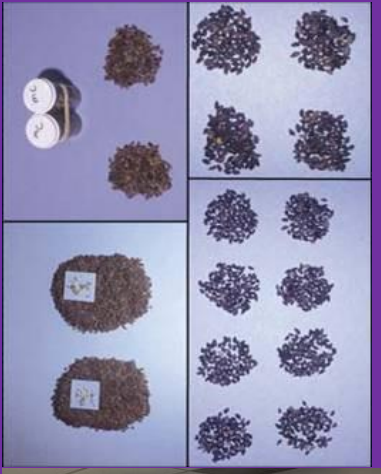
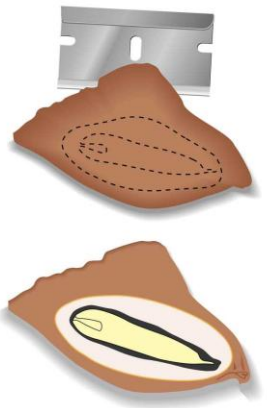


Is ISTA Relevant for Tree Seed Testing in Canada?



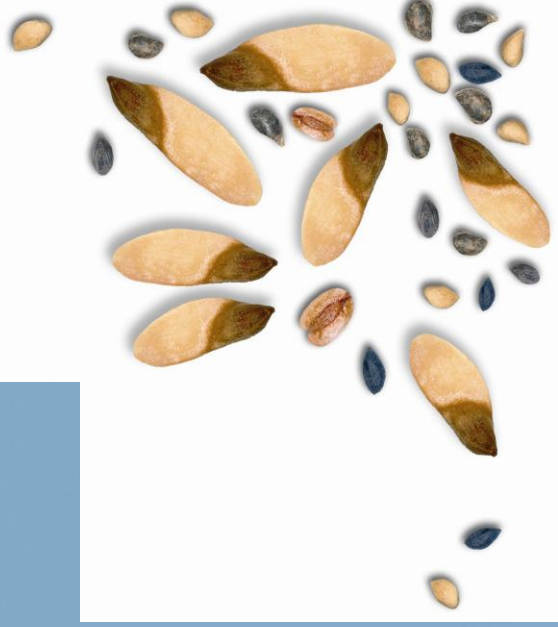
Dave Kolotelo

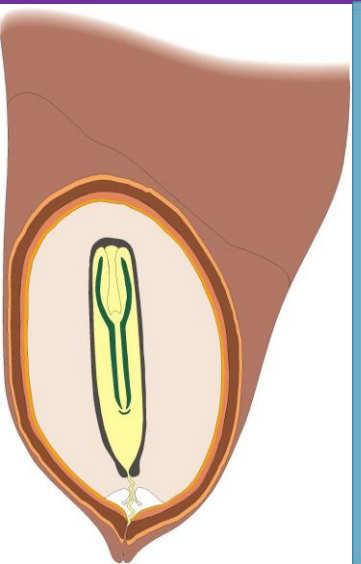
Dave.Kolotelo@gov.bc.ca

ISTA Annual Meeting 2026
Calgary, Alberta, CANADA

Talk Overview

- Canada overview / British Columbia
- BC Tree Seed Testing
- FTS History Lesson
- BC Testing Priorities





Canada and Tree Seeds

- Most tree seeds in Canada are used domestically
- For seed exports we have a Seeds Act and Plant Protection Act
- These Acts and associated regulations fall under the Canadian Food Inspection Agency (CFIA) – 'focus' is on Agricultural seeds
- Canada is a signatory of the OECD Forest Seed and Plant scheme
- GMO's are not available for conifer seedling production
- In 2023 Canada planted 563 M seedlings
- Provinces have jurisdiction over natural resources like our forests (except some Parks)
  - Huge country – over 5000 km wide
  - Trees have long rotations 50 to 100 years
  - Regulated seed transfer to maintain growth AND survival
  - Climate change is happening faster than trees can migrate
  - Assisted migration is happening in some jurisdictions
  - Local seed may no longer be best, more local control is best

Tree Seed Working Group

Tree Seed Working Group
News Bulletin
Canadian Forest Genetics Association
l'Association canadienne de génétique forestière

OBJECTIVES: 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
4. Advising on implementation practices


Tree Seed Working Group
News Bulletin 78
Canadian Forest Genetics Association
Association canadienne de génétique forestière
July 2026

