

A photograph of a sunset over a mountain range. The sun is low on the horizon, partially obscured by a mountain peak, creating a bright orange and yellow glow. The sky transitions from a deep orange near the horizon to a pale yellow at the top. The mountains are silhouetted against the bright sky.

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

Dr. Daniel Luoma

Department of Forest Ecosystems and Society  
College of Forestry  
Oregon State University

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



# What are truffles?

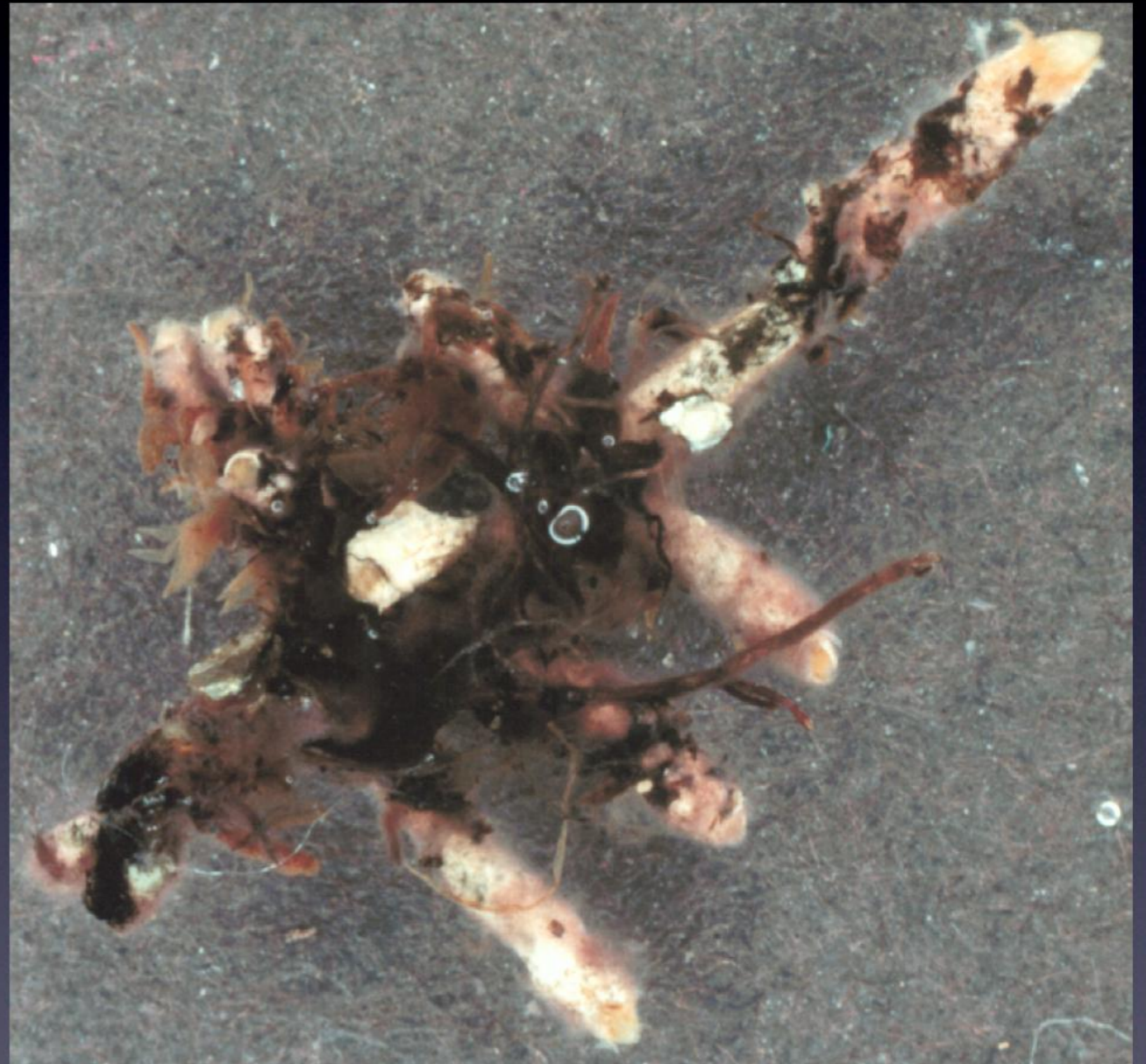
- ✦ Similar to apples on a tree
  - a fruiting structure for reproduction



# Where do they come from?

Mycorrhiza = a symbiosis

- mycos - fungus
- rhiza - root



A stylized black silhouette of a tree with numerous pink starburst patterns scattered throughout its branches, set against a blue background. The tree's trunk is on the left, and its branches extend across the top and right portions of the frame.

