

Sowing Guidelines, Seed Use Efficiencies with SPAR & Seedlot Source Information

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Overview

- **SPAR – Seedling Request information flow**
- **Sowing Guidelines**
 - **How sowing guidelines have evolved and changed**
 - **Sowing guidelines calculations – quick and easy method and the complete calculations**
 - **Seed use efficiency - Grams can be reduced by nurseries to create seed use efficiency**
 - **Sowing dates can be changed by nurseries to bring in more efficiency in seed stratification times**
- **New feature to map collection area in SPAR & SeedMap**
- **Natural Stand Seedlot Collection site analysis project**



SPAR Seedling Request process flow

- ⇒ **Seedling Requests are entered** by agencies (eg. licensees, BC Timber Sales, FFT, woodlots) for species, seedlot, quantity, stock type, planting year/season. Grams are calculated using **default sowing guidelines**.
- ⇒ **Nurseries are assigned** by the Request Agency for privately funded requests and by BCTS HQ for ministry administered requests.
- ⇒ **Nursery can reduce grams & change sowing dates** for requests assigned to them
- ⇒ **Information flow between SPAR and CONSEP** (local Tree Seed Centre system)
- ⇒ **Tree Seed Centre does seed withdrawal, preparation** (some nurseries do stratification) and **shipment to nurseries** based on sowing dates.
- ⇒ **Nurseries receive seed and sow** in specified container type on appropriate sowing dates.



Sowing Guidelines – what are they?

The sowing guidelines are:

- **a set of calculations that convert the amount of seedlings requested by forest professionals to the quantity of seed that needs to be removed from long-term freezer storage for a seedling request.**
- **used to calculate the number of potential seedlings for an entire seedlot as well as the number of seedlings producible per gram of seed.**
- **the SPAR calculations are used by many forest companies and nurseries, however, some adjust the grams of seed required (usually downwards) based on past experience or limitations placed on high-value seed by the owner.**



Sowing Guideline History

1980's - very basic sowing rules existed – 2, 3 or 4 seeds per cavity, and 1 seed/cavity for Class A lots with > 90% germination, along with oversow factors.

1993 – SPAR – automated sowing rules when seed is selected in a seedling request

Sowing Guidelines Task Group formed in 1996

1996 Sowing Guidelines - difference between Class A and B rules removed, seeds per cavity and sowing correction factors adjusted.

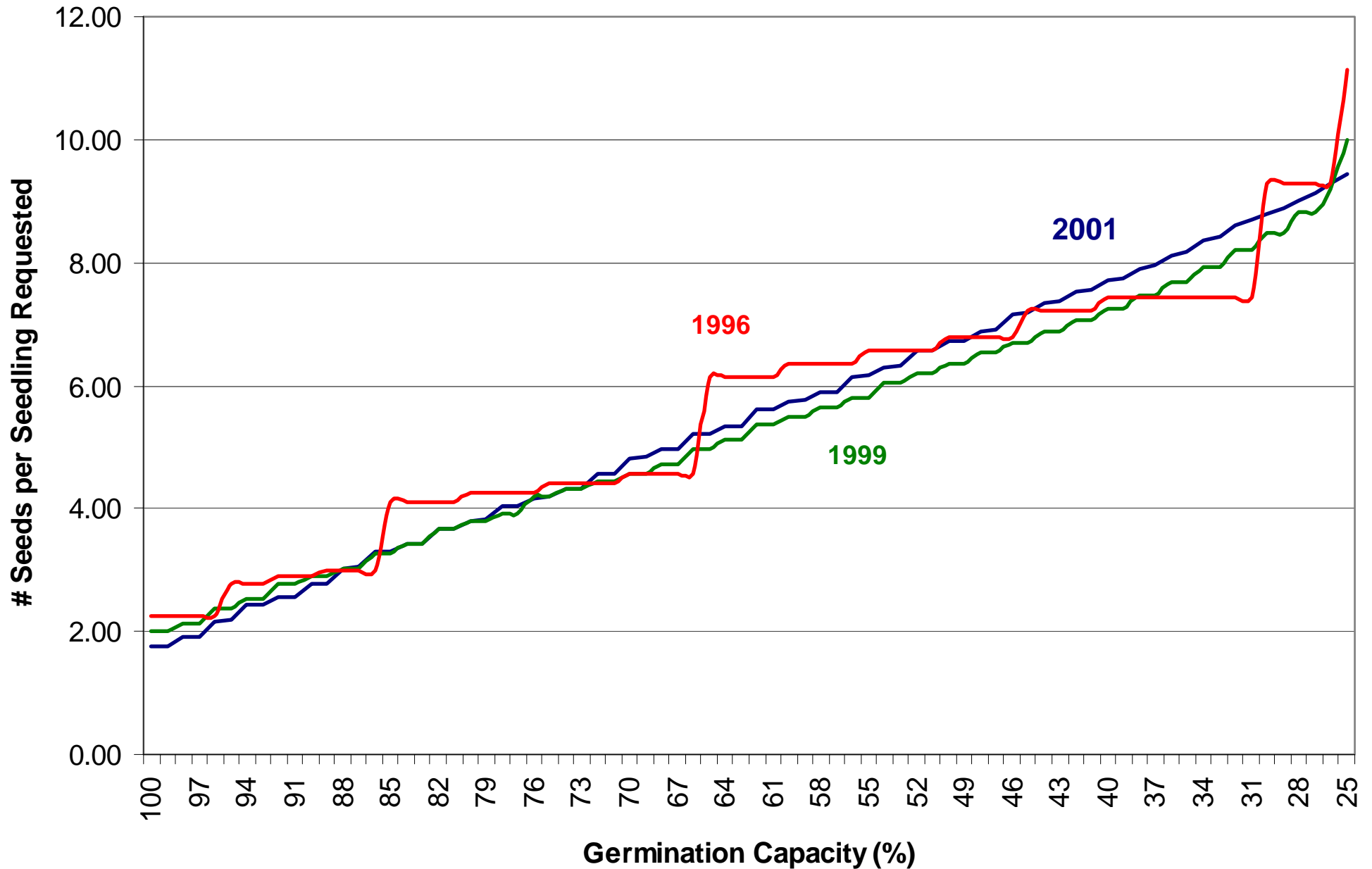
1999 Sowing Guidelines – allocation of seeds was streamlined to correspond closely to germination capacity changes and fractional sowing introduced (see [Extension Note Vol 3 No 4](#)). Seeds per seedling became the main factor.

