

Newsbulletin

Tree Seed Working Group

NO. 7 March 1987

A WORD FROM THE CHAIRMAN

The next meeting of the Canadian Tree Improvement Association (CTIA) will be held in Truro, N.S. during the week of August 17-21, 1987. At this occasion, the Tree Seed Working Group (TSWG) will also meet. The business meeting of the TSWG is scheduled for Tuesday evening, August 18. On the agenda, there will be the election of a new chairperson. Since I have moved to a new position, I am no longer involved directly with cone and seed problems. During that meeting, another subject will also have to be discussed. That is the publication of the papers presented at future workshops or technical sessions. For the 1987 meeting, plans are now that the publication of all contributed papers will be by abstract only but the authors will be permitted to submit their paper for publication elsewhere following the meeting. I have the feeling that all the papers presented at the workshops or the technical session on cone and seed problems should be published in one proceeding.

As for the 1987 meeting, no formal workshop will be held. However, authors are asked to contribute papers relative to cone and seed problems and send their abstract to Dr. E.K. Morgenstern before July 1st at the following address: Department of Forest Resources, University of New Brunswick, Bag No. 44555, Fredericton, New Brunswick, E3B 6C2. These papers will be grouped by subject or theme in one of the technical sessions to be held Wednesday, August 19. Each author will have a maximum of 20 minutes to present his paper and answer

questions. There will be enough time for presentation of at least 5 papers in one session. If more papers have to be presented there is the possibility that they will be scheduled at other technical sessions.

An active participation at this meeting is expected. See you there!

Yves Lamontagne

NOTE THESE ADDRESSES

Chairman, TSWG (new address)
Yves Lamontagne
Ministère de l'Énergie et des Ressources
Service de l'amélioration des arbres
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Sainte-Foy, Québec, Québec, G1P 3W8

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Editor of Bulletin
Hugh O. Schooley
Petawawa National Forestry Institute
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Chalk River, Ontario, K0J 1J0

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

EDITOR'S NOTES

The Province of Ontario is making a bold effort to reorganize and revitalize its research in Forestry. A Federal/Provincial government and industry "Forestry Research Committee" has been established to guide the implementation of research programs. One action by the committee is of particular interest to the TSWG. They have set up a sub-committee to look at all aspects of research for tree improvement/genetics, seed and seedling production. It has been my pleasure to respond to a request from this sub-committee for an explanation of the TSWG's place in the scheme of forestry in Canada. They wanted an indication of our involvement in identifying research needs, organizing research activities, and setting study priorities.

In my submission, I outlined the size and general interests of the Group, our objectives and the ways we communicate with one another. I indicated (my opinion) how we perceive research should be organized and how we presently feel it is our responsibility to support and report the seed research objectives and priorities of the various government/industry organizations rather than develop these on our own. I emphasized the strongly apparent value of seed researchers and technologists communicating with each other and invited interested Ontario people, who are not members of the TSWG, to join our forum for exchanges and to make full use of our workshops and **Newsbulletin**. I'll send you a copy of my submission if you ask for it.

Preparation of this submission has indicated to me that it is now time for the Group to review its successes and neglects. We are a developing 'force' within Canada's forestry community and we can maximize our influence in promoting tree seed science and technology by focusing our attention on specific goals.

Many thanks to TSWG members who contributed to this issue of the **Newsbulletin**. For the first time most of what is printed here

was sent to me without it being necessary to phone a lot of people asking for contributions. This participation by you all sure makes my job a lot easier.

In his Xmas/New Years greeting to CFS staff, Associate Deputy Minister of Forestry, J.C. Mercier stated that "the more the public knows about forestry, the greater will be its realization of how important the forest sector is to the economy of Canada and the greater will be the public demand for the allocation of more resources to the forest sector." He asked CFS employees "to unite our efforts, work harder and be more visible on behalf of forest." I'm passing on this little pep-talk to all of you. You must especially support and promote your Tree Seed Group's interests in seed research, seed production and seed utilization. Remember -- all forestry activity initially depends on tree seed. It is our efforts and professional competence that will make possible the continued presence of healthy and vigorous forests for the benefit of future generations of mankind.

Now that you all have been 'fired-up' to an active state (as a result of the above pep-talk) I challenge you to demonstrate to the **Bulletin** readership that you can and are doing something to make other people aware of our profession. Let me know of your activities and I will in turn pass on this information in the next issue of the **Bulletin**.

Hugh Schooley

RESPONSE TO EDITOR'S NOTES

Dear Mr. Schooley:

Thank you for a copy of the C.T.I.T.'s Tree Seed Working Group Newsbulletin, No. 6. I found the bulletin both interesting and informative. May I please be included on your mailing list for future publications? (Yes-ed.).

In response to the Editor's Notes, I wish to offer the following "enlightenment". The Northwestern Region of the Ontario

Ministry of Natural Resources intends to achieve the target of genetically-improved planting stock for black spruce by 1995. They established eleven seedling seed orchards in 1982 and many of the trees are now in the 4-6' height range. Family test measurements in 1987 will provide base-line performance data. Subsequent re-measurement in 1990 will provide information for roguing of the orchards to the 75% level.

