

Tree Seed Workshop



Tree Seed Centre Operations



- Deliver “Excellence in Cone and Seed Services”
 - Cone evaluations
 - Cone and seed processing
 - Seed Storage*
 - Seed Testing*
 - Seedlot Registration*
 - Seedlot transactions *
 - Pretreatment & distribution
- Meet Crown land reforestation program needs

* Stewardship Activities

TSC Facility Background

- Moved from Duncan in 1986 (started in 1957) **50!**
- 2.6 hectare parcel (ALR) / 15 FTE's
- Mission Critical Facility (Priority Response Level 1)

Security

- fenced perimeter and on-site residence
- fire protection system
- intrusion alarms and video monitoring
- Back-up power generators
- Systems checked daily / service & repair contracts

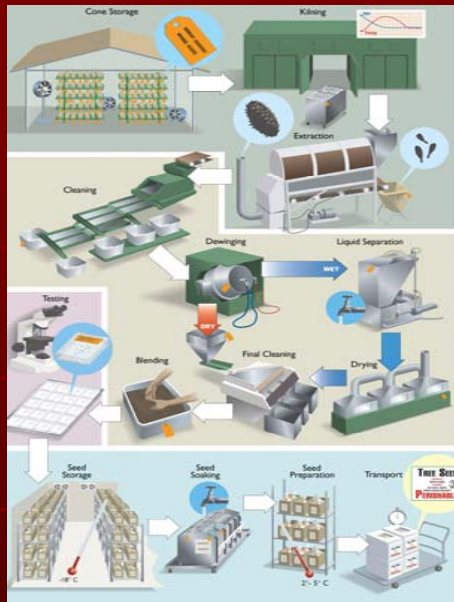
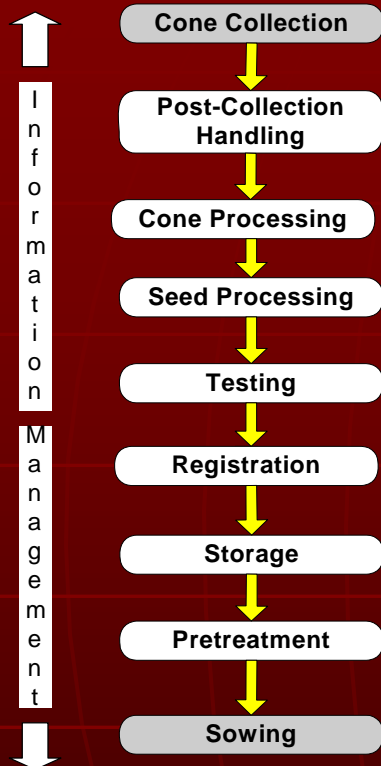


Tree Seed Centre – Business Areas

- Cone and Seed Processing
- Inventory Management
- Testing
- Facilities and Site Operations
- Systems Operations
- Finance and Administration
- Cone and Seed Improvement