2001 Sowing Guidelines – Seeds per seedling were refined further. [Extension Note Vol 5 No 2](#) describes sowing guidelines and calculations

2007 Sowing Guidelines - reductions in seed allocated for Pli only
- see [SPAR website](#)



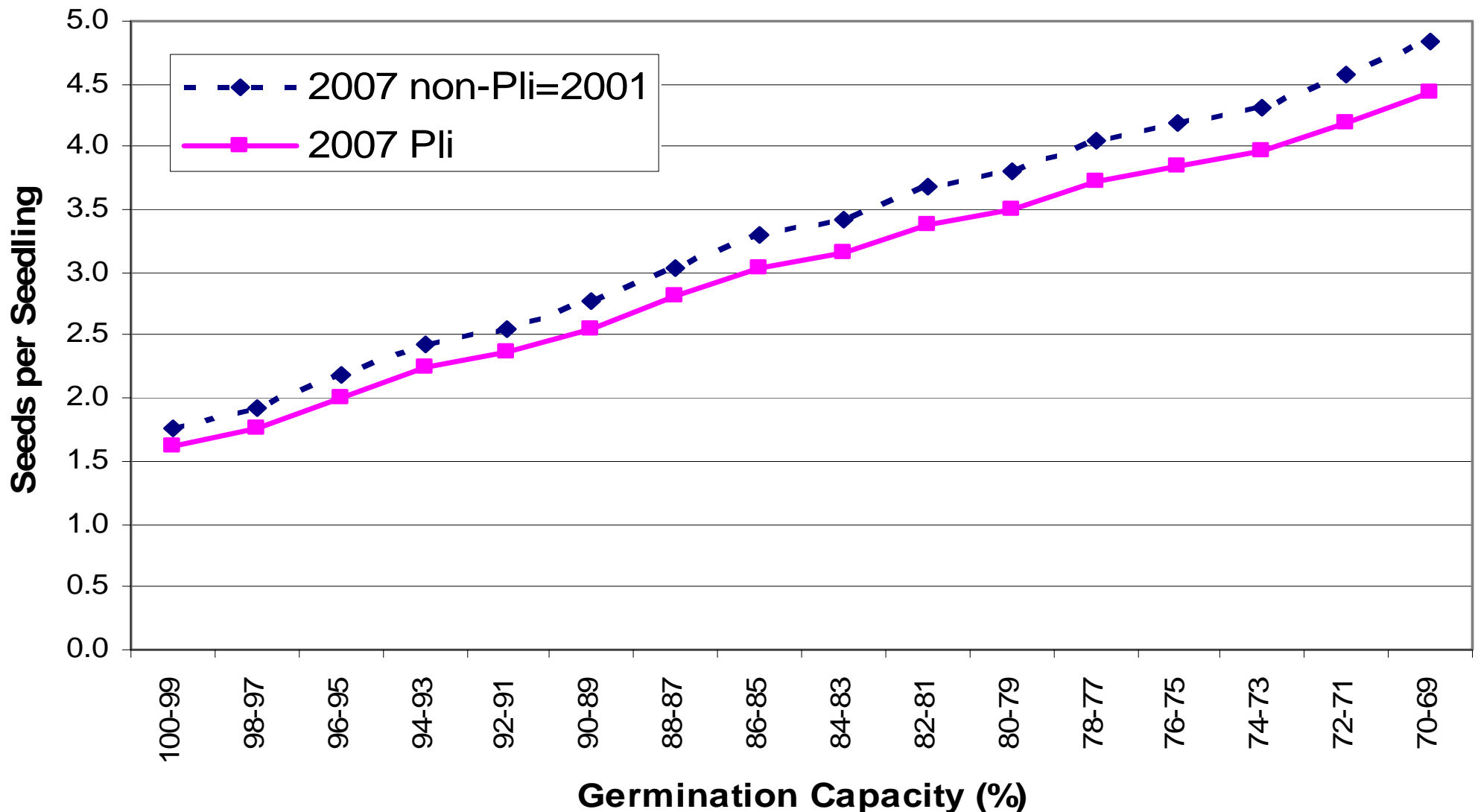
1996, 1999 and 2001 Comparison





Changes for Pli only - 2007

- Pli sowing guidelines were reduced slightly in 2007 due to short supply in some areas. The seeds per seedling were reduced by decreasing the sowing correction factor.





Quick and Easy Gram Calculations

You need to know

- Quantity of seedlings requested
- Seeds per gram (SPG) of seedlot
- Germination capacity (GC) of seedlot

Obtain seeds supplied per seedling from table

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	1.3	1.27	0.20	1.91
96-95	1.5	1.28	0.20	2.18
