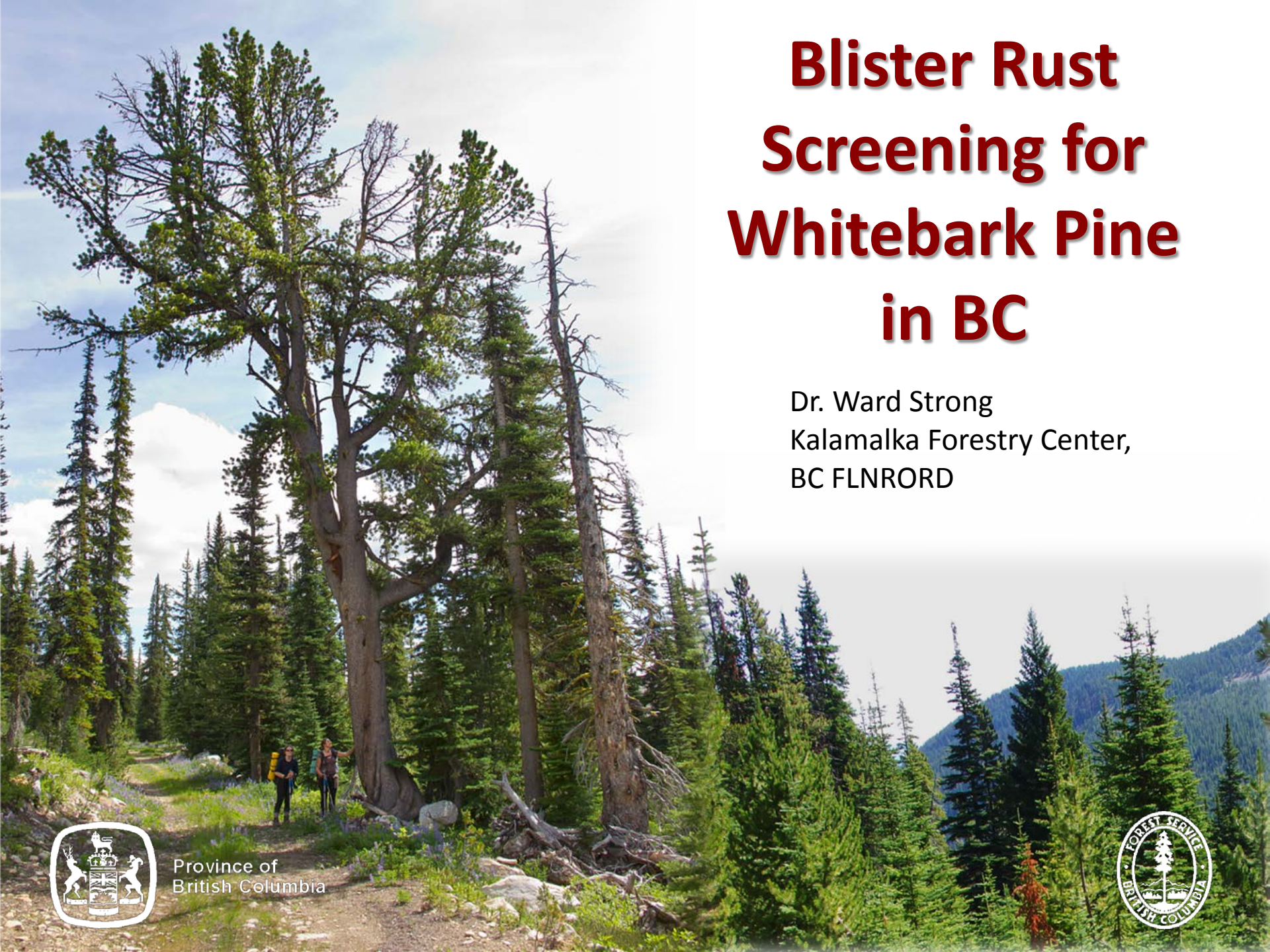


Blister Rust Screening for Whitebark Pine in BC

Dr. Ward Strong
Kalamalka Forestry Center,
BC FLNRORD

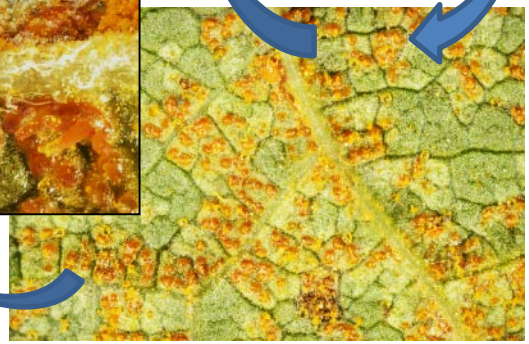
White Pine Blister Rust

Whitebark Pine

Ribes (currants)

