CANADIAN TREE IMPROVEMENT ASSOCIATION

Newsbulletin

Tree Seed Working Group

NO. 2 NOVEMBER 1984

MEMBERSHIP DIRECTORY

I am pleased to report that 105 responses to the TSWG Membership Questionnaire have been received. Of these, 93 are Canadian, 7 are from the U.S., 2 from India and 1 each from Nigeria, Finland and Sweden. It is most encouraging to find so many seed workers and seed users readily interested in working together in the TSWG in solving seed problems. Based on fields of interest, our membership is represented by 37% tree improvement, 35% seed production and management, 24% seed utilization and 4% in seed collection, processing, testing, storage and teaching. A draft of the Membership Directory has been completed by **Francine Ackerman** of the National Tree Seed Centre and we hope to have it printed very soon.

Ben Wang

TSWG OBJECTIVES

Our first News Bulletin included a statement of TSWG Objectives that was adequate in principle but which required elaboration. As originally defined, the Group's principal aim is to promote tree seed science and technology through:

(1) seed research from bud initiation to seed utilization

(2) identification of seed problems relating to tree improvement and forest management,

(3) the exchange of information on seed related problems, and by

(4) advising on implementation practices.

Seed science is concerned with the end product of tree improvement and the raw material for forest establishment. Most of the work interfaces with that of many other scientists and technologists involved in the silvicultural continuum. The work of the TSWG includes, therefore:

a) Tree Improvement. The geneticist describes tree populations and determines the sources of seeds that will provide optimal forest quality and growth in the future. The tree breeder selects, crosses and evaluates improved growing stock and advises on procedures for their mass production. In comparison, the seed worker is concerned with seed yield and quality which, in turn, involves management of seed production areas, development of seed collection methodology and equipment, and optimizing seed handling, processing and storage. In short, the seed worker is responsible for information and practices that ensure an adequate seed supply and that maintain maximum quality of this genetic resource.

During the rush to create new forest products through genetics, the seed worker must provide an input into basic reforestation policy. Should seed orchards be relied upon to meet all future seed needs, or would a balance of orchards and natural areas dedicated to seed production be more desirable? What is the relative value of natural seed sources compared to land races; how do seeds from land races compare with those from seed orchards and subsequent generation of seed orchards? Efforts to develop new, improved seed sources must be counterbalanced with adequate efforts to preserve existing natural seed-source gene pools.

b) Stock Production. In the silvicultural continuum, seed procurement is the least expensive operation when genetic standards are not considered. Hence seed wastage is common; for example, bare root nursery stock is produced with built-in yield factors of only 15%-40% from viable seeds to seedlings shipped. Similarly, double, triple (or higher) seeding is used in container nursery pro-

duction as a means of avoiding empty containers and, thereby, reducing production costs. As the availability of improved seeds increases, seed workers must ensure that the growth advantage developed by the geneticist is applied over the greatest area of new forest. Seeds must be manipulated to maximize the production of seedlings of the highest possible quality.

c) Direct Seeding. With limited forest renewal funds, forest managers are attracted to direct seeding since it appears to be inexpensive; it has been, however, a highly inefficient use of seeds. The seed worker, therefore, faces many challenges in improving the effectiveness of this, and other, methods of forest establishment.

d) Natural Regeneration. A basic knowledge of the seeding characteristics and seedbed requirements of various tree species is essential to the manager who plans forest operations to promote natural regeneration. Factors such as crop periodicity, seed dissemination distances and the time and duration of seed release which, in turn, effect the number and spacing of seed trees or cut strips and blocks, and the scheduling of site preparation activities, all influence such planning.

The work of the TSWG

The immediate task of the Tree Seed Working Group is two-fold. First, the TSWG must conduct an inventory of human resources in this field, and their interests. This is already underway by means of the questionnaire circulated with the first News Bulletin.

Second, gaps in our knowledge must be identified. As outlined in News Bulletin No. 1, an inadequate attempt to identify research needs was made at the last CTIA meeting. A more thorough review, together with recommendations to direct new efforts, is required to satisfy management requirements for a reliable seed-data basis.