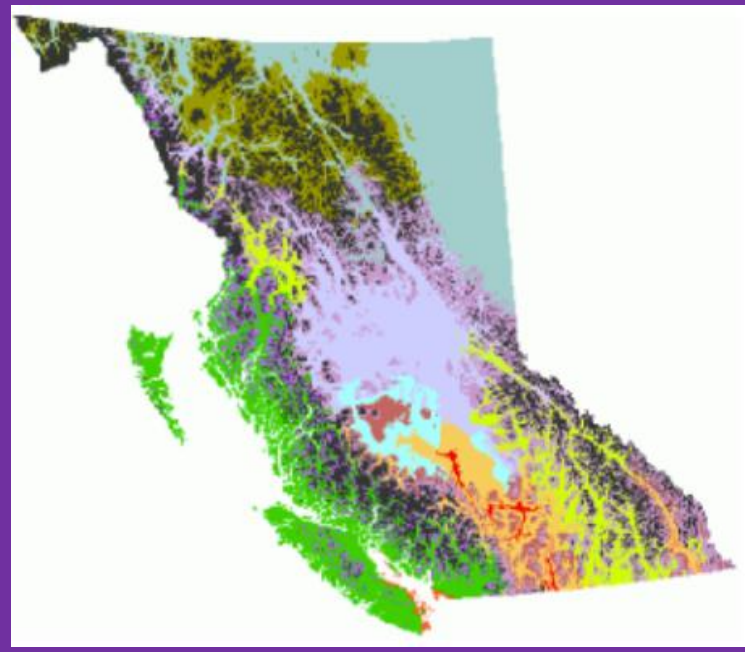
SEED COLLECTION

Featured in this Issue

Host biennial workshop and our biannual News Bulletin
Contact Dave to get on distribution list

British Columbia (BC)

- Most of Canada is comprised of boreal forest, not BC
- BC has a complex ecology and topography
- In 2023 BC planted 46% of seedlings in Canada
- In 2026 over 70% of seed derived from seed orchards
- Seed is owned by those having reforestation obligations
- Primary regulation in BC is the Chief Foresters Standards for Seed Use (Testing, seed transfer+++)
- All testing done at provincial Tree Seed Centre

