Volume 15 Number 1& 2 December 2004

Seed and Seedling Extension Topics

Welcome to the 23rd issue of Seed and Seedling Extension Topics newsletter. This newsletter burst forth in August 1988 with Glen Matthews at the helm and the following mandate: "It has finally happened. The first issue of a newsletter for nurseries, seed orchards and others interested in the regeneration phase of forestry." …"The purpose of the newsletter is to disseminate technical information from anyone who would like to contribute". Sharing information is the key element, whether on new stratification techniques, seed orchard insect pests or the energy crisis with input from all interested persons who contributed to and for the development of a newsletter that has been widely read and a "useful" tool.

Times may indeed change but the goals of Seed and Seedling Extension Topics have remained constant over the years, as it was shepherded by the following editors: Glen Matthews, Don Summers, Gwen Shrimpton, Robb Bennett, Eric van Steenis, Dave Trotter and Diane Douglas. Publication began with the former Silviculture Branch, through the days of Nursery and Seed Operations Branch and currently with Tree Improvement Branch.

The Forest Nursery Association of BC (FNABC) will be the new producers of Seed and Seedling Extension Topics which is good news indeed. Please help in the continued success by contributing – whether it be results of a trial or your opinion on a topic. Past issues of the newsletter can be found at: http://www.for.gov.bc.ca/hti/publications/newsletters/newsletters.htm

The Tree Seed Working Group Newsbulletin, described in an article on page 3 and TIC*talk*, the newsletter of the Forest Genetics Council of BC also serve the seed, seedling and tree improvement community.

The FNABC AGM in Surrey was a grand event and we thank John Kitchen, Dave Trotter and their committees for a job well done. Mike Thelitz is the new president of FNABC and will be welcoming us to Prince George for the AGM in 2005. Congratulations to Dave Armit on receiving the Green Timbers Award. Larry Pedersen, the outgoing Chief Forester, gave a keynote speech and presented the Chief Forester's Seedling Award to BC MoF Surrey Nursery.

Currently Al McDonald with BC Timber Sales is maintaining a website with nursery information, FNABC AGM agendas and some proceedings. http://www.for.gov.bc.ca/nursery/fnabc/fnabc.htm

Life under the new *Forest and Range Practices Act* and the Chief Forester's Standards for Seed Use will create new challenges for the reforestation industry. Changes abound, however, the goal of sharing information and maintaining connections with friends and colleagues in the community of seed and seedlings is still relevant in our lives and I look forward to continuing connections. Seasons greetings!

Diane Douglas
Tree Improvement Branch
Ministry of Forests

INDEX

NEWSLETTERS FOR SEED AND SEEDLING

Tree Seed Working Group

Are you looking for additional information on tree seed? Some of you are already on the distribution list for the Tree Seed Working Group (TSWG) Newsbulletin and need not read on. This organization functions under the Canadian Tree Improvement Association (CTIA) and holds a workshop at the biannual CTIA meeting and distributes an electronic Newsbulletin twice a year (December and June).

To receive the Newsbulletin simply send an e-mail to myself (Dave.Kolotelo@gems7.gov.bc.ca) or to Dale Simpson (Dsimpson@nrcan.gc.ca) indicating you would like to be placed on the distribution list.

The Tree Seed Working Group began in 1983 with four objectives on promoting 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) Exchange of information on seed related problems
4) Advising on implementation practices

The FNABC and nursery communities interests certainly fall within the TSWG mandate and we invite you to read, write and be involved in our organization. I would like to thank Susan Thorpe and Fernando Rey for discussing Quality Assurance in the nursery at our workshop last summer. For those in attendance I believe it is clear that we all have something to learn from each other. Streamlining the entire Seed Handling System (cone collection to nursery sowing) through gains in efficiency at each stage is the ultimate goal.

The theme of our next "**40th**" Edition of the Newsbulletin is "**What are your biggest problems or information needs with respect to tree seed**".

Good luck with your crops for 2005 and don't hesitate to call if you have questions regarding tree seed.

Dave Kolotelo
Tree Seed Centre
Tree Improvement Branch
Ministry of Forests

TIC*talk*

TICtalk is the a publication designed to provide a vehicle for information to the forest industry and the general public on tree improvement in British Columbia and is the newsletter of the Forest Genetics Council of British Columbia.
Please contact:
Diane.Douglas@gems9.gov.bc.ca or
250.356.6721 for more information or if you would like to contribute an article.

Seed and Seedling Extension Topics

This newsletter will continue to be published by the Forest Nursery Association of British Columbia.