Granted, we are not without our problems. White pine weevil, spruce budworm and Armillaria root rot are pests deserving of our attention. Cover crop management, fertilization and irrigation require scientific "refinement". Nevertheless, our program is sufficiently developed that the 1995 target is in our sights.

The region's six white spruce clonal orchards are in various stages of establishment. Planting commenced in 1983 and continues where poor graft survival necessitates regrafting. Although some of the orchards exhibit less-than-optimum survival and growth, we are hopeful that genetically-improved seed will be produced by the year 2000.

Finally, our current efforts are directed toward the establishment of Jack pine seedling seed orchards. These will be planted from 1988 to 1990 and will require state-of-the-art management to achieve production of genetically-improved seed by 1995.

I hope that my description of the Northwestern Region's program will alleviate some of your concerns expressed in Editor's Note.

Al Barauskas, Tree Improvement Specialist
Northwestern region, OMNR
P.O. Box 5160, Kenora, Ont. P9N 3X9

CONE AND SEED RESEARCH NETWORK

Editor's Note: Major project reviews were conducted by the Canadian Forestry Service of tree seed programs at Petawawa National Forestry Institute and the Great Lakes

Forestry Centre. As a participant in the two reviews, Doug Skeates of the Ontario Tree Improvement and Forest Biomass Institute has written to express the need for closer networking and cooperative programs within the cone and seed research community in Ontario.

"I was honored to be asked to participate in reviews of cone and seed projects at P.N.F.I. and G.L.F.C. The first was a review of studies of the National Tree Seed Centre at Petawawa: -- the work of Ben Wang, Project Leader, Hugh Schooley, Willard Fogal and Rajesh Mittal. Included were studies in seed testing, seed storage technology, seed orchard technology, and in seed pathology. It was proposed to phase out work on cone and seed insects. Proposed future plans included greater emphasis on treatments for improved seed production in seed orchards and technology transfer. The second review was of cone and seed insect pests project at G.L.F.C. Jean Turgeon and Peter deGroot presented their plans relating to a clean up of past studies of forest pests and expansion of studies of pests reducing yields of seed produced by spruce and pine species.

Both reviews indicate the limited availability of cone and seed scientists. Being 'thin on the ground', spread far and wide geographically and somewhat isolated by the nature of employment divisions, scientists have had to work in semi-isolation.

Besides these workers, there are others in Ontario doing seed research. Several graduate and undergraduate seed studies have been supervised by Bob Farmer at Lakehead University. Frank Lozano of the University of Toronto has conducted nutrient evaluation programs in Ontario seed orchards. At O.T.I.F.B.I. there are two seed research and development programs. Doug Skeates is concentrating currently on seed production/collection science and technology while Rong Ho and Aldrich Hak have flower induction and breeding hall seed production projects. Fred Haavisto at G.L.F.C. has published extensively on aspects of black spruce seed production.

There is a real need for Ontario scientists to coordinate their programs, collaborate where they have closely related projects and to work together to fit their various pieces of the jig saw puzzle into a more complete picture. Each program augments the others, and between them, the scientists are in a strong position to recommend action to fit the remaining pieces in place.

Subsequent to these reviews there has been an exchange of views between National Tree Seed Centre scientists and seed scientists at O.T.I.F.B.I. It is hoped that this will generate closer collaboration at least between scientists from these two centres. Possibly this could expand to produce more comprehensive liaison throughout Ontario."

Doug A. Skeates

IMPORTANCE OF ISTA ACTIVITIES

The International Seed Testing Association (ISTA) is responsible for formulating the official testing rules for all types of seed. Within this organization, the interests of forestry are attended to by the Forest Tree and Shrub Seed Committee. This Committee has 17 official members and is currently chaired by Ben Wang, of PNFI. An official membership is not required to participate in the Committee's activities: they welcome and pay close attention to communications from other individuals and groups.

The activities of the Committee and ISTA as a whole, are well known to researchers involved in seed testing and to seed analysts. The Committee oversees the efforts of 11 working groups that study the various aspects of the seed testing process. A list of these groups and their current objectives follows: -

1. Bulking and Sampling Working Group
 - To obtain seed heterogeneity test data on species.

2. Purity Analysis Working Group
 - To review 1,000 seed weight of species to ensure that working sample weights contain at least 2,500 seeds.
 - To monitor progress of ISTA Purity and Statistics Committees.
3. Germination Test Working Group
 - To review and reconcile the germination test prescriptions of dormant species in ISTA Rules that are different from the AOSA Rules.
 - To explore techniques for vigour testing of seeds.
 - To list definitions of terminology used in tree seed testing.
 - To organize a tree seed testing workshop in 1988.
 - To standardize Table 5A of ISTA Rules.
4. Tetrazolium Test Working Group
 - To resolve anomalies in the evaluation guide for seeds.
5. Excised Embryo Test Working Group
 - To review and improve excised embryo tests.
6. X-radiographic Technology Working Group
 - To prepare a proposal for using x-radiography to evaluate ungerminated seeds at end of germination test.
 - To perfect x-ray contrast testing techniques.
7. Tree Seed Pathology Working Group
 - To identify seed-borne organisms and develop methods for testing them.
 - To verify test methods.
 - To test two fungi on Picea seed and list fungi of tree seeds.
8. Testing Seed by Weighed Replicates Working Group
 - To obtain weighed replicate test data on seed species.
 - To report weighed replicates test data on Betula species.