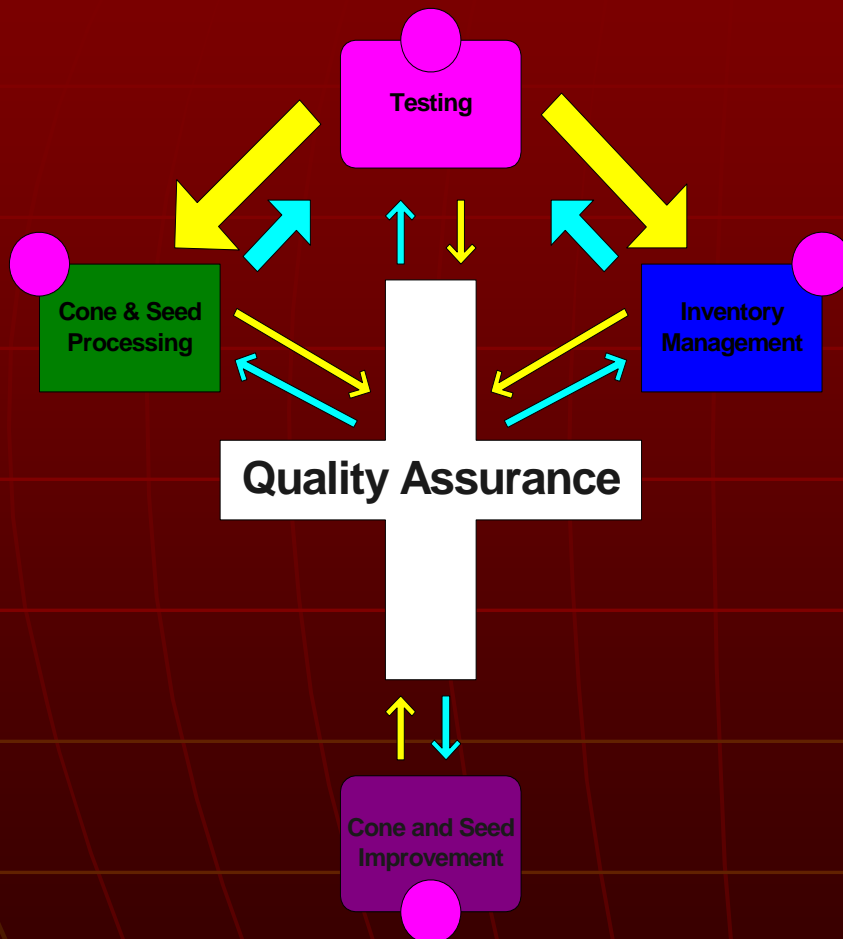
Seed Handling System



Ensure seedlot:
Identity
Integrity
Information

- Examines all steps of seed handling from collection to use
- Any previous “link” can impact your product

Quality Assurance Foundations



- Avoid Physical contamination (**Clean**)
- Avoid seedlot contamination (**Label**)
- Information Management (**Organization**)
- Handling a perishable product (**Care**)