For more information, please contact:
Siriol Paquet
Sylvan Vale Nursery
Black Creek, BC
ph. 250.337.8487
svn@telus.net

Chief Forester's Standards for Seed Use

Effective April 1, 2005, the use of tree seed in British Columbia will be regulated by the *Chief Forester's Standards for Seed Use.* These standards contain the requirements for registering, storing, selecting and transferring seed used to establish free growing stands under the *Forest and Range Practices Act (FRPA)*. They apply to licensees and ministry staff who plant trees on Crown land, and persons whom wish to register seed for use by the aforementioned.

These standards, were established by Jim Snetsinger, Chief Forester, in accordance with requirements and authorities provided in section 169 of *FRPA*, section 43 of the *Forest Planning and Practices Regulation* and section 32 of the *Woodlot Licence Planning* .

Their purpose is to maintain the identity, adaptability, diversity and productivity of the provinces tree gene resources. They are based on stewardship principles and over forty years of research in forest genetics and tree seed management.

These standards were developed in conjunction with *FRPA* and its regulations by ministry staff in consultation with forest sector representatives over the past two years. Input was provided by licensees, members of the Forest Genetics Council of BC and its technical advisory committees, BC Tree Seed Dealers Association, and the Forest Nursery Association of BC.

These standards represent an updated consolidation of the seed use requirements that existed under the *Forest Practices Code*, which included regulations, a guidebook and ministry policies. As such, this document serves to provide "one-stop shopping" for seed collectors, seed orchard and nursery managers, forestry professionals, licensees and ministry staff alike.

The *Chief Forester's Standards for Seed* Use, and additional information about them, can be viewed and downloaded from the Ministry of Forests' website at: http://www.for.gov.bc.ca/code/cfstandards/

Training on these new standards will be offered early in 2005. Notice of the dates and locations for this training will be provided in the weeks ahead.

For further information regarding these standards, please refer to the above website or contact Brian Barber, RPF, Technical Advisor, Tree Improvement Branch, Ministry of Forests at: 250. 356.0888 or brian.barber@gems4.gov.bc.ca

Brian Barber
Tree Improvement Branch
Ministry of Forests

Western Redcedar Seed

This article discusses some of our recent Quality Assurance (QA) results with pelleted western redcedar (Cw). A previous article covered the topic up to 1996, but an update seems justified. If you are interested in the former article from this Newsletter, you can go to the following link (http://www.for.gov.bc.ca/hti/publications/newsletters/newsletters.htm) and select Volume 9 No. 1 Summer 1996. It is amazing how much has changed since then.

Changes since 1996

It is recognized that Cw is the BC conifer species with the highest rate of seed deterioration in long-term storage. In 1997 a deterioration estimate of a reduction of 1.44% germination per year was estimated and in 2002 this estimate was updated to 1.24%. The deterioration rate estimates and species retest frequencies are now consistently being re-analyzed at five-year intervals. To ensure the most up-to-date information is provided for this species the retesting frequency has been increased to every 18 months. This is the most frequent retesting of all of our species in storage.

One of the significant concerns in the mid-90's was who was doing the pelleting – Paul Trussel or Harris-Moran. No pelleting for the BC Ministry of Forests is currently performed at Harris-Moran in California and all our needs are met by Carl Happel out of Vernon. Paul sold the company to Carl in 1996 and continued to be involved in the business for a few years. Sadly Paul Trussel passed away in the spring of 2001 at the age of 84.

Quality Assurance Results

One of the complications with Cw seed was the fact that lab testing is performed on naked seed, but operationally in the nursery pelleted Cw is used for almost all requests. We have been quantifying this difference between naked and pelleted seed (=falldown) since 1994 and the results are presented in Figure 1.