9. Testing of Tropical Tree and Shrub Seed Working Group

- To identify species of importance in international trade.
- To obtain data on handling, physical and physiological characteristics, pre-treatment requirements and germination conditions.

10. Seed Storage Working Group

- To develop standard procedures for determining moisture content and tolerance limits for large hardwood seeds.
- To identify species with truly recalcitrant characteristics.
- To examine drying using techniques that do not involve heated air.

11. Forest Tree and Shrub Seed Handbook Working Group

- To revise draft manuscript and publish.

Anyone interested in actively participating in any of the working group activities should write to Ben Wang at PNFI.

Ben Wang

SOME SEEDS CAN STAND ULTRA-LOW STORAGE TEMPERATURES

Although ultra-low storage temperatures of from -70°C to -196°C have not been shown to be significantly superior to -20°C for preserving physiological quality of seeds, it has been suggested that the colder the storage temperature, the longer the potential storage time. The unique advantage of ultra-low temperature storage of seed is that practically all metabolic activities of the seed are essentially stopped at temperatures of -145°C to -196°C . Such cryopreservation technique has been considered most desirable and safe for preserving valuable genetic germplasm material in many countries.

As part of a study on seed storage requirements at PNFI, preliminary trials indicated

that seed of some species may not be effected by the sudden change from room temperature to ultra-low temperature when placed directly into liquid nitrogen storage. The germination of jack and red pine and black spruce seed was not affected by direct storage at -80°C , -150°C , and -196°C for up to 4 weeks. However, seed of lodgepole pine and white spruce suffered some loss in germination after the direct storage.

Ben Wang

TREE IMPROVEMENT WORKSHOPS

Co-operators in the tree improvement programs in the Maritimes are rapidly engaging in new phases of their respective programs. A series of workshops are being planned to both provide instructions on various aspects of program development and to facilitate information exchange between co-operators. The first of these workshops is scheduled for March 17, 1987 in Fredericton. The subject of this workshop will be cone and seed insects in seed orchards. Topics to be addressed include: current knowledge of what species are present, how to monitor insects in seed orchards, their potential for damage, what control options are currently available, and research priorities for developing new control tools. Although a formal schedule for future workshops has yet to be developed, subjects to be addressed will include 1) managing seed orchard soil fertility, 2) pollen collecting, handling, and controlled pollination techniques, and 3) cone and seed collection and handling. For further information on these workshops contact:

Ron Smith
Canadian Forestry Service
P.O. Box 4000
Fredericton, N.B.
E3B 5P7
(506)452-3530

TREE SEED TESTING WORKSHOPS

At this time last year Ben Wang, CFS/PNFI and George Edwards, CFS/PFC, authored a Newsbulletin #5 article that asked "Do you want a workshop on seed testing?". Many people answered yes!! So a workshop, that will be repeated at various locations across the Country, is being organized. Plans should be finalized soon. An Ontario workshop has been agreed upon. It will be held at PNFI from September 29 to October 1, 1987. This hands-on workshop is organized jointly by the Canadian Forestry Service and the Ontario Ministry of Natural Resources. It will discuss seed testing and seed related stock production problems. Details will be announced at a later date.

Ben Wang

NEW SURVEY OF TREE SEED EQUIPMENT

At the 1985 Symposium in Vienna, it was agreed the IUFRO Seed Problems, that Project Group P2.04.00, survey of tree seed equipment should be updated. The first one was completed in 1976 and published the following year (Bonner, F.T. 1977. Equipment and supplies for collecting, processing, storing, and testing forest tree seed. U.S.D.A. Forest Serv. Gen. Tech. Rep. SO-13). I would like the updated version to follow the same format.

Equipment classes are as follows:

- Cone, Fruit, and Seed Collection Equipment
- Cone Kilns, Other Extraction Devices
- Cleaning/Processing Equipment
- Mixing and Sampling Equipment
- Moisture Testing Equipment
- Storage Equipment
- Germinators
- Seed Counters
- X-ray Equipment
- Specialized and Miscellaneous Equipment

The following examples from the 1977 Survey shows what information we need:

Type	Use	Specs.	Mfg.	User
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Kilns

Drying kiln	drying (P,L)	2 electric heaters, 2 fans; 8 cone boxes 5 kg/box	Local	360
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Gravimetric Testers Which Dry Seeds

Brabender oven	seeds resistance and heaters cones dry seeds; (P'R) scale read- out in % moisture	Brabender 360 O.H. Duisburg, West Germany (FDR)
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Under "Use", codes are: P (practical use); R (research work); L (laboratory use).

Under "Manufacturer" local means local construction, usually not available commercially.