Together, seed workers and tree improvement specialists must convince their forest management colleagues of the importance of seed quality in forest regeneration. The attitude that considers the provision of an adequate quantity of seeds as the only problem, must be altered. Seed workers must promote higher standards of seed collection, and improvement of the efficiency of seed utilization. It may even be necessary to recommend the discarding of poor quality seeds as genetically-improved seeds become available. We must promote collections in bumper crop years when both genetic quality, seed yield and germinability tend to be best — even if adequate quantities are in storage.

Whenever and wherever possible, the TSWG must promote an understanding of seed science and technology amongst the forest community. The converse is also necessary, *viz.*, that it is essential for tree seed workers to see their own work in the broader context of the whole forestry field.

Doug Skeates

Welcome From the Chairman

I was encouraged by the overwhelming returns from our membership survey. It reflects the recognition of the importance of tree seed problems in the expansion of reforestation programs in Canada and elsewhere. Certainly there is a need for our Tree Seed Working Group.

I would like to officially extend a warm welcome to all those who returned the questionnaire — our "registered" members — especially those in the newly-formed Canadian Forestry Service Cone and Seed Insect Working Group, and overseas members.

Now that we have a membership core, we need to plan the future development of the TSWG. To achieve this and maintain our progress, your help and direction is very much needed. Therefore, I earnestly urge you not merely to ask what the TSWG can do for you, but to seriously consider what you can do for the Working Group and the forestry community at large.

Ben Wang

SEED RESEARCH NEEDS

Research concerning forest tree seeds has been given increasing attention in recent years in British Columbia. The B.C. Ministry of Forests/Canadian Forestry Service Joint Cone and Seed Committee has been reviewing research needs for about a decade and earlier this year updated the list of priorities. In the following table, **Research and Development** (R/D) priorities are shown to the left of the headings, while **Operational and Training** (O/T) priorities are shown to the right; highest priority is rated 1, lowest is 8.

These priorities are based on current problems impinging on the regional reforestation program, and they relate primarily to seeds collected from natural stands although seed orchard problems were not excluded. Needs will be reevaluated in 2 to 3 years' time to reflect progress in producing solutions in these problem areas.

In some instances, the needs vary widely, depending upon whether they are viewed from a R/D standpoint or from an O/D, i.e., implementation, standpoint. For example, although cone and seed processing problems exist, it is felt that there is little current need to spend limited resources researching solutions since there is operational machinery available (at a price) that would negotiate these problems if it could be acquired. The O/T priority for Cone and Seed Processing was given the highest rating on this account. A high O/T rating was also given to Cone Harvesting and Field Handling, recognizing that the main problem here is in implementing research findings. Where O/T priorities are lower than those for R/D, it was recognized that little or no improvement could be made in the field until other research findings are available.

The British Columbia Coastal Tree Improvement Council recently identified problem areas in seed orchard management and listed 13 research

R/D Priority		O/T Priority
1	Seed testing and preparation for sowing (includes seed pretreatment; monitoring seed performance in the field; vigor testing; quick (viability) tests; viability separation)	4
2	Cone induction and seed development (includes cone initiation; crop forecasting and monitoring; crop collectability and maturation)	3
3	Cone and seed and other insects (includes biology of the pest; prevention and control)	6
4	Cone and seed diseases (includes biology of the pest; prevention and control)	7
5	Cone harvesting and field handling (includes mechanized (aerial) harvesting; field handling)	2
6	Seeding (includes pelletizing; precision seeding; sowing factors)	5
7	Cone and seed processing (includes kilning; extraction; dewinging; sizing; cleaning)	1
8	Seed storage	8

needs as follows (in descending order of priority):

High Priority
A Cone enhancement
B Pollen management
C Cone and seed pests
D Container orchards

Moderate Priority
E Crown management
F Frost control
G Site influences
H Genetic gains

Low Priority
I Stock propagation
J Orchard efficiency
K Cone harvesting
L Clonal propagation
M Crop forecasting

In establishing their respective research priorities, both the Committee and the Council considered the potential impact of the research, its feasibility, cost and risks, as well as the costs of implementing research findings, and the species to be studied. Certain contrasts between the two lists are marked, as in the need for Crop Forecasting, which was given a high rating in regards to seeds from natural stands, but the lowest priority when considering seed orchard needs.

