

# Methodology to organize operational Pli cone harvests by using observations of seed set declines



*Gary Giampa*

*Seed Orchard Supervisor, Kalamalka Seed Orchards  
Ministry of Forests, Lands and Natural Resource Operations*

# The Problem

- Poor seed set in North Okanagan (NO) Pli orchards has been an issue for a number of years. We still do not know why this occurs.
- We need to average about 15 filled seeds per cone (fspc) to meet our production goals.
- Pli orchards in Prince George (PG) have no trouble meeting fspc production goals. PG production levels are the target for NO Pli seed orchards.

# Filled Seed Per Cone

## Comparing NO and PG results

- # of filled seed / # cones in sample
- Data from 3 years of SPU0722 stats trial
- FSPC measure *production*

Orchard	2010 fspc	2011 fspc	2012 fspc	3 yr average fspc
Kal 307	6.2	8.8	7.3	7.4
VSOC 218	4.1	6.2	9.6	6.6
PG 228	22.9	23.6	20.1	22.2

# % Filled Seed Per Cone

## Comparing NO and PG results

- # filled seed / # filled + empty seed in sample
- Data from 3 years of SPU0722 stats trial
- % filled seed measures *performance*

Orchard	2010 %fspc	2011 %fspc	2012 %fspc	3 yr average %fspc
Kal 307	28.8	48.3	40.3	39.1
VSOC 218	25.3	34.3	45.3	34.9
PG 228	66.8	75.8	72.4	71.7

A point of interest – most conifer species perform poorly in the North Okanagan seed orchards.

The other species are meeting seed needs so we are not too worried about them at this point. But, Pli is not the only poor performer!

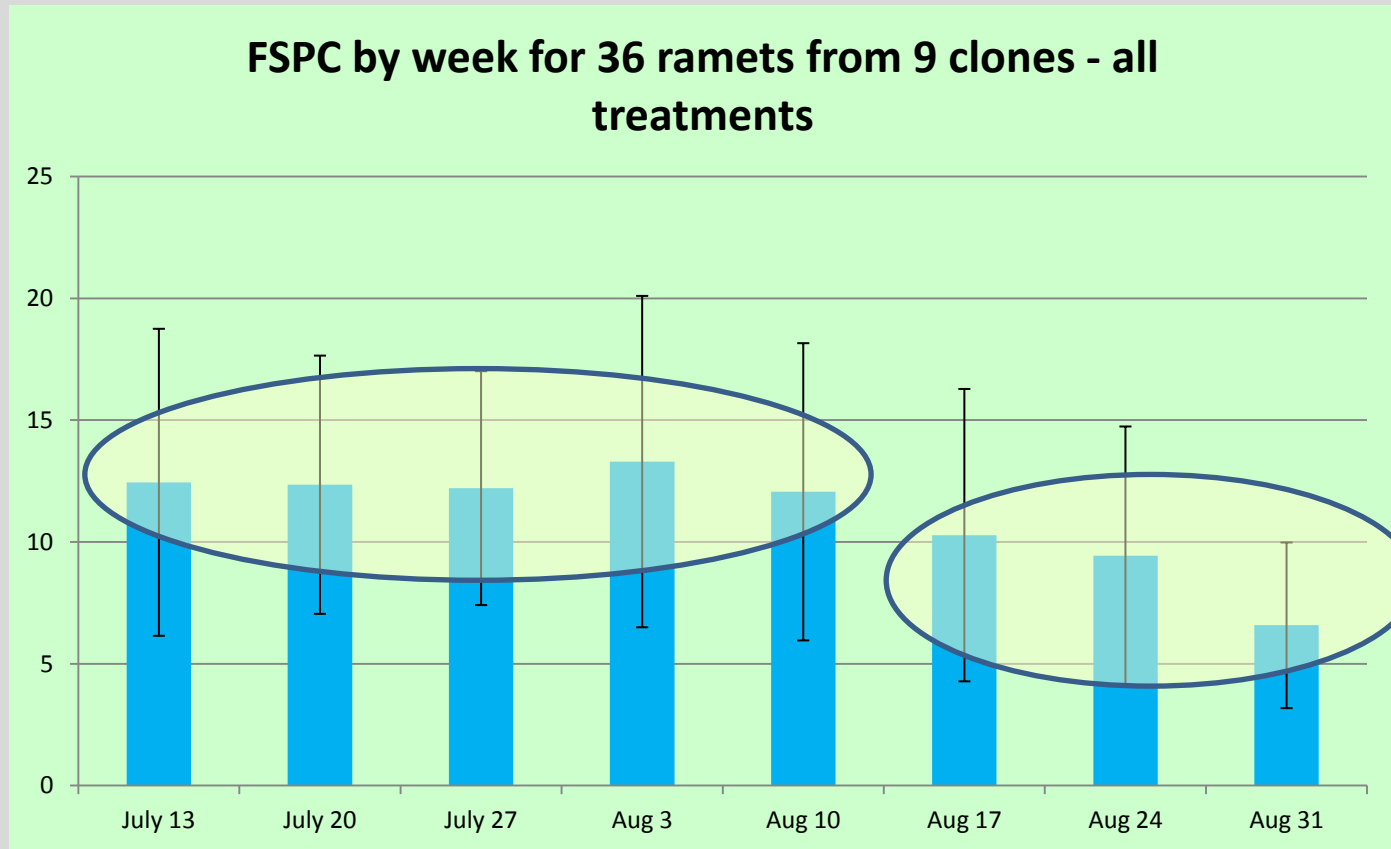
**% filled seed from 2012 operational collection samples.**