CLOC is always ticking

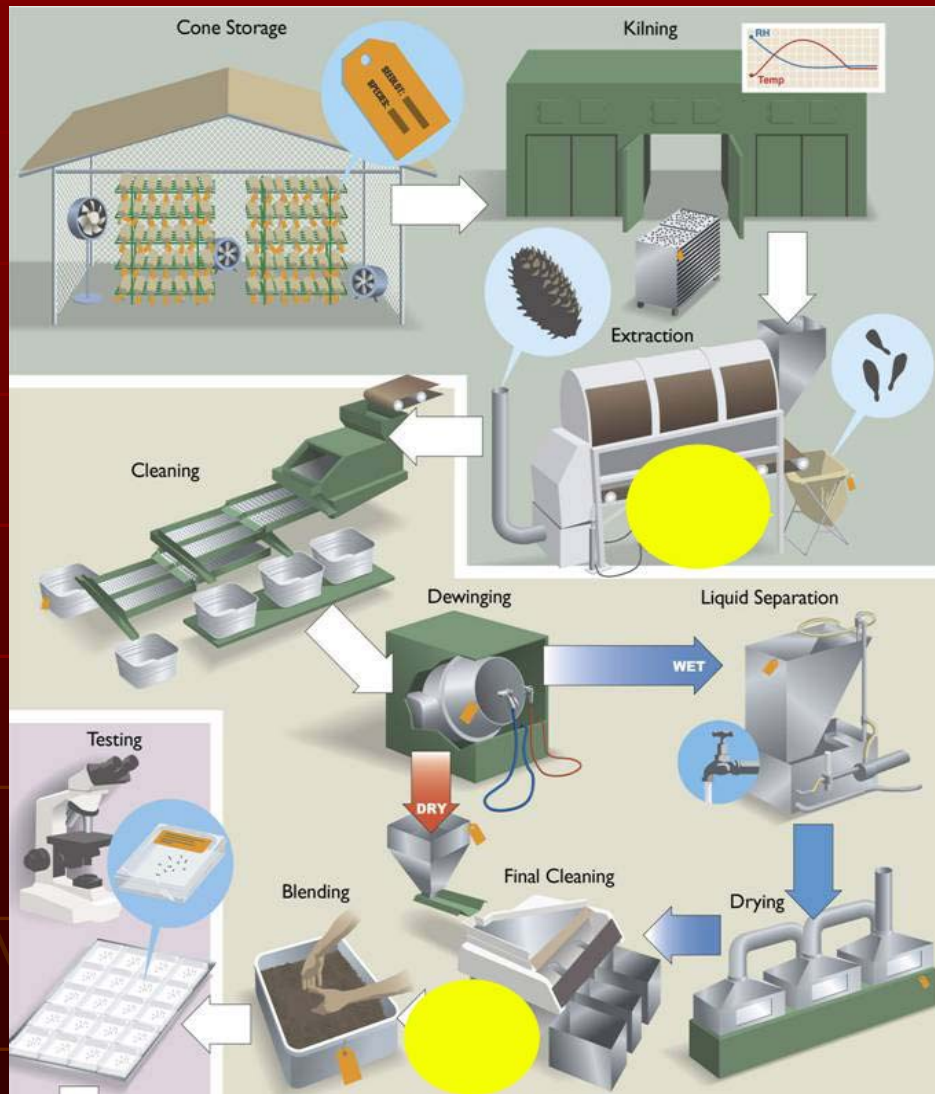
Cone-Seed Receipt & Storage



- Receive, store and evaluate cones/seeds
- Goal is to slowly dry the cones (after-ripening)
- turn sacks (**uniformity**)
- Protect from sun, rain, animals
- Allow for good air-flow
 - (1 sack depth except serotinousPli)



Cone and Seed Processing



Cone Processing (no kilning)

- *Abies* spp. Cones disintegrate (maturity)
- **NO KILNING**
- Resin vesicles
- Deep dormancy
- High degree of variability
- Fresh cones may be 40 - 50% moisture content
- Disintegration occurs at about 15%

- Cw and Hw currently not being kilned
 - Resin vesicles
 - Low dormancy



Kilning

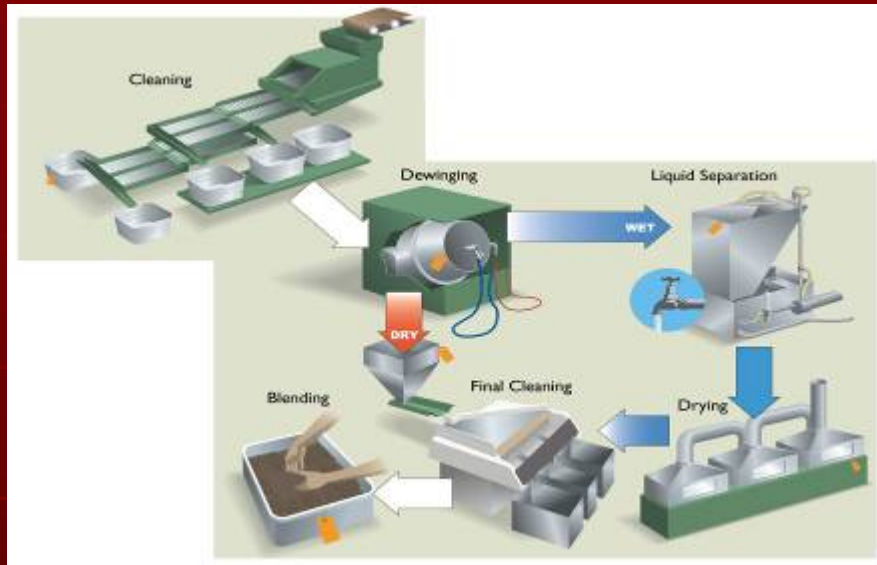


Tumbling /Seed Extraction



- Dissect + Determine # unextracted seeds/cone
- **Tradeoff:** All seed out vs. increased debris

Seed Processing



- Initial Cleaning (scalping) will remove debris **based on size and shape** of screen opening
- Large decrease in volume of material
- Debris contains fungi, moisture and can abrade the seeds
- Dewinging based on seed wing anatomy attachment (*wet or dry*)
- Final Cleaning **based on specific gravity of seeds** (*gravity table or pneumatic separators*)

Initial Cleaning (Scalping)