These research priorities are shown here primarily to stimulate discussion and input from other regions and research centres. Identification of seed research needs is, as stated in Seed Bulletin No. 1, one of the primary tasks of the TSWG and this can only be completed if there is input from the membership. Your comments on the B.C. priorities or on the subject in general will be most welcome.

George Edwards

CONE AND SEED INSECT GROUP FORMED

It is of no surprise to seed workers and seed users that insects represent a major impediment to successful seed production. Seed losses of up to 100% are not uncommon, and such losses are especially significant in seed orchards. Although there has been considerable entomological research done on basic biology, ecology and control of insect pests, much remains to be done. There is no better time to continue such work than now! The Canadian Forestry Service has recently expanded its research efforts on cone and seed insects. To proceed efficiently and effectively a collective effort would be in the interest of all of us working on seeds.

I can think of no better forum to exchange ideas, discuss research needs and develop research programs on cone and seed insects than the TSWG. For this reason, a Cone and Seed Insect sub-group of the TSWG is proposed. This group would operate within the TSWG and share the same goals and objectives as outlined in the first TSWG News Bulletin.

A half-day or one-day workshop on cone and seed insect problems and research needs is being proposed for the 1985 CTIA meeting. The purpose of this workshop would be to acquaint ourselves with current programs in cone and seed insect research, to identify research needs, develop a communications and cooperative research network and formally organize the group. Some of the planning is currently underway but we need your help.

If you are presently involved in cone and seed insect research and are interested in joining the group your participation would be most welcomed. Collectively we can work together towards the advancement of our knowledge of this problem. If you have any suggestions and comments on how the group should function, etc., they too are welcome. Please send your names and ideas to:

Peter de Groot,
c/o Forest Pest Management Institute,
Box 490,
Sault Ste. Marie, Ontario,
Canada, P6A 5M7

Peter de Groot

WHITE SPRUCE CONE CROP IN ONTARIO

As a result of the hot, dry summer experienced in eastern and southern Ontario in 1983 and with the absence of a severe late spring frost this year, the white spruce cone crops in these areas are among the best since 1967. There are, however, reports of moderate insect infestation in cones at some collection sites.

Dr. Gordon Murray, in charge of the white spruce genetic improvement program at PNFI, intends to collect cones from 320 selected plus trees in the

Beachburg area of the Upper Ottawa Valley to take advantage of the high physical quality of seeds usually obtained in good seed crop years such as this one. The seeds will be used to establish a breeding population of Upper Ottawa Valley white spruce, with some of the material to be used by the Ontario Ministry of Natural Resources to establish a production seed orchard. Geneticists at PNFI will use these seeds for advanced generation breeding.

The white spruce crop in the rest of Ontario ranges from poor in the Northwest and North-central regions to moderately good in the Northern and Northeastern regions according to **Brian Swaile**, Superintendent, Ontario Tree Seed Plant.

Peter Janas

OECD SEED CERTIFICATION

Canada has been certifying tree seeds for export under the OECD (Organization for Economic Cooperation and Development) Scheme since 1970. Most of the "action" has been in the Pacific Region, with certification concentrating solely on seed source identification. OECD activities are expected to expand on two fronts in the near future: first, interest in seed sources from other parts of Canada, notably Ontario, require additional certification facilities to be installed, and secondly, surplus seeds from untested seed orchards are expected to be available from B.C.

Anticipating the need for certification services in other parts of the country, a three-day OECD Seed Inspectors Training Workshop was held in Victoria, B.C., in May of this year, attended by representatives from other CFS Centres. The participants reviewed the certification procedures developed in the Pacific Region over the past 15 years and were shown how to adapt these to meet their own regional requirements. A one-day tour of field collection sites, a seed extraction plant and a seed storage facility gave the attendees some feeling of the logistical problems they may face.

"Guidelines for Approval and Registration under the OECD Scheme of untested seed orchards in Canada" have been drafted and will be used to register forest company seed orchards in British Columbia in 1984. This is the first step to enable the companies to market surplus seeds with an accompanying OECD certificate.

