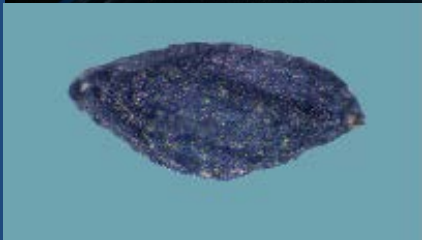
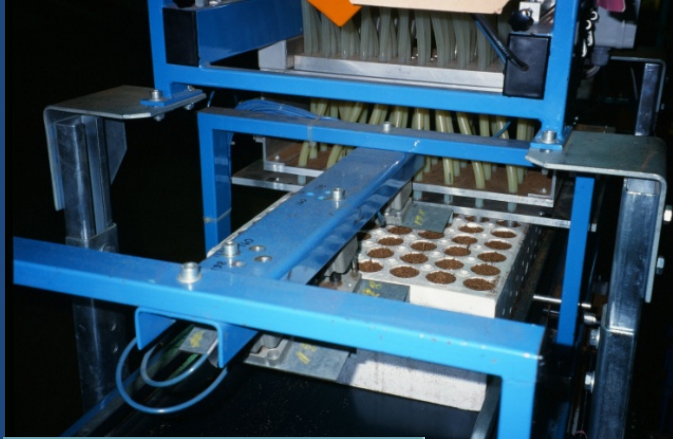
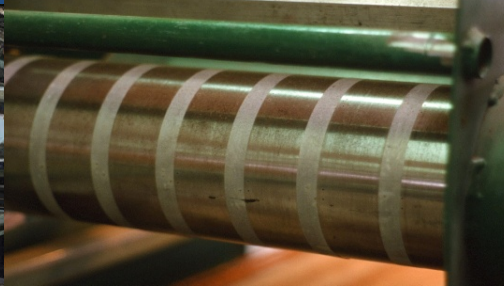


Sowing Guideline History and Test Result Inputs



Dave Kolotelo
Connections Through Seed
October 2018



Early History

- Sowing Rules origin ?
- Calculate grams of seed required to deliver seedlings
- 1988 – Glenn Mathews introduces separate rules for A-class Fdc
- 1993 – separate A and B sowing ‘rules’
 - A-class seed single sown if GC >90%
 - Many nurseries unable to meet request #'s
 - Nurseries having difficulty with A-class Sx
- 1996 – Sowing Rules Task Force (next slide)
- 1998 – June 30th – new A-class seed prices introduced
- 1999 – Sowing Guidelines Introduced



1996 Task Group

- The following people made up a task group to review Sowing “Rules” to address seed shortages, excesses, A vs. B class rules, single sow levels, standard vs. individual nursery rules, cost of seed

Rob Bowden-Green (Chair)
Brian Barber
Al McDonald
Dave Kolotelo
Eric van Steenis
Tony Willingdon



- The first action was to survey nurseries with regard to seed usage and concerns
- **Susan Zedel** subsequently joined in and plays a vital role
- Current recruits **Spencer Reitenbach** & **Kona van Diest**

Task Group Recommendations



- One set of rules for A and B-class seed (biological)
(seed prices weren't as different as they now are!)
- Single seed sowing removed and 1.5 sowing factor assigned to seedlots with GC > 95%
- Correction factor reduced to a maximum of 1.75
- All requests need some minimum amount for sowing
- 1997 and 1998 Seedling Requests evaluated for % seed use (79%)
- Cw was lower at 68% → 1.2X pelleting factor removed
- Simulations performed on seed use – streamline relationship between GC and seed allocation

- Introduced fractional sowing factors
- Introduced “seeds required per seedling requested”
- $$= (\text{Sowing Factor} * \text{Corr. Factor}) + (\text{NHF} * \text{Corr. Factor})$$

