

Kalamalka Seed Orchards



Seed Use Efficiency

Langley

July 2008

Seed Orchard Seed Production

Interior

Kalamalka Seed Orchards

**SUE narrow sense:
Seedlings per seed**

**SUE broader sense:
How well the whole seed handling
system works, from the start at
orchard planning, right through to
seedlings, the final product for our
purposes.**

How can we produce orchard seed as efficiently as possible?

- **Orchard Planning and design**
- **Produce lots of cones**
- **Produce cones with lots of seeds per cone**
- **Produce cones so that seed recovery can be maximized**
- **Produce seed with high germination capacity**

How can we produce orchard seed as efficiently as possible?

- Orchard Planning and design

Seed Orchard Planning

- **Inputs**
 - Seedling demand
 - Seed planning zones
 - Return on investment
 - Predicted production per ramet
 - Availability of appropriate orchard stock
 - Politics
- **Output**
 - Appropriately sized orchards
 - Meet demand

Challenges to Seed Orchard Planning

- **Inputs**
 - Seedling demand
 - Seed planning zones
 - Return on investment
 - Predicted production per ramet
 - Availability of appropriate orchard stock
 - Politics
- **Output**
 - Appropriately sized orchards
 - Meet demand

Challenges to Seed Orchard Planning

- **Inputs**

- Seedling demand constantly changing
- Seed planning zones sometimes change
- Return on investment ??
- Predicted production per ramet may be unknown
- Availability of appropriate orchard stock depends on the Research Branch selection and testing
- Politics !!

- **Output**

- Appropriately sized orchards
 - Meet demand a moving target

Orchard Size Trade-off

- **Minimize size**
 - Cheapest but takes longer to meet needs
 - Reduces future flexibility
- **Increased size**
 - More expensive but needs are met sooner
 - More flexibility to meet future needs
 - Quicker to reduce than to increase
 - More improved seedlings planted sooner equals added benefit to the Province

Orchard Design

- **Clonal row for small needs**
- **Container orchards**
- **Regular soil-based orchards**
- **Location vitally important**

The less fiddling the better!

How can we produce orchard seed as efficiently as possible?

- Orchard Planning and design
- Produce lots of cones
 - Cost per cone decreases as cones per tree increases

Produce lots of cones per tree

- **Tree health**
 - Irrigation
 - Fertilization
 - Pest control
 - Defoliators and tree pests
 - Cone pests
- **Cone induction treatments**
 - Drought stress
 - Hormones (GA)
 - Stem wounding

Produce lots of cones per tree (cont.)

- **Pruning and crown management**
 - **Bigger trees = more cones?**
 - (not always)
 - **Lower cones = cheaper management**

Crown management can function to fine-tune orchard production if demand changes.

How can we produce orchard seed as efficiently as possible?

- Orchard Planning and design
- Produce lots of cones
- Produce cones with lots of seeds per cone
 - Cones cost the same to carry to maturity whether they hold 5 seeds or 100 seeds so the cost of increasing seeds per cone is usually worth it.

High Numbers of Seeds per Cone

- **Tree health and cultural practices**
- **Supplemental Mass Pollination**
 - Often not warranted
- **Pest management**
 - *Leptoglossus*
 - *Dioryctria*
 - *Cydia*
 - *Strobilomyia*
 - *Megastigmus*

How can we produce orchard seed as efficiently as possible?

- Orchard Planning and design
- Produce lots of cones
- Produce cones with lots of seeds per cone
- Produce cones so that seed recovery can be maximized
 - We can't expect the extractory to recover every seed we send them. What can we do to help?

Maximize Seed Recovery

- **Pest Control**
 - Larch adelgid
- **Collection timing**
 - Before they open!
 - But not too early either
- **After ripening**
 - Cone storage
 - Sack turning
- **Safe shipping**

How can we produce orchard seed as efficiently as possible?