Under "User" numbers refer to a coded list of laboratories.

I urge all Group members to assemble this information for your equipment which was not listed in the 1977 edition and send it to me. Also send any changes in 1977 listings such as change in a manufacturer's address; delete equipment no longer used.

Frank Bonner
U.S. Forest Service
P.O. Box 906
Starkville, MS 39759 USA

Editors Note: If your organization is extracting seed then it should belong to this IUFRO Project Group. If your not a member contact Frank at the above address and join.

CONE AND SEED YIELD FROM A JACK PINE SEEDLING ORCHARD

The Tree Improvement Unit of the New Brunswick Department of Natural Resources and Energy made its first major cone collection in an 8-year-old jack pine seedling seed orchard. The 5.4 hectare orchard located at Otter Brook in central NB was rogued in 1985-86 to 53% of the original planting, or approximately 2150 trees per hectare.

Since the majority of the cones were within reaching distance from the ground, they were easily collected with a pair of shears. Cone collection began on September 4, 1986 and was completed September 29. The cones were collected earlier than necessary due to concern that they might be lost to the high population of red squirrels in the area. Although there was little evidence of squirrels early in September, by the third week there was a large population in the orchard.

A total of 1644 litres of cones took 76 man days to harvest from the orchard. There was only an average of 10 cones/tree. The cost of collection @ \$75/man day) was \$5700 or \$3.47 per litre. In mid-January and a total of 18.51 kg of dried seed (approximately 5.04 million seed) was extracted from the orchard cones.

In addition, a sample of 100 cones from four collection dates (September 4, 11, 18 and 26) was taken and the seed extracted. The cones had an average of 43 full seeds with a seed weight per 1000 of 3.56 g. Two hundred seeds from each of the four dates were randomly selected and their germination tested. Results indicated that there was no difference between collection dates with an overall average germination of 97%.

Kathy Tosh

Editor's Comment: Note again the amount of information contained in the above article. This detailed account of seed production proves without a doubt, the development of a successful orchard. Why don't we all

collect this type of information to demonstrate our management efforts? Researchers at PNFI are in the process of organizing a computerized registry for such information. Its accumulation will be of enormous value in establishing the seed production capabilities of various species and in identifying good orchard management practices. If you are interested in this registry contact Hugh Schooley.

GA4/7 PROMOTES CONE PRODUCTION BY BLACK SPRUCE

Trees in a black spruce seed production area in central Newfoundland were sprayed with GA4/7 (gibberellin A4/7) on the top flower producing part of the crown. 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. Growth substances of this type are expensive and their use on a mass scale is unlikely, but it is quite feasible to apply the chemicals to the few trees which are chronically poor flower producers. Research is continuing to refine the techniques in terms of optimal concentration and application date.

J. Peter Hall

POLLEN CONTAMINATION IN A NEW BRUNSWICK SEED ORCHARD

For seed orchards to produce seed of maximum genetic quality, the influx of non-orchard pollen must be minimized. Pollen contamination may be a concern only when orchard trees are young and not producing enough pollen to mask the non-orchard pollen. On the other hand, when orchards are young, a certain amount of pollen contamination may be desirable to pollinate any seed cones that are produced.

Pollen contamination can be most easily monitored when orchards are young. This was done in 1984 at a five-year-old New Brunswick Department of Natural Resources and Energy black spruce seedling seed

orchard. That year was a good cone production year for black spruce and hence pollen production was also high. The study determined that pollen dispersal lasted 9 to 15 days. Most of the foreign pollen originated from south and west from a residual stand in the direction of prevailing winds. Pollen production was positively associated with temperature and negatively related to precipitation. Because this orchard is exposed to contaminating pollen, this factor must be considered when managing the orchard.

J. Dale Simpson

THE RELATIONSHIP BETWEEN THE DEVELOPMENT OF CONES OF BLACK SPRUCE AND THEIR INSECT FAUNA

The following is an abstract of Phd. thesis recently completed by TSWG member, Yves Prévost at the University of Guelph. Congratulations Yves. (Editor).

The seasonal trends in the physical and chemical characteristics of the female reproductive structures (FRS) of black spruce, *Picea mariana*, were divided into four phases, based on changes in the length and diameter of the developing cones. Associated with these changes were differences in water content and dry weight per cone which could be explained by the synthesis and hydrolysis of the indigestible fibers (IFIB) and their hydrophobic and hydrophilic properties. The concentration of N, P, K, Ca and Mg was positively correlated to metabolic activities of the cone tissues.

Life tables for FRS constructed for 1983 and 1984 included nineteen insects and the red squirrel. Most organisms (65%) fed during phases one and two when the FRS were succulent (75% water), had a low IFIB (20%), and rich sugar and fat content. Fewer organisms (25-30%) fed during phases three and four, when the cones were drier and the IFIB content was 75%. Few species (10%) fed on mature cones. Collectively,

these organisms damaged 89.9% and 53.5% of the cones in 1983 and 1984, respectively but Lepidoptera damaged 61.8% and 44.3%. The spruce budworm, (SBW), and the spruce coneworm, were the most important Lepidoptera pests. Red squirrels damaged 18.8% of the cones in 1983 and none in 1984. The spruce cone axis midge, and the spruce cone maggot, caused minor damage in both years. During 1984 damage to cones treated with Cygon-2E was reduced to 15.6% compared to 53.5% for non-treated cones. Cones had greater SBW damage than current-year foliage because they were available for 2nd-instar larvae feeding in the spring when only the vegetative buds were present and because chemical analyses showed the FRS to be nutritionally superior to foliage as food during most of the SBW feeding period.