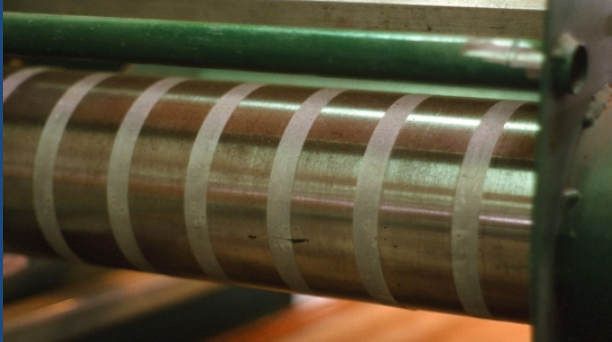
Germination Capacity (%)	Sowing Factor	Correction (Oversow) Factor	Nursery Handling Factor	Seeds Supplied Per Seedling
100-99	1.2	1.25	0.20	1.76
98-97	1.4	1.27	0.20	1.91
96-95	1.6	1.27	0.20	2.18
94-93	1.7	1.28	0.20	2.42
92-91	1.9	1.27	0.20	2.56
90-89	2.0	1.26	0.20	2.78



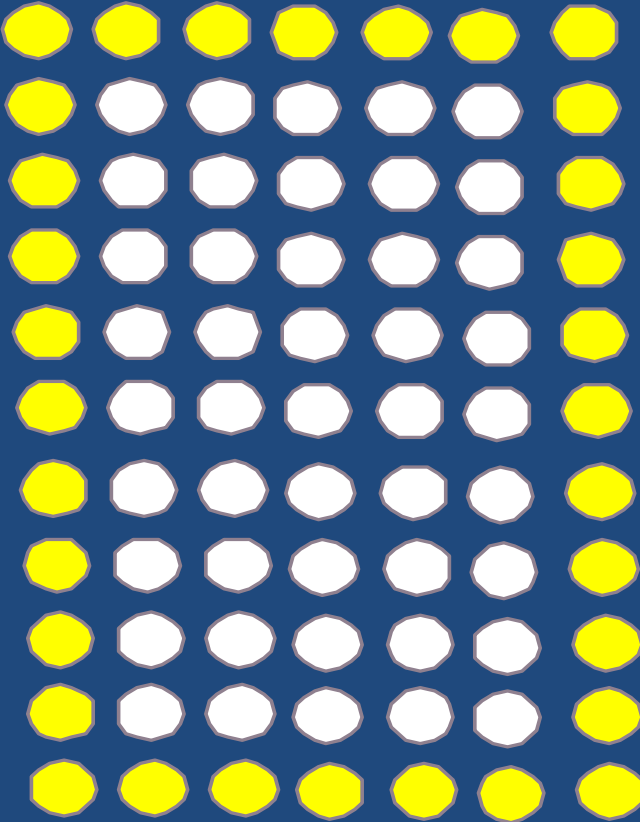
- Sowing “**Guidelines**” emphasized
- Focus on seed calculations, **NOT nursery recommendations**
- Calculations for grams required or reversed for number of seedlings obtainable from a given quantity of seed (**Pot. Trees**)

Fractional Sowing

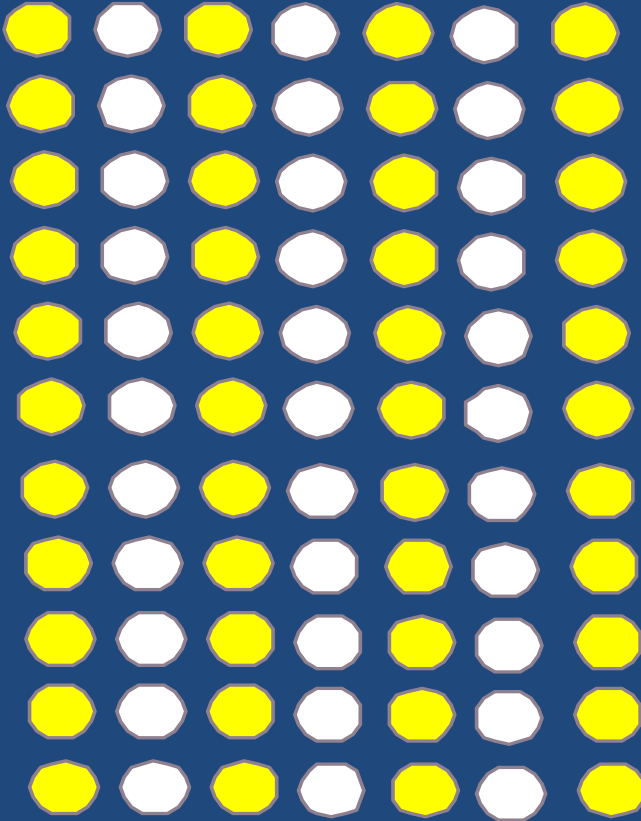
77-cavity styroblock



1.42



1.57



2 seeds
1 seed



What are the Inputs



- 1) Seedlings required / grams available
- 2) Seeds Per Gram SPG (*seedlot specific*)
- 3) Germination Capacity [**2%**] GC (*seedlot specific*)