94-93	1.7	1.28	0.20	2.42
92-91	1.9	1.28	0.20	2.56
90-89	2.0	1.26	0.20	2.78

Insert into the following equation:

$$\text{Grams} = \frac{\# \text{ seedlings needed} \times \text{seeds/seedling}}{\text{seeds per gram}}$$

Example: 50 K seedlings Seedlot with GC=96% & SPG = 509

from table we determine that 2.18 seeds are supplied per seedling

$$\text{Grams} = \frac{50,000 \times 2.18}{509} = 214.1 \text{ grams (SPAR rounds to 215)}$$



Sowing Guideline calculation details behind the scenes ...



What do all these terms mean....



Sowing Factor (SF)

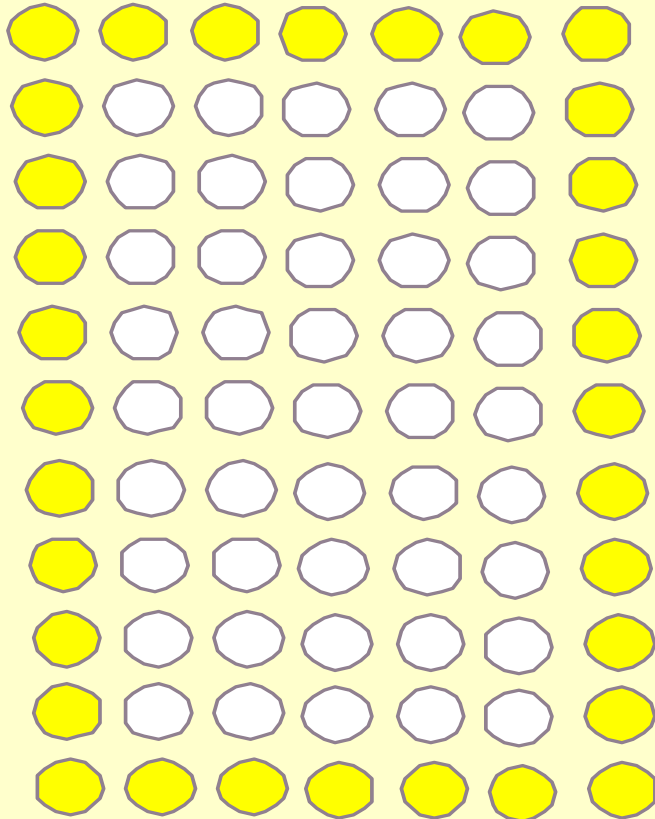
- Average number of seeds sown per cavity
- pre-1999 sowing factors were strictly integer values
- **fractional sowing** (i.e. 1.4) introduced in 1999
- many nurseries have this capability with their seeders