Common Impurities



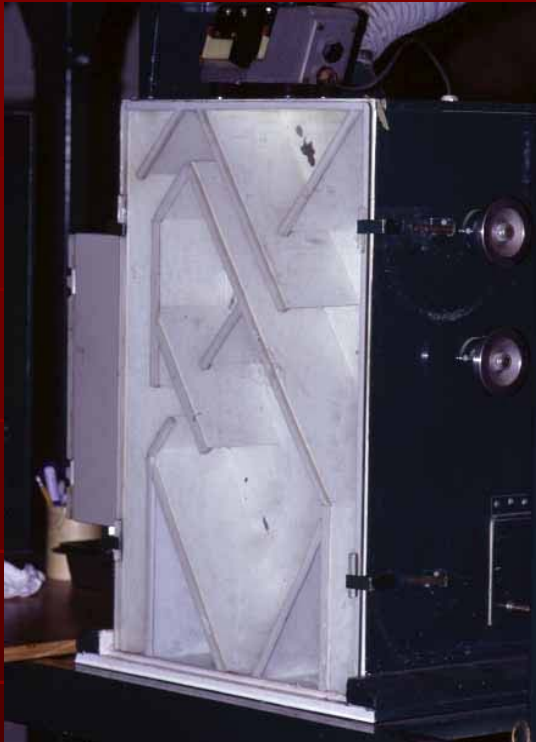
Wet vs. Dry Dewinging



Dewinging



Final Cleaning and Blending



Process to Chief Foresters Standards

- clean to a minimum of 97% purity
- dry to a moisture content between 4-9.9%

Cone and Seed Processing



Seed Testing

■ STANDARD

- "Seedlot" Results on SPAR (current 'A' & past)
- Moisture Content & Purity
- SPG (derived from Purity & WT100)
- Germination (possibly several tests)
- X-ray



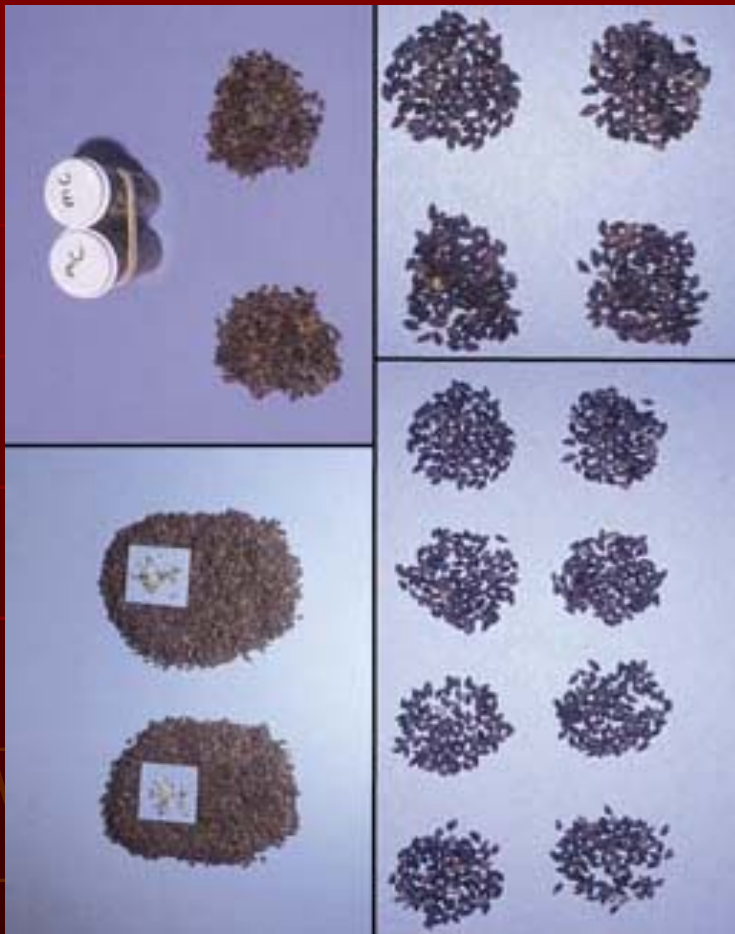
■ QUALITY ASSURANCE

- "Request" or trial result (*subset of a seedlot*)
- Stratified Sowing Requests at shipping
- Returned seed from nurseries

Standard Testing

Activities

- Conduct standard tests
 - Purity
 - Moisture content
 - Average seed weight
 - Germination (possibly several)
 - Total seedlot weight
 - X-ray
 - possibly fungal assays
- Identify/schedule seed for retesting
- ISTA is primary guide