George Edwards

EDITOR'S NOTES

It was pretty much as expected. Of the 105 individuals on the TWSG membership list less than 10% took the trouble to submit information for this issue of the News Bulletin despite earlier exhortations. Although Bulletin no. 2 does not exactly lack for news, if the rest of you sit back and leave it to the same small group in the future, you could be heading for intense boredom reading about the exploits of a handful of people...

Everyone is suffering under restraint, but some of you must have gone to the odd meeting or visited **somewhere**, have written or read an interesting paper, have done something — **anything** — that might loosely be construed as being of interest to your fellow members. It need not take more than 20-30 minutes once a month to jot something down and mail it either to your Chairman or Editor. For the New Bulletin and TSWG to succeed, we must have input from a broad spectrum of the membership. Focussing on the activities of a few will achieve very little. Let us show the rest of the forestry community, indeed the world at large, that Tree Seed Workers are not the apathetic bunch found in some other organizations.

FRENCH VERSION OF THE NEWS BULLETIN

Only two members (about 2% of the total respondents) expressed an interest in receiving the News Bulletin in French. Regrettably, the production of a second-language version cannot be justified at this time, but if interest increases the matter will be reviewed.

BANGKOK, THAILAND: JOINT IUFRO INTERNATIONAL SYMPOSIUM AND X-RADIOGRAPHY WORKSHOP

Some 90 scientists and foresters from 17 countries and FAO attended the International Symposium on "Seed Quality of Tropical and Sub-tropical Species" held May 22-26, 1984, in Bangkok. Thirty scientific papers on genetic, environmental and technological factors related to seed quality, and its assessment, and organizational roles and general problems of tree seeds, were presented at five technical sessions. The species covered

included *Eucalyptus*, *Araucaria*, *Acacia*, *Toona*, *Swietenia*, *Agathis*, *Tectona*, *Pinus*, *Lagerstroemia*, *Quercus*, as well as several others, and the topics ranged from seed storage, geographic variation, gene conservation, tropical seed orchards, seed collection, to seed testing and seed pathology. Proceedings of the Symposium will be published (under the auspices of the Thailand organizers) in the near future.

A one and one-half day workshop covered the history, theory and application of x-radiography to tree seeds, and extensive laboratory exercises on structure, safety and operation of an x-ray unit, sensitivity of biological materials, preparation of seeds for x-ray analysis, types of x-ray film and processing, analysis of germination potential and contrast agents for viability testing were conducted. Proceedings of the Workshop will be included with the publication of the Symposium papers.

Since this was the first symposium of tropical and sub-tropical seed quality held in Thailand, the technical sessions produced a lot of interesting questions and enthusiastic discussions, resulting in a very successful meeting. The generous sponsors — IUFRO, ASEAN/Canada Forest Tree Seed Centre, IDRC, FAO, Royal Forest Dept. of Thailand, Faculty of Forestry of Kasetsart University, other Forestry Organizations and the Thai Plywood Company — and the hard-working Organizing Committee, as well as the enthusiastic participants, can unreservedly be proud of themselves.

Ben Wang

AOSA/SCST CONVENTION 1984

The Association of Official Seed Analysts/Society of Commercial Seed Technologists held their joint Annual Meeting June 9-16 in Boise, Idaho, with over 200 delegates in attendance. Tree and shrub seed analysts were poorly represented; only two foresters, **Oscar Hall** (NTSL, Dry Branch, GA) and **George Edwards** (CFS, Victoria, BC) were present, although six people attended the Tree and Shrub Seed Committee meeting.

Highlights of the convention included a panel discussion on "The Seed Analyst and Seed Conditioning"; a half-day Symposium on "Production, conditioning and quality assurance of special seed kinds"; a one-day field tour of seed growing areas, and a one-day session of technical research papers. During the latter, Oscar Hall read his paper on "The effect of dry heat on tree seed germination: lodgepole pine, slash pine and Douglas-fir", and George Edwards reviewed his research with "Upgrading seedlot quality in conifers by flotation separation".

Tree seed workers are missing some worthwhile material by not attending the technical sessions or special symposia put on at these meetings. Even though the subject matter usually concerns anything but forest trees, or even fruit trees, it can be most interesting to learn that many of the problems encountered in, say, the peanut industry, in terms of seed handling, maturation, deterioration are very similar to those with tree seeds; or that seed sorting, dormancy and some of the storage problems of flower seeds, likewise, parallel those of conifers. These meetings provide excellent opportunities for the mutual exchange of ideas, and participation by those concerned with tree seeds needs to be encouraged.