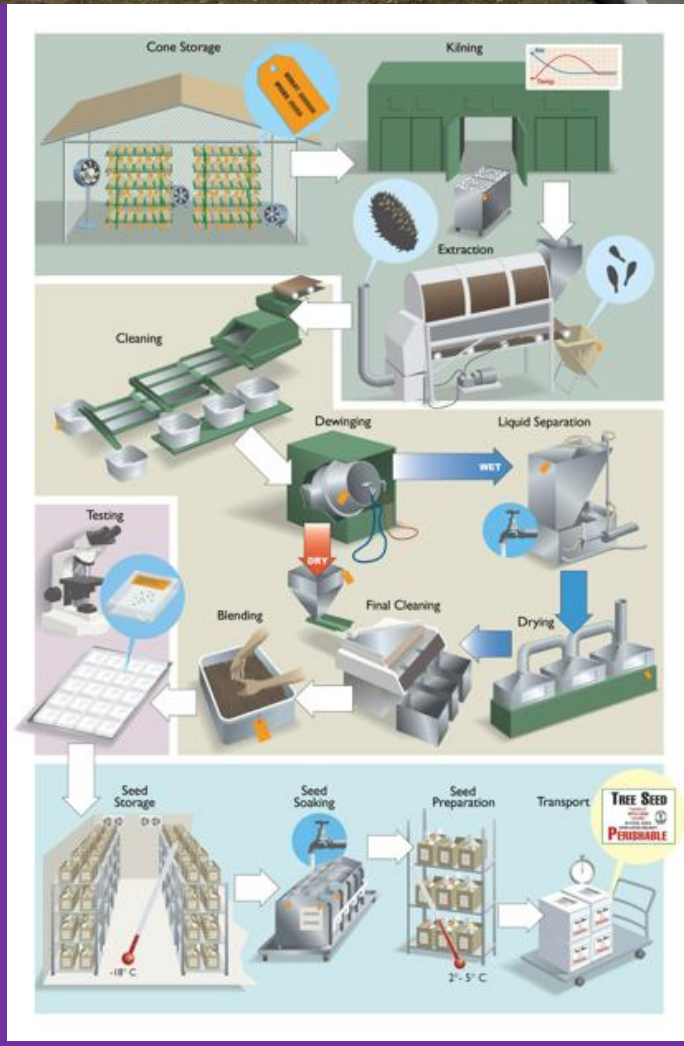


Biogeoclimatic zones of BC

- **Purity** : > 97% pure seed by weight (most 99+%)
- **Moisture Content** : 4.0 - 9.9% (almost all <8%)
- **Seed Size** – we use seeds per gram (SPG) not 1000SW
- **Germination** – wide range of tree species and test types
- **Fungal Assays** – traditional plating – *Caloscypha fulgens*, *Sirococcus conigenus* and *Fusarium* spp
- Tetrazolium test reserved for extreme, time sensitive questions (cooler ⇨ freezer)

BC Tree Seed Centre

- Deliver "**Excellence in Cone and Seed Services**"
- Scope is basically the Seed Handling System / trees
  - **Cone and Seed Processing $**
  - **Seed Storage** (70 000 Kg; 5640 SL; 7 B trees; 112 M $CDN)
  - **Testing** (oldest seedlot from 1957 still performs well)
  - **Stratification / pelleting on contract $**
  - **Genetic Conservation / Research**
- **April 1/24 to March 31/25**
  - **4088 tests performed (81 = 2% Out Of Tolerance)**
  - **2271 germination tests (63 = 2.8% Out Of Tolerance)**
- **Most species we test have some physiological dormancy**
- **Match Testing and seed pretreatment (95% of requests)**
  - **Seed soaking in both environments**
- **Do not use weighted replicates for small seeded species, all 4 X 100**