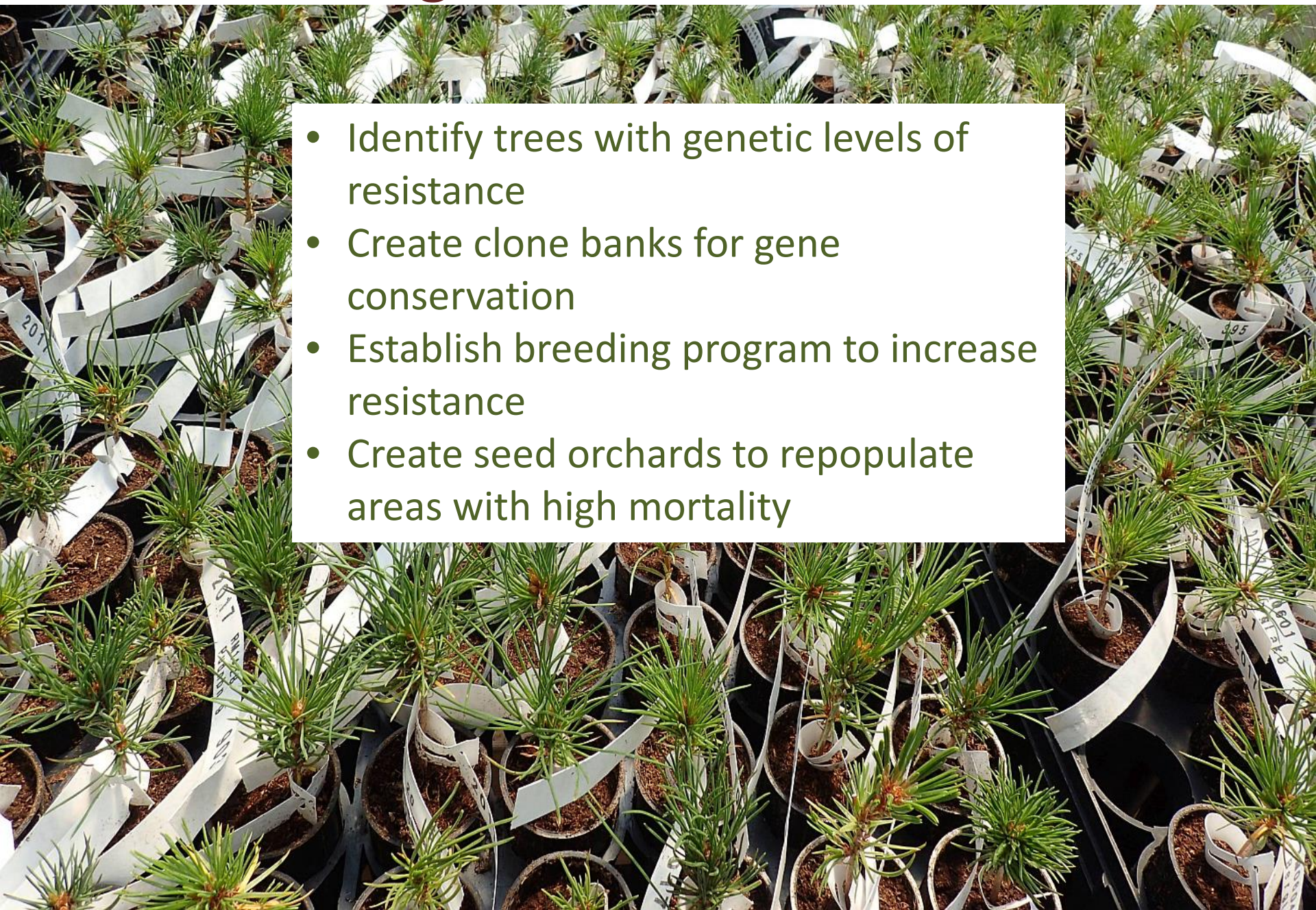
Aeciospores

Uridio-
spores



Basidiospores

Screening for Blister rust Resistance



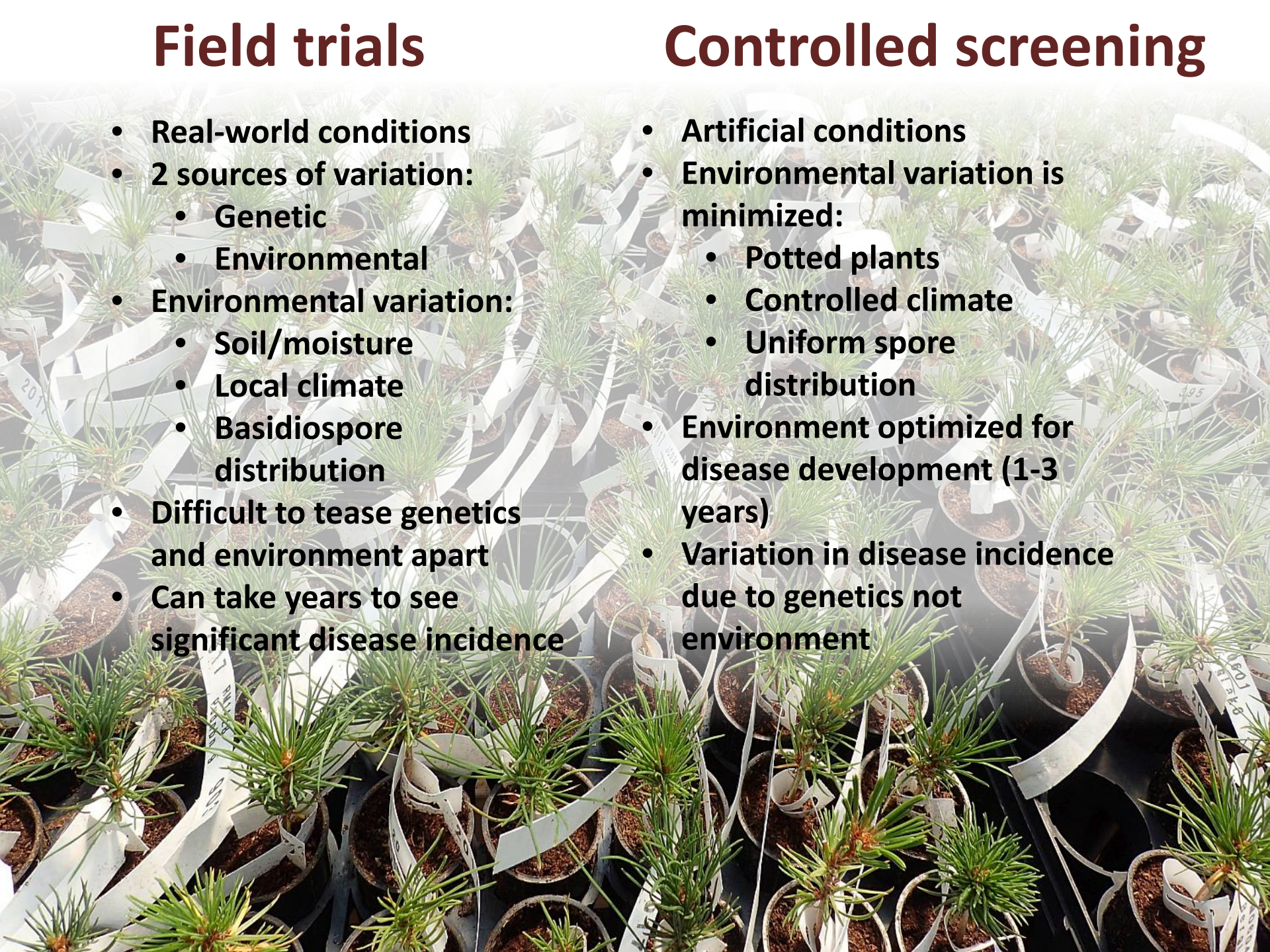
- Identify trees with genetic levels of resistance
- Create clone banks for gene conservation
- Establish breeding program to increase resistance
- Create seed orchards to repopulate areas with high mortality

Field trials

- Real-world conditions
- 2 sources of variation:
  - Genetic
  - Environmental
- Environmental variation:
  - Soil/moisture
  - Local climate
  - Basidiospore distribution
- Difficult to tease genetics and environment apart
- Can take years to see significant disease incidence

Controlled screening

- Artificial conditions
- Environmental variation is minimized:
  - Potted plants
  - Controlled climate
  - Uniform spore distribution
- Environment optimized for disease development (1-3 years)
- Variation in disease incidence due to genetics not environment



