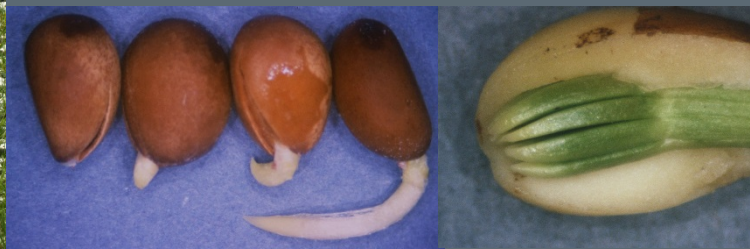


# Whitebark Pine Seed Update & Stratification Trial Results

WPEF Meeting  
Jasper, AB – September 21

Dave Kolotelo



# Overview

- BC Seed Inventory Update
- Stratification Trial Results
- Helpful Hints



# BC Seed Inventory



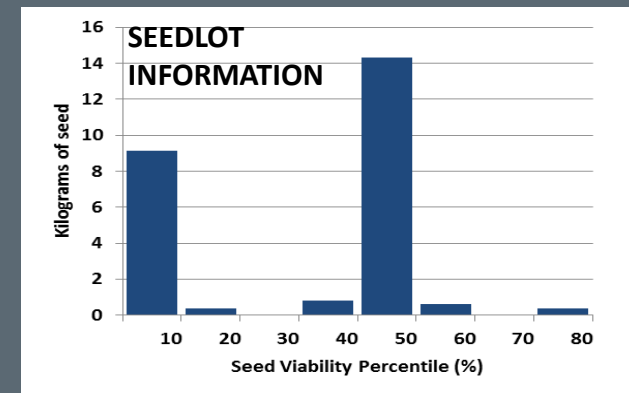
- Provincial Seed Bank

- genetic conservation and research
- 563 individual tree collections from 55 populations representing over **34 kg** of seed

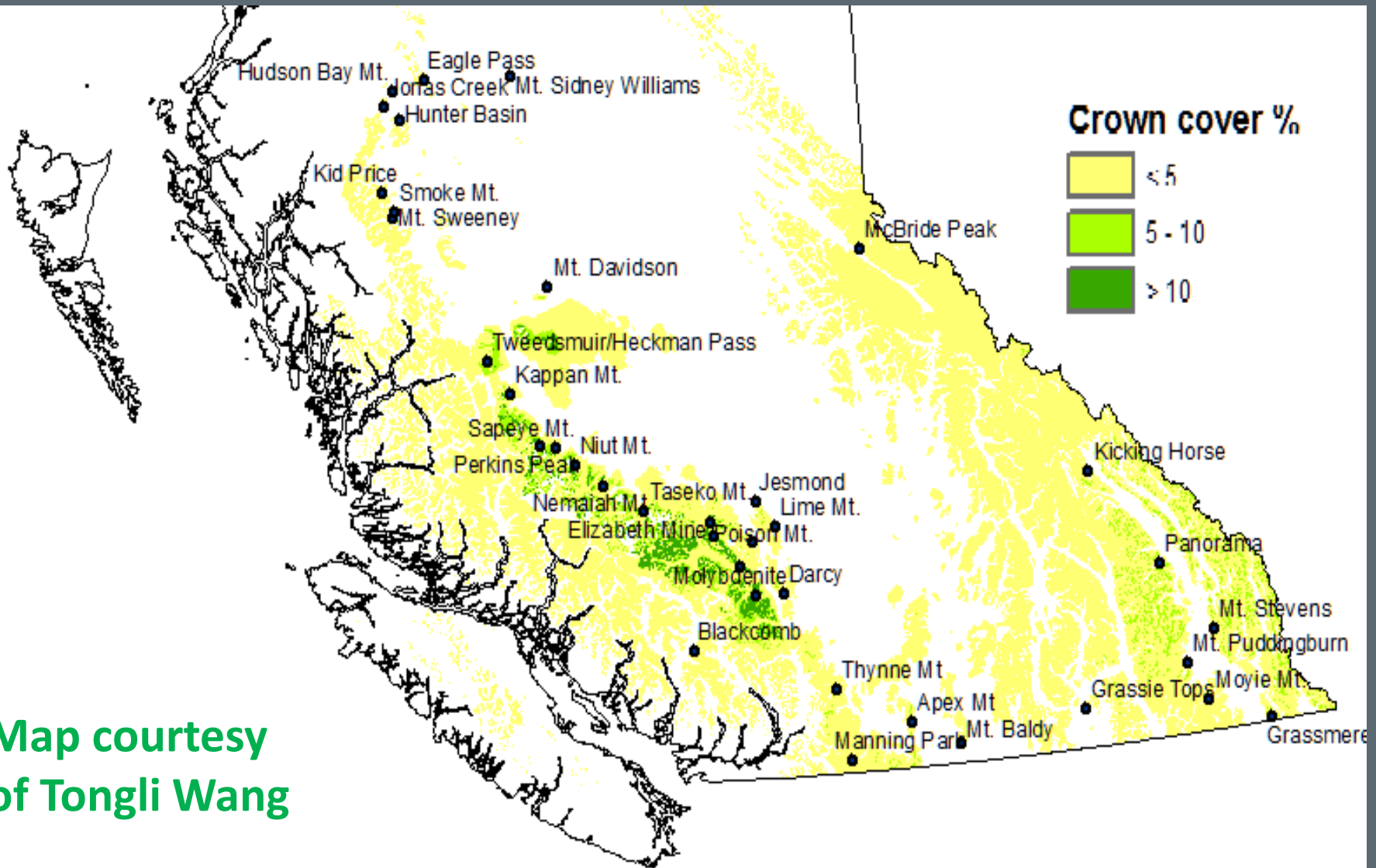
- Private Seed *(there is also seed stored elsewhere)*