Germination Capacity (%)	Sowing Factor	Correction (Oversow) Factor	Nursery Handling Factor	Seeds Supplied Per Seedling
100-99	1.2	1.25	0.20	1.76
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Obtain seeds supplied per seedling from Table

Insert into the following equation

$$\text{Grams} = \frac{\# \text{ seedlings requested} * \text{Seeds / seedling}}{\text{Seeds per Gram}}$$

50 000 seedlings

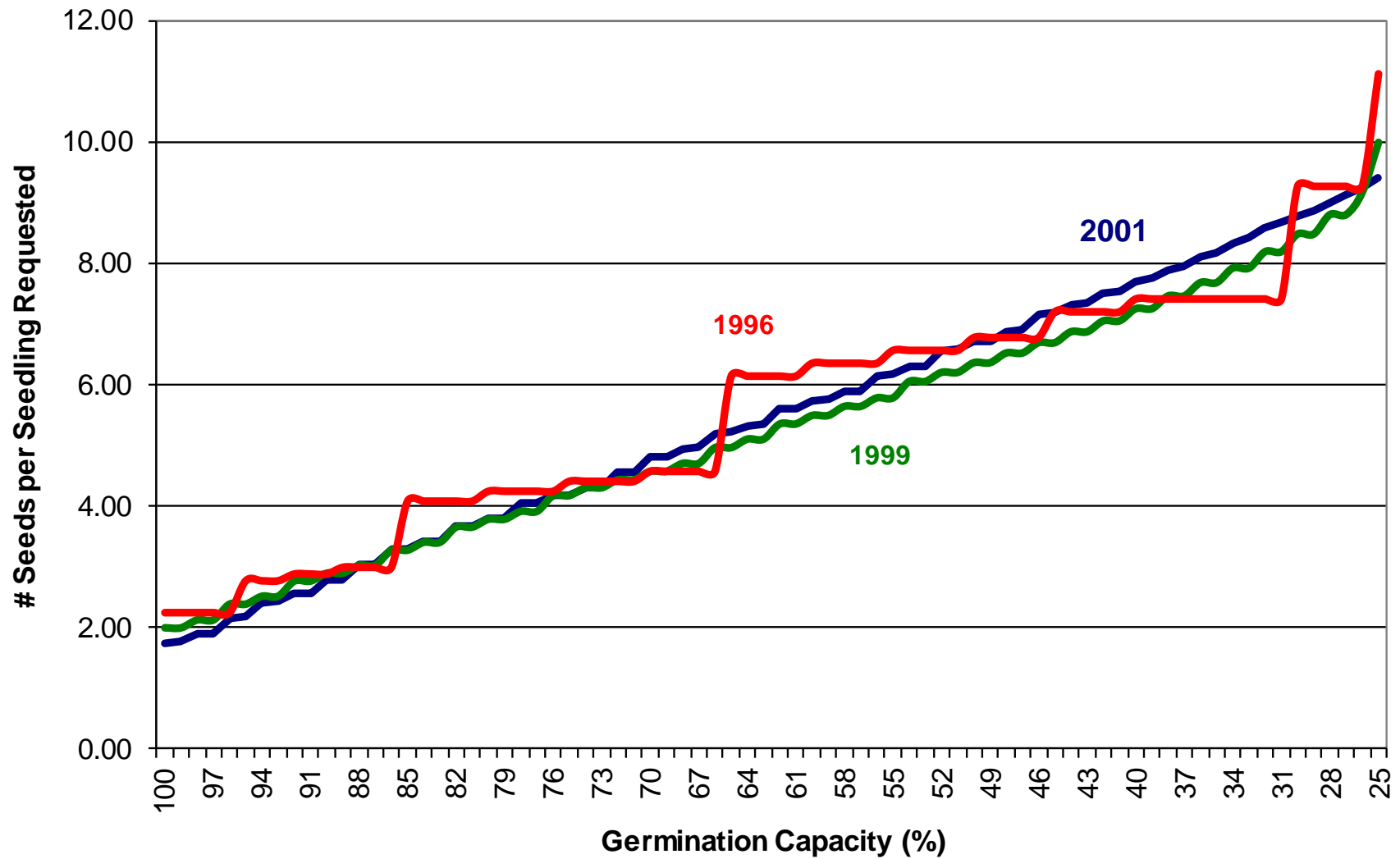
GC = 96%

SPG = 509

from Table 1 we determine that 2.18 seeds are supplied per seedling.