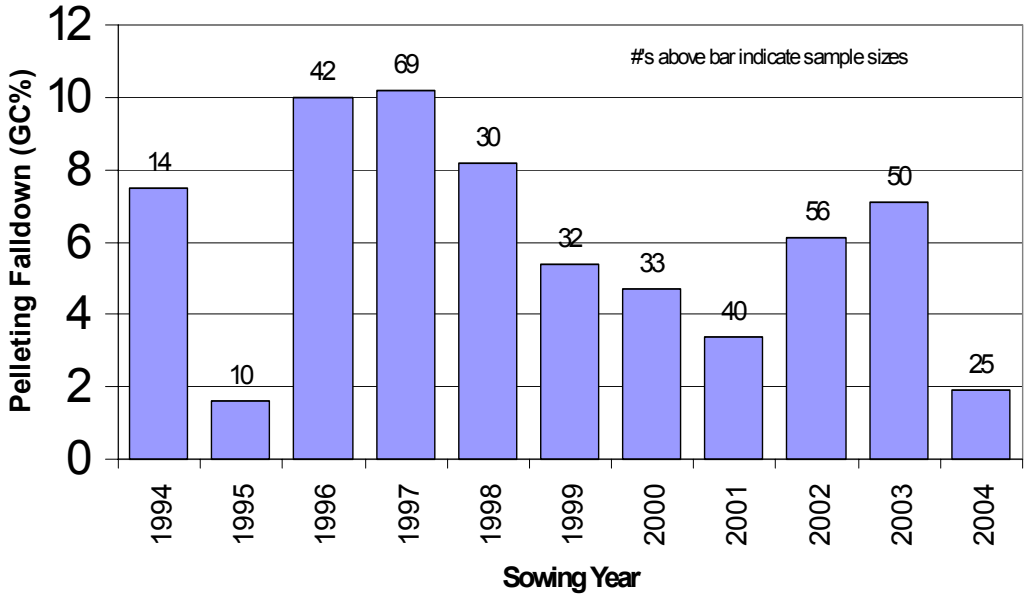

Figure 1. The estimated pelleting falldown on sowing requests from 1994 to 2004.

There has been a great deal of variability over time. Some of this can be attributed to different pelletors, but for 2000 and beyond all pelleting can be attributed to Carl Happel. Last year the results were very good with only a 1.9% difference between naked and pelleted seed. I think your feedback on the program as well as Carl's enthusiasm to introduce improvements into the system have paid off.

Germination is certainly the most important criteria, but in 2003 we introduced an additional evaluation to quantify the contents of pellets. A sample of 200 pellets were taken from sowing requests, divided into 8 replicates of 25 seeds and placed into a compartmentalized vitamin organizer. Water was added to each cell and following pellet breakdown the contents were classified as: single-seeded; empty, debris-filled; more than one seed per cavity and other species. The results from the first two years of this program are presented in Table 1.

Table 1. The average percent by content category of pelleted western redcedar seed.

Year	# SRQ	1SD/PELL.	EMPTY	DEBRIS	> 1 SD	OTH. SP.
2003	24	96.0	1.8	0.7	1.5	0.0
2004	26	98.0	0.7	0.7	0.7	0.0

The 2004 results are quite impressive with 98% of the pellets containing only one seed. It should be noted that debris-filled pellets are a function of seedlot purity and they are not a problem of the pelleting process.

Feedback

Feedback from our clients is important to ensure that you are getting the product you desire. Our QA program provides basic information on seed viability and pellet quality, but there are many intangibles associated with the product. For example, the screening of pellets at the pelleting facility has greatly reduced the amount of fine debris in requests. In 2004, several nurseries noticed that pellets were teardrop shaped with a point at one end. These points eroded quite easily resulting in fine material being produced reducing the sowing request purity. This material could clog up machinery (if fine enough) or be mistaken for a seed (if large enough). The shape was the result of trying to minimize pellet thickness and produce a more oval pellet based on your feedback, but the thickness of the pellet was increased. Although we had a few complaints about the tear drop shape of pellets we did not receive complaints about pellet thickness. This will guide our administration of the pelleting contract unless we hear otherwise.

We welcome your comments on pelleting. If you have concerns about the pellets you receive, please communicate them **as soon as possible** to Tree Seed Centre staff. We will also be performing more germination testing and pellet assessment work on red alder as some (not all) nurseries request that this species also be pelleted.

Dave Kolotelo
Tree Seed Centre
Tree Improvement Branch
Ministry of Forests

Coastal Douglas-fir Stratification

A significant proportion of coastal Douglas-fir (Fdc) regeneration in BC is accomplished using seed imported from the US. This is due to accelerated logging of Fdc and a lag in BC orchard production to meet this need. Weyerhaeuser Co. primarily supplies the seed and they recommend that the seed be stratified for a total of eight weeks prior to sowing, although their germination tests are performed using a three-week stratification treatment. The current stratification regime used in BC is three weeks, which is the direction given by the International Seed Testing Association (ISTA 2004). This study was intended to quantify the benefits (and/or risks) associated with eight weeks stratification versus our current methods for seed orchard produced seed. A brief review of pertinent literature is also included.

I would like to thank everyone who supplied seed for this trial.

Materials and Methods

A total of ten seed orchard seedlots (5-BC and 5-US) were selected (Table 1) and germination tested using four replicates of 100 seeds with a 24-hour soak followed by either zero, three or eight weeks stratification at 2°C. Germination counts were conducted on Monday, Wednesday and Friday for 21-days allowing for calculation of the Germination Capacity (GC) and the Peak Value (PV) (Czabator 1962). Criteria for germination was that the radicle was at least 4X the length of the seed coat.

Table 1. Seedlots used in the Fdc stratification trial.