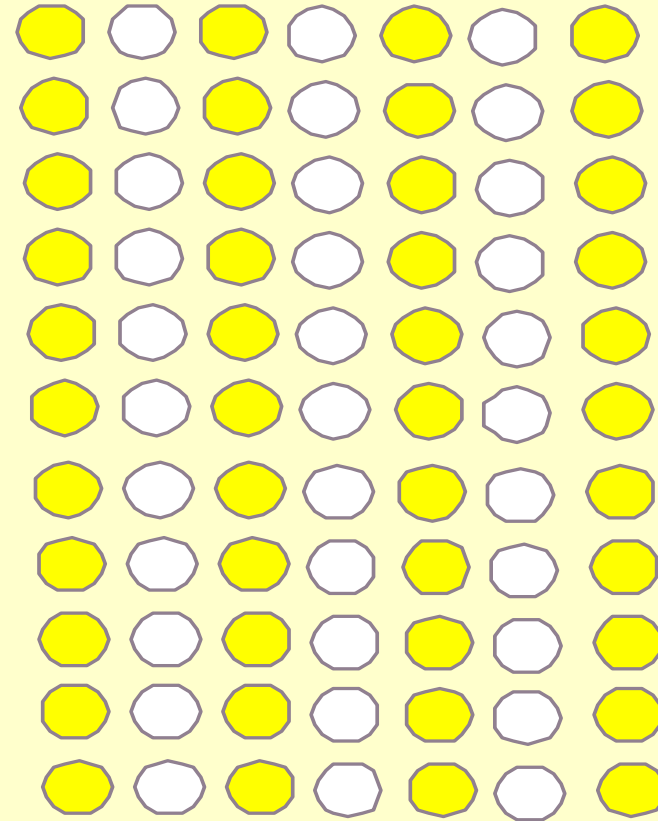
Fractional Sowing Examples

eg. 412a or 415d

1.42



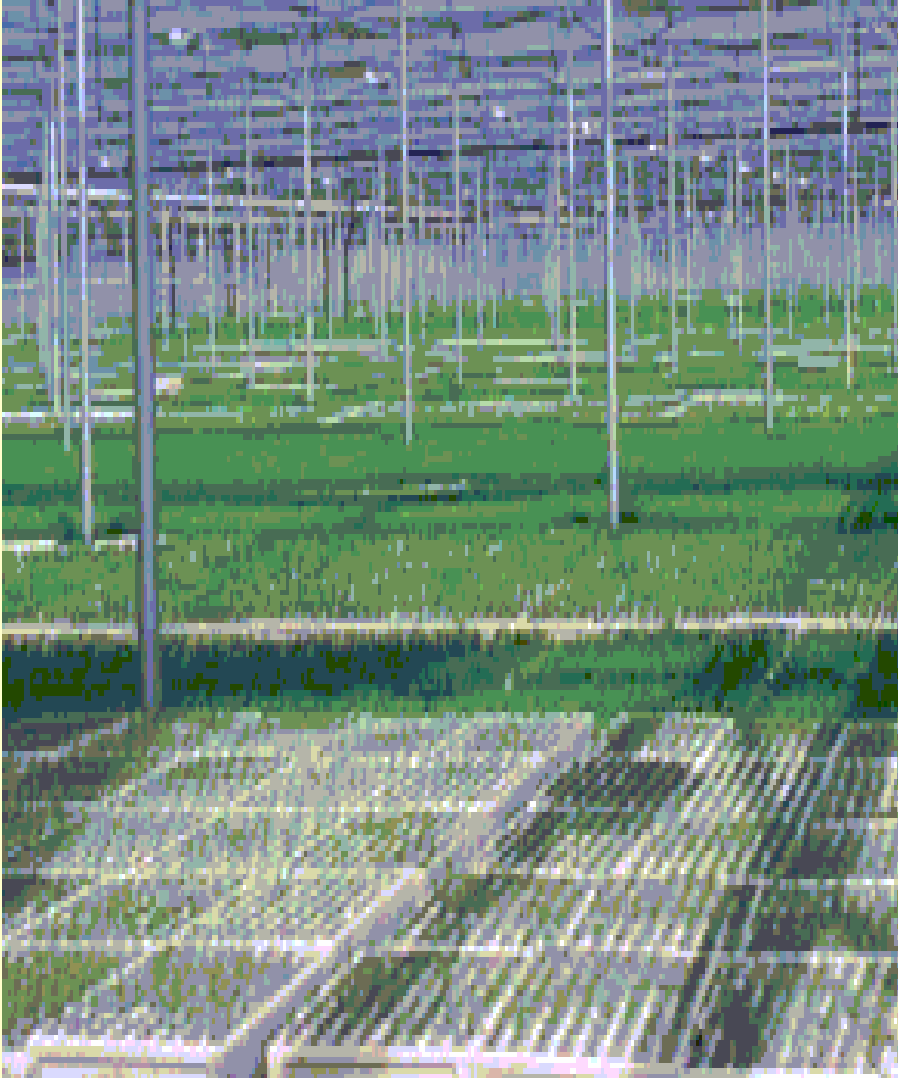
1.57



2 seeds
1 seed



Correction (Oversow) Factor [CF]



- A factor to account for non-productive cavities
 - culled seedlings
 - “pest” problems
 - empty cavities due to germination or seeding
- if we need 100 blocks to exactly meet request and the CF is 1.2 then 120 blocks sown



How do Sowing Guideline calculations work? SPAR uses a few tables

Container	Cavities/block
410	112
412A	77
412B	112
415B	112
415D	77
512A	60

**Cavities per block table –
eg. 410 / 415B / 412B are
all 112 cavities per block**

**Seeds per block table
has a number for each
combination of
container type and
seeds per cavity –
includes a nursery
handling factor**

Cavities/block	Seeds/Cavity	Seeds / Block
112	1	134
112	1.1	146
112	1.2	157
112	1.3	168
112	1.4	179
112	1.5	190