The next AOSA/SCST meeting will be held in Richmond, VA, June 1985 (in Minneapolis, 1986), and there will be a one-half-day Symposium on tree seeds; **Frank Bonner**, (USFS, Mississippi) is the Symposium Chairman. Put it on your calendar.

George Edwards

CANADIAN SEED SURVEY

As part of the Canadian Forestry Service's Forest Resource Data Program (established in 1976), a survey of the use of forest trees seeds in Canada was undertaken at the Petawawa National Forestry Institute (PNFI). The report, "Canadian Forest Tree Seed Statistics: 1980-81 Survey Results," co-authored by **P.S. Janas** and **B.D. Haddon**, is available from PNFI as Information Report PI-X-41. Of the 54 species collected for reforestation in Canada, 34 are conifers and 20 broadleaves. The survey found that jack pine (*Pinus banksiana*), white spruce (*Picea glauca*) and black spruce (*Picea mariana*) are by far the most important and widely used reforestation species in this country, accounting for 59%, 22% and 6% of all the seeds used; seeds of the broadleaved species accounted for 0.5%. To meet projected seedling requirements for 1987, seed usage must increase by some 4% each year, a target easily within reach of seed procurement programs for most species. More than 88% of all the seeds used in Canadian reforestation programs originate from unimproved natural stands, less than 12% come from seed collection and production areas, and only 0.2% come from seed orchards. The survey compares seed reserves with crop periodicities; contrasts the use of seeds on a regional basis (for example, Ontario used 10 times as much seed, to produce 28%

fewer seedlings, as British Columbia); compares the number of species used in regional reforestation programs (Ontario uses 34, while Alberta and Saskatchewan each use two), and reviews the seed production of the major reforestation species by production strategy (genetically improved vs. unimproved). It concludes that dramatic increases in the amounts of genetically improved seeds used for regeneration are required if, as provincial agencies predict, 55% of all seeds used are to originate from seed production areas and 3% from seed orchards by 1987. The survey is to be repeated biennially.

George Edwards

NATIONAL ASSEMBLY OF ALDER SEED

Alder is receiving increasing attention for use as a short-rotation wood fibre production species in energy plantations and for improvement of soil fertility because of its nitrogen-fixing ability. With sponsorship from ENFOR (Energy from the Forests), the National Tree Seed Center at the Petawawa National Forestry Institute, has embarked on a national seed collection of native *Alnus* species, the purpose being: (1) to provide seeds of a wide array of species and ecotypes to the research community; (2) to contribute to the International Energy Agency's worldwide *Alnus* seed collection initiative (coordinated by Dr. Steenackers in Belgium); and (3) to obtain general information on seed collection, processing techniques, and cone seed yields of Canadian alder species.

Last autumn, about 450 seedlots comprising single tree and general collections of *Alnus crispa*, *rubra*, *rugosa*, *sinuata*, and *tenuifolia* were collected from selected forest regions and sections in British Columbia, Alberta, New Brunswick, P.E.I. and Nova Scotia. These lots are now being documented, processed and tested at the Seed Centre's facilities. The project should be completed by spring of 1985, with collections being planned in the remaining provinces this autumn.

Researchers interested in obtaining a listing of these seeds should send a request to:

P.S. Janas
National Tree Seed Centre
Petawawa National Forestry Institute
Chalk River, Ontario
K0J 1JO

Peter Janas

TREE QUIZ FOR TREE PEOPLE

Check your knowledge by choosing the one correct answer to each question. Answers are on page 9. No fair looking until you have completed the quiz. Ten correct is excellent and if less than five, try again.

