



Tree Seed Working Group Workshop

The Importance of Cone & Seed Services

2019 Canadian Forest Genetics Association Conference
Conférence de l'Association canadienne de génétique forestière 2019



August 20, 2019, Lac Delage, Quebec, Canada

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Please Join the Tree Seed Working Group

CFGA's Tree Seed Working Group has four objectives on promoting tree seed science and technology through:

- **Seed research from bud initiation to seed use**
- **Identification of seed problems relating to tree improvement and forest management**
- **Exchange of information on seed related problems**
- **Advising on implementation practices**

We need to continue knowledge transfer in our specialized and evolving field to support both the refereed journals and practitioners.



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Please Join the Tree Seed Working Group

- Active CTIA/CFGF Working Group since 1983
- Main activities: News Bulletin published biannually (280+ subscribers) and CFGF workshop held biennially
- A place to air and address all your seed problems and best practices!
- Past editions hosted on BC TSC website.
- Intention to recreate Ben Wang's 1985 survey and tree seed 'worker' directory

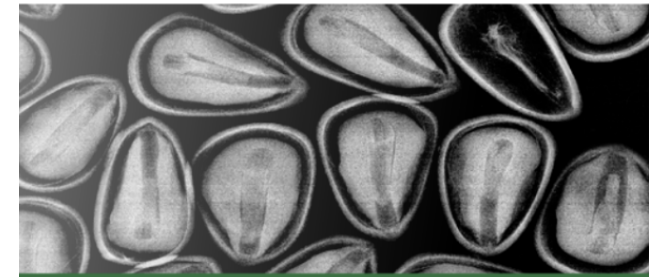


Tree Seed Working Group News Bulletin

*Canadian Forest Genetics Association
l'Association canadienne de génétique forestière*

68

August
2019



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TSWG Membership Survey: Please Vote!

Survey includes priority-setting on 25 seed-related issues.

Of 43 current survey respondents, the top ranked priorities for each category are:

High Priority	Medium Priority	Low Priority
1. Cone and seed collectors – efficiency, shortages, training, etc	1. Reproductive biology and seed population ecology	1. Electrical conductivity and role in predicting seed germination
1. Upgrading seed storage protocols and practices	2. Diseases affecting seed crops	2. Water activity tools for seed handling and storage
2. Insect pests affecting crops	3. Seed biochemistry or physiology	2. Applied genomic tools
2. Tree seed diversity in practice	3. Seed maturity indices	2. Seed pelleting technology
3. Seed orchard management	3. Post-secondary education (seed)	3. Data management tools
3. Seed germination & viability	4. Seed and cone yield analysis	4. Filling ex situ conservation gaps



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In Memoriam (2017-2019)

Ben Wang (Canadian Forest Service, CFS Seed Scientist)

Heather Rooke (BC Tree Seed Centre)

Dr. Michael Carlson (BC Tree Breeder)

Jim Corrigan (BC Provincial Seed Orchard Pest Biologist)

Dr. John Russell (BC Tree Breeder)

John Ogg (BC Cowichan Lake Research Station)

Dave Wallinger (BC cone collecting and tree planting pioneer)

Dr. Marek Krasowski (UNB Professor)

Ted Cormier (The Seed Source, Ontario seed collector)

**The TSWG News Bulletin is a potential forum for
honouring colleagues not only their passing, but
for their achievements too!**



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Why Our Theme?

Reaffirm the importance of cone and seed services and identify knowledge gaps

Facility Closures

- Ontario Tree Seed Plant, Pineland Nursery, many nurseries in Canada and USA
- In BC, the last time we had a cone crop this large we had four seed processing plants

Rapid Succession

- Baby boomers – reductions in government programs / responsibilities
- Loss of practical wisdom, expertise, and field knowledge; serious labour shortages everywhere!

Services Taken for Granted

- Lack of understanding of the tree improvement delivery system
- Lack of funding in public research, extension in practical seed production / processing / pests
- We don't know it all and our product is changing (with climate change / orchard seed)

A Tree Seed Centre requires large capital investment

- Not a great business case: highly variable crops, lack of substantial export markets
- The public sector should be involved as part of their **stewardship** mandate



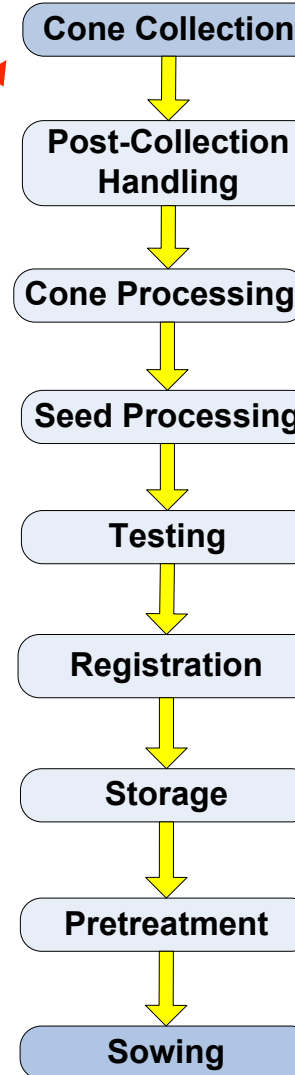
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Cone & Seed Services: Critical Part of the System



