Brooks, Program Head are determined that the seed centre, which will service both public and private needs, will operate to recognized international standards. Unfortunately, the Costa Rican Forest Service presently lacks the funds with which to purchase equipment and supplies. To help the seed centre become operational, they are appealing for both technical information and for grants.

Costa Rica has a serious deforestation problem and plans for the seed centre to become an integral part of a reforestation program. Reforestation is essential if Costa Rica is to supply her future wood needs and also to preserve her world-renown system of national parks and forest reserves. Time is of the essence if an effective reforestation program is to be in place before the magnificent biological diversity which remains in Costa Rica is damaged forever. Your concern can help

reverse the deforestation trend that is threatening this beautiful country.

For more information, or if you can help in any way please contact Gilberto Brooks or Thomas Clements at the Banco de Semillas, Direccion General Forestal, Apartado 10094, San José 1000, Costa Rica. Telephone 28-76-45.

#### Editor

#### THE MUAK LEK CONNECTION, POSTGRADUATE STUDENTS IN CANADA

As part of the ASEAN/Canada Forest Tree Seed Centre program in Thailand, Canada is sponsoring two of the Centre's scientists in Master degree programs at the University of Alberta. Prapan Pukittayacamee and Chaiyasit Liengsiri arrived in Canada late in 1983 and are expected to complete their degrees late in 1986. Both are working on seed problems of tropical legume species under the supervision of Dr. Kare Hellum, a well known seed scientist within the Tree Seed Working Group. Dr. Hellum worked with both Thai scientists while he was acting as a Canadian seed specialist in the early days of development of this program in Thailand.

Chaiyasit is developing optimum germination conditions for Pterocarpus macrocarpus, a beautiful Thai heavy hardwood for furniture production. He has studied a range of temperatures and treatments of seed collected from six stands across Thailand. Electrophoresis studies are also being conducted using 6 isoenzyme systems to pinpoint genetic differences between sources.

Prapan's work is with Acacia auriculi-formis, an introduced fast growing legume from Australia. His studies include time of collection, maturation and pretreatment of seed to break seed coat dormancy. Germination criteria are used to evaluate optimum conditions for collection through to utilization of seed in stock production.

Chaisurit and Prapan are the last of the first wave of ASEAN post graduate students. Most have returned to Philippines, Malaysia, Indonesia and Thailand after completion of their Canadian programs. Three others from the Centre at Muak Lek are in Canada for a year's preparatory study of English and their chosen field of seed science prior to being considered for doctoral programs here.

It is most gratifying to travel in the ASEAN countries, continuously meeting grads and postgrads from Canadian universities, in a range of subject fields including seed and genetic resources. It is even more gratifying to see seed policies in the ASEAN countries slowly advancing as these young scientists start having greater influence on national programs. Through them the input of TSWG members is having an important effect on advancing the science of forest regeneration in the tropics.

Doug Skeates

#### THE MUAK LEK CONNECTION, SHORT-TERM CANADIAN TRAINING

The ASEAN/Canada Tree Seed Centre is in many ways a protege of Canada's tree seed community. A visit to the National Tree Seed Centre at Petawawa would make Thai scientists feel right at home. The similarities in equipment cannot be attributed to chance. The Petawawa lab was used as a model for equipping the centre at Muak Lek. The young Thai scientists have adapted models from Canada in their own programs from those of Canadian scientists who have assisted in development of the ASEAN Centre.

During the past few months, 9 of the Centre's 12 scientists, have been in Canada along with scientists from Malaysia, Indonesia and the Philippines. Three have embarked on one year pre-postgraduate programs with Dr. Sziklai at U.B.C. and two are in the process of finalizing MSc programs with Dr. Hellum at the University of Alberta.



The other four, with 3 ASEAN colleagues in the field of seed and genetic resources, participated in training sessions primarily in Ontario. Three programs were designed to meet specific needs of participants and the countries they represented.

(1) Seed testing:

Two women, Ornanong Chaichanasuwat (ACFTSC) and Remedios Evangelista (Fori, Philippines) worked one month in each of three laboratories around the world. They started at the Danida Seed Centre in Humlebaek, Denmark with Dr. Helmuth Barner. The second experience was with Dr. Milan Simak at the University of Umeå, Sweden. Their final involvement was with Ben Wang at the Petawawa National Forestry Institute. Although most of the testing technology has been developed for temperate conifers it is hoped that the ASEAN scientists will take a leadership role in advancing this field and particularly radiography with tropical hardwood species.