....then

Germination	Seeds / Cavity	Correction Factor
99-100	1.2	1.25
97-98	1.3	1.27
95-96	1.5	1.28
93-94	1.7	1.28
91-92	1.8	1.28
89-90	2.0	1.26

Sowing Rules Factor table – for each germination range (2% increments), the seeds/cavity and sowing correction factors are set in SPAR

Cavities to sow = seedlings required x correction factor

Number of blocks = cavities to sow / cavities per block

**Grams = Number of blocks x seeds per block
seeds per gram**



We want to encourage seed use efficiency

- **Economic incentives to reduce seed quantities for request agencies are obvious as it reduces their seed costs, but economic incentives for reducing grams at the nursery are not as straight-forward.**
- **Discussions (negotiations) between the customer and nursery are encouraged and will result in greater seed-use efficiencies.**
- **Nurseries are encouraged to calculate the actual grams of seed required for their seedling requests based on their own practices and experience.**
- **Nurseries can then use SPAR to reduce the gram amounts by seedling request.**
- **Request agencies can increase or decrease the grams when necessary.**



Nursery Grams Adjustment function available for nurseries

- use filters to generate a list of requests to change
- then update each request and save

Application Home

SPR200 Nursery Grams Adjustment

- Search
- Lot Info
- Requests
- Reports
- Services
- Maintenance
- TSC
- Registration
- Admin

Request ID: (All other criteria will be ignored if request key is given)

Assigned Nursery: J.D. LITTLE FOREST CENTRE

Request Agency:

Species:

Stock Type:

Planting Year:

Stock Age:

Container Type:

Season:

1 rows returned

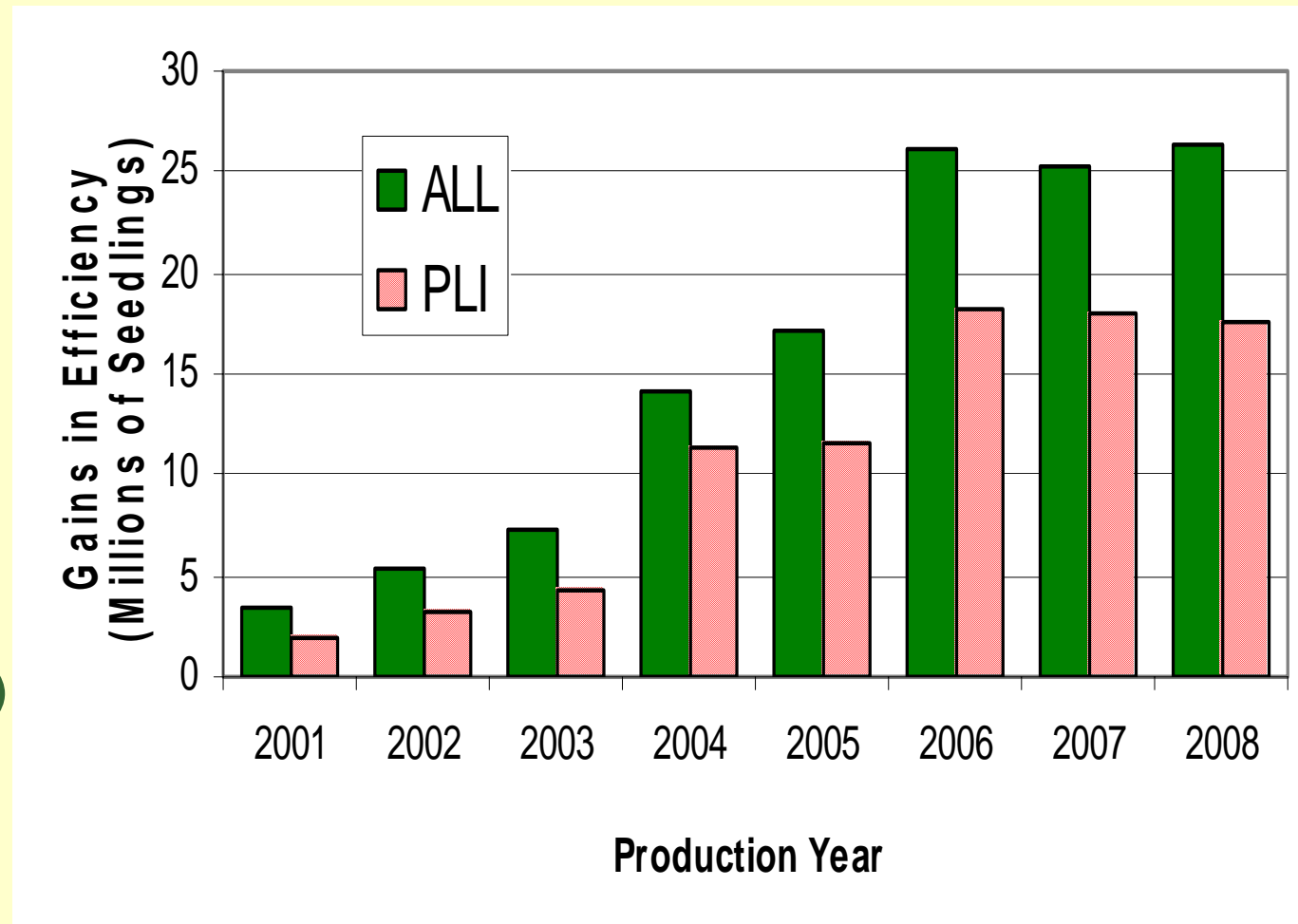
Request ID	Lot	Species	Nursery	Stock Cntr Type	Stock Type	Plant Age	Year	Request Season	Agency	Seedlings (000's)	Grams	
2008DPG0006	45818	PLI	CANFOR	PCT	410	100000	2009	SP	CANFOR 32	35	<input type="text" value="150"/>	<input type="button" value="Save"/> <input type="button" value="Cancel"/>
2008DPG0006	45818	PLI	CANFOR	PCT	410	100000	2009	SP	CANFOR 32	35	181	<input type="button" value="Update"/> <input type="button" value="Details"/>