Yves H. Prévost

(now working at CFS, Laurentian Forestry Centre, P.O. Box 3800, Sainte-Foy (Québec) G1V 4C7)

SYSTEMIC INSECTICIDES FOR CONTROL OF CONE AND SEED INSECTS IN DOUGLAS-FIR

The systemic insecticides acephate, dimethoate and oxydemetonmethyl have been screened experimentally, and the first two used operationally for control of Douglas-fir cone and seed insects in seed orchards on Vancouver Island, British Columbia. Dimethoate, as a foliar spray, controlled the cone and seed insects and increased the number of filled seeds per cone, making it the recommended choice. Oxydemetonmethyl, as a foliar spray, was as effective as dimethoate in controlling the insects but appeared less effective at increasing the number of filled seeds produced per cone. Injections of oxydemetonmethyl were less effective than foliar sprays in controlling insect damage. Acephate as a foliar spray was inconsistent in the level of pest control achieved and as an injection gave poor results.

Don Summers and Gordon E. Miller -

PEI PAYS FOR PLUS TREES

In their 1984-85 Annual Report released last fall the Prince Edward Island, Department of Energy and Forestry, showed it is anxious to get their tree improvement program rolling at full speed: -- and they are willing to pay for help. As an incentive to get woodlot owners to identify plus tree candidates the Department has offered a reward of \$100 per tree.

In the fiscal year 1984-85, 34 rewards were paid out. In 1985-86, 53 rewards were paid. The reward system is so well accepted by private woodlot owners, silviculture contractors, cross country skiers, etc. that in the fiscal year 1986-87, the Department did not have to operate its own selection crews. Figures indicate that for every three calls they receive, one yields a plus tree. Woodlot owners with plus trees are asked to enter into an agreement that allows the Department to collect seed and scions from these trees for 5 years.

Mike Butler, Tree Improvement Supervisor, with the Department suggests that this is an excellent method to obtain selections from private woodlots and that in some cases the plus tree owners become so interested in the program that they not only drop in to check on the grafting process but visit the seed orchard to check on "Their" tree.

If you would like further information on Prince Edward Island's Reward Program, please contact Mike.

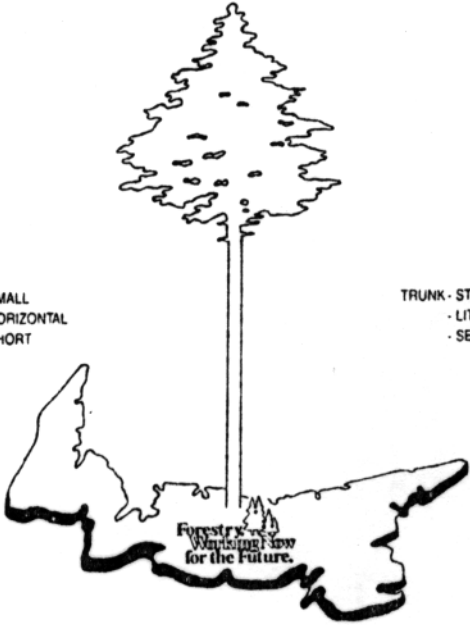
REWARD \$100

HELP US FIND "PLUS TREES" FOR OUR REFORESTATION PROGRAM FROM THESE PLUS TREES WE WILL ESTABLISH SEED ORCHARDS TO SUPPLY SUPERIOR PLANTING STOCK TO REFOREST THE ISLAND

CROWN - SINGLE LEADER
- COMPACT


BRANCHES - SMALL
- HORIZONTAL
- SHORT

TRUNK - STRAIGHT
- LITTLE TAPER
- SELF PRUNING




IF YOU FIND A TREE THAT MEETS THE ABOVE DESCRIPTION AND IS TALLER AND/OR LARGER IN DIAMETER THAN THE TREES AROUND IT, CALL YOUR LOCAL DEPARTMENT OF ENERGY & FORESTRY OFFICE OR THE TREE IMPROVEMENT OFFICE, UPTON ROAD WEST ROYALTY (892 0228)


IF THE TREE MEETS OUR CRITERIA YOU WILL BE REWARDED!



Department of
Energy and
Forestry



Agriculture
Canada



Department of
Energy and
Forestry

TREE SELECTION AND SEED ORCHARD ESTABLISHMENT IN QUÉBEC

In order to meet the requirement of the reforestation program of the Québec Ministry of Energy and Resources which aims at 300 million seedlings annually, about one billion viable seed of various species will be needed each year. Hopefully, all this seed will soon be from seed orchards.