Sampling

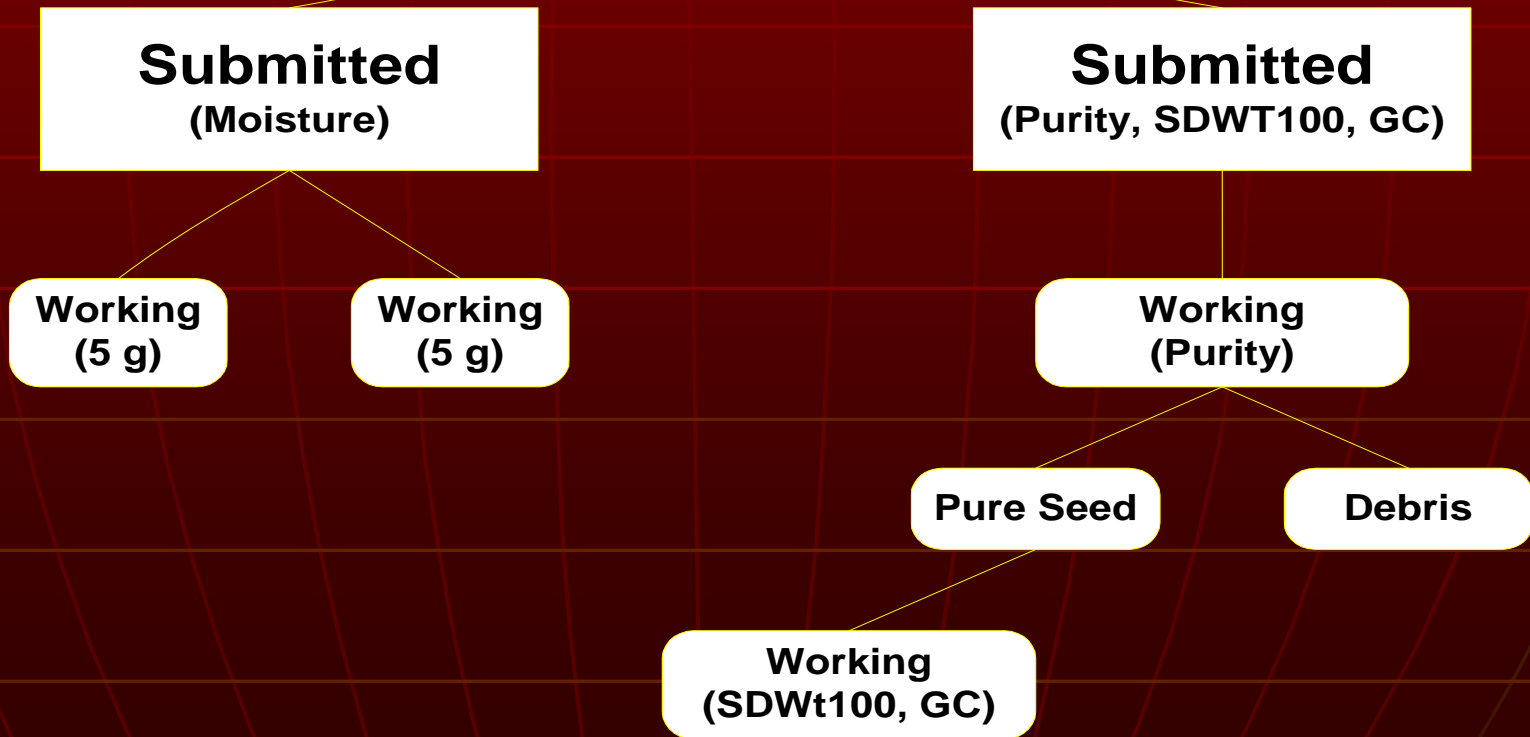
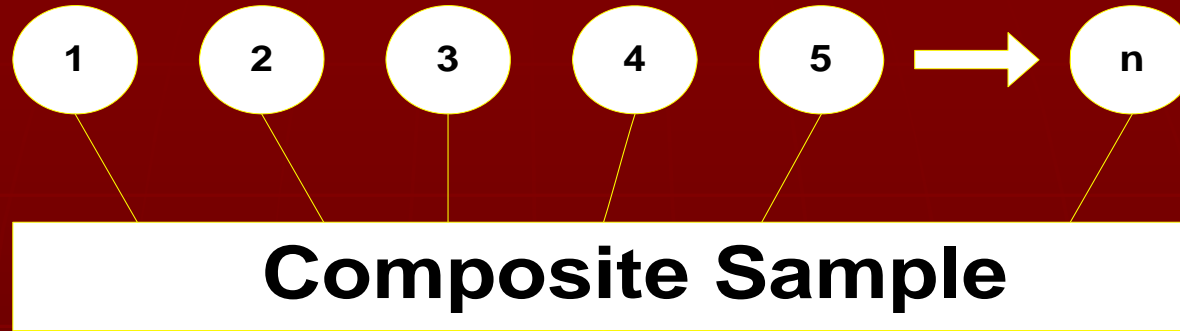
Objectives