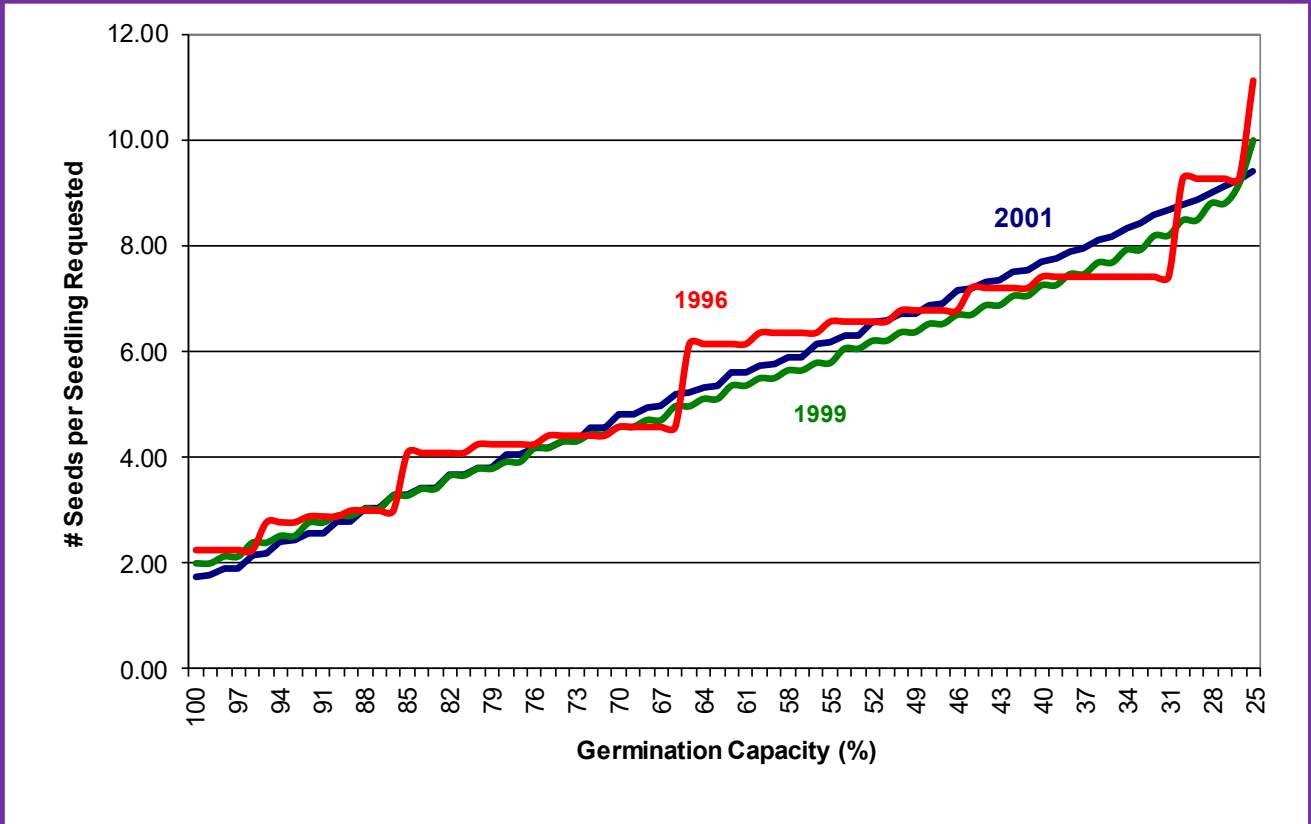


BC TSC Testing

- Large differences between ISTA and our germination tests for:
  - *Pinus albicaulis*
  - *Pinus monticola*
  - *Callitropsis nootkatensis*
  - *Abies lasiocarpa, Abies amabilis*
- No significant International trade – *ISTA scope expanding??? !!!*
- *Some reluctance for more complicated dormancy breaking treatments involving MC changes, warm stratification and long durations*
- *Inherent variability of trees – Seedlot X Treatment interactions are normal*
  - *Extended stratification*
  - *Temperature regimes*
  - *Sanitation treatment impacts*

How are test results used?

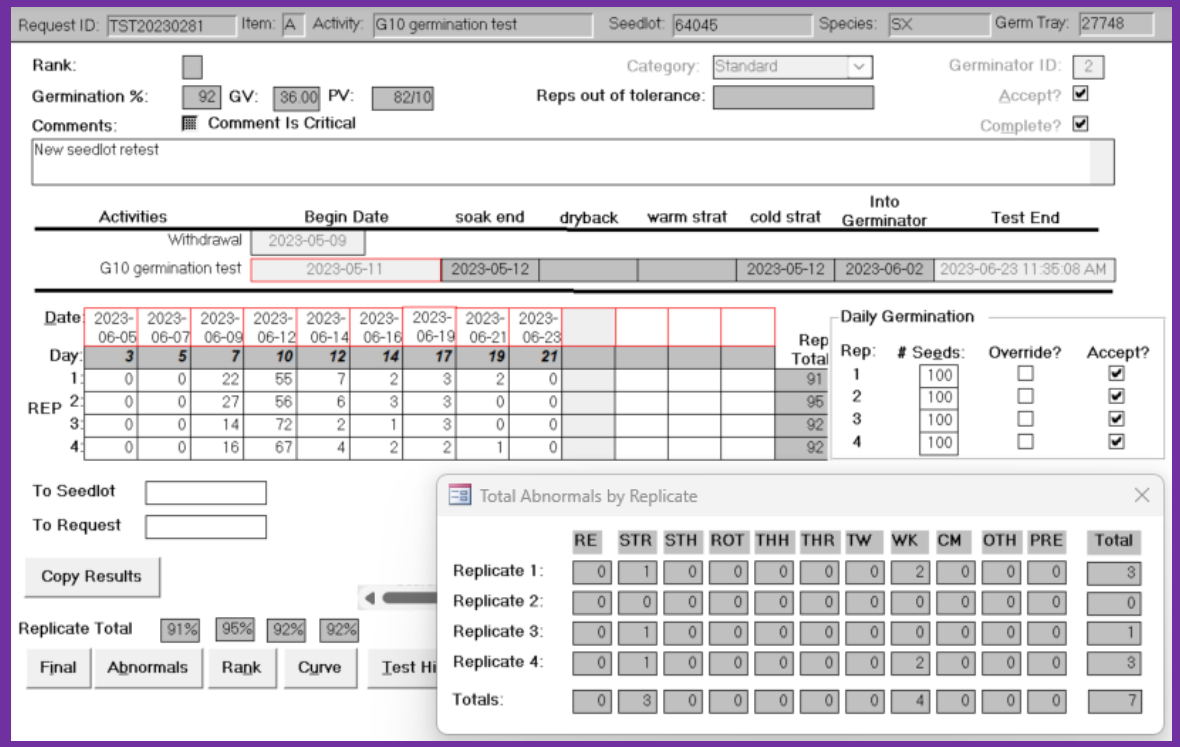
- Making conversion from seedling requested to grams of seed to withdraw
- Sowing **Guidelines –** encourage seed use efficiency (40 M seedlings of seed savings annually)
- **Grams = # seedlings requested * Seeds / seedling**
  Seeds per Gram