- Crown land reforestation / restoration
- 14 seedlots with a total of **25.6 kg** of seed **(+ 2 best used)**
- 101 families with a total of **14.6 kg**

**74 kg** (167 lbs) **of seed in total**



# BC Seed Bank Population Distribution



Map courtesy  
of Tongli Wang

# X-ray Based Seed Viability Estimates

- Seed Value , time, # collections make germination tests 'unrealistic'
- Operational seedlots have germination estimated based on x-rays
- Viability (alive=potential) vs. germinability (overcome dormancy ++)



## Interactive lab exercise

Hi-lite 100 seeds

- Green = viable
- Pink = non-viable
- Yellow = questionable

Compare assessments  
between technicians

Discuss → Consensus

Final seedlot  
determination at left

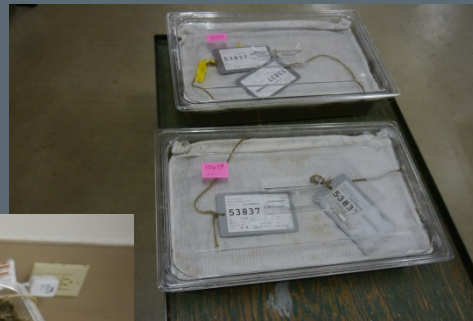


# Whitebark Pine Propagation References

- Overton, E.C., J. Park, N. Robertson, and A. Eramian. 2016. Current practices for growing Whitebark pine seedlings at the U.S. Department of Agriculture, Forest Service, Coeur d'Alene nursery. Tree Planters' Notes 59:64-68.
- Riley, L.E., R.E. Watson, and L.A. Winn. 2016. Whitebark pine germination: Is it really that difficult? Tree Planters' Notes 59:91-96