(2) Microtechnology:

The Centre is developing facilities for research and training in the fields of isoenzyme analysis and tissue culture. Two scientists, Sudareth Ngamkhajornwiwat (ACFTSC) and Chumnan Wangmanee (ACFTSC) worked primarily with Dr. Rong Ho and Dr. George Buchert at the Ontario Tree Improvement and Forest Biomass Institute with visits to Dr. Bill Cheliak's and B.S.P. Wang's labs at Petawawa. Development of operational assessment techniques in ASEAN seed orchards, and mass propagation of valuable genetic resources will be important components of the Muak Lek program in the future. Development of this technology with tropical hardwoods will accelerate operational tree improvement programs and assist in training workers in this field.

(3) Nursery and Vegetative Propagation:

Three men, Abdul Rahim bin Abu Samah (Kepong, Malaysia), Mr. Sudirman (Bogor, Indonesia, and Kowit Pong-anon (ACFTSC) participated in working visits to most

Ontario provincial nurseries and seed stands as well as a cross section of nursery and seed research programs of federal and provincial institutions in the province. En route, they also visited relevant federal and provincial establishments in Alberta and British Columbia organized by Dr. Slavoi Eis of the CFS, Victoria and Dr. Narinder Dhir from Alberta F.S. The purpose was to acquaint the ASEAN workers with a wide range of operational techniques and equipment. Their work in ASEAN countries is with propagation of tropical hardwood species from both seed and vegetative materials. The program in Canada included inputs from nursery superintendents, breeding centres, the Fast Growing Hardwood Development Unit in eastern Ontario, and seed and stock production scientists at OTIFBI and federal institutes at Petawawa and Sault Ste. Marie.

As noted in previous newsletters, a significant bi-product of such programs is to encourage continuing interrelationships between ASEAN and Canadian scientists and operational workers, and Canadian counterparts. Most of the scientists visiting Canada on various programs have been able to renew contacts with Canadian scientists who have worked at the Centre. The visits here in Canada are valuable components of the Centre's training program, but an equally valuable component is the participation of Canadian scientists in the ASEAN program. Hopefully more of our seed and genetic resources scientists will be able to participate in the future to the benefit of both communities.

Doug Skeates

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**"FIDS" ONTARIO SURVEY INDICATES  
INSECTS ARE A PROBLEM**

Whoever says flower, cone, and seed insect are not a problem "worthy of consideration" is making a big mistake. The Canadian Forestry Service, Forest Insect and Disease (FIDS) Unit in Ontario conducted an insect survey on white spruce flower, cones, and

seed during the heavy crop year of 1984. Some of their results are frightening.

Collections of flowers were made after pollinization but before the flowers became fleshy and turned over as conelets. In all, 3038 flowers were examined in the laboratory, and of these, 774, or 25.6%, were damaged. The proportion of flowers damaged ranged from a low of 2.5% to a high of 72.4% in different areas. The principal agents causing flower damage were the spruce budworm, a spruce bud moth, the spruce coneworm, and unknown lepidoptera. Many of the unknown lepidoptera may have been spruce budworm, particularly in areas infested by this insect, but in all cases the insect was absent and identification was necessarily on the basis of damage only. The following insects were also found in the survey but caused only minor damage: the blackheaded cutworm, the purple-striped shootworm, the lesser yellow spruce shootworm, two spruce micro moths, the orange spruce needleminer, the oblique-banded leaf roller, and the spring spruce needle moth.

The cone and seed survey was carried out in a similar manner. Some 2795 green, but fully mature white spruce cones were examined and dissected. Of these, 1566 or 55.9% had some form of insect or disease damage. Seed losses within cones from different areas were as high as 56%. The proportion of damaged cones ranged from a low of 12% to a high of 100%. The main causal agents of seed and cone damage were as follows: spruce cone maggot, unknown lepidoptera, spruce coneworm, the spruce seed moth, the spruce budworm, the spruce cone axis midge, a cone moth, and the fir coneworm. As in the case of the flower survey, much of the damage by unknown lepidoptera may have been caused by spruce budworm, particularly in areas that are currently infested by this insect. Other insects that were encountered in low numbers but did not cause appreciable damage were: the spruce seed chalcid, the redstriped needleworm, the spruce cone gall midge, the spruce cone moth, and a spruce micro moth.