Origin	Seedlot	Orchard	SPZ[1]	GW
WA	60274	996	M	6
WA	60660	996	M	5
WA	61251	996	M	7
WA	61252	996	M	16
WA	61294	996	M	10
BC	60306	146	SM	2
BC	60583	149	M	7
BC	60643	154	M	5
BC	60684	120	SM	2
BC	61059	116	M	2

Results and Discussion

The seedlots from the US did appear to have slightly deeper dormancy as is indicated by their lower unstratified GC and PV (Table 1). After stratification for three weeks the differences between the two sources of seed were minimal (1.5% GC). Extending stratification to a total of eight weeks increased GC by less than 2% for both sources of seed. The extension of stratification to eight weeks did consistently increase the GC (except 60660 and 61251) and the rate of germination (except 60660).

[1] **SPZ** = Seed Planning Zone and **GW** - Genetic Worh esstimates for volume growth

Table 2. Results for Germination capacity (GC - %) and Peak value (PV) of seedlots tested with zero, three and six weeks stratification.

Seedlot	GC-0	PV-0	GC-3	PV-3	GC-8	PV-8
60274	79.0	4.5	91.0	7.0	92.3	7.4
60660	72.3	3.5	93.5	8.3	92.5	7.5
61251	56.8	2.7	85.8	5.5	84.8	6.5
61252	43.0	2.0	82.5	5.2	86.8	7.2
61294	65.5	3.1	88.5	6.0	91.3	7.8
WA Mean	**63.3**	**3.2**	**88.3**	**6.4**	**89.5**	**7.3**
60306	74.5	4.1	87.5	7.6	91.5	8.4
60583	88.0	4.7	95.5	8.2	96.3	9.2
60643	78.0	4.0	92.0	7.1	93.8	8.8
60684	70.0	3.4	86.8	6.8	87.5	7.4
61059	77.5	4.0	87.0	7.8	88.8	8.2
BC Mean	**77.6**	**4.0**	**89.8**	**7.5**	**91.6**	**8.4**
Overall Mean	**70.5**	**3.6**	**89.0**	**7.0**	**90.6**	**7.8**

The germination tests were performed under optimal conditions, but it is well known that extended stratification will increase the '**vigour**' of seed or its ability to germinate under sub-optimal temperatures (Allen 1960, 1962; Gosling et al 2003; Poulsen 1996; Tanaka 1976; Sorensen 1991). The practical implication is that if you are not able to supply optimal, or close to optimal, conditions for germination then extended stratification will be beneficial. If you are able to supply optimum germination temperatures (considered the primary limiting factor once imbibition and some amount of stratification has occurred) then the benefit of extended stratification is limited. What is optimum? In testing we use an eight hour period with lights at 30°C followed by 16 hours at 20°C. This equates to 440 **degree hours** per day using a 5°C threshold temperature [(30-5) (8) + (20-5)(16)]. Degree-hours seems like a more reasonable way of looking at germination requirements vs. the much coarser degree-days. This would be equivalent to a nursery maintaining a constant temperature of 23.3°C which is certainly a realistic scenario for nurseries germinating Fdc in BC.

Are there any risks to extending stratification? In paper by Edwards and El-Kassaby (1995) they show that for 15 half-sib families a five-week stratification treatment was optimum, but a seven week treatment reduces the speed of germination in some families. Sorensen (1996) has also identified significant stratification length X family interactions. These observations suggest differential levels of dormancy among families. Gosling *et al.* (2003) also note decreased germination in a single seedlot, but it occurred after 48 weeks of stratification. Although extended stratification appears beneficial, at some point the decrease of seed reserves caused by the increased respiration (relative to dry seed) will negatively impact the germination characteristics.

In reviewing 'older' literature it is apparent that pre-germination was a much greater concern than it is today. It is unclear whether this is a genetic difference (or sampling difference) over time or whether our treatments today are different. Seed moisture content control through surface drying currently in use for Fdc and targeting of the moisture content are good methods of restricting pregermination.

In summary, extended stratification can be an effective tool to improve germination rate, especially when germination temperatures are sub-optimal. There is a point at which long stratification periods will be deleterious due to the decrease in seed reserves available for germination. From a genetic standpoint there is certainly evidence that dormancy can vary greatly between genetic entries and even a seven week stratification period may reduce the germination rate in some families. The decision on whether to extend stratification should first consider the germination conditions seed will be exposed to and whether there are currently concerns with crop uniformity (i.e. is germination synchronised and rapid or is there a noticeable lag within the crop).

References

Allen, G.S. 1960. Factors affecting the viability and germination behaviour of coniferous seed. IV Stratification period and incubation temperature, Pseudotsuga menziesii (Mirb.) Franco. Forestry Chronicle 36:18-29

Allen, G.S. 1962. Factors affecting the viability and germination behaviour of coniferous seed. VI Stratification and subsequent treatment, Pseudotsuga menziesii (Mirb.) Franco. Forestry Chronicle 38:485-496.

Czabator, F.J. 1962. Germination value: An index combining speed and completeness of pine seed germination. For. Sci. 8:386-396.