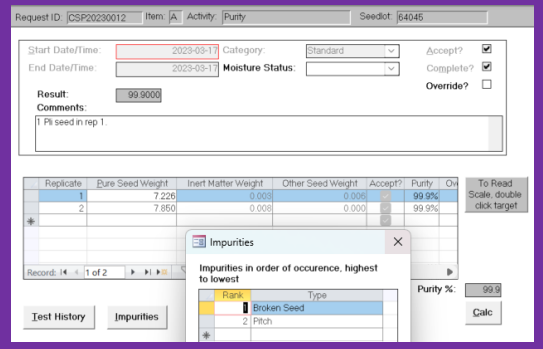


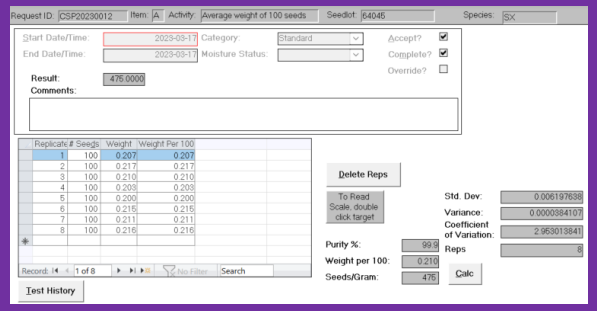
Germination Capacity (%)	Sowing Factor	Correction (Oversow) Factor	Nursery Handling Factor	Seeds Supplied Per Seedling
100-99	1.2	1.25	0.20	1.76
98-97	1.4	1.27	0.20	1.91
96-95	1.6	1.27	0.20	**2.18**
94-93	1.7	1.28	0.20	2.42
92-91	1.9	1.27	0.20	2.56
90-89	2.0	1.26	0.20	2.78

These sowing guidelines are generated through an open database (SPAR)