Clients / Stakeholders / Community of Practice



Information / Knowledge Management

Continuous Improvement / Quality Assurance



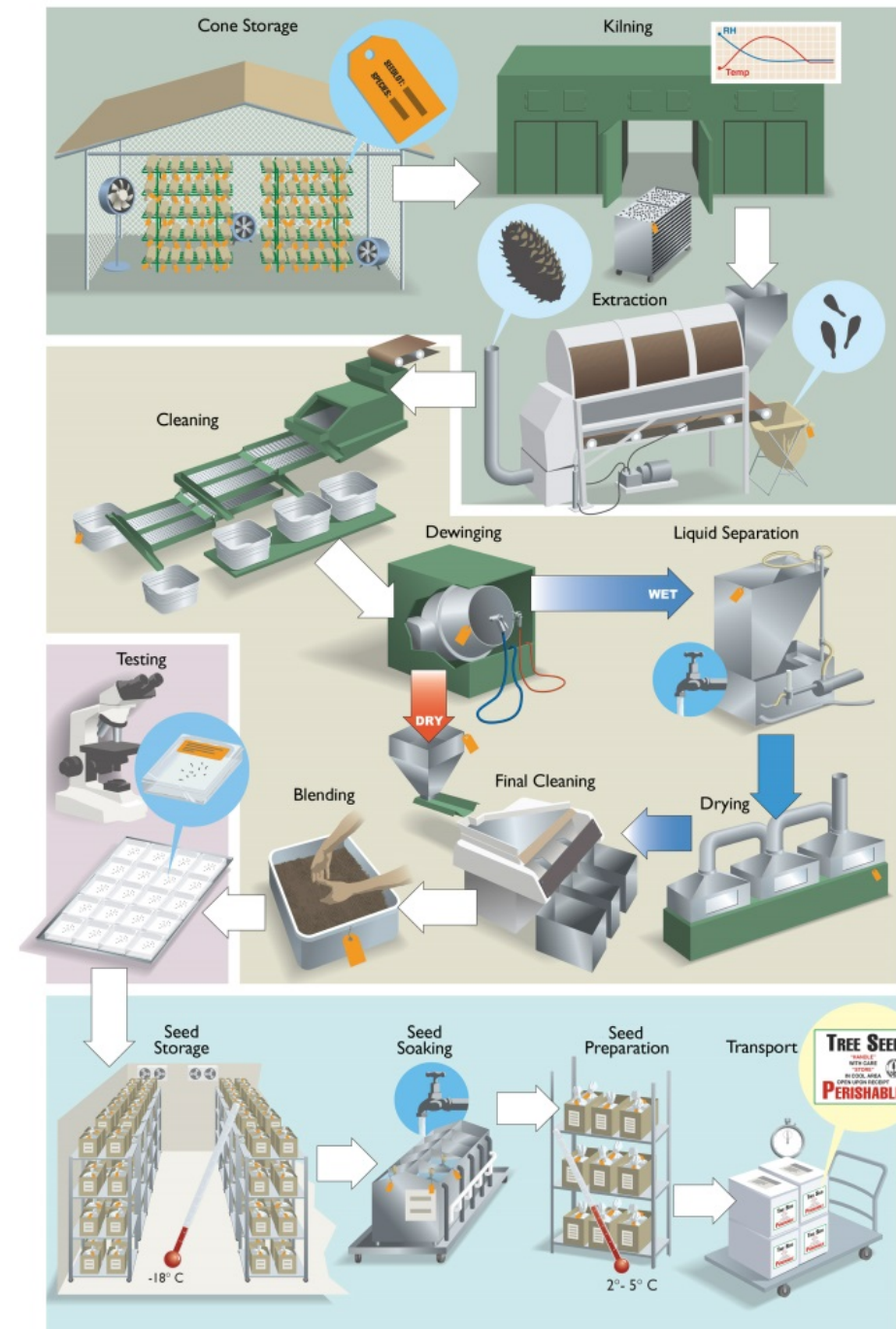
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Workshop Outline

TSWG Membership Priorities:

- Cone Crop Development and Training
- Cone Crop Challenges
- Genetic Conservation
- Appropriate Facilities & Expertise
- Storage, Testing & Seed Preparation
- New Tools