Blister Rust Screening Cycle

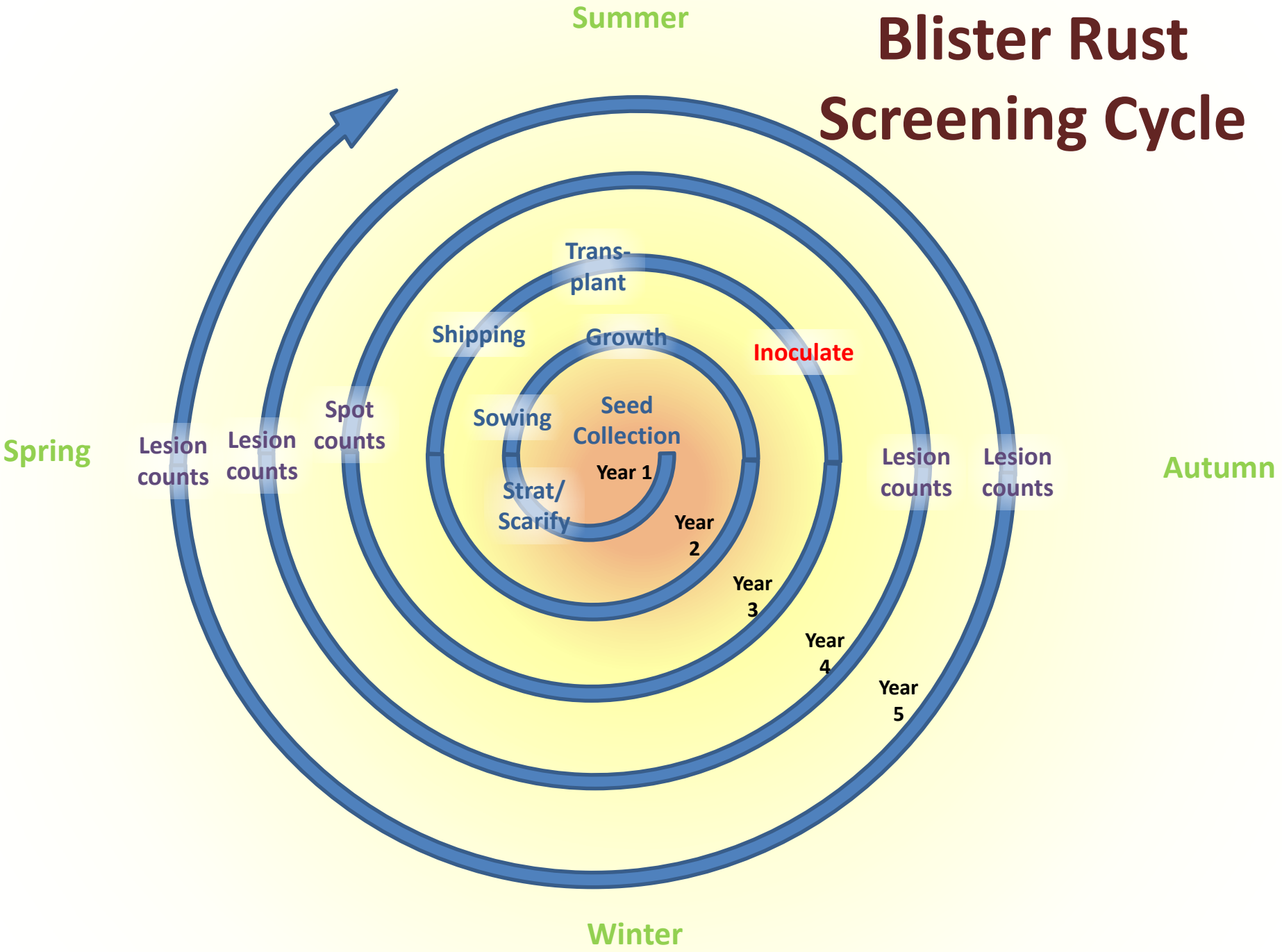



Photo: Michael Murray
“Plus” Tree Selection

Objective:

- Multiple families/year
- 25-50 seedlings/family

Inoculation Year	No. of Families (parents)
2013	10
2014	30
2015	10
2016	35
2017	40
2018	48