A total of 18 123 plus trees have been selected (Table 1). They have been selected for specific traits that include: good growth, straight stem, good natural pruning, small branch diameter, large branch angle, narrow crown, good wood quality, and fair tolerance and good recovery after disease, insect, animal or frost damage. Of course, all these traits cannot be found on a "perfect" tree. So, depending on species, more importance is put on some traits. For example, a straight stem is most important for Jack pine and tamarack and a good resistance to weevil and rust is desirable for eastern white pine.

Plus trees are selected by a specially trained team in each of the administrative regions of the Province. The selection is conducted by walking in all the best natural stands and the oldest plantations. Some selections are also made in the most promising progenies and provenances identified in the various tests throughout the Province. Provincial personnel are also responsible for seedling production, and the establishment and management of the orchards. A grafting center was opened in Duchesnay in 1982 where specialized personnel make about 25 000 grafts per year.

The Province needs about 1 247 ha of seed orchards of various species. Out of this, 530 ha was already planted by 1986 (Table 1). In 1987 and 1988, 309,0 ha will be added to the total area. In Québec, seedling seed orchards are established for black spruce and Jack pine. In each orchard of this type, 350 selected trees

are represented. For all other species, the clonal type of seed orchard is preferred. About 225 clones are present in each orchard. The number of ramets per clone depends on the area required.

The first jack pine seedling seed orchard established in 1978 produced some cones in 1985. Other orchards will begin to produce cones progressively so that around year 2000, hopefully, all the seed required for the reforestation program will originate from orchards.

Yves Lamontagne

Table 1

Seed orchard area required and established and number of selected trees per species

Species	Seed orchard area required (ha)	Seed orchard area established (ha)	No. of selected trees
<u>L. laricina</u>	31.8	4.3	771
<u>L. decidua</u>	3.0	0.0	0
<u>L. dunkeld</u>	1.0	1.0	25
<u>P. abies</u>	76.0	0.0	282
<u>P. glauca</u>	118.4	55.8	4 102
<u>P. mariana</u>	637.9	280.3	7 188
<u>P. rubens</u>	48.1	0.0	1 303
<u>P. banksiana</u>	284.0	178.1	3 743
<u>P. resinosa</u>	8.7	2.7	349
<u>P. strobus</u>	33.5	8.5	334
<u>P. sylvestris</u>	5.0	0.0	26
Total	1 247.4	530.7	18 123

ADELGIDS AS CONE AND SEED INSECTS?

Spruce gall aphids (Adelges cooleyi, Pineus similis, P. pinifolia) are of increasing concern in British Columbia spruce seed orchards. In 1985, about 15% of the cones and 30% of the foliage examined in a survey of interior spruce at Skimikin Seed Orchard were infested. In 1986, a coastal Sitka spruce orchard lost approximately 9% of the cones to these adelgids. The impact of gall aphids on cones and seed is being studied in terms of extractable seed/cone, seed germination and seed size to determine the effect of infested cones on overall seedlot quality.

Don Summers

CONE RUST IN WHITE SPRUCE

In 1984 there was a bumper white spruce cone crop in New Brunswick. Ideal conditions for spore germination (humid and wet spring) and the abundance of raspberry, the alternate host required by the cone rust Pucciniastrum americanum to complete its life cycle, resulted in very high levels of infection of white spruce cones throughout much of New Brunswick. This fungus reduced both the quantity and quality of seed produced in heavily infected cones. In Nova Scotia the spring of 1986 was humid and wet, and this rust was again present in moderate levels in many of the white spruce clonal orchards. Although it is impractical to eliminate all raspberries from the vicinity of white spruce orchards, the presence of this fungus supports the need for weed control in orchards. See the following reference for more information. (Smith, R.F., L.P. Magasi, and K.J. Harrison. 1986. Cone rust, a potential problem in white spruce seed orchards. Can. For. Serv. Maritimes, Tech. Note No. 161. 3 p.)

Ron F. Smith

LOSS OF NORWAY SPRUCE REPRODUCTIVE BUDS TO BIRDS

A developing seed crop is vulnerable to damage from many sources. Cone and seed insect pests are receiving considerable attention and the destructive activities of squirrels are fairly well known. Besides these damaging agents, it appears that birds can also significantly influence seed production. Recent observations made at Petawawa National Forestry Institute (PNFI) have identified Evening Grosbeak (Hesperiphona vespertina) damage to reproductive buds on Norway spruce. A mid-winter examination of the trees to forecast the probability of a cone crop next year indicated extensive damage.

During the winter, Grosbeaks travel in flocks and feed together on a common food source. On spruce they pull off the bud scales and consume the bud tissues. Bud feeding by these birds was assessed on six upper crown branches removed from each of five open grown, 20-25 m high, genetically selected, hardy trees. Losses were as follows: -

Tree No.	% buds eaten	
	Female	Male
1	67.5	50.5
2	52.3	34.2
3	53.5	30.5
4	35.2	13.8
5	40.6	40.0

The above data clearly show that the losses were substantial, particularly for female buds. Although losses of male buds on sample branches were also high, their loss from the trees as a whole was not serious. This was so because feeding by the birds was concentrated in the upper one-third of the tree crowns and most male buds are produced lower in the crown.

