Native culinary truffles have a potential role in forestry, agriculture, and tourism

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• What are truffles?
• Where do truffles come from?
• Why might they be important in agro-forestry?
What are truffles?

Similar to apples on a tree
- a fruiting structure for reproduction
Where do they come from?

Mycorrhiza = a symbiosis

- mycos - fungus
- rhiza - root
Mycorrhizae

The mutually beneficial symbiotic association of fungi and plant feeder roots that is necessary for the fungus to complete its life cycle.
Importance of Mycorrhizae

Mycorrhizal fungi form symbiotic relationships with trees and other vegetation. Trees supply carbon from photosynthesis to the fungi, in turn, fungi absorb minerals and nutrients from the soil and transfer them to roots. Mycorrhizae are essential for survival and growth of most coniferous forest trees and other shrubs and herbaceous vegetation.
Anatomy of a pine ectomycorrhiza

(fungus on the outside of the root)
Fungus (yellow) and roots in organic soil
Why might they be important in agro-forestry?

Oregon white truffle
$50 - $200 per pound

Oregon black truffle
$80 - $300 per pound

Photo: Dan Luoma
Photo: Charles LeFevre
Oregon Culinary Truffles

An Emergent Industry for Forestry, Agriculture & Culinary Tourism

A feasibility study by
David Pilz,
Charles Lefevre,
Leslie Scott
& James Julian
• Superb native PNW truffles grow in private woodlands

• The PNW has a reputation for tourism and foods that are produced locally, sustainably, and organically.

• The Oregon Truffle Festival, the first of its kind in the English-speaking world.

• A world renown, six-decade legacy of truffle research and the greatest concentration of truffle specialists in the world.
The North American Truffling Society has been promoting sustainable commercial harvesting of truffles since the 1970's.
Oregon black and white truffles

Photo by Mike McDermott

Searching for truffles at the Oregon Truffle Festival.

Photo by Andrea Johnson
Geographic ranges of Oregon black and Oregon white truffles based on herbarium collections at Oregon State University.
Soils suitable for Oregon white and Oregon black truffles.
Environmentally, truffles are not only suited to our climate and soils, but can be produced in a sustainable and ecologically friendly manner. They lend themselves to low-input and organic farming methods, and require few resources for production and distribution. The PNW’s native black truffle species grows in coastal streamside forests that enhance salmon habitat; all of them thrive in young forests that sequester the greenhouse gas CO$_2$. 

Photo: Dan Luoma
# Native Oregon Truffles: Potential 2030 U.S. Demand, Value & Acres

<table>
<thead>
<tr>
<th>Factor</th>
<th>Units</th>
<th>Low estimate</th>
<th>Medium estimate</th>
<th>High estimate</th>
<th>Optimistic estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total demand for native truffles</td>
<td>U.S. tons/yr</td>
<td>23</td>
<td>91</td>
<td>312</td>
<td>833</td>
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<tr>
<td># Acres needed</td>
<td>Acres</td>
<td>9,000</td>
<td>18,250</td>
<td>31,219</td>
<td>55,500</td>
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<tr>
<td>Value of U.S. demand for native truffles</td>
<td>$ Millions</td>
<td>4.5</td>
<td>36.5</td>
<td>187.3</td>
<td>666</td>
</tr>
</tbody>
</table>

Estimates modeled by James Julian, agricultural economist with the Agricultural Economics Research and Extension Service of Oregon State University in Pilz et al., 2009
604 gram truffle. Found in the south of Tuscany, near Chiusi. $500 – $3,000 per pound
Teruel, Spain
• Teruel Province underwent massive depopulation during second half of the 20th century.

• This was accompanied by the abandonment of traditional agricultural practices.

• One response was investment in developing production of the European (Périgord) black truffle.
• Teruel held the 1st International Congress of Trufficulture in early March, 2013. The event brought together 270 people from 23 countries.

• Trufficulture is an excellent tool for the sustainable development of rural areas and helps to revitalize multiple-use of the forests that was lost in previous decades.
Potential need for development of processing facilities
Production of artificially inoculated seedlings
TRUFA NEGRA DE TERUEL
TUBER MELANOSPORUM

PESO: 26

LOTE: 1013

CONSERVAR REFRIGERADA
Tourism
The Congress was organized by the Aragon Government, with its Industry and Agriculture Department as well as CITA, in collaboration with Teruel City Council, Teruel Council, Huesca Council, Zaragoza Council, National Institute for Agricultural and Food Research and Technology (INIA), Aragón Developement Institute, Dinópolis, Teruel Chamber of Commerce, Teruel Employers’ Federation, Caja Rural of Teruel, Teruel Black Truffle Growers Federation (ATRUTER), Gúdar-Javalambre region, Spanish Truffle Growers Federation (FEET), University of Zaragoza, Polytechnic University of Valencia (UPV), Forestry Spanish Society (SECF) and Cesefor Foundation.
Priorities

* Create a reputation for high quality truffles *

PNW’s native truffle industry will flourish when it develops a reputation for producing and marketing only high-quality truffles. When these truffles command premium prices, their sales will generate the income needed for a well-managed industry.

Creating this reputation will require a collective effort. Truffle industry association will be necessary

For the native truffle industry, the most important tasks will be:
- Encouraging expansion of research and Extension Service activities
- Sponsoring or supporting dog training
- Developing a certification program
- Encouraging collaborative ventures

Research and Extension
For a native truffle industry to flourish we must retain our existing professional expertise and hire additional specialists. Funds for expanded research will greatly improve the breadth and applicability of information we can provide to producers.

Forestry Extension programs focused specifically on native culinary truffle production can effectively educate woodlot owners about how to profit from truffles in their woodlands. Landowners need site visits by knowledgeable individuals who can evaluate the potential of their property for truffle production.

Dogs
Trained truffle dogs will help the PNW improve the quality and reputation of its truffles and create exemplary standards for environmentally responsible harvesting practices.
Diversity, Ecology, and Conservation of Truffle Fungi in Forests of the Pacific Northwest

James M. Trappe, Randy Molina, Daniel L. Luoma, Efren Cázares, David Pilz, Jane E. Smith, Michael A. Castellano, Steven L. Miller, and Matthew J. Trappe