





















# Screening Whitebark pine against blister rust :

## Options to consider - pros and cons

John N. King, retired,

British Columbia Forest Service









telia *C. ribicola* 6 Sep 2012 DGRC  
60x *Ribes nig*







*P. sibirica*, Teletskoe Lake, S. Goroshkevich





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✓<sup>®</sup>





# Options – we can reject

- Hybridisation program with *P. sibirica*
  - politically difficult
  - not enough resources to implement
  - enough resistance in our own species
- Controlled inoc. and monitoring “in house” – no longer have resources to do it in B.C.
- Ribes garden inoc. and monitoring here
  - too brutal – lack of resources
- nt



# Options – to consider

- Controlled inoc. in USDA facilities
  - will need to control resources
  - seedlings cannot be returned
- Field trials
  - seed strat and growing
  - experimental design and number of sites
  - planting of alternative host?

# Field Testing for Blister Rust Resistance

Charlie Cartwright

Nick Ukrainetz

Michael Murray

Vicky Berger













# Appendix A: Seed For Whitebark Pine Testing

| Prov                  | Lat   | Long    | Elev | Year    | Trees |
|-----------------------|-------|---------|------|---------|-------|
| Mt. Sidney Williams   | 55.02 | -125.59 | 1580 | 2007    | 20    |
| Hudson Bay Mtn        | 54.77 | -127.28 | 1800 | 2007    | 5     |
| McBride Peak          | 53.34 | -120.12 | 2100 | 2010    | 10    |
| Perkins Mtn           | 51.83 | -125.04 | 1940 | 2006    | 9     |
| Sapeye Mtn            | 51.82 | -124.81 | 2027 | 2006    | 6     |
| Niut Mtn              | 51.67 | -124.52 | 2003 | 2006    | 8     |
| Nemaiah Mtn           | 51.49 | -124.12 | 2010 | 2006    | 9     |
| Jesmond               | 51.31 | -121.92 | 1850 | 2006    | 10    |
| Kickinghorse          | 51.30 | -117.06 | 2000 | 2010    | 10    |
| Taseko Mtn            | 51.26 | -123.54 | 1950 | 2006    | 9     |
| Lime Mtn              | 51.09 | -121.66 | 1935 | 2003    | 10    |
| Mt Carson             | 50.80 | -121.72 | 2000 | 2010    | 10    |
| Darcy                 | 50.52 | -121.58 | 1800 | 2003    | 10    |
| Blackcomb             | 50.06 | -122.90 | 1893 | 2007    | 10    |
| Puddingbum            | 49.59 | -116.01 | 2340 | 2007    | 10    |
| Apex Mtn              | 49.37 | -119.92 | 2100 | 1999    | 12    |
| Moyie Mtn             | 49.26 | -115.77 | 2078 | 2007    | 15    |
| Mt. Baldy             | 49.17 | -119.25 | 2050 | 2010    | 20    |
| Blackwall             | 49.10 | -120.76 | 2005 | 2007    | 20    |
| Colville Forest, WA   | 48.67 | 117.57  | 1800 | 2009    | 8     |
| Dosewallips, WA       | 47.81 | -123.38 | 2100 | 2007    | 6     |
| Wenatchee, WA         | 47.61 | -120.93 | 2100 | 2007&09 | 10    |
| Mt. Rainier, WA       | 46.78 | -121.25 | 2000 | 2009    | 5     |
| Mt.Hood, OR           | 45.34 | -121.69 | 2351 | 2006    | 6     |
| Umatilla, OR          | 44.73 | -118.27 | 2300 | 2003    | 8     |
| Deshutes, OR          | 43.69 | -121.26 | 2000 | 2006    | 10    |
| Umpqua, OR            | 43.17 | -122.21 | 2150 | 2009    | 5     |
| Coon Creek Summit, NV | 41.79 | -115.49 | 2653 | 2008    | bulk  |
| Mt Rose, NV           | 39.32 | -119.90 | 2578 | 2008    | Bulk  |