Ribes garden at Skimikin Seed Orchards

near Salmon Arm

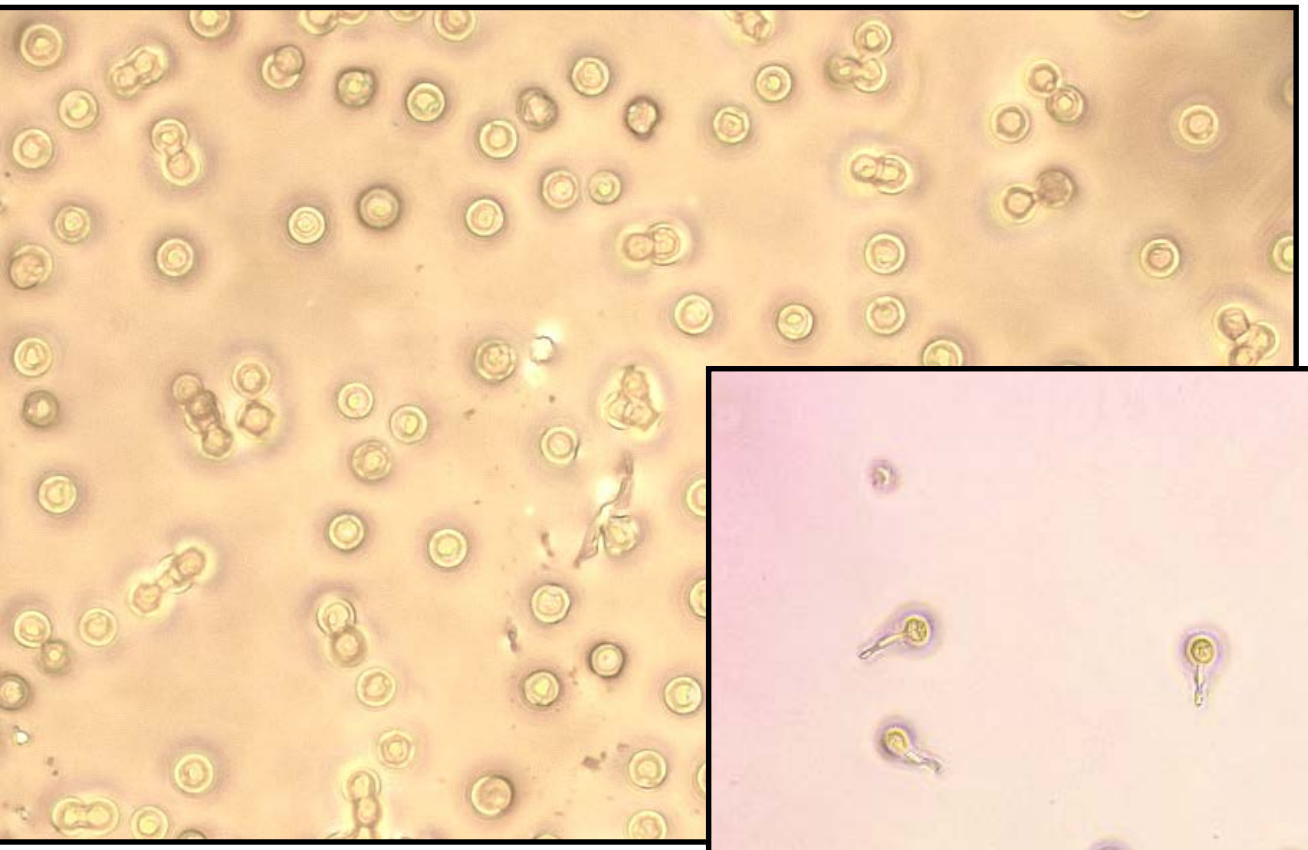
Collecting infected Ribes leaves

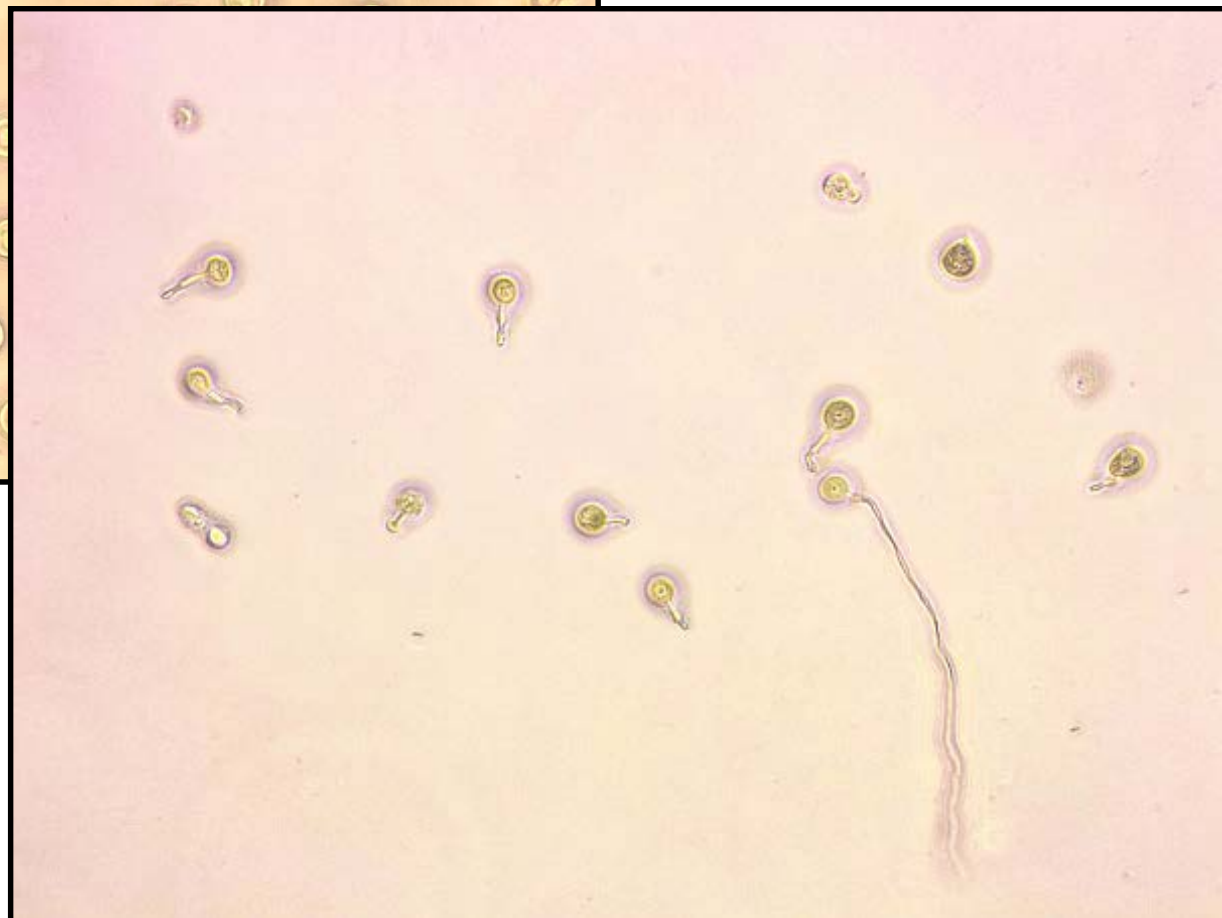
Loading inoculation chamber

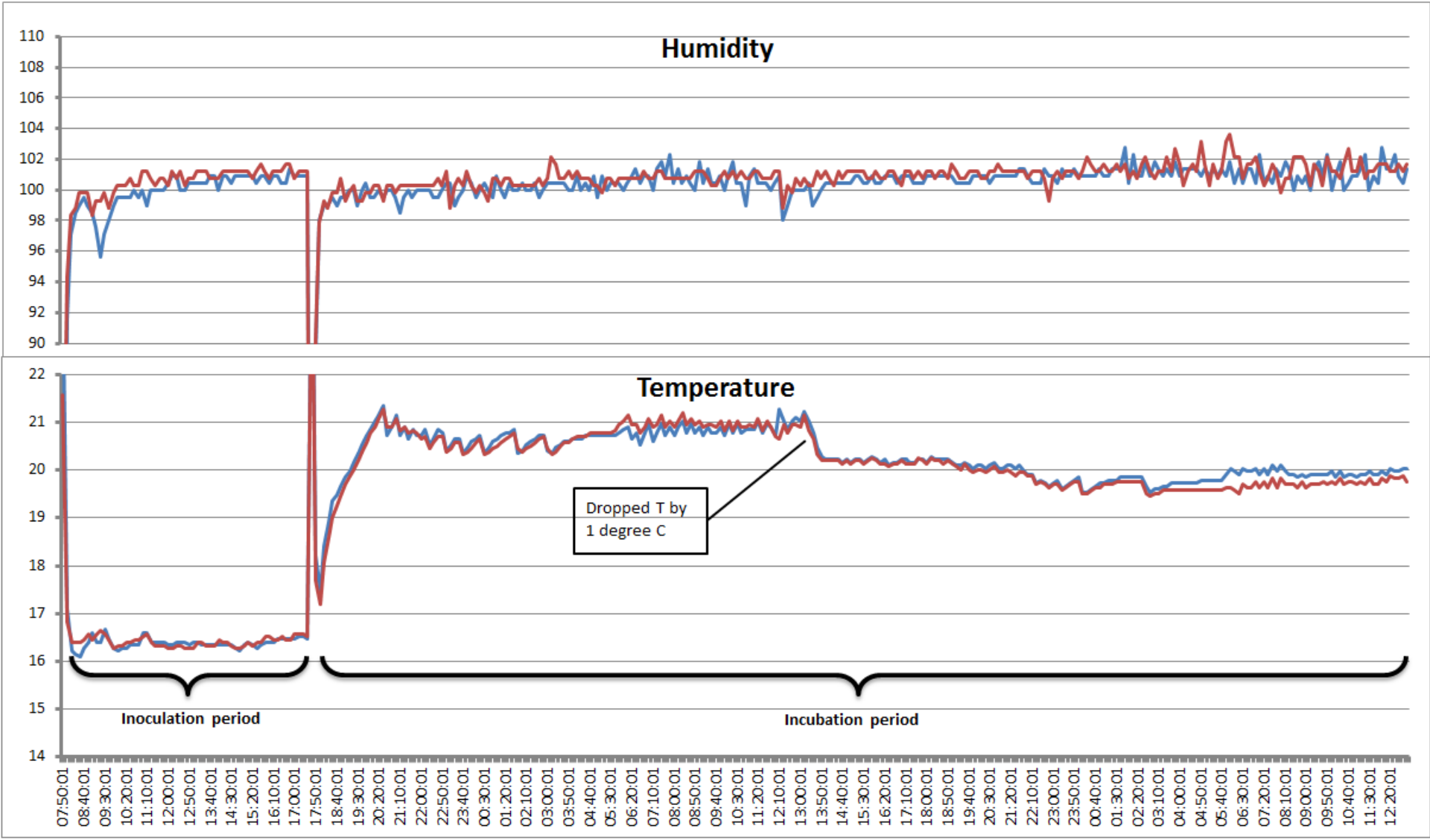
- Ribes above Whitebark seedlings

Temp, RH, and Spore monitoring

Target: 3,000-5,000 basidiospores/cm^2

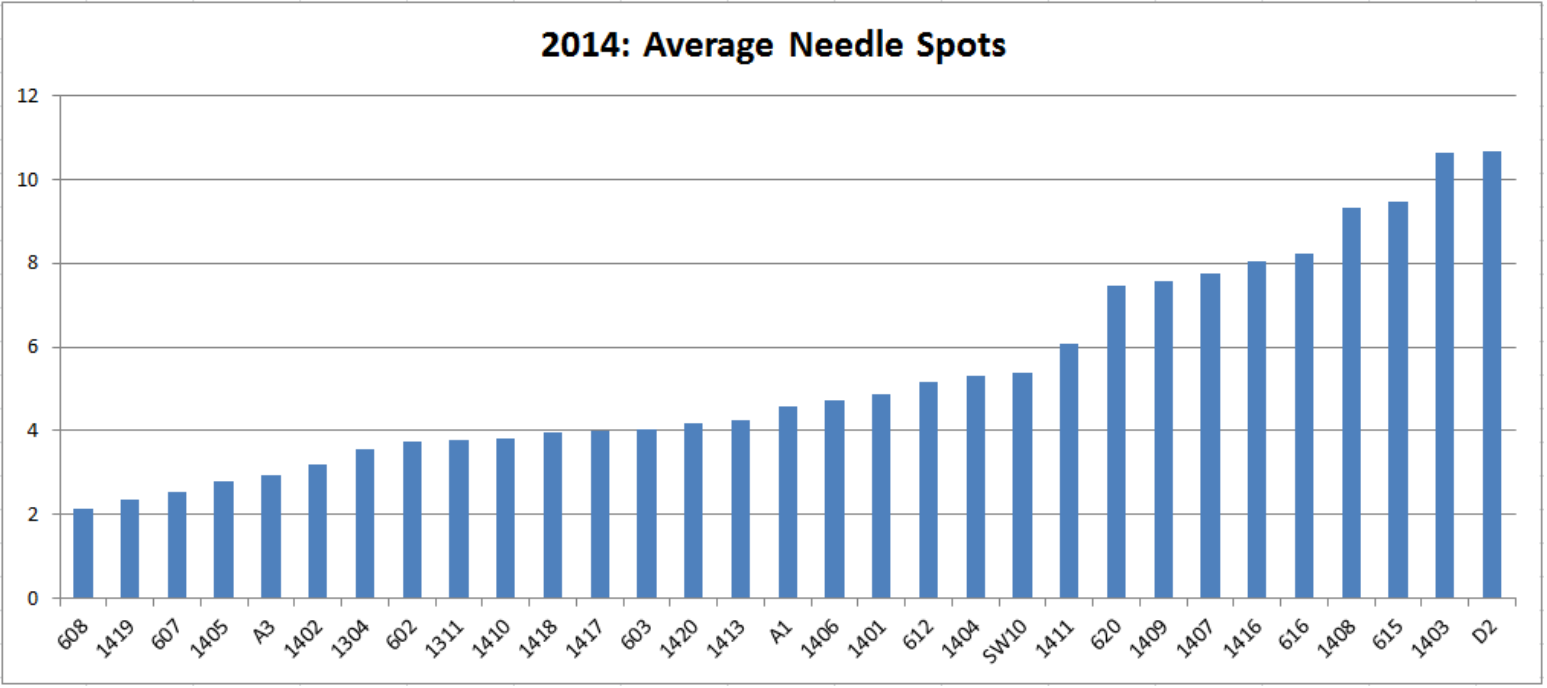