The Ontario FIDS unit is performing a valuable service for us by collecting this type of information. I'm sure similar surveys will be made on other tree species as soon as seed crop size and FIDS resources permit. Detailed surveys such as this should be conducted throughout the Country so that flower, cone, and seed insect pest are given proper consideration.

Facts and figures from FIDS Survey  
Bulletin for Ontario, Spring 1985;  
Editor

#### SEED-BORNE FUNGI: WE NEED TO STUDY THEM

Healthy seeds play an important role in the production of healthy crops. Poor seed germination in many nurseries may be due to the infection of seed-borne pathogens. The high cost of regeneration efforts makes it imperative that we use healthy seed. Seed health testing is primarily concerned with evaluating the presence or absence of disease causing organisms such as fungi, bacteria and virus pests. But it is often difficult to ascertain whether the causal agent of seed or seedling disease is seed-borne or soil-borne. Seed-coat microflora can cause the death of seed or indirectly weaken the seed thereby predisposing it to attacks of soil-fungi. Hence, it is important to know the characteristics of fungi associated with seeds of each important tree species---what damage they cause, where, when, and under what circumstances the damage occurs and what can be done to prevent damage.

Prevalence and pathogenicity of some fungi on seeds of conifers and hardwoods have been reported. Fungi attacking seeds are usually molds. Many of these develop on seed surfaces; others cause internal infections. Most of these fungi are generally considered saprophytic, but they are now being studied as causal agents of severe pre- and post-emergence losses. The influence of molds on seed can vary. Their mere presence does not necessarily harm seed, although it is generally recognized that as the mold counts increase, viability of seed

decreases. Early studies on pine seeds showed that these molds were virtually harmless on seed of high viability but poor seed suffered a substantial reduction in germination. The fungi associated with tree seed varies in different host species, in different regions and in different years.

Seed-borne fungi are more important in the tropics where the climatic conditions facilitate their development. However, most of the conifer seeds have the tendency to become dormant and must be prechilled (moist-cold-stratification) before sowing. There are fungi reported to grow and spread even at cold prechilling temperatures; the high moisture being the inducing factor. These fungi will either reduce seed germinability or infect the germinant and cause its death.

In his monumental book "Seed Pathology", Dr. P. Neergaard emphasized that the grower does not know and can not observe directly, yield reductions caused by fungi. Often the amount of damages can only be revealed by experimental methods and detailed investigations.

Since December 1984, a study on seed-borne fungi of white spruce (Picea glauca [Moench] Voss) and eastern white pine (Pinus strobus L.) has been underway at Petawawa National Forestry Institute, Chalk River, Ontario. The results of this work emphasize the concern for fungi associated with tree seeds.

Rajesh K. Mittal

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#### SEED PROGRAM ACTIVITIES AT PINE RIDGE FOREST NURSERY - 1986

Alberta's white spruce crop was only moderate this year and was mainly restricted to the North Central areas of the Province. Approximately 2500 hectolitres of spruce cones were collected. Lodgepole pine cones were also collected with an accumulated total of 4500 hectolitres to date.

Over the summer the Alberta Forest Service initiated several improvements to enhance the province's Tree Seed program. The objectives of this program include forecasting seed needs and picking to those needs; collecting cones from trees of desired phenotype and known origin; accurate determination of seed maturity; proper quality control during picking; and using acceptable handling and shipping methods. Achievement of these objectives would provide uniform, vigorous, higher quality seedlings; a minimum genetic gain of 2%; a 5-10% reduction in nursery rearing costs; and increased yields of better quality wood.

A four point program was initiated. It consists of interim establishment of seed zones; revised cone collection procedures; training of forest and industry staff; distribution of appropriate references and publications; and includes development of a Tree Seed Manual for Alberta.

The improved seed collected through this program will be used for nursery sowing of container and bareroot seedlings. Seed from the existing inventory and tree seed from bulk collections in selected stands will be used to meet most of the remaining needs such as direct field seeding, until sufficient seed becomes available from our Tree Seed Orchards. Only where considerable direct seeding requirements warrant, will new collections from "wild stands" be initiated.