# Sample Sources For Whitebark Pine Testing

| <b>Prov</b>                | <b>Lat</b> | <b>Long</b> | <b>Elev</b> | <b>MAT</b> | <b>MAP</b> | <b>PAS</b> |
|----------------------------|------------|-------------|-------------|------------|------------|------------|
|                            |            |             |             |            |            |            |
| <b>Mt. Sidney Williams</b> | 55.02      | -125.59     | 1580        | -0.4       | 714        | 391        |
| <b>Hudson Bay Mtn</b>      | 54.77      | -127.28     | 1800        | -0.9       | 826        | 507        |
| <b>Perkins Mtn</b>         | 51.83      | -125.04     | 1940        | -1.6       | 977        | 690        |
| <b>Darcy</b>               | 50.52      | -121.58     | 1800        | 1.8        | 540        | 260        |
| <b>Blackcomb</b>           | 50.06      | -122.90     | 1893        | 0.8        | 2130       | 1401       |
| <b>Puddingbum</b>          | 49.59      | -116.01     | 2340        | -0.2       | 726        | 459        |
| <b>Umpqua, OR</b>          | 43.17      | -122.21     | 2150        | 4.4        | 1494       | 584        |
| <b>Mt Rose, NV</b>         | 39.32      | -119.90     | 2578        | 5.1        | 1133       | 438        |















**Legend**

- Provincial Boundary (1:250)
- Boundary Intersected
- Boundary Intersected
- Provincial Boundary (1:500)
- Boundary Intersected
- Boundary Intersected
- Boundary Intersected
- National Parks
- Landmark - Lakes (1:250)
- Man Underground
- PS
- Quarry
- Trunk Road
- Local Road
- Footpath Area
- Footpath Area
- Utility Location
- Setback
- Canopy
- Shrub

Scale: 1: 5,000,000

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**Key Map of British Columbia**





# Draft Whitebark Pine Test Locations

|                 | Name             | Lat   | Long   | Elev | MAT  | MAP  | PAS  |
|-----------------|------------------|-------|--------|------|------|------|------|
| <b>Series 1</b> |                  |       |        |      |      |      |      |
| 1               | Hudson Bay Mtn   | 54.83 | 127.37 | 1920 | -0.3 | 1547 | 1014 |
| 2               | McBride Peak     | 53.33 | 120.12 | 2040 | -0.4 | 1302 | 705  |
| 3               | Perkins Mtn      | 51.82 | 125.04 | 1940 | -1.6 | 977  | 690  |
| 4               | Blackwall        | 49.1  | 120.77 | 1960 | 0.8  | 1431 | 1009 |
| <b>Series 2</b> |                  |       |        |      |      |      |      |
| 5               | Garbitt Mountain | 55.53 | 122.8  | 1740 | -1.3 | 1307 | 877  |
| 6               | Blackwater Mtn   | 51.4  | 116.88 | 1900 | -0.8 | 1595 | 929  |
| 7               | Blackcomb        | 50.08 | 123.95 | 1800 | 1.5  | 1727 | 1065 |
| 8               | Puddingburn Mtn  | 49.55 | 116.08 | 2280 | -0.2 | 901  | 566  |