$$\text{grams} = \frac{50\,000 * 2.18}{509} = 214.1 \text{ grams}$$

SPAR will round up to nearest gram = **215 grams**



Refinements after 1996

2% vs. 5% germination ranges

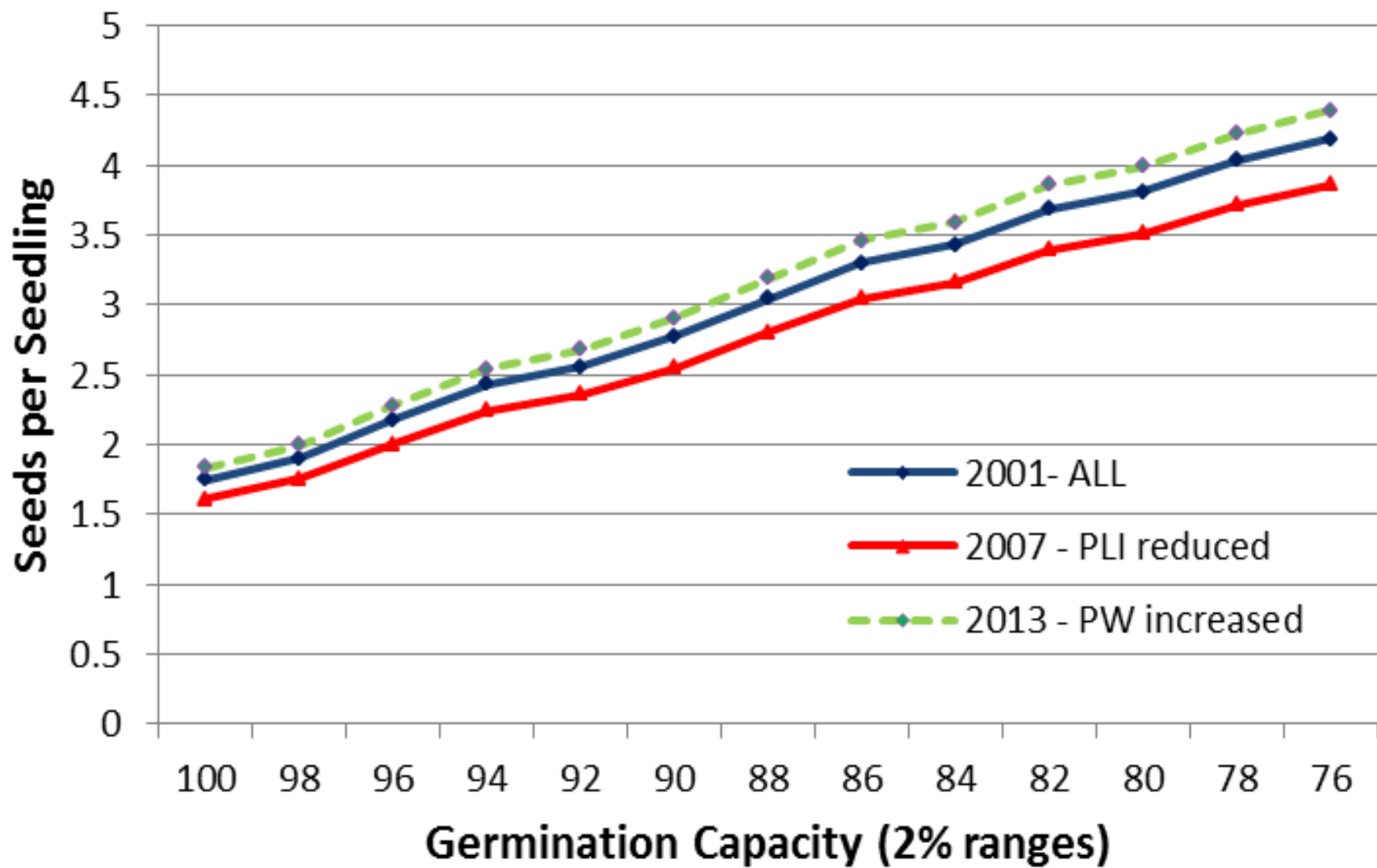
1% vs. 5% oversow factor

0.1 vs 1.0 sowing factors (fractional seeding)

Tweaks over Time

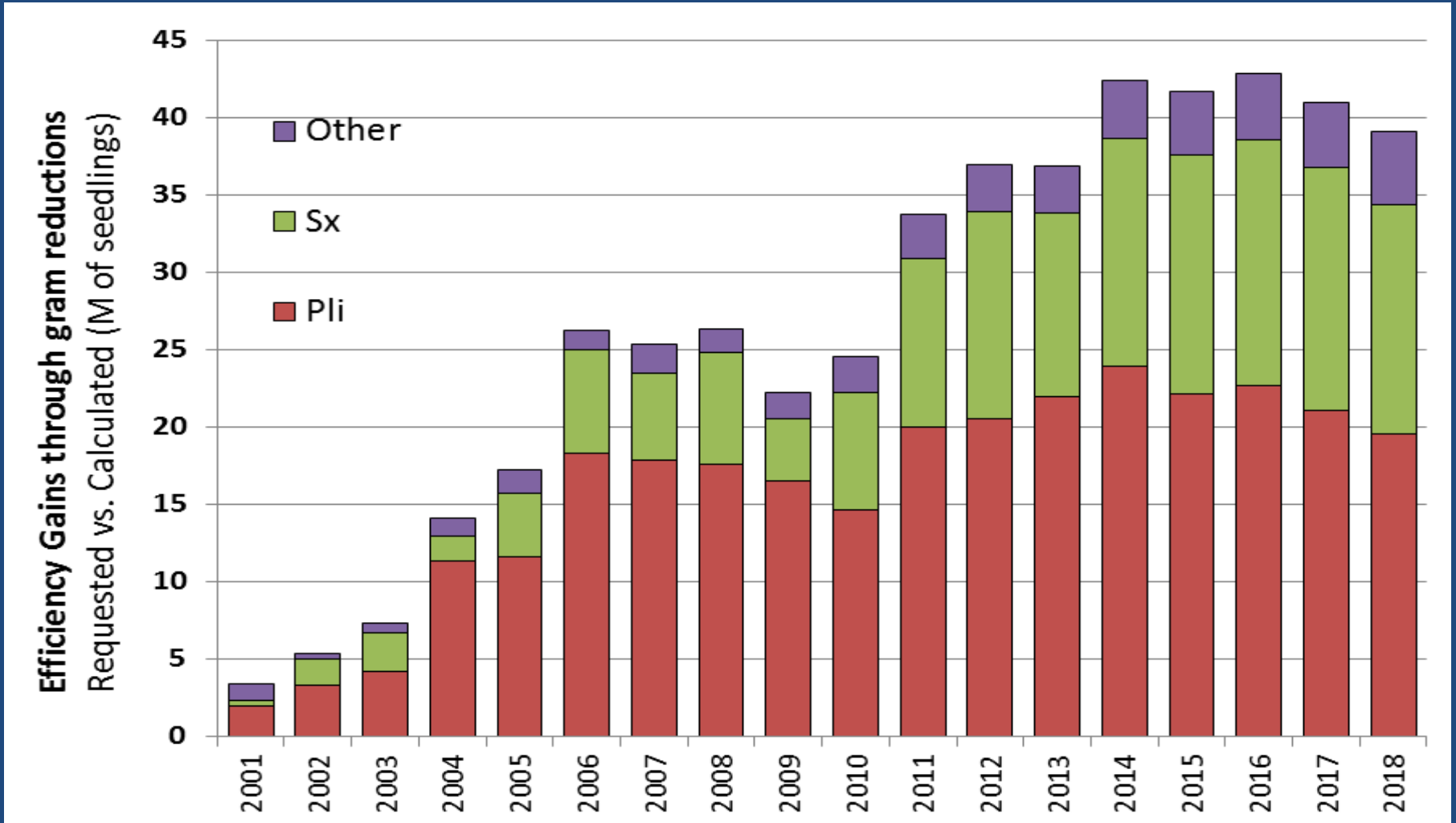
- **2001** – GC > 88% = less seed; GC < 74% more seed
- **2007** - Introduced an adjustment for PLI seed
 - Reduced oversow factor by 0.1
 - Reduction in seeds per seedling by 6 to 8%
 - Correction factor to 2 decimal places (**streamlining**)
 - Simpler method for adjusting grams in SPAR
 - Emphasis on SPAR gram adjustments (only order what you will sow)
- **2013** – Introduced an adjustment for Pw seed
 - Increased seed supplied by 5%
 - Seed Preparation & Nursery – **consistent falldown vs. Lab**
 - Emphasis on SPAR gram adjustments (only order what you will sow)