Seed Use Efficiency

Efficiency is measured as difference between requested and calculated.

“Calculated” amount is based on gram adjustments (savings)



This is how much seed we save (in terms of potential seedlings):

All Species - 2008 214.4 M requested – 188 M calculated = 26.4 M saved

Pli only - 2008 99.1 M requested – 81.5 M calculated = 17.6 M saved

Note – 2007 was 266 M requested



Seedling Request

Sowing Date Efficiency

- It's possible to stagger sow dates at the nursery, so that stratified seed for several requests does not arrive at once and sit waiting at the nursery.
- For example, a nursery will have a default sow date for all Pli 410 1+0 spring requests, but there are likely several requests that will be sown over time, therefore...
 - Some will get the prescribed 4 weeks of stratification
 - Others may get 6+ weeks of stratification if they are sown later
- Extended stratification is good up-to-a point, but after this point, reserve utilization will decrease germination characteristics.



For sowing date efficiency, nurseries should ...

Keep the SPAR Latest Sow Date table current by updating in early fall when requests are being entered

SPRM01 Maintain Latest Sowing Dates

Search Lot Info Requests Reports Services Maintenance TSC Registration Admin

Nursery: CANFOR J.D. LITTLE FOREST CENTRE

Coast/Interior: [v]

Species: SX * Stock Type: [v]

Season: SP Container Type: [v]

Facility: GH Stock Age: 100000

Go

11 rows returned

Nursery	Coast / Interior	Species	Season	Stock Type	Container Type	Stock Age	Facility	Latest Sowing Day	Default Facility	
[input] [...]	[v]	[input] [v] *	[v] *	[v]	[v]	[input] [v] *	[v] *	[input] *	[v] *	Save Cancel
CANFOR		SX	SP		309A	100000	GH	0315	Y	Update Delete
CANFOR		SX	SP		310B	100000	GH	0315	Y	Update Delete
CANFOR		SX	SP		313A	100000	GH	0315	Y	Update Delete
CANFOR		SX	SP		313B	100000	GH	0315	Y	Update Delete



....and use the Request Specific Sowing Date change function in SPAR to update some requests

Application Home

SPR24 Request Specific Sowing Date Changes

- Search
- Lot Info
- Requests
- Reports
- Services
- Maintenance
- TSC
- Registration
- Admin

Request ID: (All other criteria will be ignored if request key is given)

Assigned Nursery:

Request Agency: WVFM WEST FRASER MILLS LTD.

Species:

Stock Type:

Container Type:

Planting Year:

Season:

Stock Age:

Override:

1 rows returned

Request ID	Lot	Nursery	Stock Type	Container Type	Seedlings (000's)	Sowing Year	Sowing Month	Sowing Day	Facility	
2008DSS0026	63010	WDMERE	PCT	312	120	2008	05	15	OC	<input type="button" value="Update"/>

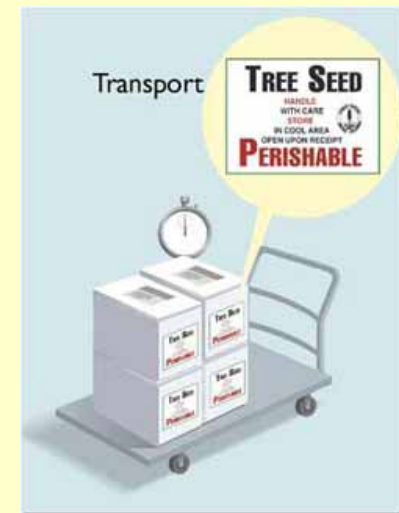
* * *



Thank you to those nurseries and seed owners
who reduced grams
of seed for seedling requests and saved
valuable seed,



... which also
reduced the amount
of seed returned to
the Tree Seed
Centre, saving
resources





Natural Stand Seedlot Collection site information

- In Seedlot Registration, the latitude and longitude is collected to the “second”.
- The Seed Planning Zone and BGC zone / subzone are verified with spatial data in SeedMap
- Clients now enter their own seedlot registration data and take more “ownership” of the data

Coming soon in SPAR:

- When a Class B/B+ seedlot is registered, the applicant will be able to use SeedMap to draw one or more polygons around the collection area. This will be saved as ‘spatial data’.
- This is more representative than just the mean latitude and longitude point currently stored in SeedMap.