1. Which element does every tree have? (a) branches (b) woody trunk (c) seeds
2. Which flower does not grow on a tree? (a) magnolia (b) poinciana (c) poinsettia
3. Which tree provides the main ingredient of guacamole? (a) avocado (b) guava (c) lemon
4. Which tree is not extinct? (a) club-moss (b) ginkgo (c) horsetail
5. Which tree's seeds are used to make chocolate? (a) cacao (b) carob (c) kola
6. Which is not a citrus tree? (a) grapefruit (b) kumquat (c) loquat
7. Which tree has showy clusters of pale purple flowers? (a) acacia (b) jacaranda (c) laburnum
8. Which tree does not bear cones? (a) banyan (b) pinon (c) redwood
9. Which tree's bark is used as a spice? (a) calabash (b) cinnamon (c) clove
10. Which does not grow on a tree? (a) butternut (b) peanut (c) walnut

NEW SEED HANDLING HANDBOOK

The draft-edition of new handbook entitled "A guide to forest seed handling" was distributed by DANIDA Forest Seed Center Denmark, early in 1984. The 394 page manuscript was compiled by **R.L. Willan**. A revised and illustrated edition is planned for publication before 1986. DANIDA Forest Tree Seed Center is located at Krogerupvej 3A, DK-3050 Humlebaek, Denmark.

Ben Wang

X-RAY CONTRAST TESTING: A "NEW" AGENT

Estimating tree seed viability by X-ray contrast methods began development in the late 1950's, and solutions of heavy metals (e.g., $BaCl_2$, $AgNO_3$) or vaporous chemicals of relatively low atomic weight (e.g. $CHCl_3$, CH_2Cl_2) have been used successfully in a number of species. Recently, **Prof. M. Simak** (Sweden) reported that water is by far the most-effective, non-destructive agent for X-ray contrast studies of seed viability. Simak's paper "X-ray method as a viability test" will be published in Proceedings of the IUFRO International Symposium on Seed Quality of Tropical and Sub-tropical Species, Bangkok, Thailand 1984. Look for it.

Ben Wang

STAFF CHANGES

Dr. MICHAEL MEAGHER, Geneticist, formerly with the British Columbia Ministry of Forests, became the white pine geneticist with the Canadian Forestry Service, Pacific Forest Research Centre, Victoria, in May 1984. He will be working closely with pathologist **Dr. Richard Hunt**.

Dr. YOUSRY EL-KASSABY, formerly with the Department of Forest Sciences, University of British Columbia, in May 1984 became the Geneticist, Tree Improvement with Pacific Forest Products Limited, following the retirement (maternal reasons) of **Mrs. Anita Fashler**. Dr. El-Kassaby's new address is:

Forestry Centre
Pacific Forest Products Ltd.,
8067 East Saanich Road, RR1,
Saanichton, B.C.,
Canada V0S 1M0

DID YOU KNOW THAT?

- The largest seed in the world is that of the double coconut, or Coco de Mer (*Lodoicea seychellarum*), a native of the Seychelles Islands. The two-lobed, singled seeded fruit is edible and may weigh up to 20 kg, as well as measuring over 30 cm, at maturity.

- The smallest seeds are those of epiphytic orchids at over 1.25 million per gram. Compare *Betula papyifera* with up to 9200 seeds per gram, or *Eucalyptus deglupta* at up to 5000 per gram.

- The most durable seeds are those of the arctic lupin (*Lupinus arcticus*) found in 1954 at Miller Creek in the Yukon Territory. Plants were produced from them in 1966. Radio-carbon dating placed their deposition in the frozen silt at no later than 8000 BC and more probably around 13 000 BC.

- Canada is the world's largest exporter of forest products, producing more than one-third of the world's newsprint and about 28% of the world's market pulp, valued in 1981 at around $13 thousand million. (Source: Canadian Resources Report 1983, 1(6).)

- Forest products account for one seventh of all manufactured goods in Canada, and the forestry sector accounts directly or indirectly for one million jobs. (Source: Environment Canada, "A framework for forest renewal", 1982.)

- One eighth of the productive forest of Canada has deteriorated to a point where huge tracts lie devastated, unable to regenerate a merchantable crop in the next 60-80 years. Of the estimated 800 000 hectares harvested annually by industry, only some 200 000 are replanted or seeded. Each year 200 000-400 000 hectares of valuable forest are added to the wasteland either because natural regeneration fails or the area reverts to non-commercial weed species. (Source: Science Council of Canada, "Canada's threatened forests', 1982.)