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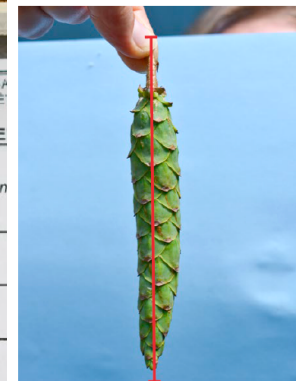
Crop Development & Training

- Delivering the full value invested in tree improvement programs by 2049 rests again on operational level functions and skilled staff.
- **Cut test, cut test, cut test!** Refine what collectors see with growing degree days and seed longevity data.
- Provide practical training opportunities to show good vs poor quality, seedlot registration requirements and proper field storage.



NATURAL RESOURCES CANADA CANADIAN FOREST SERVICE		RESSOURCES NATURELLES CA SERVICE CANADIEN DES FORÊ	
SEEDLOT TAG		ÉTIQUETTE LOT DE SEME	
SEEDLOT NO. N° lot de semences	SPECIES Essences	<i>Prunus virginiana</i> var. <i>virgin</i>	
20047713.0	PROVENANCE Okanagan, BC		
LAT. 50.06666	LONG. -119.43333	ELEV. Alt.	
DATE OF COLL Date de collection	STORAGE TEMP. Temp. d'entreposage	-20°C	
2004			

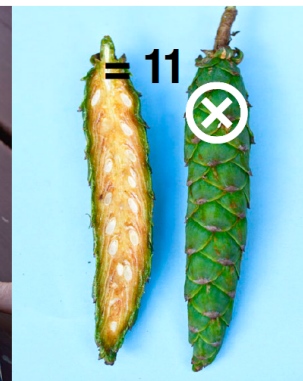
1) Align vertical axis with a sharp blade.



2) Cut cleanly in half. Watch your fingers!



3) Turn one side over and count only one half section.



Photos by Melissa Spearing

Cone Crop Challenges

- **Harvesters must understand and follow cleanliness standards.**
- **Big harvests are often ruined by the insects we know.** There must be more R&D about seed pests to address the current lack of controls.
- **More pests are coming.** We need to increase monitoring and collaboration between provinces to stay abreast of new threats.

Qualification des cônes lors de leur réception au CSFB

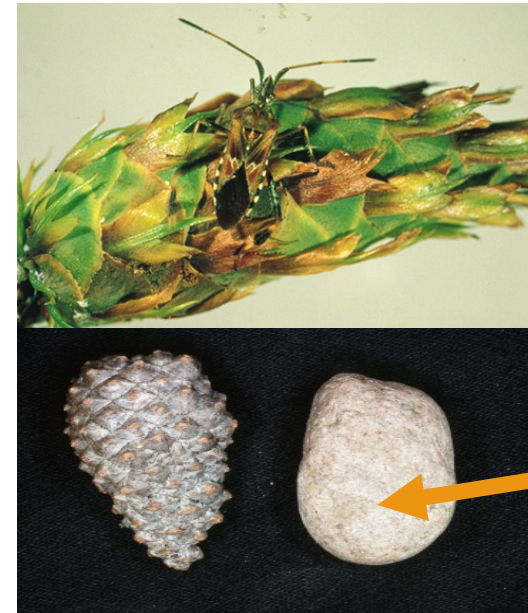
BON



Non conformité
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majeure

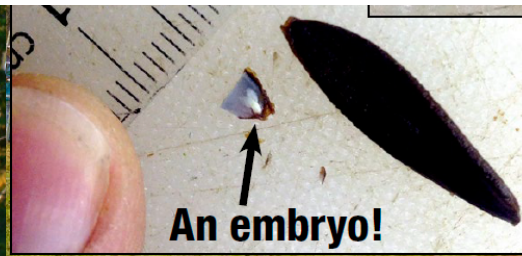
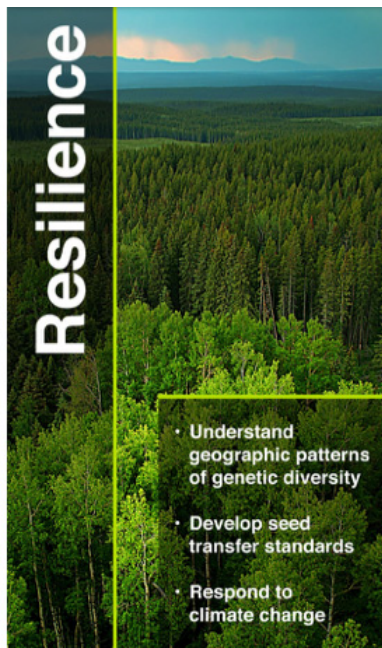