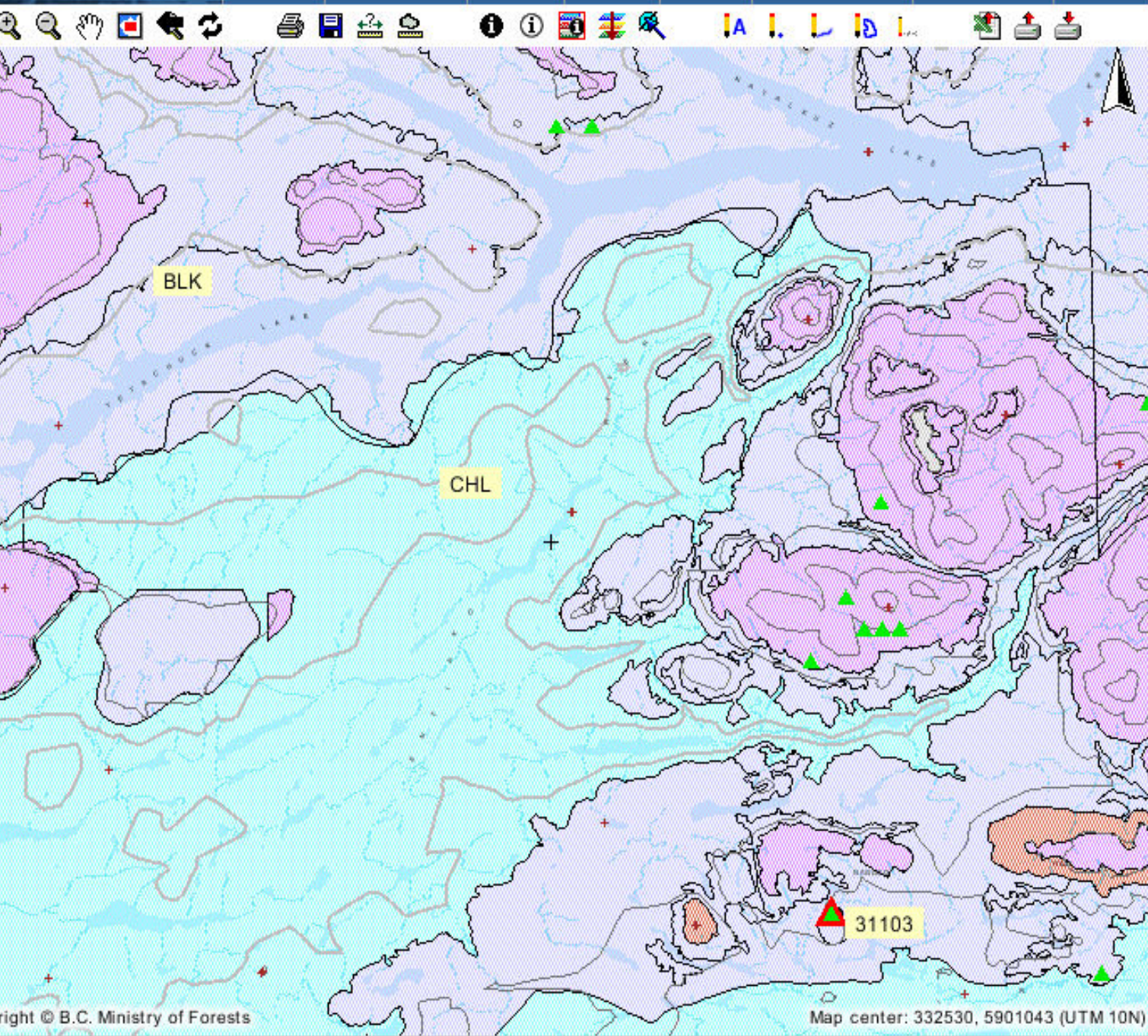
Why is this data important ...

- For seed transfer under the *Chief Forester's Standards for Seed Use*, accurate source information (elevation, latitude, longitude, biogeoclimatic zone, seed planning zone) is critical, as it determines where the seedlot can be planted.
- Seedlot availability to the owner and other clients who may be selecting surplus seed.
- Seed transfer in the future under the “climate based seed transfer model”



Problems with some older seedlot collection source information

- Under legislation and regulations prior to the Chief Forester's Standards in 2005, collection information requirements changed over time. Latitude and longitude was collected in degrees and minutes only.
- Technology for recording accurate elevation, latitude and longitude and availability of seed planning zone maps has changed significantly in the past 50 years.
- We have hundreds of active seedlots where the elevation, latitude & longitude recorded in SPAR do not correspond with the SPZ and/or BGC.
- Some seedlots have no BGC, which limits transferability.
- Some seedlots have old BGC subzone codes, most of which can be converted.