To date the program has been very well received by the forest staff in the field and several superior white spruce seed collections were made this season utilizing the aerial cone clipper. The Forest Service hopes to have the upgraded program in operation throughout all of Alberta's forests for the 1987 cone crop.

Katherine A. Yakimchuk

## SEED YIELDS FROM JACK PINE IN NEW BRUNSWICK

During the fall of 1985 a fairly large cone collection was made from a 10-year old unmanaged jack pine plantation and several mature stands following harvest operations.

The purpose was to get a cost comparison for seed yield with mature jack pine stands.

Collections from the plantation using orchards ladders were twice the cost of collections from the slash of a mature stand. However, the 8200 litres of cone from the plantation yielded 86.225 kg of seed which is equal to 13.5 oz. per bushel of cones: - while the average yield from the mature stands collection was only 6.7 oz. per bushel.

There is very little difference in the size of the plantation seed and seed from the mature stands. Germination is also the same: from 94% to 98% germination after 10 days.

The cost in collecting jack pine cones in unmanaged plantations is reasonable considering the seed yield.

John Flinn

## THE ONTARIO TREE IMPROVEMENT COUNCIL

The Ontario Tree Improvement Council has been in operation since January 1985 and since then has made excellent on-the-ground progress. The initial task of forming work plans and securing funding was completed by September, 1985. Three cooperative projects have been established in different areas of the Province to improve both black spruce and jack pine. Substantial financial support has been received through the Canada-Ontario Forest Resources Development Agreement which, when combined with company and OMNR commitments to tree improvement, is sufficient to fund the three projects through the first stage of plus tree

selection, testing, and seed orchard establishment.

Tree improvement workshops and training courses were conducted in the early fall of 1985 and plus tree selection began immediately thereafter in all three areas. In the NW Region, 200 jack pine plus trees were located, seeds collected, and scions grafted. In the NC Region, better than 200 jack pine have been selected and grafted. Unfortunately in this area, black spruce cones were virtually non-existent due to budworm damage so, although almost 300 black spruce plus trees, were located, very few were collected or grafted. In the Timmins area approximately 300 black spruce and over 100 jack pine were selected and grafted. A wood disk was cut from all plus trees so that at some future date, specific gravity and fibre length can be determined.

This fall, all agencies have increased their selection efforts and this, coupled with adequate cone crops in both black spruce and jack pine, means that most of the plus tree selection phase of the program will be completed in all three projects.

The next step in the program is the establishment of seed orchards and family tests with seedling from each plus tree. All agencies have been actively searching for seed orchard sites and have been successful in locating sites which should be conducive to good cone production. Clearing, site preparation and initial layout is in progress so that establishment of portions of the jack pine orchards can be accomplished in the spring of 1987. The remaining portion of the jack pine orchards and the black spruce orchards will be out planted in 1988 and 1989 along with tests of all the selected plus trees.

In addition to the operational tree improvement program, the Ontario Tree Improvement Council was instrumental in initiating a joint research project between Boise Cascade Canada Ltd. and Lakehead University. The study will select fast



growing poplar and larch suitable for relatively short rotations under northern conditions and will develop plantation systems which promote rapid growth of planted stock.

Jim Coles

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#### SEARCHING FOR AN ON/OFF SWITCH FOR GERMINATION

Dr. Krishan Kamra, Faculty of Forestry, Swedish University of Agriculture Sciences, S-90183, Umeå, wishes to announce the availability of his three recent papers cited below. Anyone wishing copies should write to him at the above address:

Kamra, S.K. 1985. Germination studies on seeds of Pinus sylvestris and Picea abies treated with abscisic or cinnamic acids. Indian Journal of Plant Sciences 3(1): 1-8.

Kamra, S.K. 1985. Situation pertaining to forestry seed in some developing countries in Asia and measures for improvement. IUFRO International Symposium on Seed Problems under Stressful Conditions, Vienna, Austria, 12 pp.

Kamra, S.K. 1985. Determination of germinability of Pinus oocarpa seed by x-ray contrast method. IUFRO International Symposium on Seed Problems under Stressful Conditions, Vienna, Austria, 8 pp.