Edwards, D.G.W. and Y.A. El-Kassaby. 1995. Douglas-fir genotypic response to seed stratification. Seed Science & Technology 23:771-778.

Gosling, P.G., Y. Samuel, and A. Peace. 2003. The effect of moisture content and prechill duration on dormancy breakage of Douglas fir seeds (Pseudotsuga menziesii var. menziesii [Mirb.] Franco). Seed Science Research 13:239-246.

ISTA. 2004 International Rules for seed Testing. Edition 2004. Published by the International Seed Testing Association, Basersdorf, Switzerland

Poulsen, K.M. 1996. Prolonged cold, moist pretreatment of conifer seeds at controlled moisture content. Seed Science & Technology 24:75-87.

Sorensen, F.C. 1991. Stratification period and germination of Douglas-fir seed from Oregon seed orchards: two case studies. USDA Forest Service PNWS Research Note PNW-RN-499. 23 pp.

Sorensen, F. 1996. Effects of length of seed chilling period and sowing date on family performance and genetic variances of Douglas-fir seedlings ion the nursery. New Forests 12:187-202.

Tanaka, Y. 1976. Stratification and other pre-treatments of Douglas-fir seed for nursery bed germination. Proc. 2nd International Symposium on Physiology of Seed Germination. IUFRO S2.01.06, Fuji, Japan, pp 163-173.

Dave Kolotelo
Tree Seed Centre
Tree Improvement Branch
Ministry of Forests

Seed From Dead Lodgepole Pine Trees

At the 2003 Forest Genetics Council Northern species committee meeting questions arose with regards to the collection of seed from dead lodgepole pine (Pli) trees. This was primarily in response to the need for increased seed to regenerate beetle-killed stands. Foresters should check seed inventories on SPAR first as there are large quantities of surplus seed for 'most' areas. In speaking with foresters at last summers Northern Silviculture Committee (NSC) meeting (Burns Lake) it was apparent that some are also interested in using prescribed burning to regenerate some Pli stands and there were concerns regarding how long seed remains viable on dead trees.

An invitation was extended to operators interested in determining whether stands of dead trees still contained viable seed. I received a total of 9 collections from Carolyn Stevens of the Nadina forest district. Since this data is being made available to everyone – a big thank you to Carolyn for her efforts and enthusiasm regarding these questions.
Collections were received at the Tree Seed Centre, cone evaluations performed and seed extracted and hand dewinged. The seed quantities were quite small and we decided to perform germination tests on unprocessed seed and perform cutting tests on the ungerminated seed. This does not provide estimates of germination capacity (GC) for a seedlot collected from these stands, but would provide information regarding whether viable seed is present in these dead stands of Pli. Following our 21-day test period, ungerminated seeds were cut and assessed as to whether the observed seed categories could reasonably be removed during processing. This is not a perfect or precise assessment, but it does provide some information concerning these small available samples. For four of the nine collections enough seed was available to perform both an unstratified (W1) and stratified (G20) test. The results are presented in Table 1.

Table 1. Site characteristics, germination results and estimated seedlot potential based on cutting tests on ungerminated seed for stratified (G20) and unstratified (W1) tests.

Site	Elev. (m)	BEC	Mortality Year	G20 GC%	Potential GC%	W1 GC%	Potential GC%
Sand #1	850	SBSmc2	1994	28	**75%**		
Sand #2	875	SBSmc2	1994	10%	**74%**		
Sand #3	960	SBSmc2	1994	54%	**87%**	60%	86%
Sand #4	885	SBSmc2	1994	40%	**66%**	26%	78%
Sand #5	850	SBSmc2	1994	12%	**72%**		
Tetachuk N. #1	900	SBSdk	1997/98	13%	**70%**		
Tetachuk S. #2	850	SBSdk	1997/98	67%	**85%**	47%	86%
Bryan East #3	1065	SBSdk	1995	11%	**70%**	26%	59%
Bryan East #4	1040	SBSdk	1995	3%	**70%**		

Results of germination tests were low, but this reflects unprocessed seed. The potential GC% columns indicate our best estimate of germination without sacrificing seedlot yield (i.e. increases in GC beyond this point would probably result in the loss of viable seed). Two stands Sand #3 and Tetachuk S. are potential stands, but they are still below the 95% level obtained by most Pli seedlots collected today. A further concern with collections from dead trees is that yields may be lower due to a decreased ease in cone opening and the possible deterioration of seed within cones. At this point my recommendation is to try to obtain surplus seed on SPAR and only collect from dead trees if no seed is available from seed orchards or natural stands for the area.

The results on seed viability are perhaps more optimistic as the results indicate that even ten years after tree mortality viable seed can still be found within the cones. This agrees with many studies on the long-term viability of seed on Pli trees. The theory is that following cone and seed maturity, the vascular connection between the cone and tree are broken and the cone functions independently (no further water or sugar exchange). The serotinous cone provides good insulation and protection for the seed.