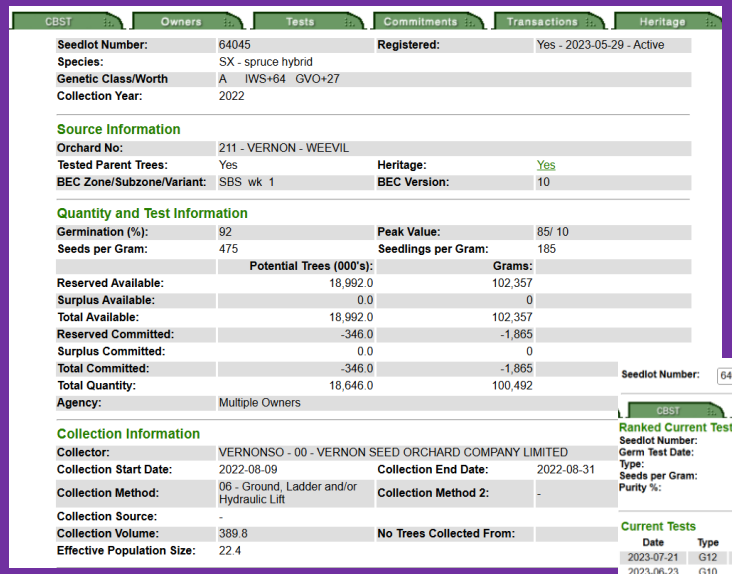
Test Details : CONSEP

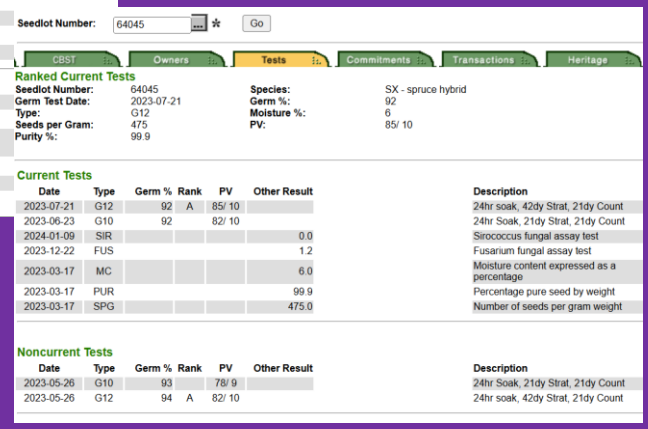


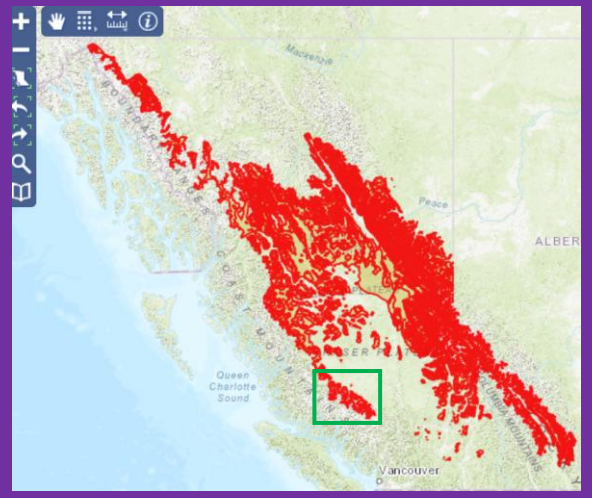


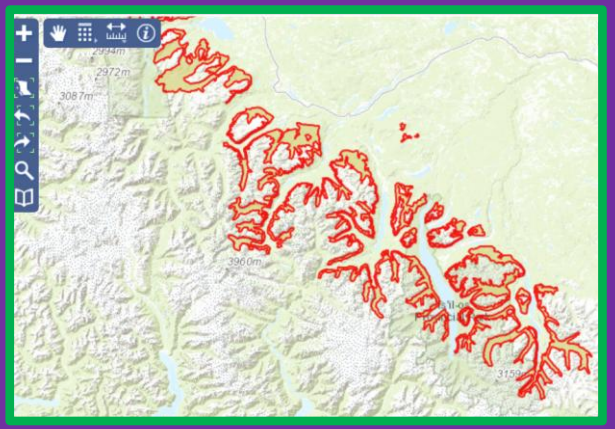


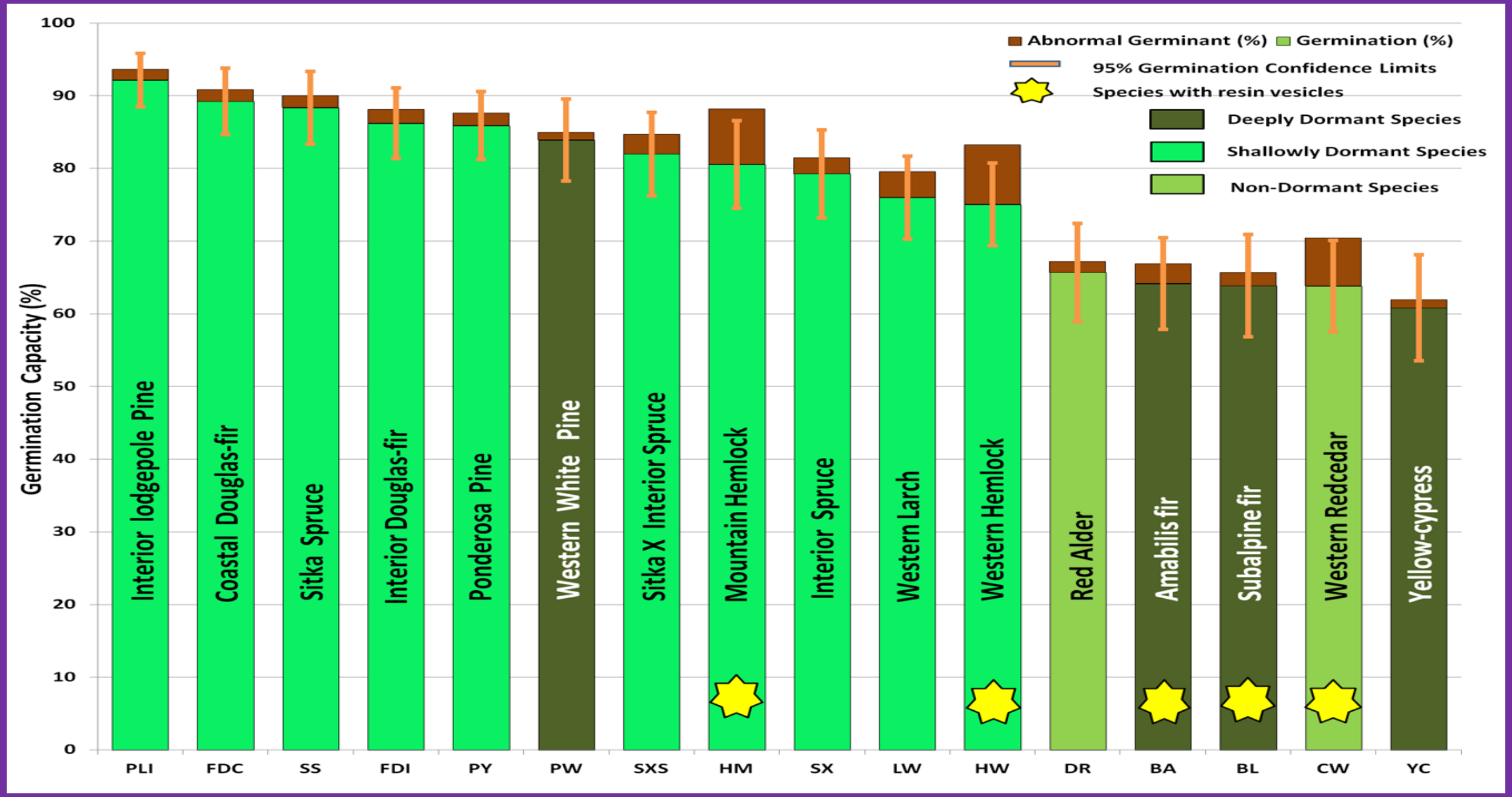
SPAR : Inventory, order entry, tests







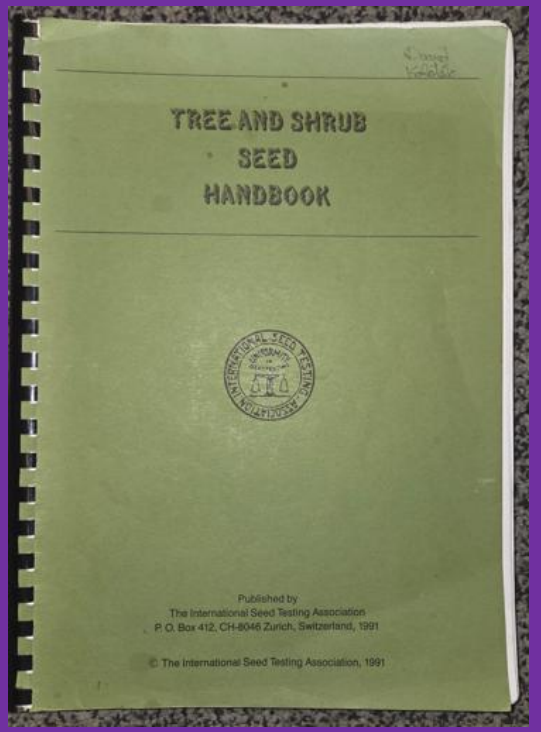



Abnormal Germinant (%)
Germination (%)
95% Germination Confidence Limits
Species with resin vesicles
Deeply Dormant Species
Shallowly Dormant Species
Non-Dormant Species
Germination Capacity (%)
100
90
80
70
60
50
40
30
20
10
0
Interior lodgepole Pine
Coastal Douglas-fir
Sitka Spruce
Interior Douglas-fir
Ponderosa Pine
Western White Pine
Sitka X Interior Spruce
Mountain Hemlock
Interior Spruce
Western Larch
Western Hemlock
Red Alder
Amabilis fir
Subalpine fir
Western Redcedar
Yellow-cypress
PLI
FDC
SS
FDI
PY
PW
SXS
HM
SX
LW
HW
DR
BA
BL
CW
YC