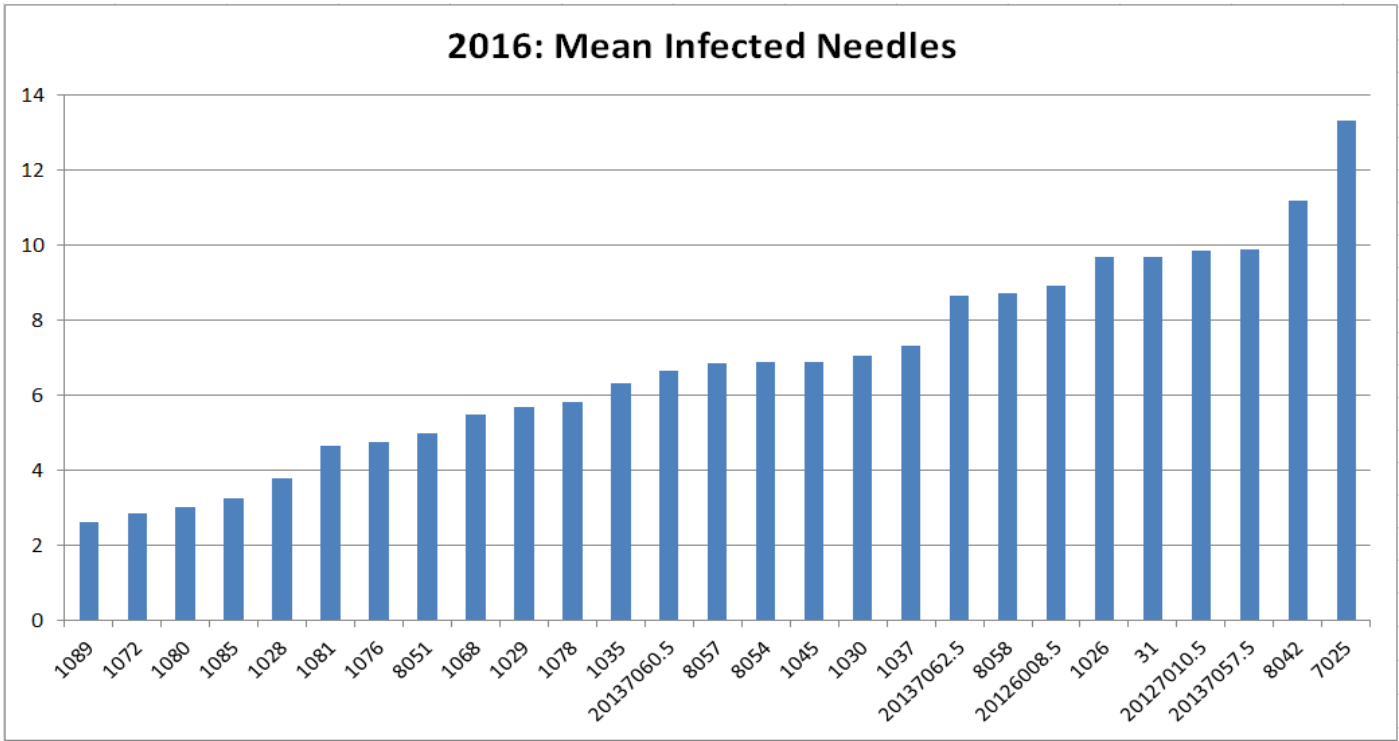



Humidity
110
108
106
104
102
100
98
96
94
92
90
Temperature
22
21
20
19
18
17
16
15
14
Dropped T by
1 degree C
Inoculation period
Incubation period
07:50:01
08:40:01
09:30:01
10:20:01
11:10:01
12:00:01
12:50:01
13:40:01
14:30:01
15:20:01
16:10:01
17:00:01
17:50:01
18:40:01
19:30:01
20:20:01
21:10:01
22:00:01
22:50:01
23:40:01
00:30:01
01:20:01
02:10:01
03:00:01
03:50:01
04:40:01
05:30:01
06:20:01
07:10:01
08:00:01
08:50:01
09:40:01
10:30:01
11:20:01
12:10:01
13:00:01
13:50:01
14:40:01
15:30:01
16:20:01
17:10:01
18:00:01
18:50:01
19:40:01
20:30:01
21:20:01
22:10:01
23:00:01
23:50:01
00:40:01
01:30:01
02:20:01
03:10:01
04:00:01
04:50:01
05:40:01
06:30:01
07:20:01
08:10:01
09:00:01
09:50:01
10:40:01
11:30:01
12:20:01