Identify Results

Coordinate Position
 UTM 10N: 349150, 5878452
 BC Albers: 1050207, 892117
 Geographic: 53°2' N, 125°14' W

Biogeoclimatic Zones (250K)
 Zone: SBS
 Subzone: mc
 Variant: 3
 BEC Label: SBS mc 3

Biogeoclimatic Sub Zones (250K)
 Zone: SBS
 Subzone: mc
 Variant: 3
 BEC Label: SBS mc 3

Natural Stand Zones Outline
 Seed Zone ID: 2915
 Seed Zone Code: CHL
 Genetic Class Code: B
 Area: 2884600

Elevation - Lines (1:250K)
 Elevation: 1200

User Selected Seedlot
 Seedlot Number: 31103
 Active Ind.: YES
 Vegetation Code: PLI
 Collection Latitude: 53 2 0
 Collection Longitude: 125 15 0
 Collection Elevation: 1220 / 1220 / 1220

BEC Zone: SBS / i /
 Superior Provincial Fed: M



Example – seedlot 44393 was off in latitude

Seedlot 44393 in SPAR.jpg - Windows Picture and Fax Viewer

BRITISH COLUMBIA SeedMap Version 3.3.2

Close X Help ?

Layers Navigation Select Query SPAR Refresh Map Disclaimer About Legend Tutorial

Identify Results

Coordinate Position
UTM 10N: 415273, 6202309
BC Albers: 1102359, 1219421
Geographic: 55°57' N, 124°21' W

Biogeoclimatic Zones (250K)
Zone: ESSF
Subzone: mv
Variant: 3
BEC Label: ESSFmv 3

Biogeoclimatic Sub Zones (250K)
Zone: ESSF
Subzone: mv
Variant: 3
BEC Label: ESSFmv 3

Natural Stand Zones
Seed Zone ID: 2920
Seed Zone Code: FIN
Genetic Class Code: B
Area: 5654708

Elevation - Lines (1:250K)
Elevation: 1400

User Selected Seedlot
Seedlot Number: 44393
Active Ind.: YES
Vegetation Code: PLI
Collection Latitude: 55 57 34
Collection Longitude: 124 21 28
Collection Elevation: 1165 / 1158 / 1174
BEC Zone: SBS / mc / 3

Scale: 1:249,305 Map Tool: Drill Down Identify

BC Albers: 1074743, 1195059 -- UTM10: 386578, 6179219 -- Geographic: 124°48' W, 55°44' N

Local intranet

Seedlot Number:

Lot Details Owners Tests Commitments Transactions Heritage

Seedlot Number:	44393	Registered:	Yes - 2005-07-11 - Active
Species:	PLI - lodgepole pine		
Genetic Class/Worth	B	Collection Year:	2005

Source Information

Location:	15 KM BLUE ROAD (3000 RD)	Heritage:	No
Seed Planning Zone:	CHL	Geographic Area:	-
Elevation: Mean/Min/Max (m)	1165 / 1158 / 1174		
Latitude:	53° 17' 34"	Longitude:	124° 21' 28"
BGC Zone/Subzone/Variant:	SBS mc 3		<input type="button" value="SeedMap"/>

Area of Use

Seed Planning Zone(s):	CHL	<input type="button" value="SeedMap"/>	
Elevation Range: Min-Max (m)	1065 - 1465		
Latitude Range: Min-Max	52° 17' 34" - 55° 17' 34"	Longitude Range: Min-Max	122° 21' 28" - 127° 21' 28"
Area of Use Comment:			

Quantity and Test Information

Germination (%):	92	Peak Value:	85/ 7
Seeds per Gram:	394	Seedlings per Gram:	166
	Potential Trees (000's):	Grams:	
Reserved Available:	736.0	4,409	
Surplus Available:	0.0	0	



Seedlot Collection Site Data Analysis Project

- A project is underway to resolve as many of the data discrepancies as possible.
- We have a list of all active Class B seedlots where the data elements are not all in sync. For those seedlots, we're going back to the original cone collection report to check for relevant information, such as licence number to help resolve the data.
- We are reviewing priority species first, eg. Pli and Fdi. In areas where Class A Sx is available, Class B Sx is a lower priority.
- It's a huge task, so assistance from seedlot owners, cone collectors and others is welcome.
- There will be a communications bulletin coming out soon to explain the project further.



**For More Information or to provide feedback on
SPAR, sowing guidelines, seedlot collection
data....**

**Tree Improvement Branch HQ
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Website:

<http://www.for.gov.bc.ca/hti/spar>