A3 Stag Leap

6/16 Pa





UW 1004

UW 1004

UW 1004







# Five 4 Tree Row Plots

|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 8  | 1  | 15 | 23 | 17 | 6  | 11 | 25 | 13 | 28 | 32 | 5  | 22 | 19 | 10 | 7  |
| 8  | 1  | 15 | 23 | 17 | 6  | 11 | 25 | 13 | 28 | 32 | 5  | 22 | 19 | 10 | 7  |
| 8  | 1  | 15 | 23 | 17 | 6  | 11 | 25 | 13 | 28 | 32 | 5  | 22 | 19 | 10 | 7  |
| 8  | 1  | 15 | 23 | 17 | 6  | 11 | 25 | 13 | 28 | 32 | 5  | 22 | 19 | 10 | 7  |
| 30 | 27 | 20 | 3  | 12 | 29 | 24 | 2  | 26 | 21 | 9  | 14 | 21 | 16 | 4  | 18 |
| 30 | 27 | 20 | 3  | 12 | 29 | 24 | 2  | 26 | 21 | 9  | 14 | 21 | 16 | 4  | 18 |
| 30 | 27 | 20 | 3  | 12 | 29 | 24 | 2  | 26 | 21 | 9  | 14 | 21 | 16 | 4  | 18 |
| 30 | 27 | 20 | 3  | 12 | 29 | 24 | 2  | 26 | 21 | 9  | 14 | 21 | 16 | 4  | 18 |

# 20 Complete Randomized Blocks

|    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|
| 1  | 8  | 12 | 3  | 22 | 14 | 7  | 4  |
| 30 | 19 | 31 | 25 | 15 | 28 | 24 | 18 |
| 16 | 10 | 6  | 27 | 32 | 13 | 9  | 26 |
| 23 | 20 | 5  | 17 | 2  | 11 | 29 | 21 |



# Incomplete Block Alpha Design

|           |           |           |           |           |           |           |           |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>1</b>  | <b>24</b> | <b>9</b>  | <b>19</b> | <b>5</b>  | <b>29</b> | <b>32</b> | <b>14</b> |
| <b>10</b> | <b>6</b>  | <b>25</b> | <b>30</b> | <b>17</b> | <b>21</b> | <b>13</b> | <b>2</b>  |
| <b>7</b>  | <b>20</b> | <b>15</b> | <b>23</b> | <b>3</b>  | <b>31</b> | <b>27</b> | <b>11</b> |
| <b>16</b> | <b>4</b>  | <b>18</b> | <b>12</b> | <b>28</b> | <b>26</b> | <b>21</b> | <b>8</b>  |