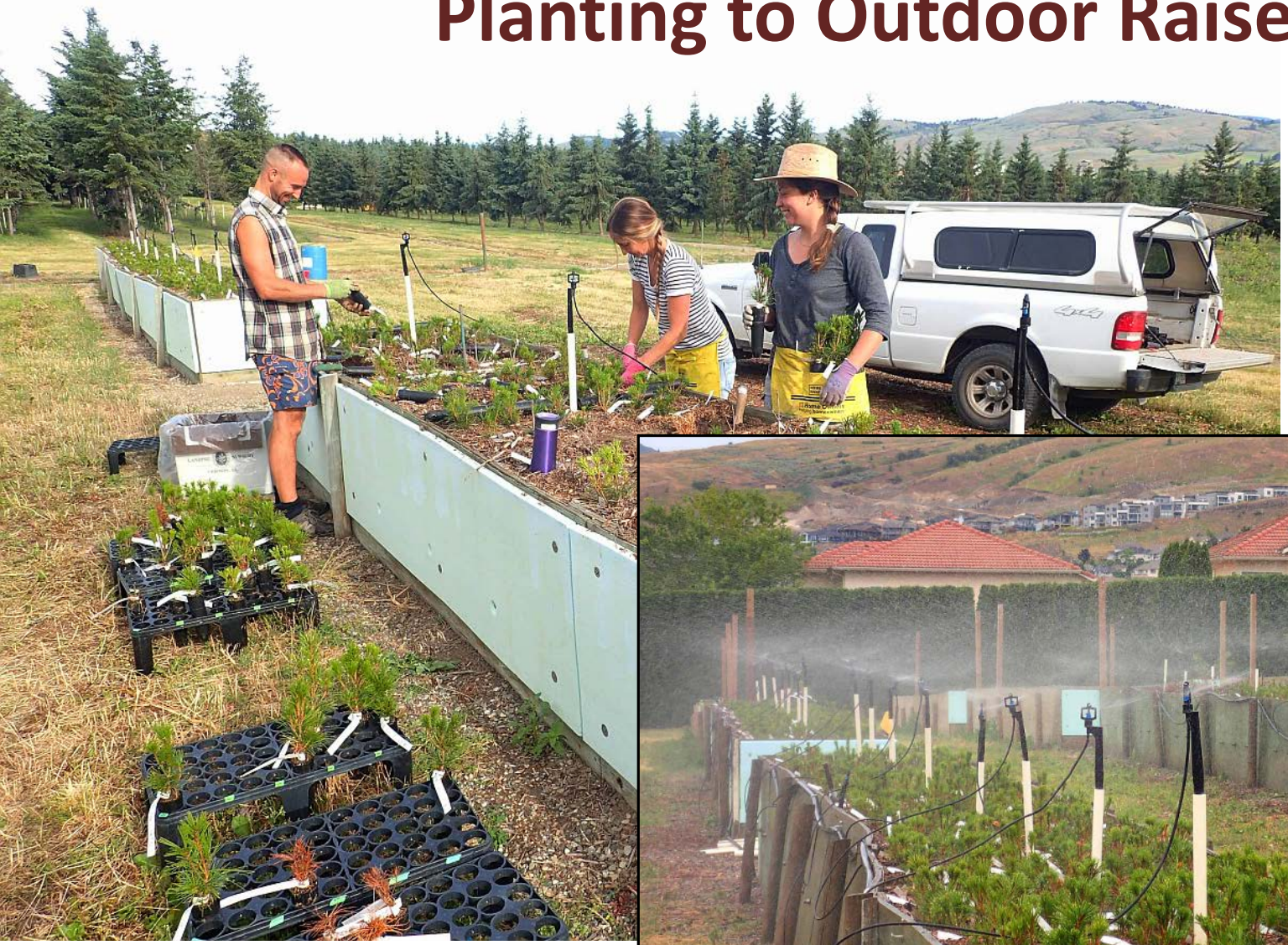
Store in greenhouse until next spring

Needle spots: the first symptoms


2014: Average Needle Spots
12
10
8
6
4
2
0
608
1419
607
1405
A3
1402
1304
602
1311
1410
1418
1417
603
1420
1413
A1
1406
1401
612
1404
SW10
1411
620
1409
1407
1416
616
1408
615
1403
D2

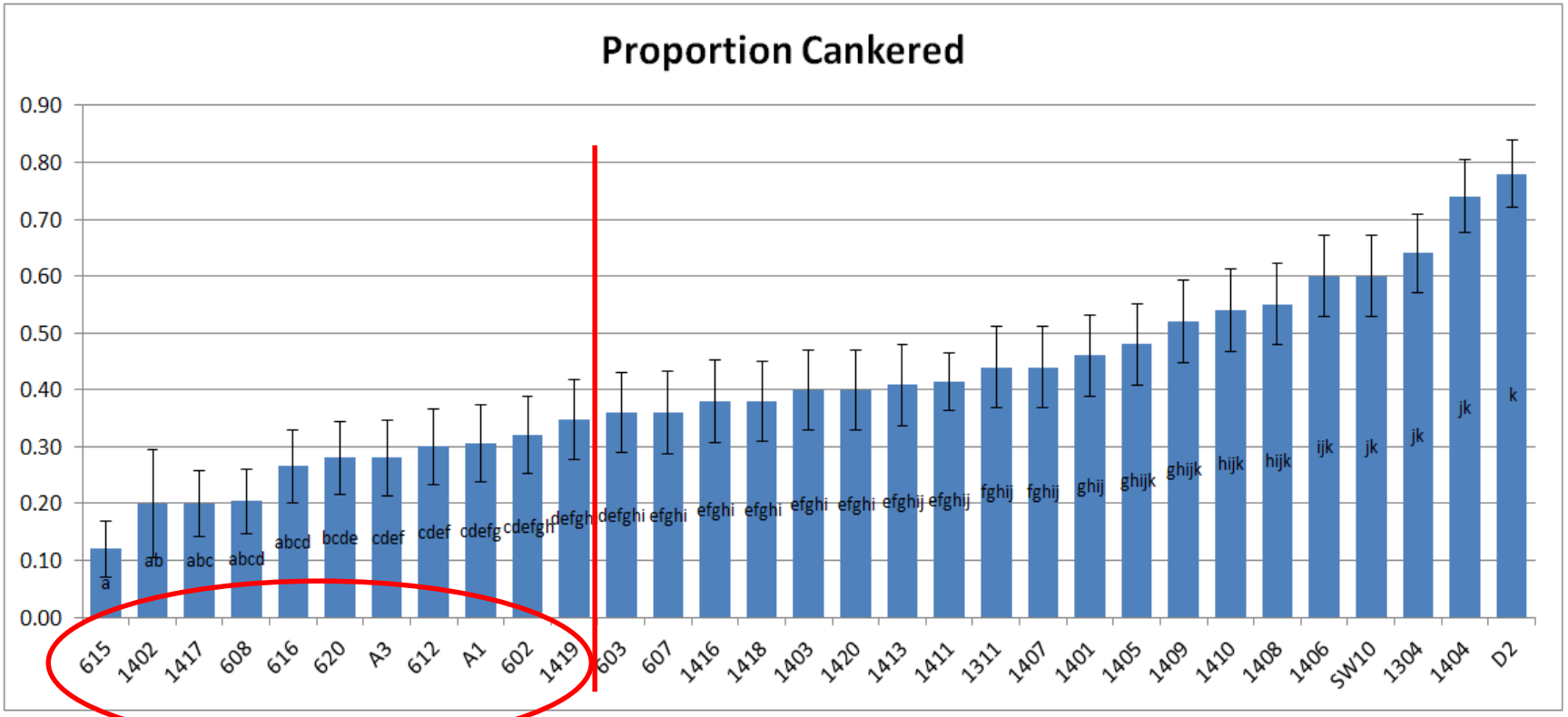

2016: Mean Infected Needles
14
12
10
8
6
4
2
0
1089
1072
1080
1085
1028
1081
1076
8051
1068
1029
1078
1035
20137060.5
8057
8054
1045
1030
1037
20137062.5
8058
20126008.5
1026
31
20127010.5
20137057.5
8042
7025