Seed Efficiency Gains

Difference between requested seedlings and calculated seedlings after gram reductions



Seed Efficiency also reduces returned seed – slight lapse in last 2 years

FGC Business Plan Numbers

- The FGC Business Plan also includes seeds/seedling factors to help plan orchard size – predict production in terms of seedlings
- These numbers differ from the Sowing Guidelines
- They are Seed Planning Unit specific and are intended to represent average ‘reality’ after gram reductions to help in orchard planning
- They were agreed to at ITAC and CTAC meetings by those in attendance
- People should be aware of these differences!

Lab Test Inputs

- Seeds per Gram (SPG)
- Number of seeds per gram based on average seed weight of 100 seeds (8 replicates) corrected by the seedlot purity $SPG = PUR\% / 100sdwt$
- SPG is also influenced by seedlot moisture content (4.0 to 9.9% under CFS)
- Seed Orchard seed generally larger (less SPG)

PY = 16 / 18



FDC = 85 / 95



PLI = 252 / 337



CW = 747 / 790

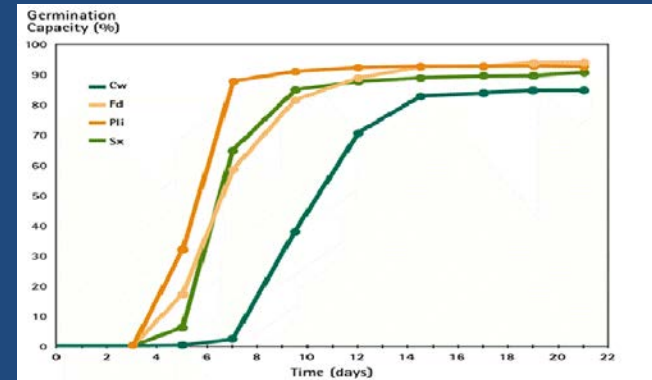


Germination Capacity (GC)



- The estimated % of normally germinating seeds with a specific pre-treatment within a given duration
- Only test repeated over time = germination retests

- Cw = 18 months
- Fdc / Fdi = 44/ 40 months
- Pli = 44 months
- Sx = 40 months



- Retests related to species deterioration rates
- Resin vesicle species show faster seed deterioration



Germination Variability

- Only 'normal germinants included in GC
- Germination tests (on SPAR) have 'passed' ISTA tolerance tests = acceptable variation between replicates
- Our relatively wild trees have variability
- The variation between the four replicates can be used to aid in seed need determinations (quantify risk)