Questions were raised regarding lethal temperatures for lodgepole pine seed. A study that used a flame front designed to stimulate a crown fire indicated that cones exposed for 10-20 seconds had germination capacities of 37 to 64%, but exposures of one minute reduced this to 0.3 to 14% (Despain *et al*. 1996). It should be pointed out that this is germination of unprocessed seed. Another study that focused solely on seed indicated that exposure to temperatures of 76-80° C significantly decreased germination (Knapp and Anderson 1980). There is the potential for there to be a quality issue if a tree is dying and trying to develop cones at the same time. There may not be adequate reserves to try and prevent dying and transport sugar to the cones resulting in poor quality or non-viable seed. Maybe the tree senses its demise and will devote resources to its offspring first? There is some anecdotal evidence on collections from red and green attack trees. We performed some seed evaluations and found no observable difference between seed collected from red and green attack trees. We did not process this seedlot and have no idea of the relative proportions of the two tree types, but the final seedlot did achieve a germination of 96%. In 2004, there are also two more seedlots that were collected from green and red attack trees. These are currently being processed at a private extractory.

I hope that this information is useful as you consider all your options for the regeneration of beetle-killed stands. I also have a literature search (keywords = lodgepole pine; seed viability; fire) of 36 references with abstracts that I can e-mail to anyone interested.

References

Despain, D.G., D.L. Clark and J.J. Reardon. 1996. Simulation of crown fire effects on canopy seed bank in lodgepole pine. International Journal of Wildland Fire 6:45-49.

Knapp, A.K. and J.E. Anderson. 1980. Effect of heat on germination of seeds from serotinous lodgepole pine cones. The American Midland Naturalist 104:370-372.

Dave Kolotelo
Tree Seed Centre
Tree Improvement Branch
Ministry of Forests

Sowing Requests Totals

Sowing Year	# of Sowing Requests	# Seedlots Used	Total Grams Used	Potential Trees (K)
1993	5,231	1,812	2,942,164	243,565.7
1994	5,485	1,918	3,596,357	264,899.1
1995	5,784	2,002	3,555,173	251,780.8
1996	5,303	1,926	3,425,642	226,981.5
1997	5,235	1,925	3,392,441	228,361.9
1998	4,692	1,847	2,873,495	205,338.8
1999	4,090	1,613	2,809,674	210,239.0
2000	4,414	1,766	3,010,176	230,050.2
2001	4,335	1,758	3,011,819	224,090.1
2002	3,659	1,568	2,451,554	215,995.5
2003	3,609	1,464	2,577,961	226,278.9
2004	3,272	1,334	2,443,865	234,161.5
12 Yr Avg	**4,592**	**1,744**	**3,007,527**	**230,145.3**

Bareroot requests from 1993 - 1999 accounted for less than 1.5 % of the total yearly number of sowing requests.

Dawn Stubley
Spencer Reitenbach
Tree Seed Centre
Tree Improvement Branch
Ministry of Forests

RDP

Research and Development Tax Credits – Are You Getting Enough?

Take a moment to consider if you are (a) improving or creating a new product or processes; (b) developing custom equipment or machinery; (c) creating or improving a new manufacturing process or, (d) developing prototype equipment or software. If so, you may qualify **for Scientific Research & Experimental Development (SR&ED) tax credits,** and that could mean adding dollars to your bottom line.

The Scientific Research and Experimental Development tax credit program has been in existence since 1985. The program has matured over the years and now represents a model incentive program that is studied by other countries around the world. It is arguably the largest, most objective and fair funding source provided by the Canadian government.

In considering the nursery/agricultural sector, certain activities carried out by companies that could qualify for the SR&ED program, quickly come to mind. These activities are generally identified as **products** and/or **processes.** Some examples include plant genetics and breeding, crop nutrition, crop development and tending, and pest management including natural biological controls. However, we have found that there are certain activities that support the above initiatives that are often overlooked. This would include projects such as developing or modifying machinery to improve milk production, or to develop software to control heat, water, and light etc. When identifying SR&ED projects, it is important to consider these other support areas as potential projects.

Operating as a government grant for Canadian controlled private corporations (CCPCs) meeting specific criteria, a refundable tax credit is provided by the **federal government at a rate of 35%.** Provinces also offer SR&ED incentives, for example **British Columbia provides a 10%** refundable tax credit.

In the case of large, foreign-controlled, or public companies, while they are not eligible for the 35% refund, they do have a 20% SR&ED tax credit available. While not refundable, this credit reduces the company's federal tax liability, dollar for dollar. If these companies can't use their SR&ED tax credits in the current year, the credits can be carried back three years to recover taxes previously paid, or carried forward ten years to offset future federal taxes.

