Mediterranean truffle orchards in British Columbia

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on behalf of the

Truffle Association of British Columbia
What is a truffle?

• hypogeous (underground) version of a mushroom
• perennial mycelium in roots and soil

• ectomycorrhizas on roots of oaks, hazelnuts, etc
• rely on animals to distribute spores
• pungent aromas only when mature
• a few species are considered to be delicacies
• Périgord black truffle worth $500-1,500/kg
• Italian white truffle worth $2,000-$4,000/kg
Périgord black truffle
*Tuber melanosporum*

Summer or Burgundy truffle
*Tuber aestivum*

Bianchetto
*Tuber borchii*
Native truffles

Oregon white truffle
*Tuber gibbosum, Tuber oregonense*

Oregon black truffle
*Leucangium carthusianum*
Truffle Association of British Columbia (TABC)

- enthusiasts, producers, mycologists, and agrologists
- dedicated to establishment of commercial truffle industry in BC
- established in 2004 (earliest truffière 2003)

- currently 10 – 20 truffle orchards in BC?
- host trees: hazelnut (*Corylus avellana*)
  - English oak (*Quercus robur*)
- new plantings only
- mostly *Tuber melanosporum*
- a few *Tuber aestivum*
<table>
<thead>
<tr>
<th></th>
<th>France / Italy</th>
<th>NZ</th>
<th>South Vancouver Island</th>
<th>Lower Fraser Valley</th>
<th>Okanagan Valley</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Annual rainfall (mm)</strong></td>
<td>600 - 1500</td>
<td>1058</td>
<td>695 - 992</td>
<td>1573</td>
<td>332 - 380</td>
</tr>
<tr>
<td><strong>Mean daily temperature summer (°C)</strong></td>
<td>17.5 - 22</td>
<td>18.7</td>
<td>15.6 - 16.7</td>
<td>14.7</td>
<td>14.75 - 15.9</td>
</tr>
<tr>
<td><strong>Mean daily temperature winter (°C)</strong></td>
<td>1 – 8</td>
<td>9.1</td>
<td>3.3 – 4.0</td>
<td>4.5</td>
<td>0.7 - 2.4</td>
</tr>
<tr>
<td><strong>Annual sunshine hours</strong></td>
<td>1900 - 2800</td>
<td>2204</td>
<td>1803 - 1985</td>
<td>1865</td>
<td>1955 - 1956</td>
</tr>
<tr>
<td><strong>Summer sunshine hours (April – Sept)</strong></td>
<td>1200 - 1800</td>
<td>1319</td>
<td>1352 - 1454</td>
<td>1326</td>
<td>1462 - 1470</td>
</tr>
<tr>
<td><strong>Approximate degree days (10 °C)</strong></td>
<td>900 - 1900</td>
<td>1430</td>
<td>957 - 1158</td>
<td>934</td>
<td>978 - 1180</td>
</tr>
</tbody>
</table>

Ian Hall compiled data for Europe and NZ
What is the perfect soil for truffle production?

<p>| | |</p>
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</table>
| **pH**                    | • minimum 7.5  
• optimum 7.9  
• not to exceed 8.0 especially for oak  
(induces Fe deficiency) |
| **Depth**                 | • 40 cm                                                         |
| **Surface OM**            | • 8%                                                            |
| **Plant available Ca**    | • High                                                          |
| **Plant available P**     | • Moderate                                                      |
| **N**                     | • Low                                                           |
| **Drainage**              | • Free                                                          |
| **Texture, structure**    | • Loam, granular                                                |
| **Aeration**              | • Good                                                          |

Information adapted from *The Black Truffle* by I Hall, G Brown and J Byars
Deep ripping to break up impermeable layers

Installing drain tiles
Liming the UBC truffière
Right fungus

Concerns:

*Tuber brumale*

Chinese truffles
Inoculation: 1 nursery in BC
1 in Oregon
1 in UK

Monitoring and quality assurance?
TABC
North American Truffle Growers’ Association
Inoculation: DIY?

Tom Michaels
Plant health concern

Eastern filbert blight

Anisogramma anomala
Finding mature truffles

• Not by rake
• Trained dogs
Truffle Association of British Columbia (TABC)

• funding from the Investment Agriculture Fund

• research and demonstration project
  - Truffière at University of British Columbia, Vancouver BC
  - Co-operator truffières

• goals
  - To monitor mycorrhiza development & soil conditions over time
  - Provide guidance on best management practices for BC
Research and demonstration:
ensuring that you have the right fungus
Truffière 3
Truffière 6
brulé
Results
<table>
<thead>
<tr>
<th>Truffle orchard number</th>
<th>Location</th>
<th>Trees planted</th>
<th><em>Tuber</em> species inoculated</th>
<th><em>Tuber</em> species found on roots</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Vancouver Island</td>
<td><em>Corylus avellana</em></td>
<td><em>Tuber melanosporum</em></td>
<td><em>Tuber melanosporum</em> <em>Tuber brumale</em></td>
</tr>
<tr>
<td>8</td>
<td>Vancouver Island</td>
<td><em>Corylus avellana</em></td>
<td><em>Tuber melanosporum</em></td>
<td><em>Tuber menseri</em> <em>Tuber anniae</em></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td><em>Quercus robur</em></td>
<td></td>
<td><em>Tuber melanosporum</em> <em>Tuber aestival</em></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td><em>Quercus robur</em></td>
<td></td>
<td><em>Tuber melanosporum</em> <em>Tuber borchii</em></td>
</tr>
<tr>
<td>5</td>
<td>Okanagan Valley</td>
<td></td>
<td></td>
<td><em>Tuber melanosporum</em> <em>Tuber menseri</em></td>
</tr>
<tr>
<td>6</td>
<td>Lower Fraser Valley</td>
<td><em>Corylus avellana</em></td>
<td><em>Tuber melanosporum</em></td>
<td><em>Tuber melanosporum</em> <em>Tuber beyeleri</em></td>
</tr>
<tr>
<td>1</td>
<td>Okanagan Valley</td>
<td><em>Corylus avellana</em></td>
<td><em>Tuber melanosporum</em></td>
<td><em>Tuber melanosporum</em> <em>Tuber aestival</em></td>
</tr>
<tr>
<td>7</td>
<td>Okanagan Valley</td>
<td><em>Corylus avellana</em></td>
<td><em>Tuber melanosporum</em></td>
<td><em>Tuber anniae</em></td>
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Summary of findings

- *Tuber melanosporum* is persisting (5 years)
- Is it spreading?

- *Tuber aestivum* inoculation success needs to be investigated further

- One instance of contamination by *Tuber brumale* has been found

- One instance of nursery mix-up with *Tuber borchii* has been found

- Colonization of planted *Corylus avellana* by native *Tuber* species has been documented
- Are these competitors for Mediterranean truffles?
What success would look like in BC:

- *Tuber melanosporum, Tuber aestivum, Tuber borchii* are produced

- Native truffles are harvested recreationally and commercially

- Marketing plan is in place for BC truffles

- All truffles are harvested using trained truffle dogs

- Quality control and certification help ensure top quality colonized seedlings and truffles