Since the trees were sampled on January 22, 1987, the data collected may represent only a portion of the total bud loss these trees may sustain before winter is over. Grosbeak damage should be assessed about the time of flowering. Damage is highly probable if the birds are observed on the trees at any time during the winter.

Moe Anderson
(CFS at PNFI)

PREDATION BY BIRDS ON NURSERY SEEDBEDS

In the fall of 1986, a spruce seedbed compartment at the Dryden Tree Nursery in Northwestern Ontario, suffered large, seed losses due to predation by a flock of birds. Black and white spruce seed were sown in mid-October. The black spruce was placed very shallow, with about half of the seed remaining visible. White spruce was sown slightly deeper, 1 - 2 mm, with only the occasional seed visible. A hydromulch protective cover was applied immediately after seeding using following prescription: hydromulch 54 kg, water 1,800 L, and corn oil 100 mL, on a seedbed 150 m long and one metre wide.

Several days after seeding, a dozen birds identified as 'snow buntings' appeared on the field and began feeding. The flock size quickly increased to about 100 birds. Propane bangers were initially effective in keeping the birds away for five to ten minutes after each bank. The noise caused the flock to rise and circle several times before settling on the field again. However, after several days, these units were no longer effective. Motor vehicles and horns were also ignored after several days of use. By using a shotgun and firing half a dozen shots, we were able to scare off the flock for longer periods of one to two hours. Some birds did not return after each firing so that by evening time only several dozen were present; but the whole flock returned the next morning. At the end of the three week period only a few dozen birds remained in the area. All the birds left at about the time the ground became completely frozen.

The birds only feasted on the black spruce seeds. No scratching marks were noted within the white spruce seeded area. The birds were very adept at digging directly above each seed drill, placed 10 cm apart, but not in the spaces between. It is estimated that up to one third of the black spruce seed was destroyed by the birds, resulting in a net loss of about 300,000 shippable seedlings.

We considered treatment of the seed with a pesticide powder as a way to discourage bird predation. However, this powder caused the calibration on our seeder to become very inaccurate, which is not an acceptable alternative.

Dryden Tree Nursery requests information as to the control and repelling techniques used by anyone experienced with a similar bird pest problem.

Terry Myland, Nursery Forester
Gaspar Horvath, Research Technician
Dryden Tree Nursery
Ontario Ministry of Natural Resources
Box 90, Wabigoon, Ontario P0V 2W0

NORTHEASTERN FOREST TREE IMPROVEMENT CONFERENCE

The biennial meeting of the NEFTIC was held July 22-24, 1986 at the University of Maine in Orono. The theme for the meeting was "Accelerated Testing and Breeding Strategies".

The breeding strategies followed for different species were described in the light of demand for fibre production over ever shorter rotations. This includes new methods for the production of seeds in seed orchards. The factors contributing to reduced seed yields in breeding programs using superior trees were also discussed. The effects of insects on cone production were described.

Variability in various tree species was described in terms of economic traits

useful to forest managers. These traits included provenance variation; resistance to insects, diseases and herbicides; and variation in isozymes, and growth of hybrids. The range of species was similarly broad including black and Norway spruce, jack, red, white, pitch and loblolly pine and the true firs. Several of the eastern hardwoods were also the subject of papers.

A field trip to the limits of International Paper and Scott Paper Company examined seed orchards of tamarack, Japanese larch, white and black spruce and jack pine; all recently established and not yet producing cone crops. A visit to the International Paper tree nursery was also instructive. The nursery produces 1-1/4 million trees annually in two crops. The species produced are black spruce, larch and red pine in containers. Seedlings are removed from containers at the nursery, shipped in waterproof boxes and planted as soon as possible.

T. Peter Hall

REPORT ON 21ST ISTA CONGRESS

The 21st International Seed Testing Association (ISTA) Congress was held successfully in Brisbane, Australia, July 10-20, 1986. Some 300 delegates from 50 countries around the world attended. Although there were few changes in the current seed testing rules, there were many changes in the chairmanship of the Technical Committees. We now have, for the first time, a Canadian ISTA President, Mr. Sandy Edrie, Associate Director, Seed Biology Laboratory, Agriculture Canada. Two other Canadians became technical committee chairman, Doug Ashton, Chief, Seed Germination and Physiology Unit, Seed Biology Laboratory, Agriculture Canada, as chairman of the Germination Committee, and myself as chairman of the Forest Tree and Shrub Seed Committee.

Of importance to the Forest Tree and Shrub Seed committee were several changes in sampling size definitions and purity

analysis definitions. These changes will come to effect from July 1, 1987.

In the forest tree and ornamental session 22 papers were submitted and seven speakers presented eight papers including my Chairman's keynote review. Reports outlined new techniques developed for biochemical staining in viability tests of Abies seed; for Fusarium disease contamination tests of two southern US pine species; and for cryopreservation of banana seed in Malaysia. A paper from the Chinese Academy of Forestry covered data on biochemical tests of 32 conifer and hardwood species. A paper on the evaluation of ungerminated seeds at the end of germination tests by x-radiography by Professor Milan Simak (and associate) was especially interesting. You will have an opportunity to read most of the submitted papers in future issues of Seed Science and Technology.