- 1) To obtain a sample size suitable for tests
- 2) To ensure the contents in a sample are the same as the entire seedlot

Random and **Representative** are keywords

- **Primary samples** are taken at various points in a seedlot (various boxes; positions within boxes)
- ISTA specifies minimum # samples per container (*eg.* with 5-8 containers (*about 35 to 60 Kg*) take 2 primary samples from each container)
- sampling performed by trier or by hand

Primary Samples



Test Tolerances

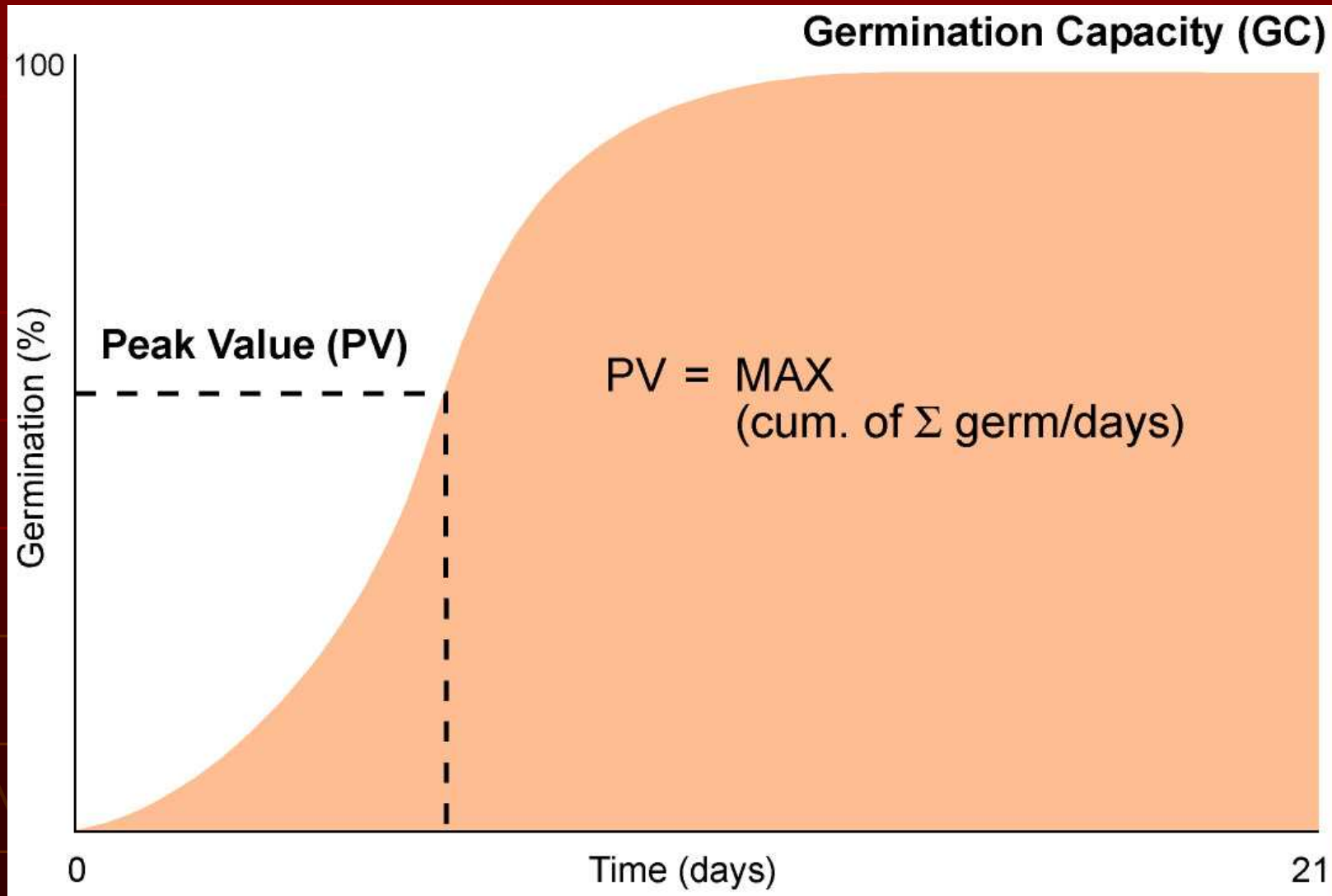
- Tolerances are acceptable levels of variability between replicates within a test
- If a replicate falls outside the tolerances then the test is repeated
- The **ISTA tolerances** are used at the TSC