UPCOMING MEETINGS

1. **SYMPOSIUM: CONIFER TREE SEED IN THE INLAND MOUNTAIN WEST**, August 5-9, 1985, Missoula, Montana. Topics include Cone and Seed Biology; Influence of Insects, Diseases and Vertebrates on Seed Production; Cone Prediction, Collection and Processing; Seed Orchard and Seed Production Area Management. Requests for information should be directed to: Conifer Tree Seed, Center for Continuing Education, 125 Main Hall, University of Montana, Missoula, MT 59812, USA.

2. **ASSOCIATION OF OFFICIAL SEED ANALYSTS/SOCIETY OF COMMERICIAL SEED TECHNOLOGISTS** Annual Convention will be held in Richmond, VA, USA, June 16-20,

1985. **A TECHNICAL SYMPOSIUM ON FOREST TREE SEEDS** will be part of the program. Further details to be announced.

3. **IUFRO PROJECT GROUP** P2.04-00 (Seed Problems) will hold an International Symposium on "Seed Problems Under Stressful Conditions", at Vienna and Grunden, Austria, June 3-8, 1985. Emphasis will be on quality and quantity of seed production under stressful conditions: northern or alpine regions and zones, urban and industrial areas with pollution, and artificial stressful conditions. There will be seven symposium sessions:

   1. Introductory remarks — biological aspects
   2. Quantity and quality of seed production
   3. Problems with collection and processing
   4. Treatment, storage, testing, identification, etc.
   5. Special problems with tropical seeds
   6. General Discussion — economics, genetic aspects, concepts for seed supply, etc.
   7. Business meeting

   For further details write to:
   J. Nather
   Federal Forest Research Station
   A-1131 Vienna, Austria.

4. **The WESTERN FOREST GENETICS ASSOCIATION** will hold its 1985 Annual Meeting at Missoula, Montana, August, in conjunction with the Conifer Seed Symposium. Actual dates will be announced later.

5. **The 20th CTIA MEETING** is tentatively scheduled for August 19-23, 1985, in Quebec City. A one-day workshop on "Seed Entomology and Pathology" will immediately precede the meeting. Further details will be issued in due course.

Answers to Tree Quiz

1 — (b) (palms don't have branches; tree ferns don't have seeds)

2 — (c)	5 — (a)	8 — (a)
3 — (d)	6 — (c)	9 — (b)
4 — (b)	7 — (b)	10 — (b) (a legume, it grows on a vine)

NEW PUBLICATIONS

Bonner, F.T. 1984. GLOSSARY OF SEED GERMINATION TERMS FOR TREE SEED WORKERS. USDA, Forest Service General Technical Report SO-49. (The glossary was a project of IUFRO Working Party S2.01.06 "Seed Problems" - now Project Group P2.04-00)

Chen, R.Z. and J. R. Fu. 1984. Physiological studies on the seed dormancy and germination of *Erythrophloeum fordii*. Scientia Silvae Sinicae 20(1): 35-41 (in Chinese with English abstract).

Edwards, D.G.W., F.T. Portlock and D.W. Taylor. 1983. The "Seed-Vac", a homemade vacuum device for transferring seed samples. Environ. Can. For. Serv. Research Notes 3(4): 22-24.

Fogal, W.H. and S.M. Lopushanski. 1984. Stem injection of insecticides for control of white spruce seed and cone insects. Proc. IUFRO Cone and Seed Insects Working Party Conf., 31 July - 6 Aug. 1983, Athens, GA.: 157-167.

Guries, R.P. and E.V. Nordheim. 1984. Flight characteristics and dispersal potential of maple samaras. For. Sci. 30(2): 434-440.

Janas, P.S. 1984. A list of seed in the Canadian Forestry Service Seed Bank. Environ. Can., For. Serv., Petawawa Nat. For. Inst. Info. Rep. PI-X-39 E/F 63p.

Janas, P.S. and B.D. Haddon. 1984. Canadian forest tree seed statistics: 1980-81 survey results. Environ. Can., For. Serv., Petawawa Nat. For. Inst. Info. Rep. PI-X-41 23 p.

Miller, G.E. 1983. Evaluation of the effectiveness of cold-water misting of trees in seed orchards for control of Douglas-fir cone gall midge (Diptera: Cecidomyiidae). J. Econ. Entomol. 76: 916-919.