# Mycorrhizae

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

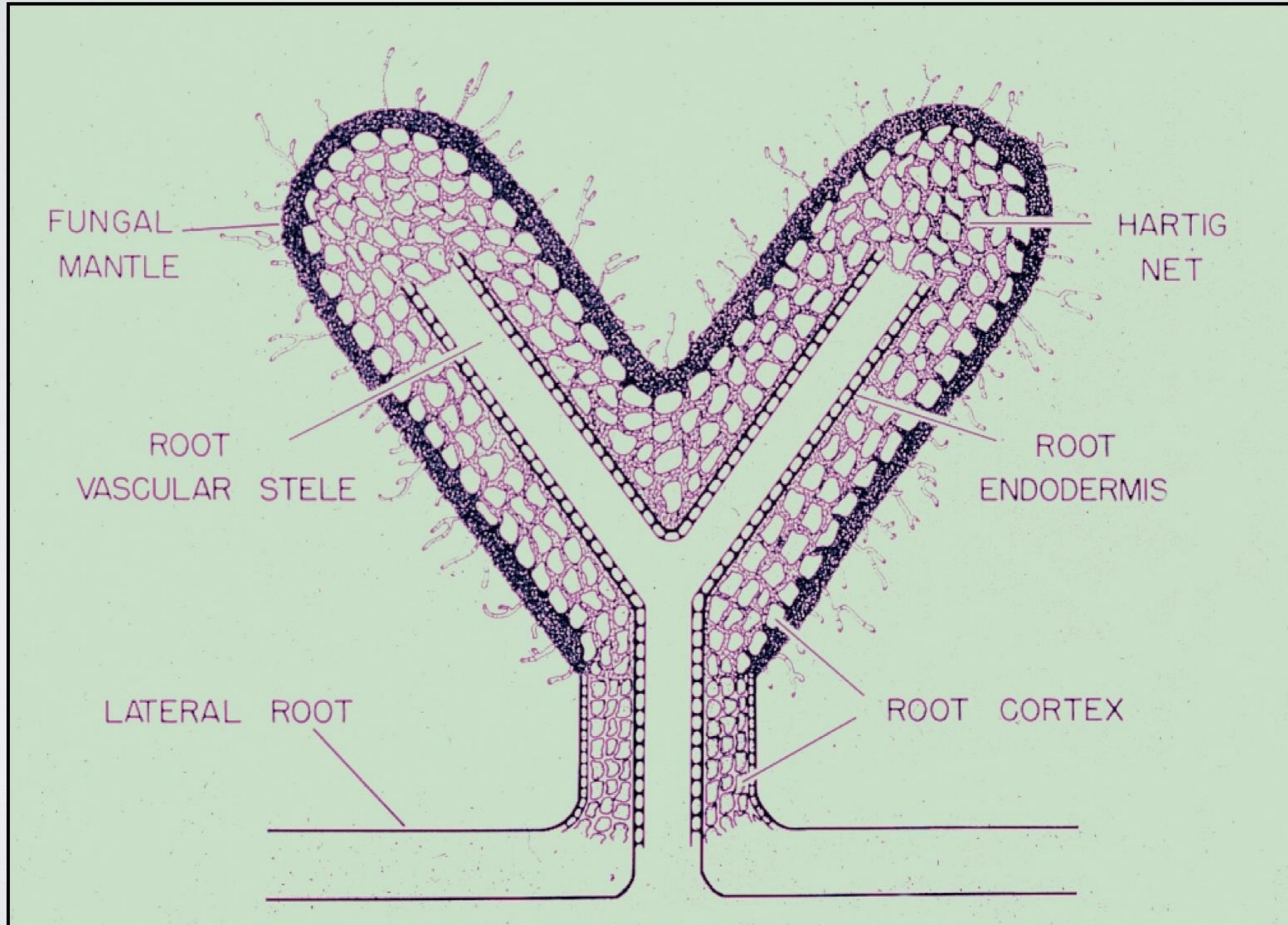
# Importance of Mycorrhizae

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.