Species	% full seed
Spruce	43.6
Lodgepole pine	55.6
Larch	56.4
Douglas-fir	56.8
Ponderosa pine	73.1

# What is the deal with the NO Pli?

- We usually harvest Pli through August into September.
- Data from recent harvest timing trials indicates that seed set declines dramatically in mid August.
- We are picking most of our crop after a high percentage of the filled seed has disappeared.
- This seed decline does not occur in Prince George.

Note the dramatic loss of seed as the summer progresses!



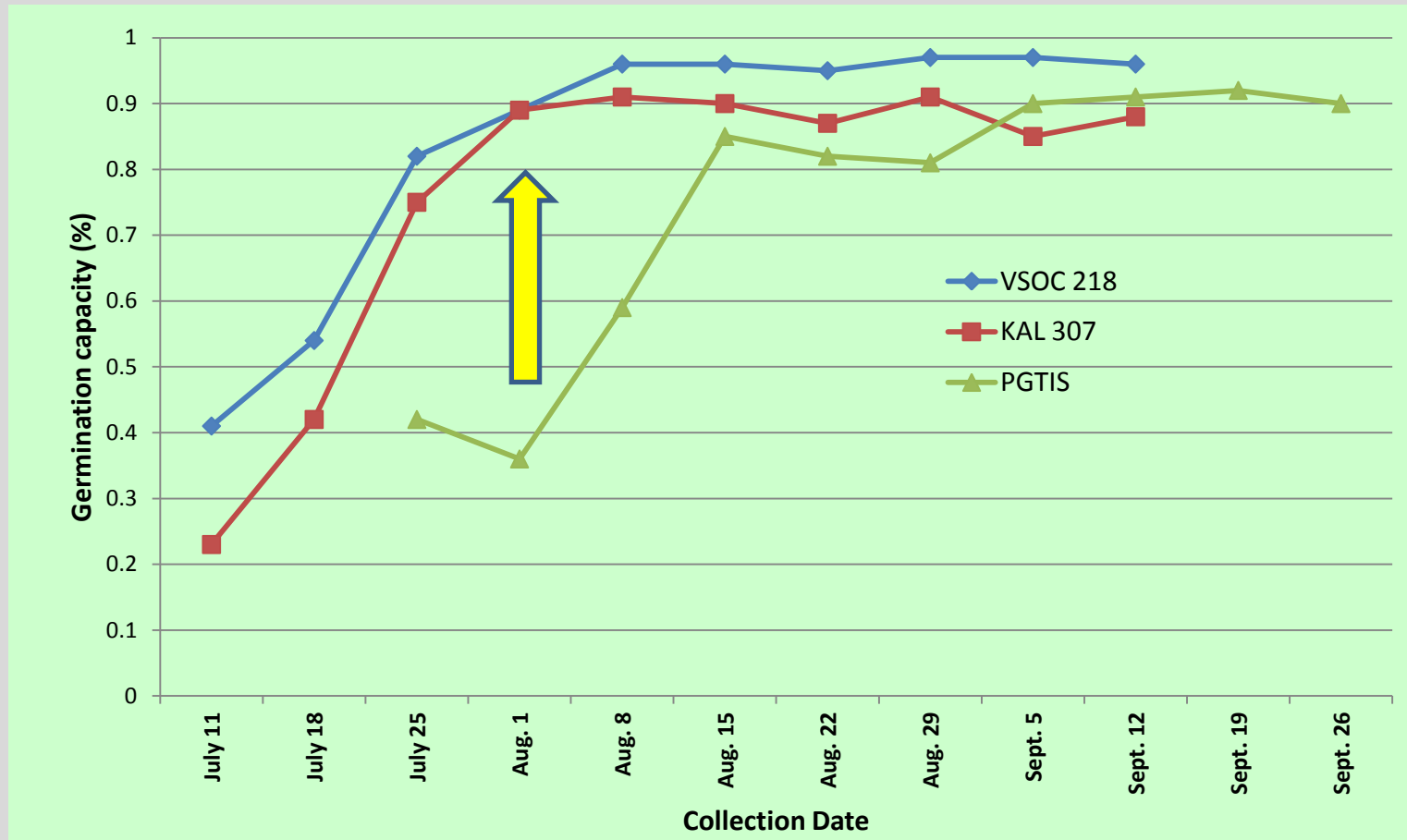
# So, why not just pick all the cones earlier?