Let's look at one situation. Assume three senior employees were dedicated to SR&ED activities throughout the year at an average salary each of $50,000 per annum. This 'expense' would generate an approximate cash refund of $100,000 from the federal and British Columbia governments, which can be a big boost to the cash flow of most agricultural businesses. What's more astounding however is how many companies believe that the administrative burden of filing for these claims outweighs the benefits. This should never be the case if proper advice is sought.

It's a simple concept – SR&ED tax credits received are strictly a function of the company's SR&ED effort. A nursery with sales of roughly $8 million received SR&ED tax credits ranging from $200,000 to $500,000 annually to improve productivity. A start-up manufacturer of custom equipment for the greenhouse industry with sales of $800,000 in the first year, earned $500,000 in SR&ED tax credits given that heavy SR&ED spending was required early on to develop the company's core technology.

In practise however, it's not always so simple. To obtain the SR&ED tax credits, a **claim** must be filed with your corporate tax return **within 18 months of your year-end.** Included in this filing, is a project description, which outlines the technological advancement, uncertainty and content of the SR&ED undertaken. That's where it can get tricky.

The objective is **not** to describe what product, process, prototype or custom equipment was created, or how it will cut costs, allow the company to expand/compete etc. – **but to describe what underlying technology was advanced.**

Another example: a nursery wanted to modify its existing environmental control technology in order to improve quality and increase productivity. While certain mechanical development was required, the real challenge was how to uniformly sense and control temperature as well as humidity. In this case, the technological advance was to develop a computerised control that applied appropriate levels of heat and airflow to enhance crop production.

The **Canada Revenue Agency (CRA)** reviews claims from two different angles – technical and financial. Our experience has shown that as long as the expenditures are reasonable and properly supported, the financial review of the claim runs smoothly. However, it is extremely important that the company's representative who meets with the CRA understands the criteria for SR&ED. Sometimes the criteria can be subjectively applied.

Having been involved with this program since its inception in 1985, we have found that the criteria and concepts behind them are not always easy to grasp, and outside professional tax help should be considered during these reviews. While it is the company's employee(s) who should describe the SR&ED that was performed, the role of the professional is to ensure that all the information and proper criteria are put forth in an appropriate manner and in a context that CRA can fairly assess the SR&ED, and potentially adversarial situations can be avoided.

It is important to document both – the technical SR&ED undertaken, as well as the related costs. Setting up a system that identifies, monitors and documents SR&ED will both ease the company's administrative burden, and facilitate an SR&ED claim. That means more dollars for the company!

RDP Associates Inc. believes that the agriculture sector has not fully realized its SR&ED potential. Often SR&ED is performed on the shop floor without the realisation that research and development is involved in a project and may be eligible for federal and provincial government support.

In other instances, researchers erroneously believe that if they receive upfront government funding to partially support their work that the project will not qualify – when in actuality expenditures may still qualify for the SR&ED credit minus the upfront government funding.

Don Whiteside
British Columbia Associate
RDP Associtates Limited

CHANGES & PEOPLE

Wake: a gathering of friends and relatives to celebrate and remember…over food and drink

On a sunny afternoon, with a feast of barbecued hamburgers, trimmings, and cold drinks, staff, friends, and colleagues of the Tree Improvement Branch's Extension Services program enjoyed a wake at Green Timbers on April 7, 2004 - a great way to say goodbye.

Extension Services opened it's doors at the Green Timbers Reforestation Center in Surrey in 1992. Their mission was to provide a center for extension and operational research for reforestation nurseries, Christmas trees and seed orchards in BC.

Programs included forest seedling propagation and deployment, nursery equipment and supplies, native plant propagation and seed collection, Christmas tree production, and seedling pest management.

The Extension Services program began to wind down in 2003 and finally closed the doors March 31, 2004.

Don, Cheryl, Eric, Dave and Diane would like to thank colleagues and friends for the opportunities of working on so many great projects and with such wonderful people. Our role was after all about relationships and sharing knowledge.

- **Cheryl Calam** (Cheryl.Calam@gems8.gov.bc.ca) transferred to the BCMoF Tree Seed Center in South Surrey
- **Diane Douglas** (Diane.Douglas@gems9.gov.bc.ca) transferred to Victoria with Tree Improvement Branch and FGC extension and communication.
- **Dave Trotter** (David.Trotter@gems2.gov.bc.ca) is now with the BC Ministry of Agriculture Fisheries and Food in Abbotsford as the Agroforestry Specialist.
- **Don Summers** (donsummers@shaw.ca) took early retirement to start his own business DW Summers and company.
- **Eric Van Steenis** (eric@terralink-horticulture.com) has joined Terralink Horticulture, a private nursery supplier in Abbostford.