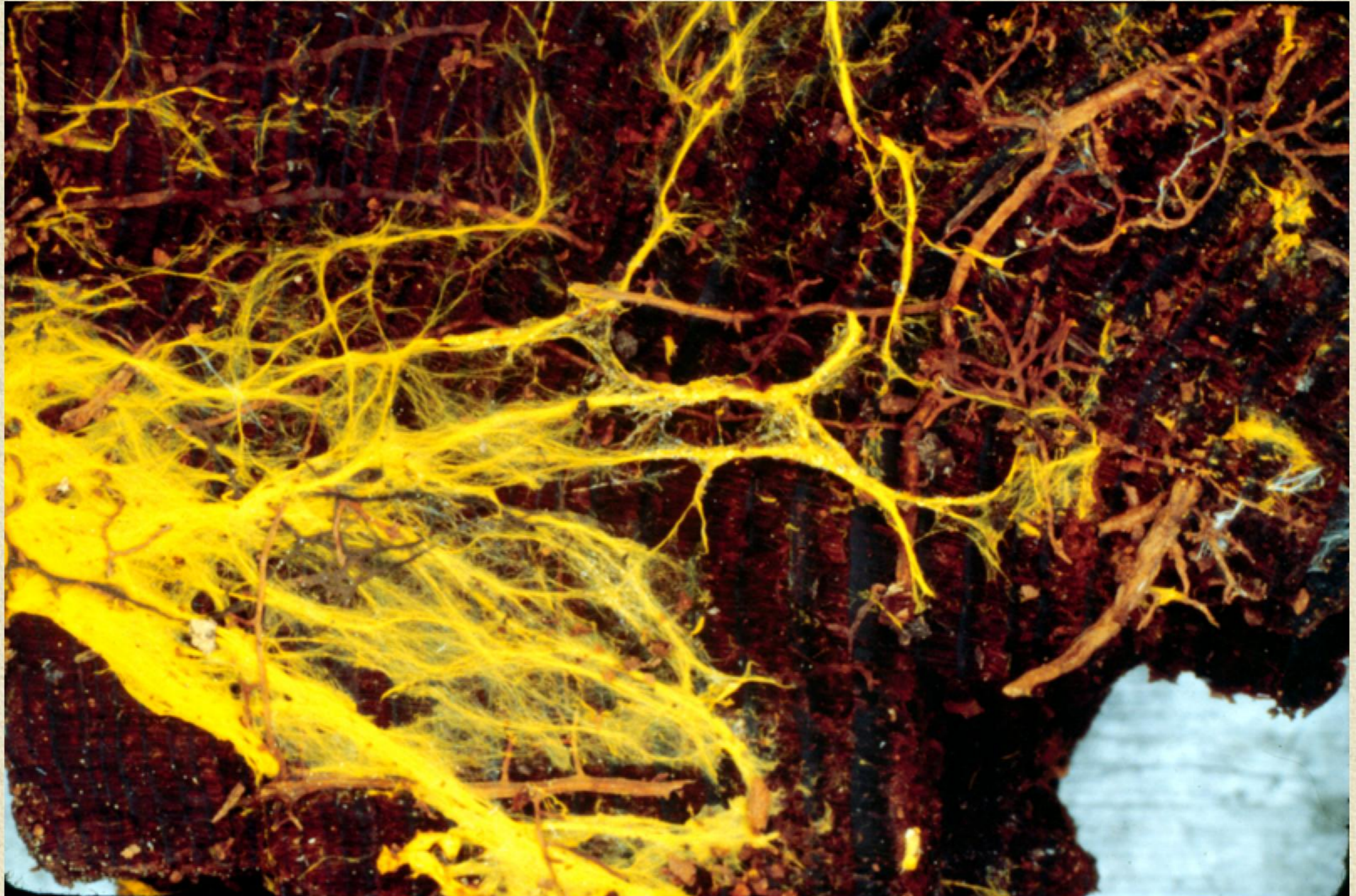
Mycorrhizae are essential for survival and growth of most coniferous forest trees and other shrubs and herbaceous vegetation