Planting to Outdoor Raised Beds



Lesion Counts

Canker results from 2014 Inoculations



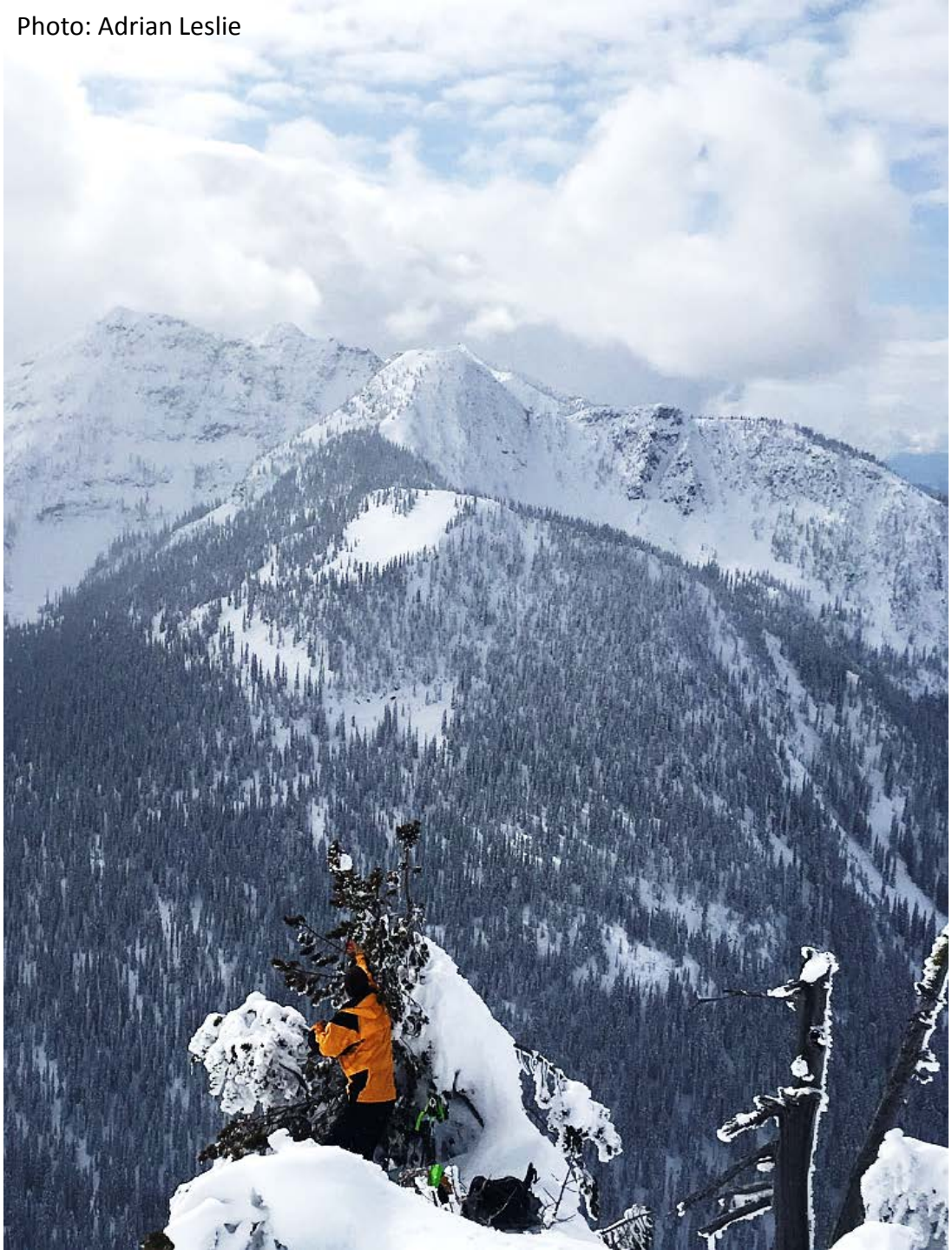


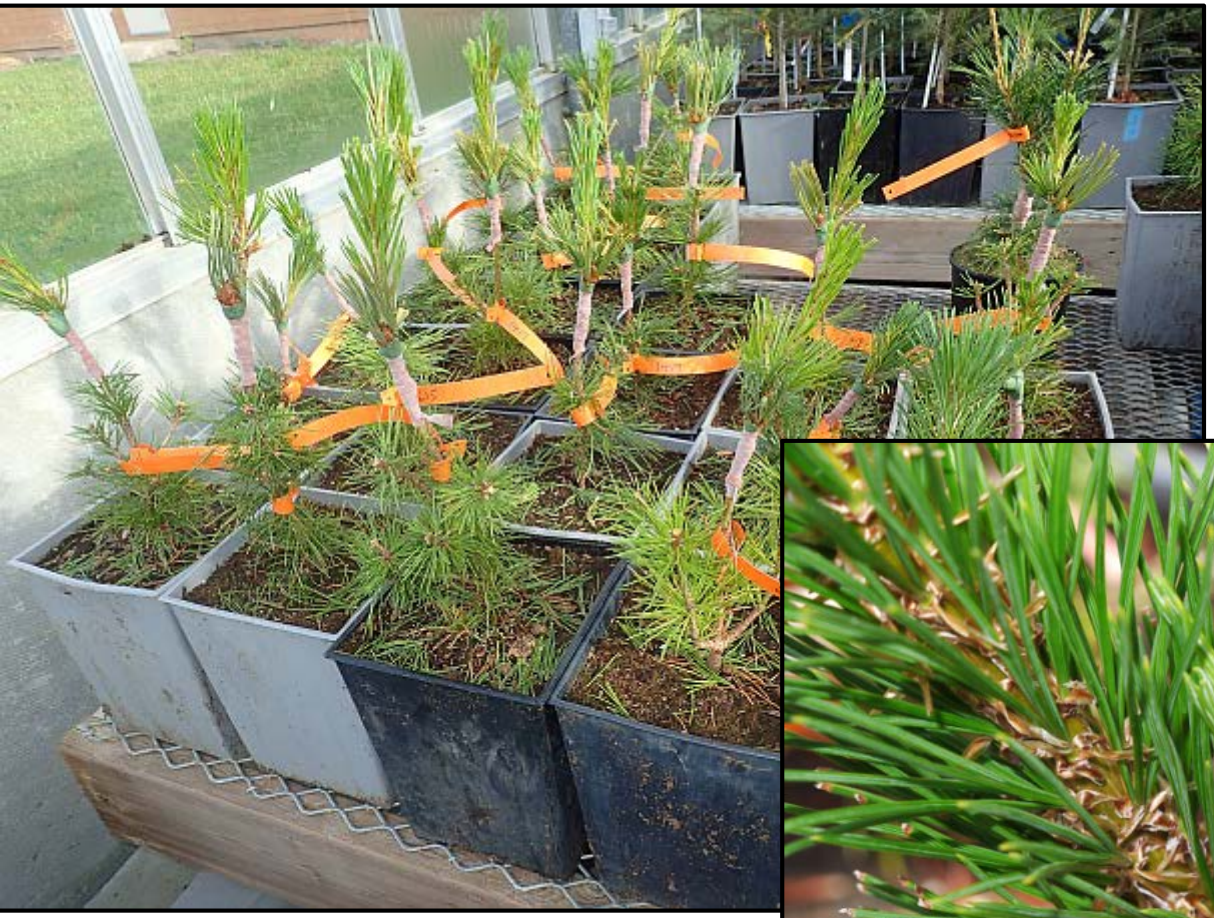
Photo: Adrian Leslie

2016 Scion Collection

- **Based on 2014 Lesion results**

2017 Grafting Program

2017 Grafting Program



THE END