An example - two seedlots both have **GC= 85%** on SPAR

Calculate standard deviation from the 4 germination test replicates

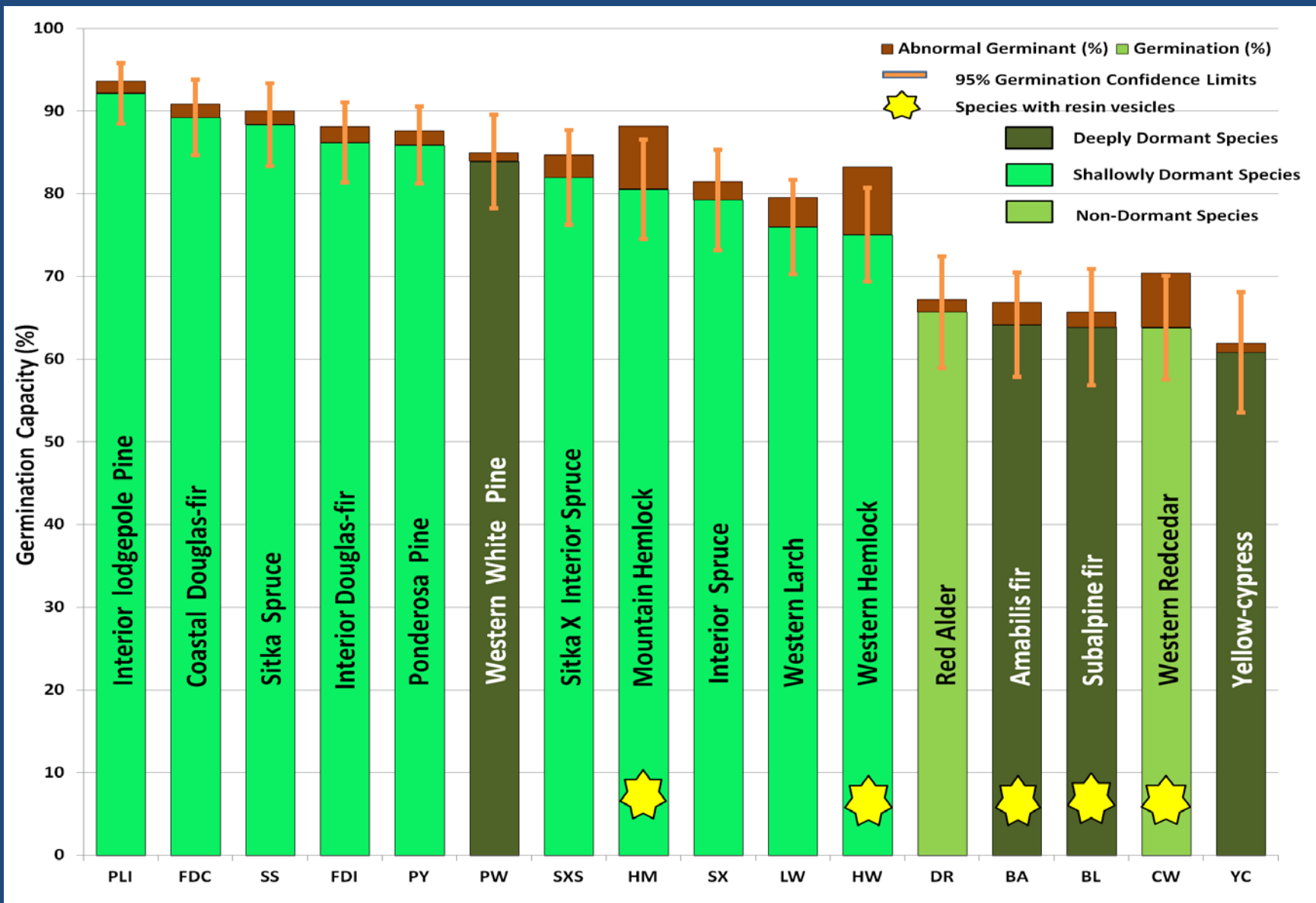
Use standard error (sd /2) to compare 95% confidence limits

SL1= 1.11; SL2 = 2.59

use appropriate t-value , calculate 95% confidence interval

- **SL1** **82.4 to 87.2%**
- **SL2** **76.6 to 93.0%**
- Can this be helpful? Or is it similar to PV





Orange line indicates the range in GC we are 95% confident in - It's large!

The Future

- Emphasis on only ordering what you will sow!
- Variability between nurseries, client expectations, seed supply and cost, ... requires **gram adjustments** for seed use to be as efficient as possible provincially
- That's best done as a nursery – 'forester' negotiation
- How can we fine-tune?
- Does additional information help?