- Orchard Planning and design
- Produce lots of cones
- Produce cones with lots of seeds per cone
- Produce cones so that seed recovery can be maximized
- Produce seed with high germination capacity
 - Has the greatest effect on how efficiently our seed is used by nurseries.
 - Whether Ministry sowing guidelines are followed or not, seedlots with a higher germination capacity will produce more seedlings per seed

High Germination Capacity Seed

- **Tree health – good cultural practices**
- **Appropriate cone handling**
 - After ripening
 - Sack storage conditions
 - Shipping conditions
- **Timing of Collection**

Timing of Collection

Effect on Germination Capacity

Common understanding:

Seed reaches its greatest germination potential (and storage longevity) at natural seed dispersal.

However, we have some indication that this is not true in all cases.

Clare Hewson 1987 Harvest Timing Trial

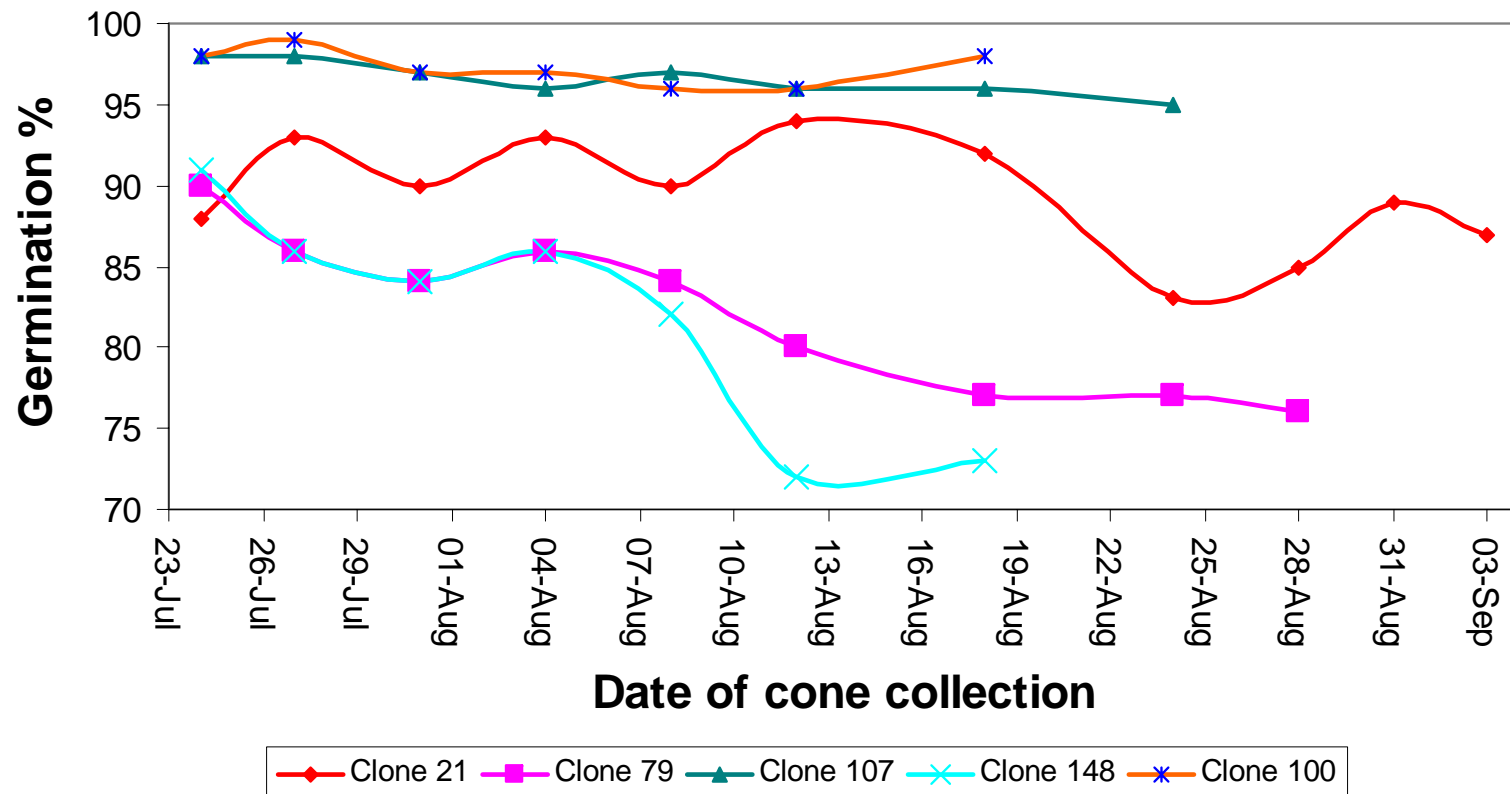
- **5 Sx clones in Research Branch breed arboretum**
- **Collection dates from July 23 to September 3**

Results: Earlier the better!