25-4

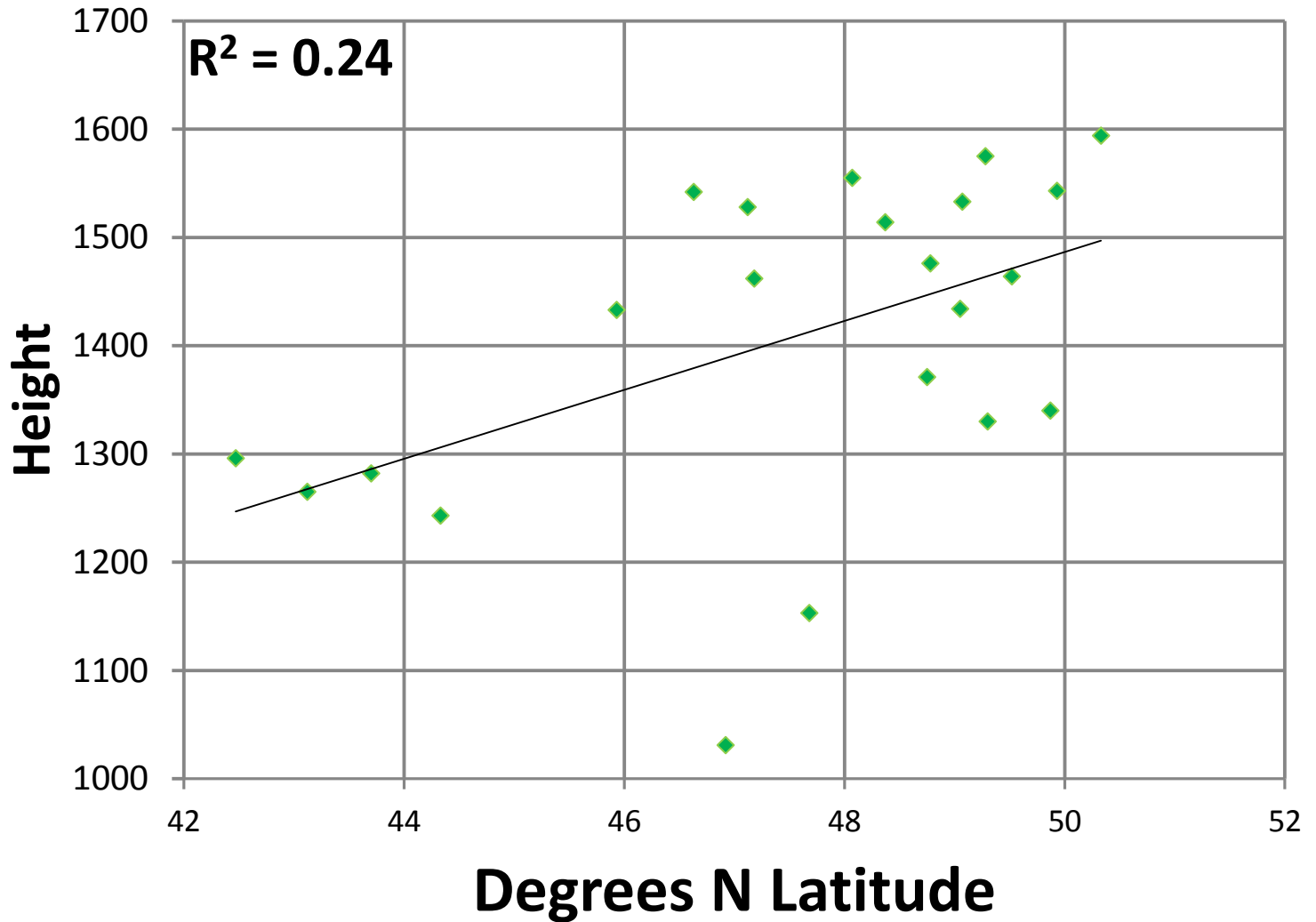
93-1



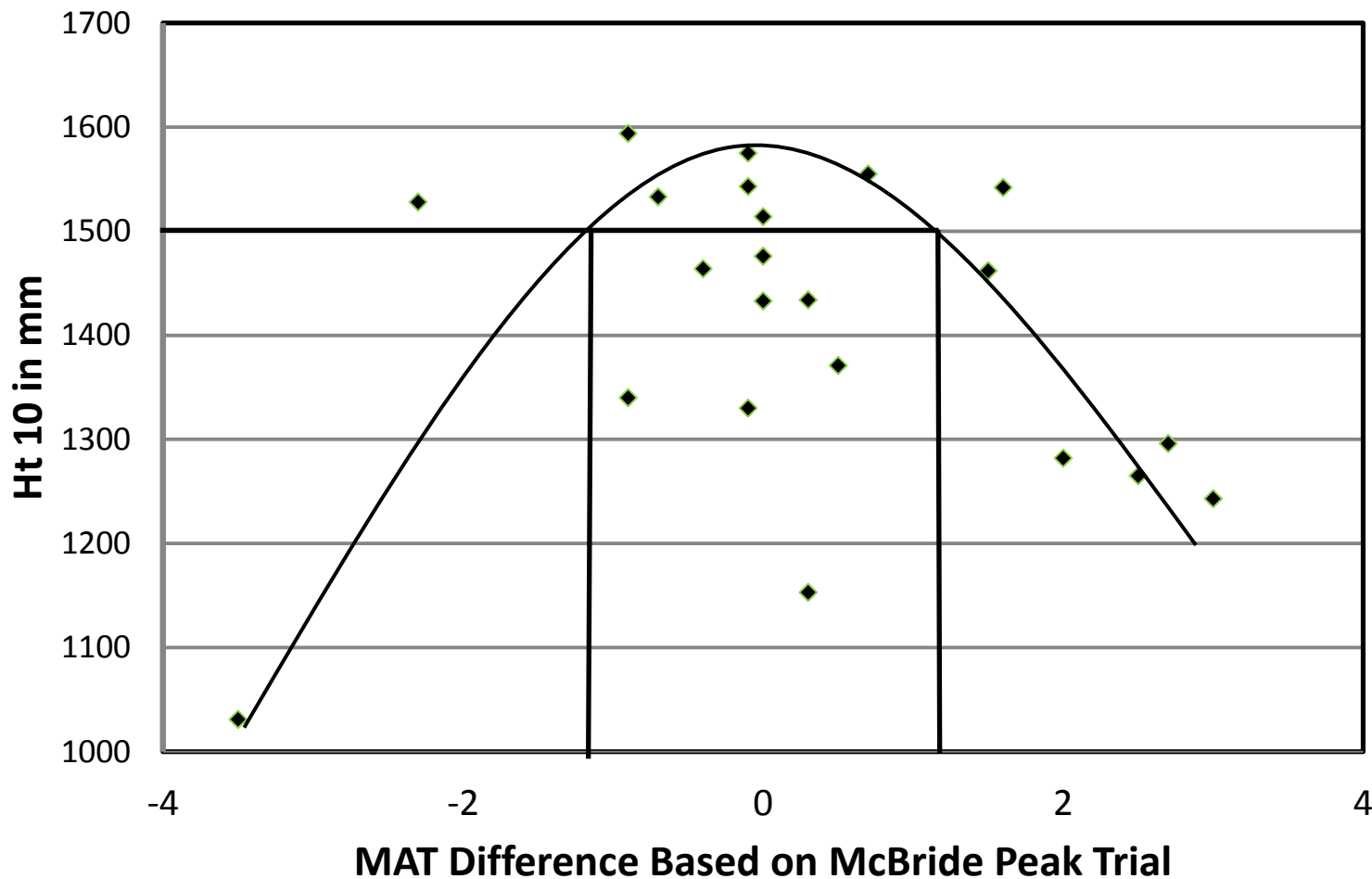




# Height 10 as a Function of Latitude of Origin



# Height 10 as a Function of Transfer Distance















| <input type="checkbox"/> Name   | Date modified        | Type        | Size | Offline availability | Offline status |
|---------------------------------|----------------------|-------------|------|----------------------|----------------|
| <input type="checkbox"/> EP1329 | 2011-11-09 10:35 ... | File Folder |      | Not available        | Online         |
| <input type="checkbox"/> EP1335 | 2011-11-09 10:35 ... | File Folder |      | Not available        | Online         |
| <input type="checkbox"/> EP1339 | 2008-06-09 2:51 PM   | File Folder |      | Not available        | Online         |
| <input type="checkbox"/> EP1340 | 2012-03-08 8:42 AM   | File Folder |      | Not available        | Online         |
| <input type="checkbox"/> EP1358 | 2011-11-09 10:35 ... | File Folder |      | Not available        | Online         |
| <input type="checkbox"/> EP1359 | 2011-11-09 10:35 ... | File Folder |      | Not available        | Online         |
| <input type="checkbox"/> EP1363 | 2011-11-09 9:57 AM   | File Folder |      | Not available        | Online         |
| <input type="checkbox"/> EP1364 | 2011-11-09 9:57 AM   | File Folder |      | Not available        | Online         |
| <input type="checkbox"/> EP1365 | 2011-11-09 9:57 AM   | File Folder |      | Not available        | Online         |
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| <input type="checkbox"/> EP1367 | 2011-11-09 9:57 AM   | File Folder |      | Not available        | Online         |
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| <input type="checkbox"/> EP1372 | 2011-11-09 9:52 AM   | File Folder |      | Not available        | Online         |
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| <input type="checkbox"/> EP1376 | 2011-11-09 9:52 AM   | File Folder |      | Not available        | Online         |
| <input type="checkbox"/> EP1377 | 2011-11-09 9:53 AM   | File Folder |      | Not available        | Online         |
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Environment: PROD

Last Updated: August 01, 2012

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