TREE SEED
"HANDLE"
WITH CARE
"STORE"
IN COOL AREA
OPEN UPON RECEIPT
PERISHABLE

**This is
a rock!**

Genetic Conservation

- Try to maintain existing levels of genetic diversity; we're still close to wild
- Future uncertainty (climate change) should point us to **portfolio diversity**
- **Ex-situ conservation is relatively cheap to implement**
- **Conservation programs aren't a 'tree-hugger' thing – it is due diligence and our insurance policy for Canada's forest genetic resources**

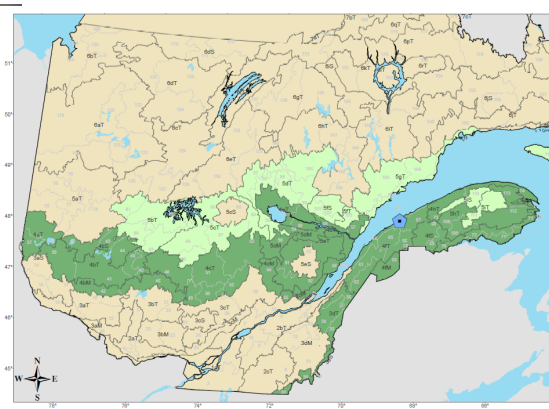
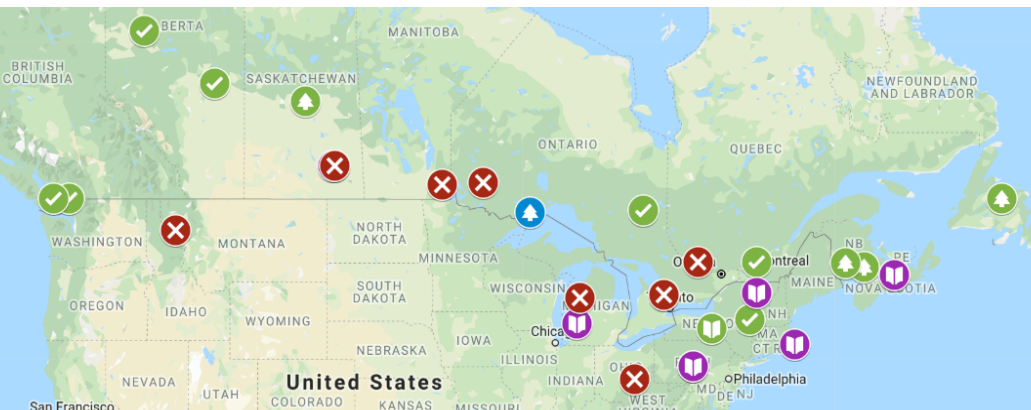


h Gene Bank, 2013, University of Guelph. Photo by Melissa Spearing



Facilities & Expertise

- Recent closures (ON, MB) have challenged the system in low-volume/demand years, **but what about the next bumper crop?**
- **Managers and policy need to focus on program value vs seed cost in economic downturns to maintain seed services.**
- How do we improve the pipeline for specialized seed service technicians? Post-secondary programs have a greater role to play.
- Climate-based seed transfer tools are complex; only real to foresters if linked to practical, real-time decisions.



Storage, Testing & Seed Preparation

- **No Canadian standard:** each province has its own legislation/policy for seedlot registration standards and storage conditions.
- Testing and training is standardized thanks to ISTA or AOSA rules.
- Challenges already with complexity of broadleaves; more to come with the introduction of new species adapted to warmer climates.



New Tools

- Huge advancements in Agriculture – faster, cheaper, accurate (\$60B)
- Much easier to calibrate methodology with low diversity materials
- Molecular tools have huge potential – getting cheaper very quickly
- Huge potential for data collection (chip technology) – need to use it



Risks to Cone & Seed Services

- Cone and Seed services taken for granted, lack of reinvestment
- High capital costs for a Tree Seed Centre; highly variable crops not a great business case – the public sector should be involved
- Research becomes “proprietary information” – need publicly-funded, practical and available-to-all research (*knowledge portfolio diversity*)
- HUGE risks associated with failure
 - BC seed inventory worth \$85M at current seed prices
 - Increased pressures with climate change – pests, fires, drought, extreme weather



Future Opportunities by 2049?

- 50+ years investment by Canadian forest industry and government in R&D but operational needs to actualize the gains are not well-supported = smart reinvestment and recruitment.
- Priorities of TSWG members are again the first steps of the seed sector (seed collection labour, seed storage protocols).
- Training and resources are available, but field experience is better learned ... in the field.
- Large gap between high tech methods and practical field activities – lots of opportunities here.
- Cross-Canadian collaboration more important than ever; join the TSWG!



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Thank You!
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