Germination Test



- All species *except Cw* receive an initial soak
- All species *except Cw* receive some chilling
- A germination test is composed of 4 x 100 seeds
 - 1 labelled germination dish
 - 1 -22-ply kimpack
 - 1 filter paper
 - 50 ml of water
 - 100 seeds

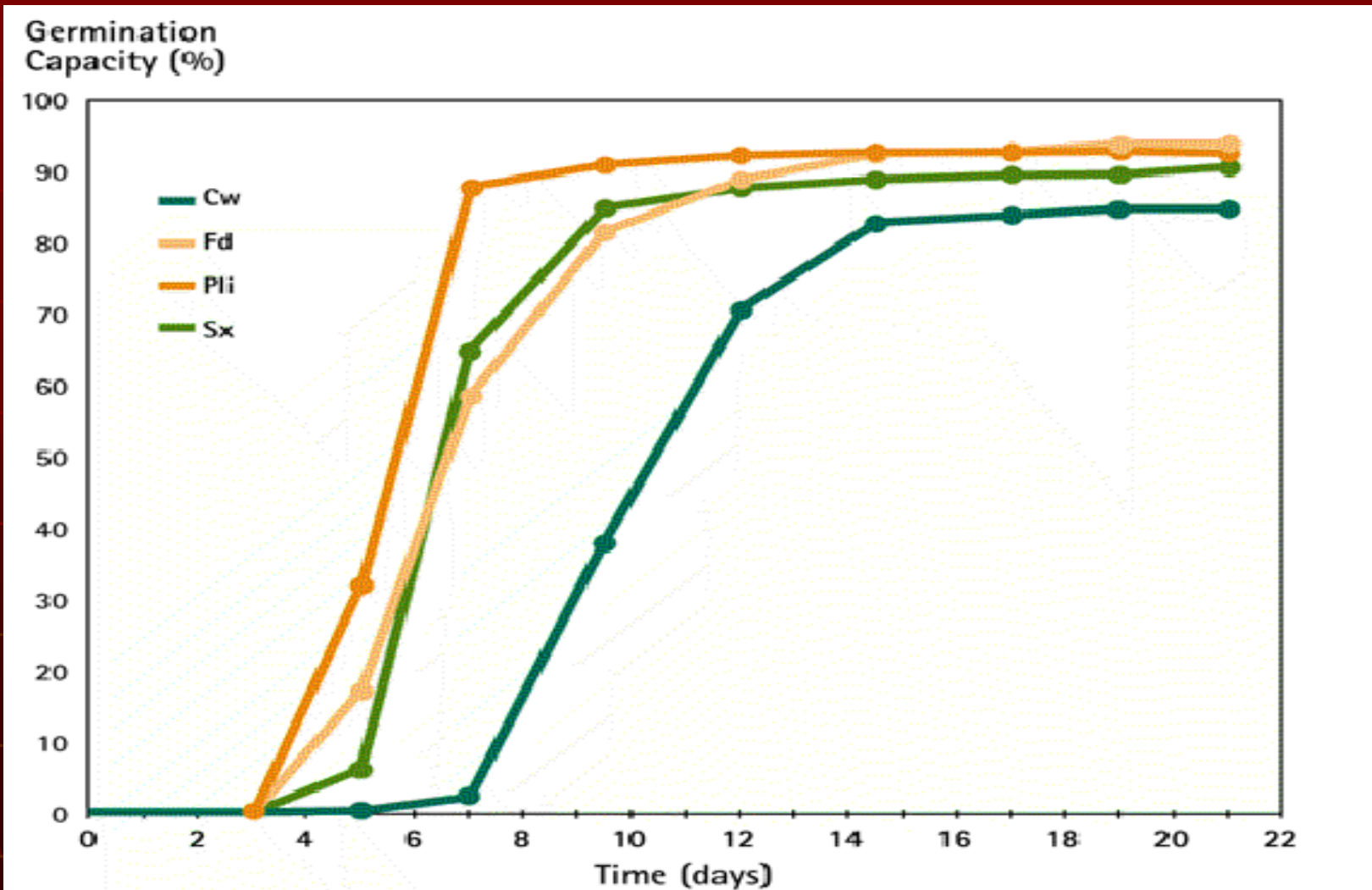
Germination Variables



Abnormal Germinants



Germination Curve Comparison



Quality Assurance Testing



- Processing results
 - *Abies* conditioning
 - Unkilned seed
- "Request" or trial result
- Stratified sowing requests
- Returned seed from nurseries

QA Results

- Sowing request (see attachment)
 - Compare testing, seed preparation and nursery germination
 - Some minor genetic class differences
- Pelleting efficiency ($C_w = 99\%$; $DR = 98\%$)
- Returned Seed – quality generally maintained (approximately 1% GC drop!)