Our harvest timing trial lots were germination tested and, unfortunately, seed quality suffered when the cones were collected too early.





Germination in the NO did not reach acceptable (90% or better) rates until early August.



# What do we know?

- Collection date has no impact on seed yield in PG, the present harvest schedule works up there.
- In the NO general seed yields remain at acceptable levels (+50% filled seed) until mid August.
- After mid August seed set declines rapidly.
- Seed quality does not meet acceptable levels until early August.
- That would give you about a 2 week window to pick a whole orchard. This would be very difficult to accomplish.

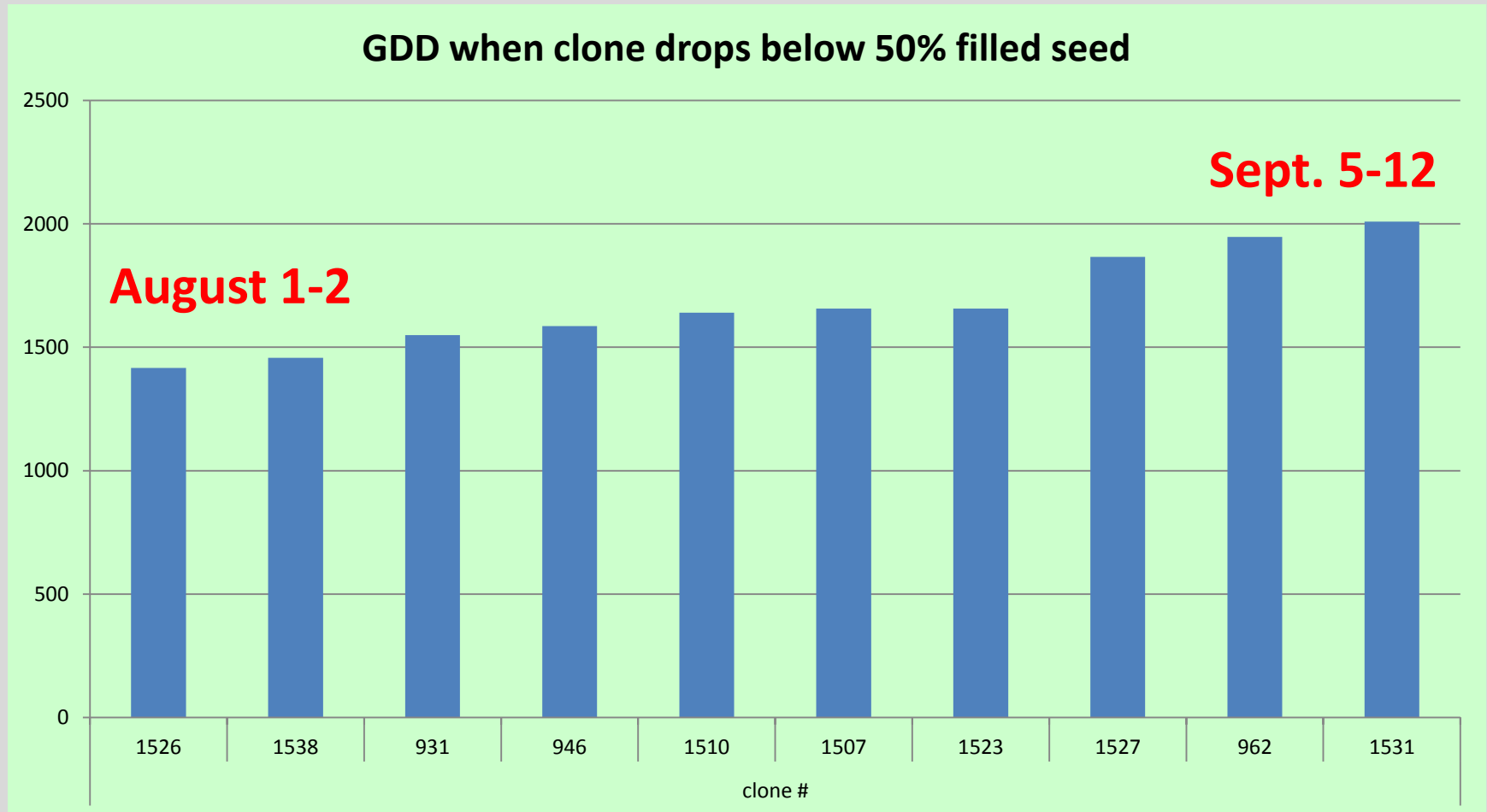
Harvesting the NO Pli orchards earlier than usual will not solve our seed delivery problems. Early collections will yield more filled seed, but, the seed does not germinate well.