# TSC Stratification Practices

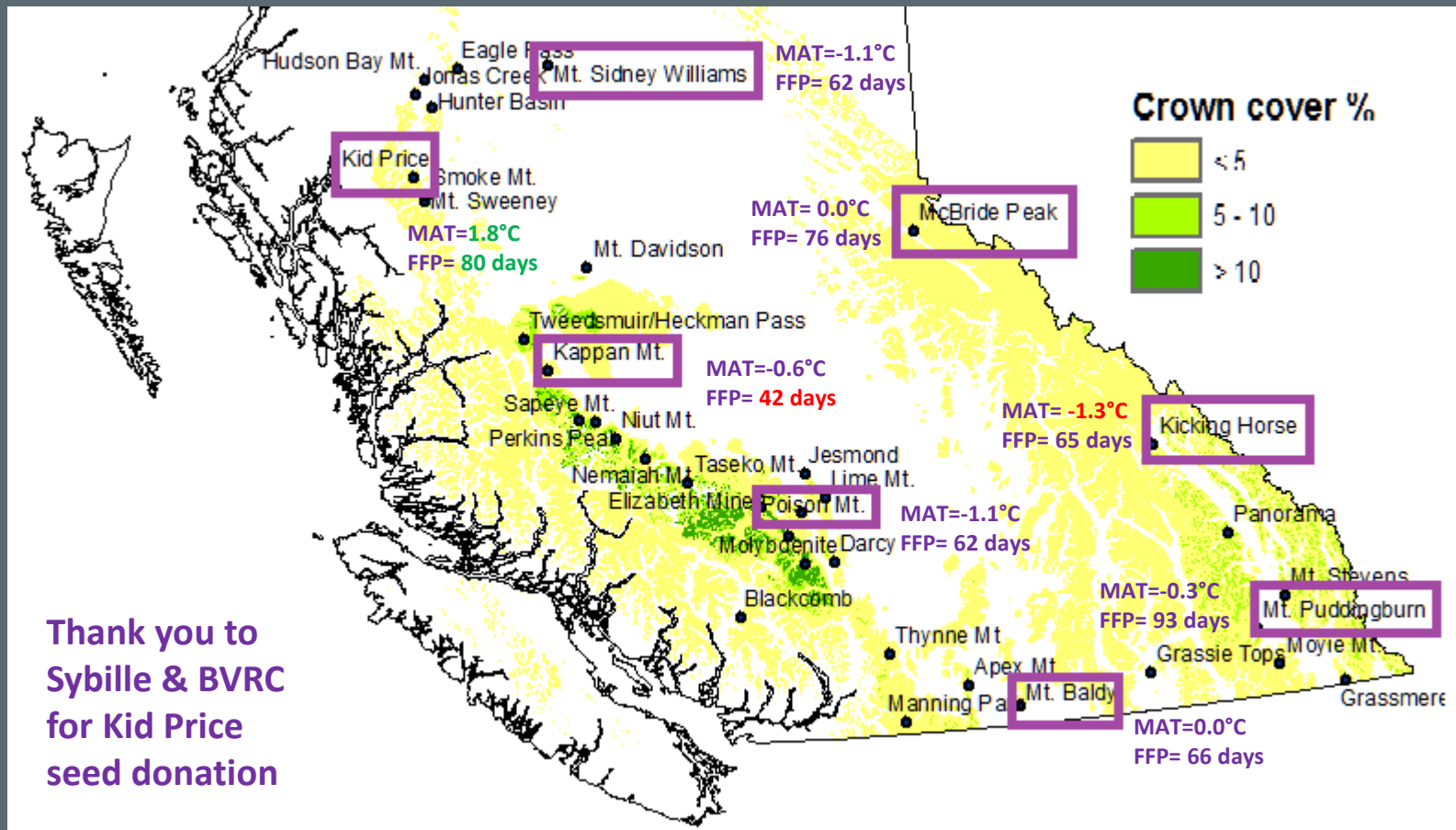
- 2016 -one seedling request -builds on experience of many others **(3 day soak – 28 day Warm – 77 day cold)**
- TSC will focus on whitebark pine seedling requests
- Imbibed seed placed in mesh bag, covered in sand and then bar towel on top
- Seed weighed/adjusted weekly – **critical in warm stratification**





# BC Stratification Trial

- 8 individual trees from widely dispersed populations
- Minimize within seed source variability – seed availability