The first paper listed outlines Krishan's unsuccessful attempts to use chemicals to inhibit the germination of tree seeds. If a successful inhibitor were to be found Krishan points out that it may be possible to pelletize treated seeds before sowing them in the field and thereby, gain some biological advantage that would otherwise be unavailable. For example, such seeds

sown in the autumn could be prevented from germinating until the following spring when conditions for survival would be much higher than they are during the cold late autumn and winter. Although Krishan's tests were unsuccessful, further research may someday discover chemicals or some other treatments that will make it possible to switch seed germination on or off, as and when desired. "This advancement would be a powerful tool in the hands of the nurseryman or forester."

Editor

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#### IUFRO CONFERENCE ON TREE IMPROVEMENT - THEORY AND PRACTICE

In mid-October the North Carolina State University - Industrial Cooperative Tree Improvement Program hosted a meeting of the IUFRO working parties on Breeding Theory, Progeny Testing and Seed Orchards. The 5 day conference provided a unique opportunity for discussion of current concerns in forest tree improvement. The practice of forest tree breeding and genetic improvement is rapidly maturing throughout the world so the papers and discussions from members of interest to all three working parties were extremely interesting.

The papers devoted specifically to the seed orchard group considered

- the accumulation of 34 years of research and experience in the S.E., USA where there is presently a surplus of genetically improved seed that is for sale. Co-op members have produced 278 tonnes of improved loblolly pine since 1978. Good site selection and intensive orchard management are credited for the surplus but research is needed in particular to provide an understanding of the modes of action of cultural practices.
- pollen contamination; its identification and its avoidance using cultural practices such as overhead sprinkling to slow down the development of orchard trees and the judicious use of supplemental pollination.

- the implications of non-synchronous flowing, unequal production of pollen between clones, self pollination and cyclic cone yields.
- seasonal and diurnal patterns of pollen flight in a loblolly seed orchard.
- management of container seed orchards in controlled environments; ie. eastern hemlock produced 5.5 times more seed than their outside orchard counterparts. This procedure also facilitates accelerated breeding programs.
- estimating genetic gain
- plus tree selection and progeny testing
- clonal vs seedling seed orchards, seedling seed orchards use as progeny tests, orchards in which new and better clones are added while other less favourable clones are discarded according to the progress of the improvement program.

A mid-conference tour visited seed orchards, a 40 million seedling nursery, first and second generation progeny tests and breeding facilities. A five day post-conference tour visited research, developmental and operational activities of four of the large industrial operations that began the tree improvement Co-op 30 years ago. This tour emphasized the integration of tree improvement into operational forest management programs on a large and intensive scale.

The conference/tour was a stimulating and rewarding experience particularly since I had not visited the south eastern USA before. Watch for the Proceedings.

Hugh O. Schooley

#### FOREST CLIMATE - 86

This symposium/workshop sponsored by the Ontario Ministry of Natural Resources, the Canadian Forest Service, and the Canadian Atmospheric Environment Service discussed climate applications in forest renewal and

forest production. It was intended that the meeting provide an opportunity for practicing foresters to dialogue with the applied climatologists and researchers. Unfortunately, however, there were only a few practicing foresters among the more than 75 attendees. The papers presented stressed the importance of climatic impacts and applications in operational forest management problems. New development directions and climatic techniques and products were demonstrated for a variety of forestry problems.

Papers of particular interest to seed workers were presented by:

Steve Ross - He indicated the temperature and drought treatment requirements for abundant flower bud initiation by potted Engelmann spruce, Douglas-fir and western hemlock. Additional comments were also made on the effects of environmental factors on the subsequent development of the flowers, cones, and seeds.

Rodger Street - He indicated the practical advantages of being able to determine the irrigation requirements of a seed orchard on the basis of weather data collected at the orchard site and conditions in the weather forecast. This work is being tested at the OMNR, Goodie Lake N., black spruce seed orchard in N.W. Ontario. The orchard, its establishment and management were described in detail in a second presentation by Celia Gram, D. MacIver and Rodger with particular emphasis on the use of a datalogger to indicate the irrigation requirements.

Marcia Phelps and Gram Powell - They presented a poster that outlined a sequential and directional variation in the onset and duration of the developmental stages of buds, flowers, cones and shoots on different clones in a young white spruce seed orchard.