FTS History

- DK Joined FTS in 2001 – Stephanie Kramer & Heidi Røsok Bye already on FTS
- Revision of the ISTA Tree and Shrub Seed Handbook on agenda then
- Most FTS members represent non-ISTA accredited facilities
  - Fees, Rules restrictions, a different & smaller business model than agricultural seed
  - Mixture of wild and early breeding programs (1-4 generations) for seed acquisition
  - Large genetic variability relative to agricultural species; Agricultural seed science education

- Tree and Shrub Seed Handbook (1991) revision
- On committee workplan since 2002
- E-handbook of Seed Testing and Nursery Practices (w/ OECD)
  - Mistake – stick with testing ! / seedling production methods too variable
  - TZ information and PSD's well populated
  - Abnormal photo documentation is common need / some included
  - Task reduced to more common genera / info needs for rarer species



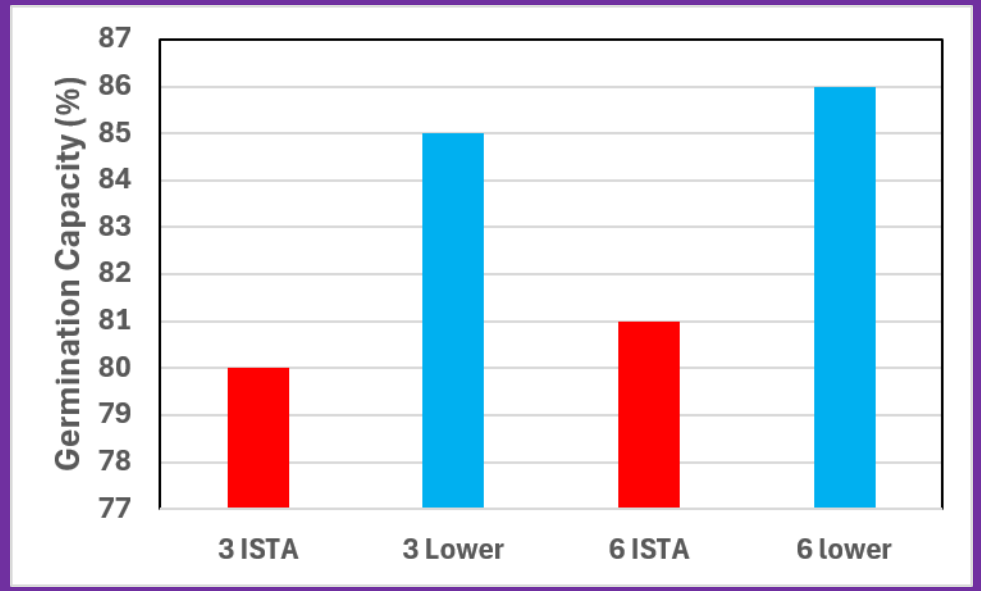
- **Houdini committee** – don't really control anything in the ISTA Rules
- Partner with another committee or they reject/accept FTS recommendations

- 2017 Pure Seed Definition fiasco w/ George Edwards (initiated in 2004 !)
- Deal with "pieces of seed units larger than one half their original size" regarded as pure seed ?
- Recommend Broken seeds be regarded as inert matter
- Decorticated seed be regarded as inert matter
- Rejection of common-sense changes – loss of credibility among tree seed testing labs

My biggest Embarassment

- Trusting ISTA contention of optimal germination temperatures in rules
- The 30: 20 regime doesn't relate to natural or production environment
  - Labs on FTS committee generally do not test at such high temperatures
  - For some *Picea* seedlots the maximum annual temperature is 22 C
  - Current temperature regime is detrimental for some species or seedlots

- Testing both 3 and 6 weeks stratification with ISTA (30:20) and lower (25:20) temperatures
- 8 *Picea glauca* seedlots
- Regardless of stratification duration the lower temperature resulted in 5% germination gain
- We will continue to test additional seedlots



BC Perspective on Testing Priorities

1. Temperature regime adjustments to improve seed use efficiency
2. Photo documentation of abnormal germinants and not solely the most common types
3. Incorporation or Testing of BC stratification treatments for deeply dormant species – Is it worth it? Who really cares?
4. Provision of confidence limits around germination test results This can impact seed use decisions – integrate into our systems
5. Calibration curves for eRH / Aw and moisture content Don't want destroy seed – but target MC for stratification