But what about storability?

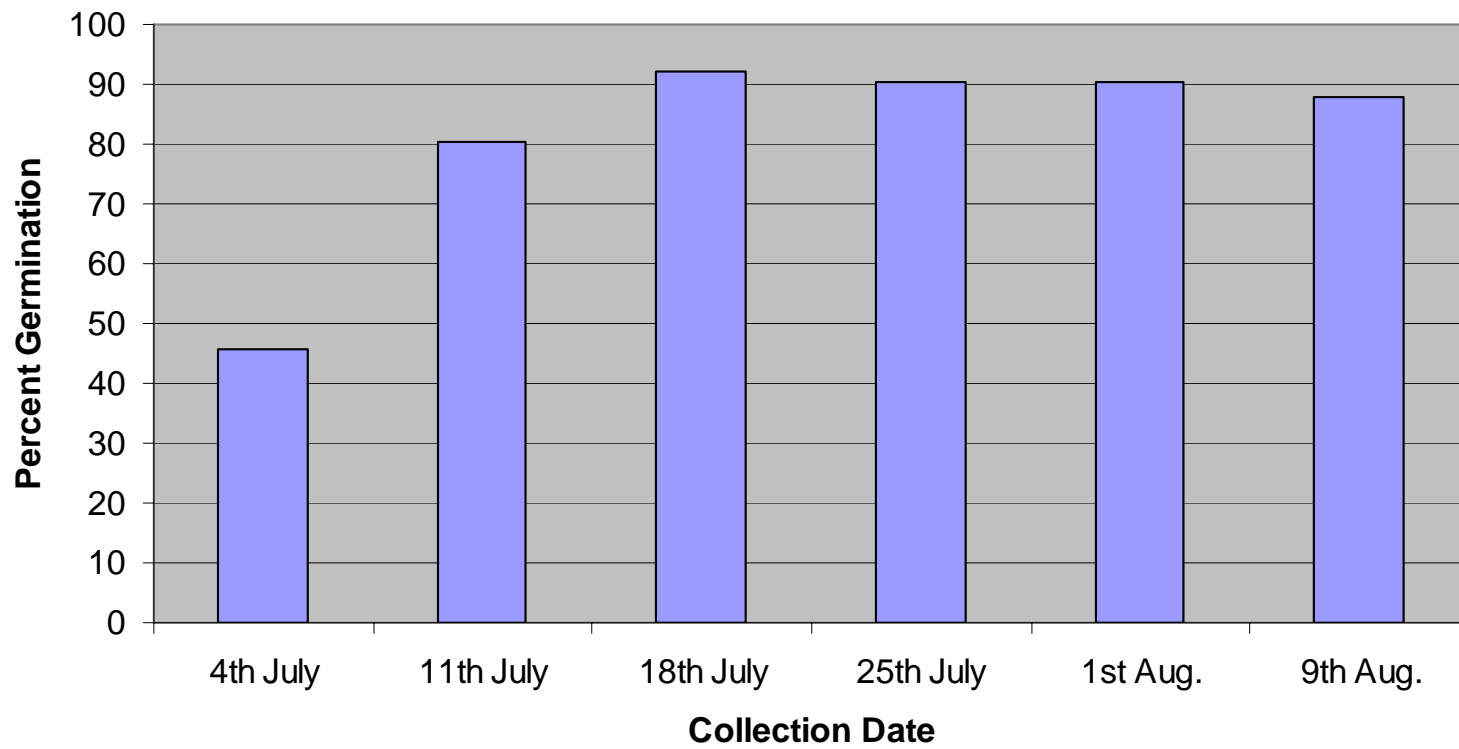
Clare Hewson Trial

2008 Germination % by 1987 Collection Date



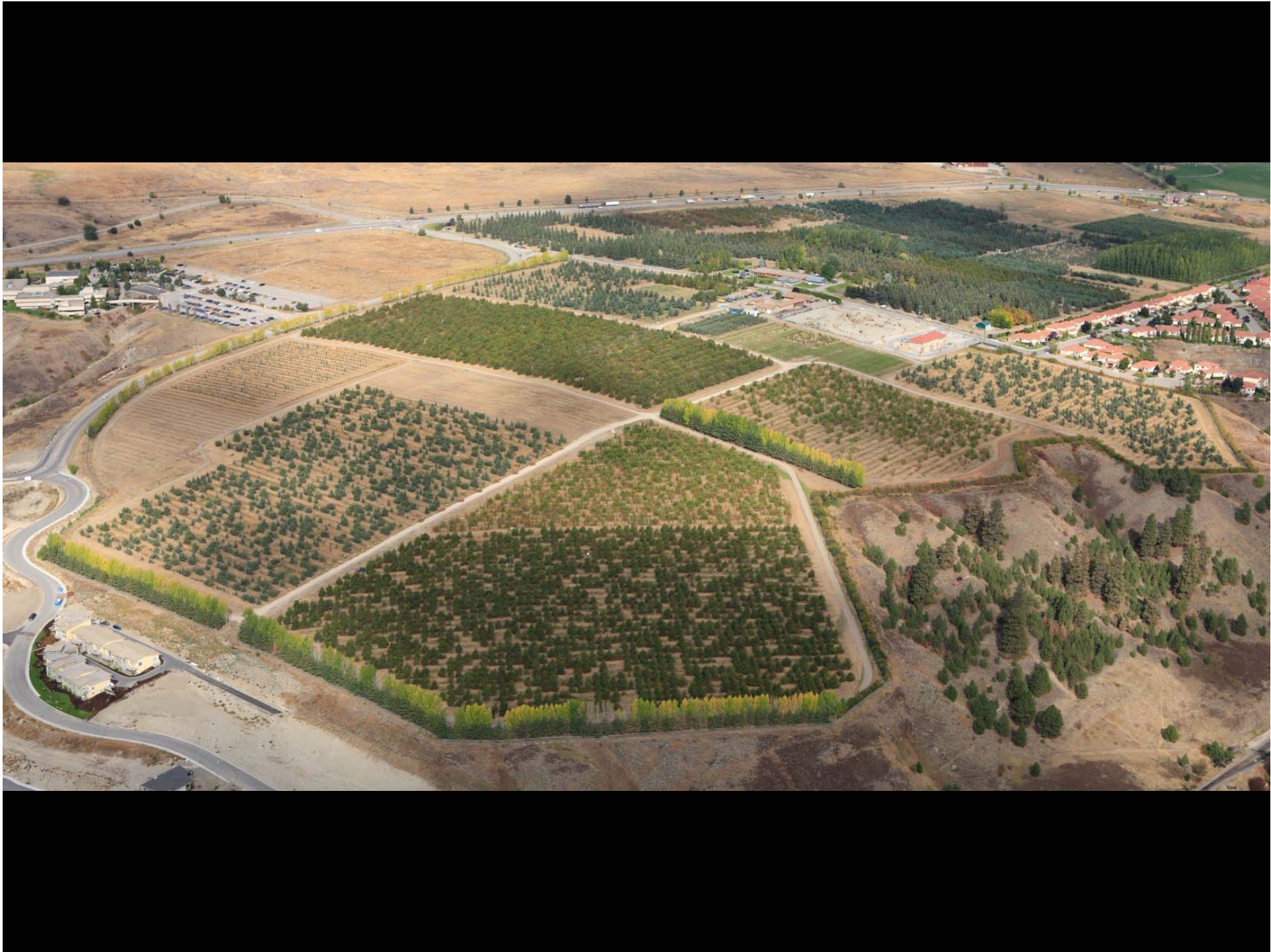
Giampa – Corrigan Trial

2008 Germination % by 2007 Date of Harvest



Earlier Collections?

- **Proceed cautiously**
- **Apply to other species?**
 - OTIP-funded work in Pli 2008
- **Added benefit through reduced pest action?**
- **Worth pursuing**







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