Diane Douglas, Dave Trotter, Don Summers and Cheryl Calam say goodbye to Green Timbers

Hybrid Joins PRT

On August 3, 2004, PRT announced that they bought Hybrid Nurseries Ltd, a respected Lower Mainland forest seedling nursery with over 350,000 square feet of greenhouse space on 32 acres.

Francoise Levesque, formerly the Production Superintendent at PRTCampbell River, took over as Nursery Manager from Hybrid's Bruce Morton. Francoise brings over a decade of nursery management experience which complements a solid educational background. With Bruce's help, Francoise was able to join the rest of the Hybrid staff in continuing to provide reliable production of forest seedlings at Hybrid Nurseries.

PRT is happy to have Hybrid join the PRT group of nurseries. For further information on PRT Hybrid, please click www.prtgroup.com/locations/hy/

John Kitchen
PRT Group

Surrey Nursery

After 35 years as a Forest Service Nursery, the Surrey Nursery was sold and now becomes Surrey Nursery Limited. Almost all the Ministry of Forests employees at Surrey Nursery chose to join the new company and now look forward to new challenges and new successes.

On November 28, 2004 Surrey Nursery's entry to the private sector, marked the end of the Ministry of Forests involvement as an operator of large scale seedling production nurseries. All the people who built the nursery program in the provincial government deserve credit for the work they did. The commercial forest nurseries in BC have many and lasting connections to the history of nurseries in the public sector.

Tony Willingdon
Surrey Nursery Limited

Green Timbers Award

Dave Armit

Dave Armit was from Ontario but came to BC to study Forestry at UBC. After graduation in 1954, he began his career with the BC Forest Service. Dave spent 4 years in Prince George in forest management, 2 years in Kamloops with silviculture, and 9 1/2 years with forest research in the Prince Rupert Region. In 1969, Dave moved to Green Timbers to work with forest nurseries, including Surrey Nursery which was under construction at the time. His final move was to Victoria in 1972 as manager of forest nurseries. Dave retired in 1988.

During Dave's tenure, as forest nursery manager , the forest service expanded to 11 nurseries and container production was steadily increasing. Production in 1970 was 55 million, basically bare root,with a few transplants and a test program of containerized seedlings. In 1988, production was 237 million: 200 million, container and 37 million, bare root. Privatization of the forest service nurseries began in 1988 and coincidentally, the last government nursery was privatized in November 2004. Dave was at the heart of the forest nursery industry during its inception and, transition into container production.

Chief Forester's Seedling Award

Carol Yoshy, Lou Sitoski and Glenn Templeton accept the Chief Forest Award for container seedling from Larry

The staff at Surrey Nursery were happy to be awarded the Chief Forester's Seedling award in recognition of their production of high quality lodgepole pine. Building our capability to grow pine on open compounds has been a focus for many years and this award is the result of a team consistently working towards a common goal.

CONTRIBUTORS TO THIS ISSUE

Diane Douglas
Editor SSET Newsletter
Extension & Communication
Tree Improvement Branch
BC Ministry of Forests
PO Box 9518 Stn Prov Govt
Victoria BC V8W 9C2
ph. 250.356.6721
fax 250.356.8124

John Kitchen
President & COO PRT Inc.
#410 355 Burrard St
Vancouver BC V6C 2G8
ph. 604.687.1404 ext 222
john.kitchen@prtgroup.com

Dave Kolotelo
Cone & Seed Improvement Officer
Tree Seed Centre
Tree Improvement Branch
BC Ministry of Forests
18793- 32nd Avenue
Surrey, BC V4P 1M5
ph. 604.541.1683 ext 228
fax 604.541.1685
Dave.Kolotelo@gems7.gov.bc.ca

Dawn Stubley
Operations Supervisor
Tree Seed Centre
Tree Improvement Branch
BC Ministry of Forests
18793- 32nd Avenue
Surrey, BC V4P 1M5
ph. 604.541.1683 ext 239
fax 604.541.1685
Dawn Stubley@gems3.gov.bc.ca

Spencer Reitenbach
Cone & Seed Services
Tree Seed Centre
Tree Improvement Branch
BC Ministry of Forests
18793- 32nd Avenue
Surrey, BC V4P 1M5
ph. 604.541.1683 ext 229
fax 604.541.1685
Spencer.Reitenbach@gems5.gov.bc.ca

Tony Willingdon
Nursery Manager
Surrey Nursery Limited
3605 - 192nd Street
Surrey BC V3S 0L5
ph. 604.576-9161 ext 226
fax 604.574.4235
twilling@shaw.ca

Don Whiteside
RDP Associates Ltd.
#3, 2110 Whistler Road
Whistler, BC V0N 1B2
ph. 604.938.9888
fax 604.240.8685
donwhiteside@direct.ca