- It appears that the NO is not the ideal location for Pli seed orchards.
- However, we have thousands of trees in the ground. So we need to find a way to make this work!

Initially we were discouraged by this outcome. However, there are a couple of interesting results hidden in the data which may present us with a chance to meet our goals.

- We collected clonal samples on a weekly basis and tracked % filled seed levels by collection period.
- We tied each collection period to a Growing Degree Day (GDD) figure collected on site.

It appears that each clone starts its' seed decline at a different point.



# What does this mean?

- Some clones “crash” early in the summer.
- Some clones hang in there until September.
- There is a “right” time to pick each clone (when seed germination is good but before seed decline reaches unacceptable levels). These windows of opportunity are very narrow, often only a few days.
- We can defer picking certain clones and concentrate on collecting those clones that lose seed early on.
- We can divide our orchard trees into collection groups, for instance – early, mid, late groups.

# How does this help us?

- Dividing the orchard ramets into groups based on their decline in fspc numbers allows us to organize our collections.
- This system allows us to concentrate on collecting clones when they contain the maximum numbers of viable seeds.



# Clonal Harvest Timing Profile.

- This is the term we use to describe each clone's seed decline schedule.
- For our harvesting system to work you need to know the seed decline profile for each major clone.
- This requires a bit of work, but will provide information that will make cone harvesting easier and more efficient in the future.

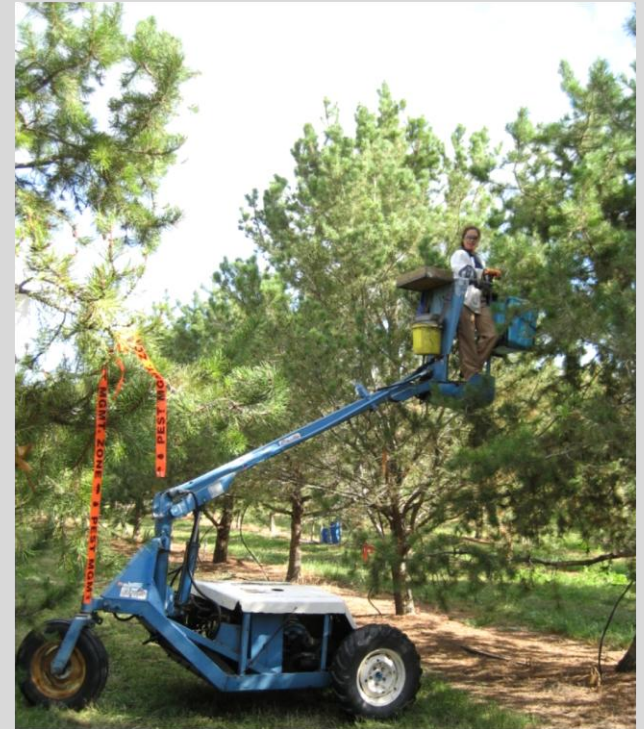


# How to develop Clonal Harvest Timing Profiles.

- Choose several ramets from each major orchard clone.
- Collect weekly samples starting in mid July and continuing until late August.
- Bulk samples by clone for every weekly collection period.
- Extract, x-ray and count filled and empty seed for each clone by collection period.
- The “crash point” will be obvious.
- Pick acceptable filled seed levels and tie to GDDs.
- Organize your clones into harvest groups (early, mid, late).

# Another important use for harvest timing profiles.

- The profiles (tied to GDDs) tell you when to start picking a “group” of clones.
- They also can tell you when a “group” has lost seed to the point where you have to make a decision. **Is it worthwhile to continue picking this group, or, should you move onto the next group before it starts losing seed?**
- We call this “the walk away point.” If orchards can be picked before most clones reach this point, we should maximize their seed yields.



# Thank You

- Germination Testing : Dave and the TSC people.
- Sample collection and seed processing: Karen, Nancy, Faye, Mark, Judy and Deb at Kal.
- Moral support and advice: Jim and Penny.