Ron Hallett and S.I. Cameron - They offered a paper on the climatic restrictions of

stock production that indicated devastating and enormous losses of container and bareroot seedlings at many nurseries across the country. Much of the loss could have been avoided with better stock management procedures. Several other papers considered greenhouse climate in the production of high value genetic stock or in the large scale production of seedlings for planting.

Dave Handley - While discussing the integration of climatic knowledge into forest regeneration decisions proposed that the information base and procedures used to forecast forest fire hazard ratings could easily be modified to identify periods when tree planting could be done most successfully.

The proceedings of this meeting should offer considerable material of interest when they become available in about six months.

Hugh O. Schooley

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#### UPCOMING MEETINGS

##### IUFRO MEETING ON SEED PROBLEMS:

The next international symposium of IUFRO (P2.04.00, Seed Problems) Project Group is planned for Zimbabwe in August 1987. Watch for further announcements.

##### Genetic Manipulation of Woody Plants

The molecular biology of woody plants is a rapidly expanding field worldwide. To further stimulate the development of knowledge and progress in application to forest, ornamental, food, and other trees, an international symposium will be held on the Michigan State University campus June 21-25, 1987.

The symposium program will focus on four major topic areas:

- (1) Tissue culture systems,
- (2) DNA analysis and manipulation,
- (3) Regulation of gene expression, and

- (4) Integration of genetic manipulation into breeding programs.

These topics will be addressed by 33 invited speakers from many countries. There will also be an opportunity for contributing papers in the subject areas. For further information and to be placed on the conference mailing list, please write to: James W. Hanover, Department of Forestry, Michigan State University, East Lansing, Michigan 48824-1222, U.S.A.

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#### NEW PUBLICATIONS

Bonner, F.T. 1986. Cone storage and seed quality in eastern white pine (*Pinus strobus* L.). *Tree Planters Notes* 37(4): 3-6.

Edwards, D.G.W.; Portlock, F.T. 1986. Expansion of Canadian tree seed certification. *Forestry Chron.* 62(5): 461-466.

Fleming, R.L.; Haavisto, V.F. 1986. A case for improving the efficiency of seed extraction from black spruce (*Picea mariana* [Mill.] B.S.P.) cones. *Tree Planters Notes* 37(4): 7-11.

Fogal, W.H.; Lopushanski, S.L. 1985. A test of foliar-applied insecticides to prevent damage to white spruce cones by insects. *Forestry Chron.* 61(6): 499-502.

Leadem, C.L. 1986. Stratification of *Abies amabilis* seeds. *Can. Jour. Forest Res.* 16(4): 755-760.

Owens, J.N.; Webber, J.E.; Ross, S.D.; Pharis, R.P. 1986. Interaction between gibberellin A<sub>1</sub> and root-pruning on the reproductive and vegetative processes in Douglas-fir IV. Effects on lateral bud development. *Can. Jour. Forestry* 16(2): 211-221.

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



## WHO IS USING X-RAY RADIOGRAPHY?

I received the following request for information. Please help: fill out the questionnaire and mail it today: Editor.

Dear Hugh:

I am interested in finding out who else in our Tree Seed Working Group uses soft x-ray radiography in their work on tree seeds. This technique for examining seeds is an excellent non-destructive diagnostic tool that has caught the interest, I feel sure, of numerous researchers and tree seed workers in Canada. My present objective is to locate the equipment and find out how it is employed, and by whom, as a means of determining how widely utilized it is.

I have prepared a short questionnaire that I hope you can include in the next issue of the TSWG News Bulletin. If readers of the News Bulletin will respond to this enquiry - even null responses are of value - it will be of considerable help. Later, when I have summarized the information, I should be able to report the results.

Sincerely,

D.G. Edwards

Complete this questionnaire, place it in an envelope and use the address label provided to send it to George Edwards.

----- TEAR OFF -----

1. Do you use soft x-rays in your work with tree seeds?

☐ - YES (Go to question 2)

☐ - NO (Stop. Mail back the questionnaire)

2. Where is the equipment located?

OWNER:

ADDRESS:

3. Would you agree to being contacted again for more information about the equipment, how you use it and what you use it for?

☐ - YES

☐ - NO

YOUR NAME:

ADDRESS:

4. Any comments?