Seedlot Registration

Purpose

- Register seedlots
- Maintain identity, integrity & information about seedlot
 - Source
 - Transferability
 - Genetic worth
 - Quality
 - Quantity
 - Heritage
 - Ownership
 - History of use



Seed Preparation & Shipping



Activities

- Scheduling
- Manage changes
- Withdraw seed
- Prepare seed
 - Soak and stratify
 - pellet
 - send dry
- Label and ship seed

Seed Pretreatment

- Application of treatments to seeds to overcome dormancy (*or* increase speed, uniformity, vigour, reduce pest window) and facilitate sowing for seedling production
- Generally mimics lab testing
- Fungi are main 'enemy'
- BASIC STEPS
 - SOAK
 - STRATIFY (moist chilling)

Seed Soaking



Surface Dry

- After soaking excess moisture is drained by hanging the net and then surface dried
 - seed flows freely = seeder requirement
 - to reduce bulking-up of pathogens
 - to allow oxygen to freely reach the embryo
 - reduction in pre-germination

DO NOT REMOVE INTERNAL MOISTURE

- Many systems can do a good job
 - minimum seed depth, uniform drying
 - movement of seed probably required

Surface 'moist' vs. 'dry' seed



Stratification Durations

- 0 Days Cw
- 21 Days
 - Sx, SS, Fd_, Lw
- 28 Days
 - Pli, Py, Hw, Bg
- 62 Days (G44)
 - Ba, Bl, Bn
- 92 Days (Split Regimes)
 - Ba, Bl, Bn....Yc
- 112+ Days
 - Pw



Seed Storage



- Moisture < 10%
- minimal metabolic activity (-18°C)
- seedlot deterioration estimated as
 $\Delta GC / \Delta \text{time}$
- retest species deteriorating faster more often
- Gene Conservation

Cone-Seed Improvement



Activities

- Conduct applied and basic research
- promote seed-use efficiency
- Develop and summarize QA programs
- Provide tree seed information and extension services

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Tree Seed Centre



"Our Mission"

Excellence in Cone and Seed Services

Overview

Facilities
The Tree Seed Centre facility includes: offices, cone preconditioning areas, cone and seed processing and distribution areas, dedicated seed laboratory, coolers, and long-term storage vaults.

Seedlot registration & certification
All seed destined for crown land reforestation must be registered. Requirements for natural stand, seed orchard and non-BC seedlots are legislated in the [Chief Forester's Standards for Seed use](#).

Seed storage
Seed storage involves maintenance of optimum storage conditions for conifer tree seed. The province's inventory includes an operational component used for reforestation and a contingency for catastrophic losses and secondly a dedicated seed bank for gene conservation. Management of the dynamic inventory (seed sales and transfers) and ensuring the seedlot balances are accurate is also the role of this area.

Withdrawal requests
Seed is primarily requested for reforestation (sowing requests), and we also facilitate distribution of seed for research and other purposes. Requests are either sent dry or pretreated at our facility.

Testing
Testing uses standardized sampling, testing and evaluation practices to quantify seedlot attributes. Seedlot results are available for moisture content, purity, germination, seeds per gram, and possibly fungal assays. In addition to standard tests the testing area also plays a vital role in Quality Assurance and research.

Cone and seed processing
Involves detailed seedlot evaluation, conditioning of cones, the extraction of seed from cones (cone processing) and the removal of debris and non-viable seed (seed processing).

Cone and seed improvement
Conducts applied and basic research on tree seed, constructs and summarizes quality assurance programs and performs education, extension and communication activities.

Administration

[Fee schedule](#)
[Surplus seed prices](#)
[Operational time requirements](#)
[Invoicing](#)
[Species average table](#)
[Client reports](#)
[Information management](#)
[Priority processing](#)

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Links

[International Seed Testing Association](#)
[Association of Official Seed Analysts](#)

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<http://www.for.gov.bc.ca/hti/treeseedcentre/index.htm>