The two Forest Tree & Shrub Seed Committee meetings were attended by five of the 17 official members in addition to other ISTA Congress participants interested in, or associated with forest tree and shrub seed problems. These committee meetings discussed past progress, future programs, membership, and the structure of the committee.

The post-congress forestry tour was very interesting and exciting. The 5-day tour took 12 participants through the coastal plain and sub-coastal highlands of northern New South Wales and southern Queensland. We saw a variety of forest types from sub-tropical rain forests to warm temperate forests. We visited the Whian State Forest of over 5,000 ha and saw some beautiful young stands of blackbutt (Eucalyptus pilularis) regenerated from seed trees and by plantings of 6-month-old jiffy pot seedlings. We visited forest tree nurseries, a seed processing plant, seed orchards, and extensive plantations of Pinus elliotii, Pinus caribaea var. hondurensis and Araucaria cunninghamii. To me, the highlight of the trip was the 'virgin forest' of the majestic Bunya pine (Araucaria bidwillii) in the 11,700 ha

Bunya Mountains National Park. Although we did not see cones of Bunya pine, we were told they are about 30 cm in diameter containing large, tasty, starch-rich seeds.

I visited the seed testing laboratory at Gympie. It is maintained by the Queensland Department of Forestry and provides service tests of approximately 250-300 seedlots per annum. Seedlots are tested for germination before storage, and immediately before sowing or prior to sale. Caribbean pine and hoop pine are the major test species, although some small lots of interspecific hybrid seeds and a wide range of ornamental taxa are also tested here. We hope to obtain some information on the species, purity weight, pretreatments and test conditions of some tropical and subtropical species from this laboratory.

Ben Wang

UPCOMING MEETINGS CANADIAN TREE IMPROVEMENT ASSOCIATION

The 21st biennial meeting of the Association will be held at Truro, Nova Scotia, from August 17-21, 1987. An optional tour of seed orchards in the Annapolis Valley precedes the meeting. The meeting itself consists of a one-day symposium on the theme "Tree Improvement -- Progressing Together," and a day of contributed papers and the CTIA/ACAA business meeting. A two-day field tour follows to view tree improvement and reforestation activities and nursery facilities on Cape Breton Island.

For further information, please contact:

T.J. Mullin, Chairman CTIA/ACAA
Tree Breeding Centre, P.O. Box 190
Debert, N.S., B0M 1G0
(Tel. 902-662-3300)

GENETIC MANIPULATION OF WOODY PLANTS

The molecular biology of woody plants is a rapidly expanding field worldwide. To further stimulate the development of know-

ledge 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:

- (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.

IUFRO SYMPOSIUM ON FOREST SEED PROBLEMS IN AFRICA

IUFRO Project Group (P2.04.00) on Seed Problems and the Zimbabwe Forestry Commission will hold a symposium at Harare, Zimbabwe from August 23 to September 2, 1987. Papers will focus on collection, handling, quality determination, storage and conditioning of forest seed for reforestation programs. Since the meeting is being held in Africa it is hoped that African countries will take the opportunity to submit papers dealing with their seed problems. Seed scientists from Asia and Latin America are also encouraged to participate. Special sessions will be held to discuss seed problems and measures to solve them.

People interested in attending should contact:

B.R.T. Seward, Forest Research Centre
P.O. Box HG 595, Highlands, Harare
Zimbabwe, Africa

ASEAN JOURNAL - THE EMBRYON

The Embryon, Volume 2, No. 1, was published in September 1986. This official journal of seed science and technology of the ASEAN-Canada Forest Tree Seed Centre was first published in August 1984, and its future publication will be occasional. This issue, edited by Doug Skeates, contains eight scientific articles:

- Mechanical extraction and cleaning of nuts of some tropical species. By P. Amata-archachi and P. Wasuwanich;
- Effect of cone colour and seed-extraction methods on yield and quality of seeds of Pinus merkusii. By H. Arisman and G.R. Powell;
- Storage of Azadiradita indica A. Juss. seeds. By K. Chaisurisri, B. Ponoy, and P. Wasuwanich;
- Fungi associated with different forest tree seeds of the Forest Research Institute seed bank. By M.P. Dayon;
- Seed zone in Thailand an environmental interpretation. By S. Eis;
- X-radiography of tropical forest tree seed. By B. Kobmoo and D.A. Skeates;
- Preliminary studies on flower development in Dipterocarpus alatus Roxb. by S. Ngamkhajornwiwat and P. Wasuwanich; and
- collection and storage of seeds of Shorea roxburghii G. Don. by J. Panochit, P. Wasuwanich, and A.K. Hellum.

Note the Canadian content by Skeates, Powell, Eis and Hellum.

The journal is available from the ASEAN-Canada Forest Tree Seed Centre. Muak-Lek, Saraburi 18180. Thailand.

Ben Wang

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