# Stratification Treatments

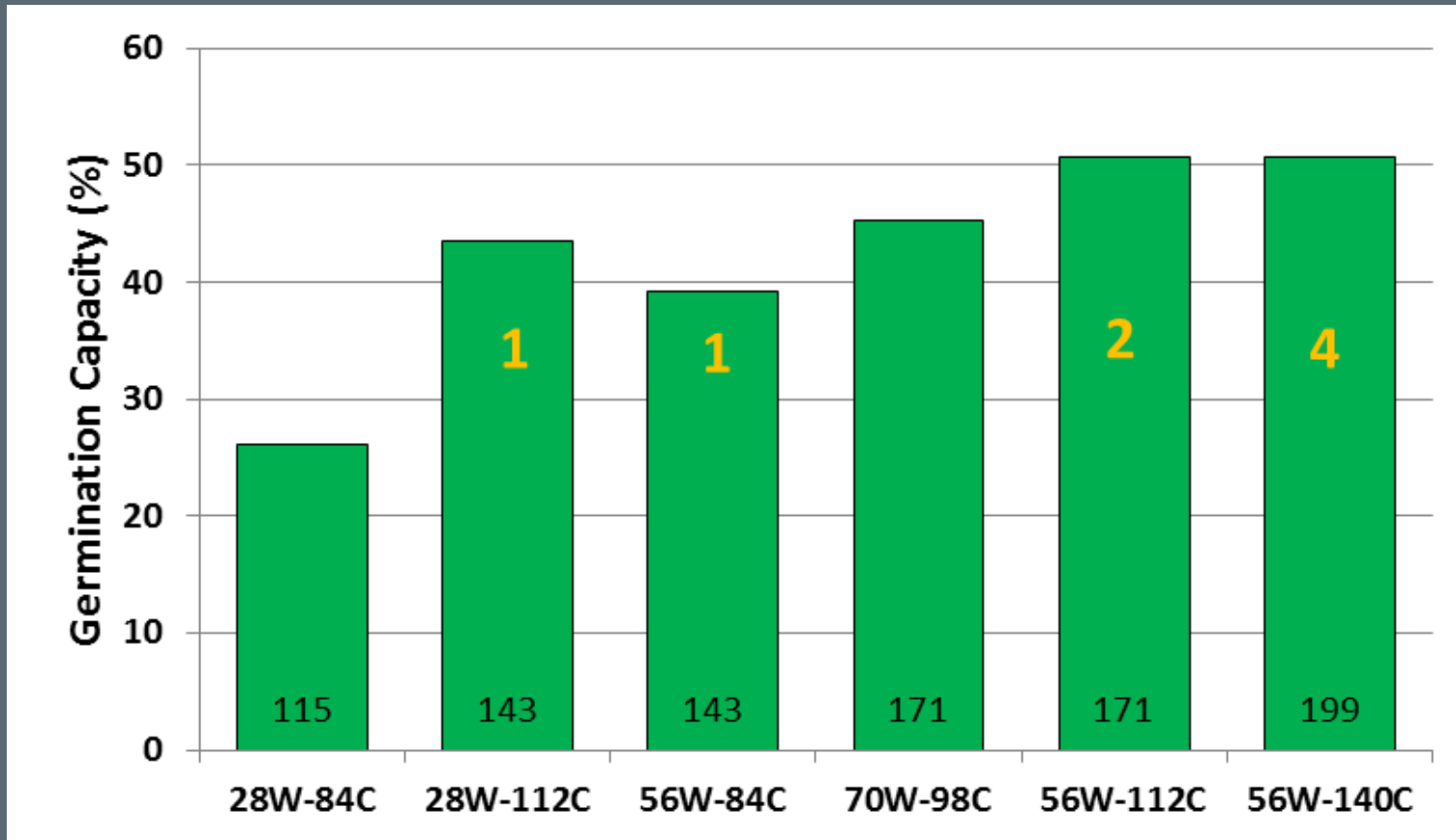
Treatment	Soak - days	Warm (20 C) days	Cold (2-5 C) days	Total days
1	3	28	84	115
2	3	28	112	143
3	3	56	84	143
4	3	70	98	171
5	3	56	112	171
6	3	56	140	199