Miller, G.E. 1983. When is controlling cone and seed insects in Douglas-fir orchards justified. For. Chron.: 304-307.

Miller, G.E., D.S. Ruth, and G.G. Grant. 1983. Attraction of male *Epinotia* sp. to traps baited with isomers of Dodecenol and Dodecenyl Acetate. Can. For. Serv. Res. Notes 3(4): 24.

Miller, G.E. 1984. Pest management in Douglas-fir seed orchards in British Columbia. Proc. IUFRO Cone and Seed Insects Working Party Conf., 31 July — 6 August, Athens, GA. 179-185.

Miller, G.E., and A.F. Hedlin. 1984. Douglas-fir cone moth and cone gall midge: relation to damage and prolonged diapause to seed cone abundance in British Columbia. Proc. IUFRO Cone and Seed Insects Working Party Conf. 31 July - 6 Aug., 1983, Athens, GA pp. 91-99.

Miller, G.E. 1984. Biological factors affecting *Contarinia oregonesis* (Diptera: Cecidomyiidae) infestations in Douglas-fir seed orchards on Vancouver Island, British Columbia. Environmental Entomology Vol. 13, No. 3. 873-877.

Owens, J.N. and M. Molder. 1984. The reproductive cycle of interior spruce. British Columbia Min. of Forests, Research Branch, 30p.

Owens, J.N. and M. Molder. 1984. The reproductive cycle of lodgepole pine. British Columbia Min. of Forests, Research Branch, 29p.

Owens, J.N. and M. Molder. 1984. The reproductive cycles of western red cedar and yellow cedar. British Columbia Min. of Forests, Research Branch, 28p.

Owens, J.N. and M. Molder. 1984. The reproductive cycles of western and mountain hemlock. British Columbia Min. of Forests, Research Branch, 34p.

Pitel, J.A. and B.S.P. Wang. 1984. A review of papers published in the proceedings of the IUFRO international symposium on forest tree seed storage. Commonw. For. Rev. 63(1): 55-66.

Pitel, J.A., B.S.P. Wang, and W.M. Cheliak. 1984. Improving germination of hop-hornbeam seeds. Can. J. For. Res. 14(3): 464-466.

Pollard, D.F.W. and F.T. Portlock. 1983. Timing and duration effects of gibberellin and fertilizer treatment on stobilus production in young western hemlock. Environ. Can., For. Serv., Research Notes 3(1): 3-5.

Pollard, D.F.W. and F.T. Portlock. 1984. The effects of photoperiod and temperature on gibberellin $A_{4/7}$ induced strobilus production of western hemlock. Can. J. For. Res. 14; 291-294.

Sullivan, T.P., J.R. Sutherland, T.A.D. Woods, and R.S. Sullivan. 1984. Dissemination of the conifer seed fungus *Caloscypha fulgens* by small mammals. Can. J. Forest Res. 14: 134-137.

Sutherland, J.R. 1983. Two seed-borne diseases of conifers: the seed or cold fungus and *Sirococcus* blight. Proc. West. Int. Forest Disease Work Conf. 31: 6-8.

Sutherland, J.R., S.J. Hopkinson and S.H. Farris. 1984. Inland spruce cone rust, *Chrysomyxa pirolata*, in *Pyrola asarifolia* and cones of *Picea glauca*, and morphology of the spore stages. Can. J. Botany (in press).

Sutherland, J.R., T.A.D. Woods and G.E. Miller. 1984. Effect of dimethoate and oxydemeton-methyl insecticides and ferbam and potassium coconate fungicides on germination *in vitro* of Douglas-fir and white spruce pollen. Tree Planters' Notes 35: (1): 22-24.

Thomson, J.A., J.R. Sutherland, T.A.D. Woods and S.M. Moncrieff. 1983. Evaluation of seed disease effects in container-sown Sitka spruce. Forest Sci. 29: 59-65.

Wang, B.S.P. and F. Ackerman. 1984. A new germination box for tree seed testing. Environ. Can., For. Serv., Petawawa Nat. For. Inst. Info. Rep. PI-X-27 15p.