- Extended 3–day running water soaks used based on work performed by Bob Karrfalt
- Warm and cold stratification performed on sand
- No seed sanitation performed *(wouldn't disregard that step again)*
- 4 replicates of 50 seeds = 200 seeds per treatment *(9600 seeds)*
- Seeds germinated under 25° C (8 hours) / 15 °C (16 hours) conditions
- Germination criteria – radicle = length of seedcoat
- Germinants salvaged – shipped to nurseries



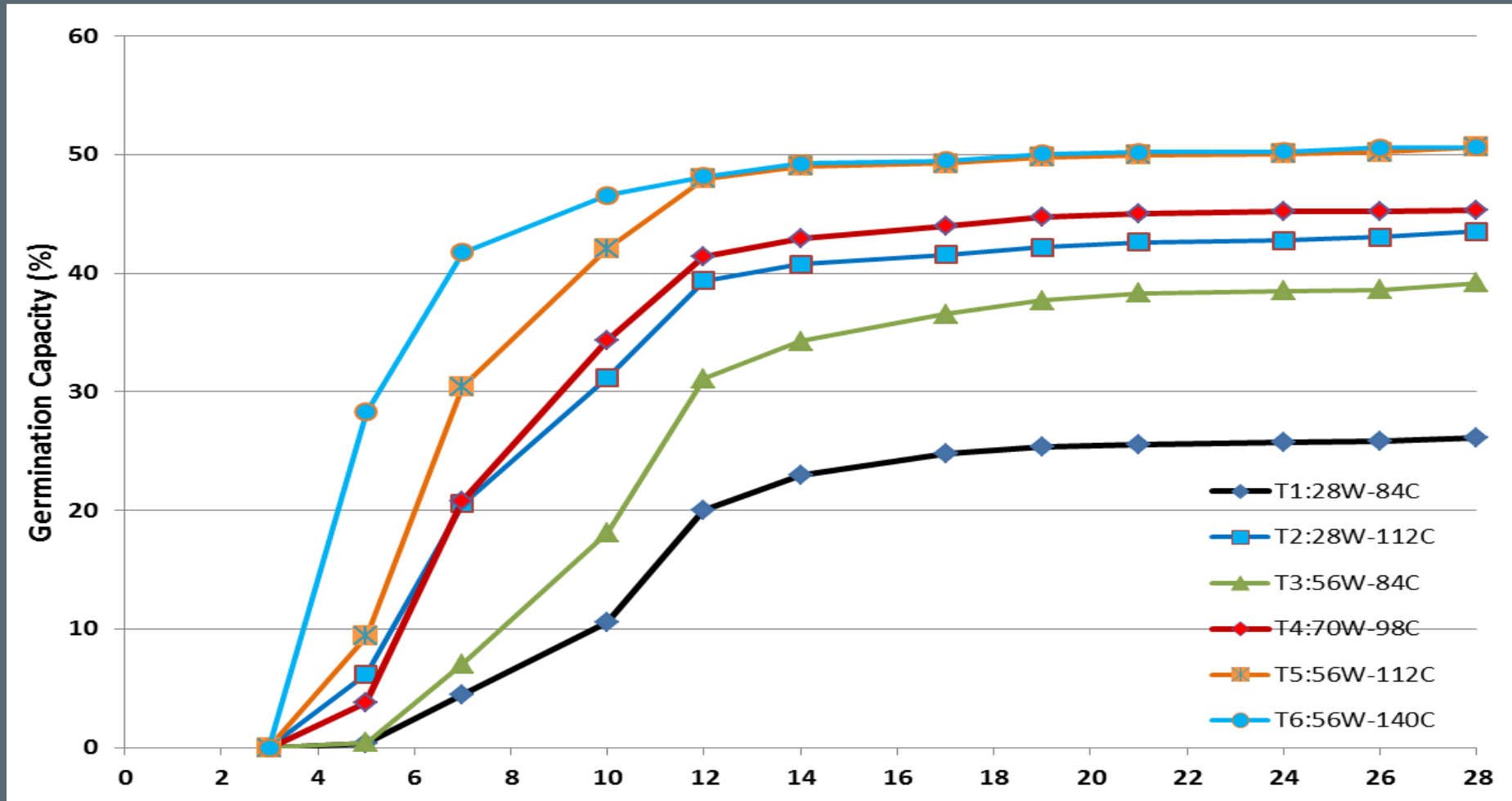


# Treatments Mean Results



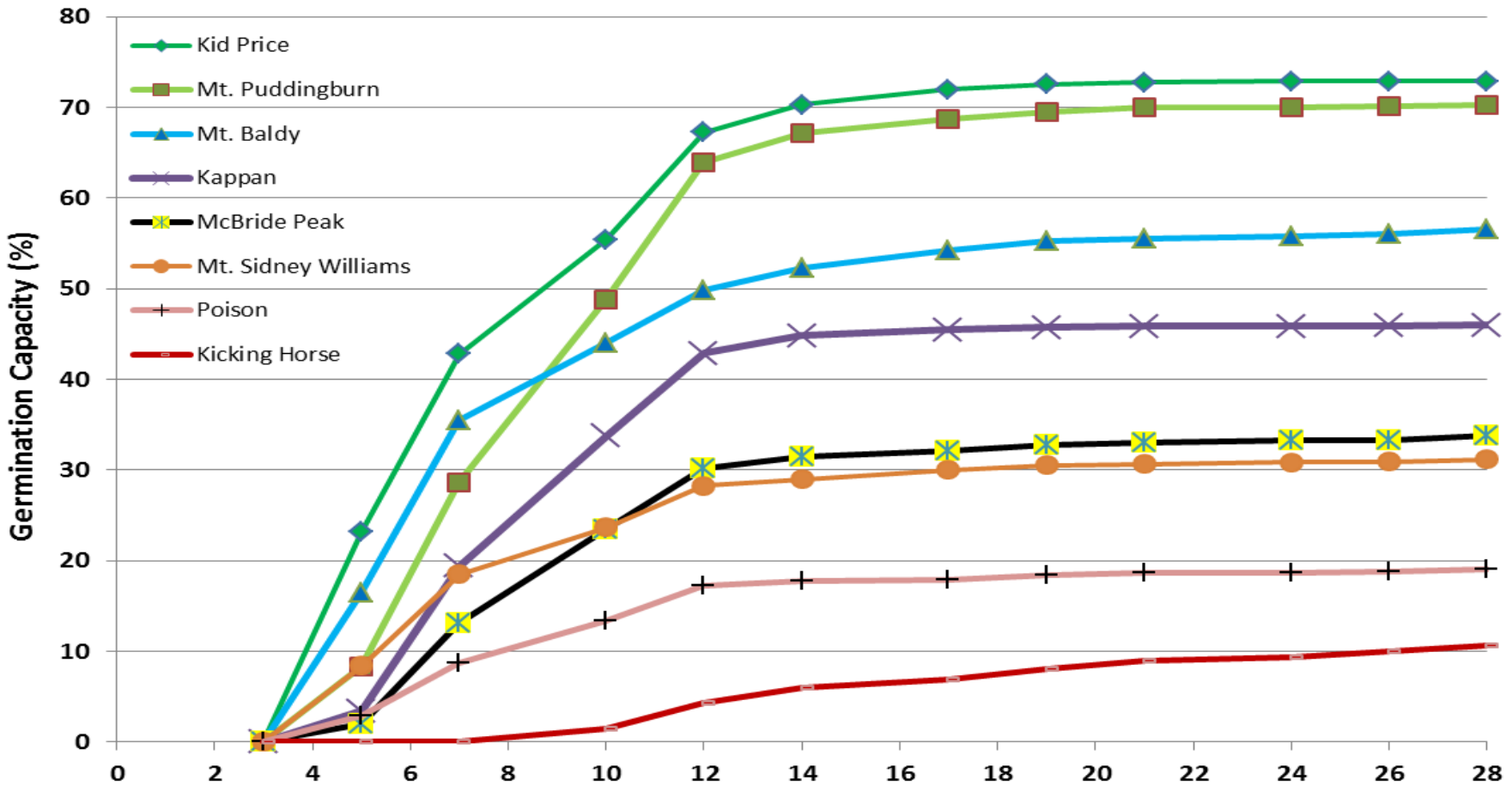
- Increased cold stratification is the best use of time
- Extending warm stratification beyond 28 days is beneficial
- Increasing cold beyond 112 days had minimal benefit on germination

# Treatment Germination Curves



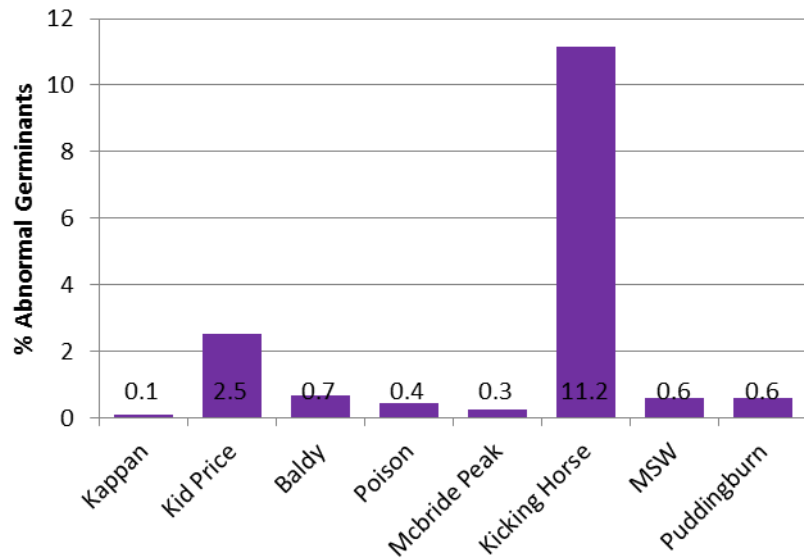
- Increasing cold stratification beyond 112 days increased germination rate
- T1 (115 days) achieved about half the germination one can get with 171 days

# Individual Family Results



- Very large difference in family lot quality (11 to 73%)
- Germination is related to processing efficiency vs. geography (Germ vs. Yield)
- Kid Price did receive secondary processing (YPP)

# Abnormals Germinants by Family



- Abnormal germinants are 'viable' seeds that will not produce a seedling
- Reversed and stunted radicle most common
- Kicking Horse has a very high %



# Stratification Recommendations

- Allot plenty of time (6 months!)



**3-day running water soak**

**H<sub>2</sub>O<sub>2</sub> treatment = 3% for between 2-4 hours**

other options may also work

**56 days warm stratification**

This is the wildcard element – probably maturation dependant

**112 days of cold stratification**

More isn't detrimental in most seedlots

- Monitoring is important





# Helpful 'Hints'

1. Seed is high in fat content and a magnet for rodents – protect your investment *(note aeration)*



2. Germination is more a function of processing efficiency vs. seed origin

Invest in appropriate processing to remove empty seeds (possibly underdeveloped seeds) - *sometimes you have to accept losses*

### 3. Consider options to seedling production

- a) **Pre-germination and dibbling germinants**  
do it early (1 mm) – increases space efficiency  
**Warning – germination is rapid!**
- b) Nicking seeds and eliminating non-viable seeds  
increases space efficiency – “buys” time for large  
production numbers



4. ‘Burying’ the seed in sand seems to be beneficial  
**(fungal ↓ ; stabilizes moisture content)**

5. Seed Sanitation important **(also a function of  
processing efficiency!)**

6. Monitoring is important  
**catching problems early is always best  
pre-germination / fungal growth / drowning**