# 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?



Photo: Dan Luoma

**Oregon white truffle**

\$50 – \$200 per pound



Photo: Charles LeFevre

**Oregon black truffle**

\$80 – \$300 per pound

# 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

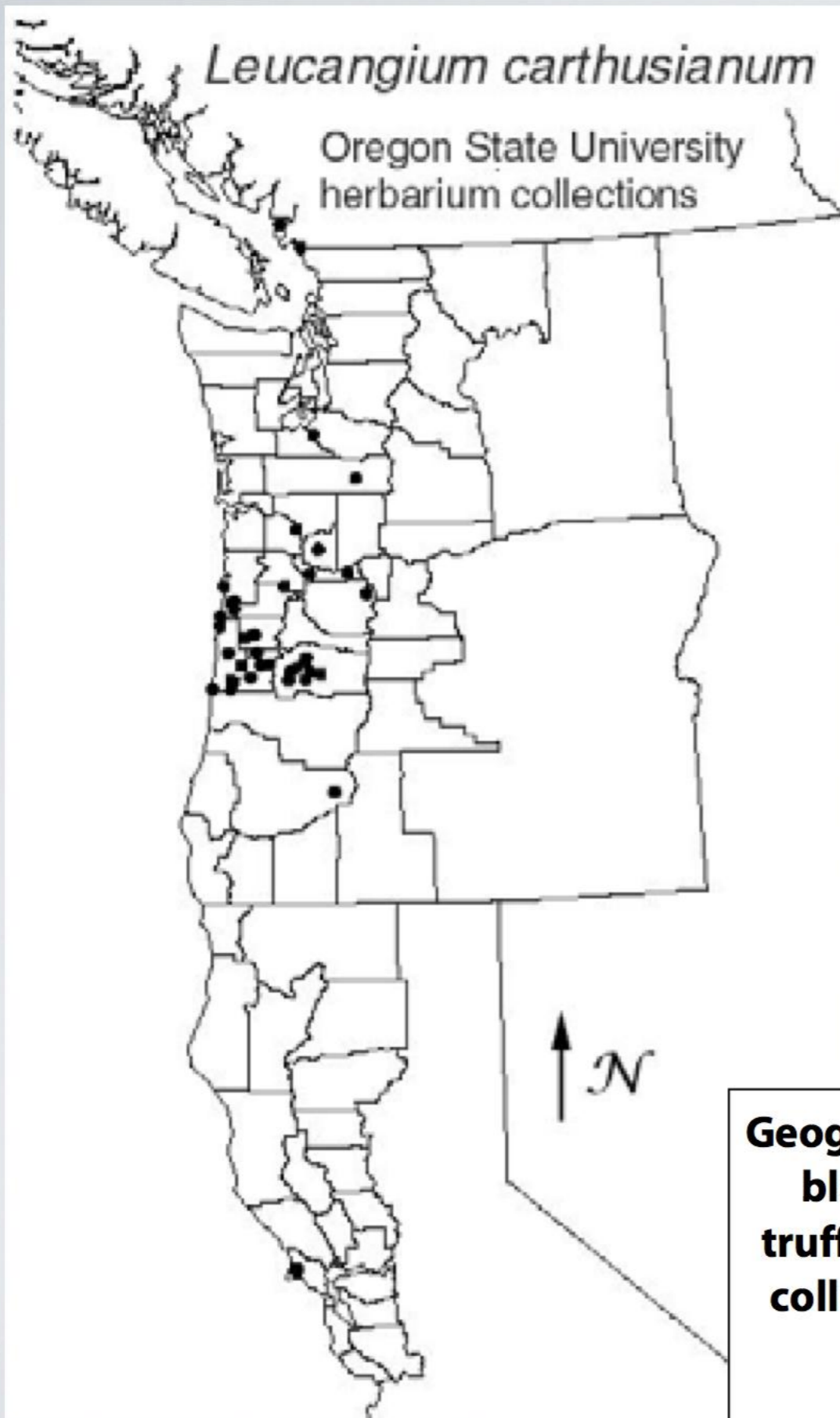


**Searching for truffles at the Oregon Truffle Festival.**

Photo by Andrea Johnson

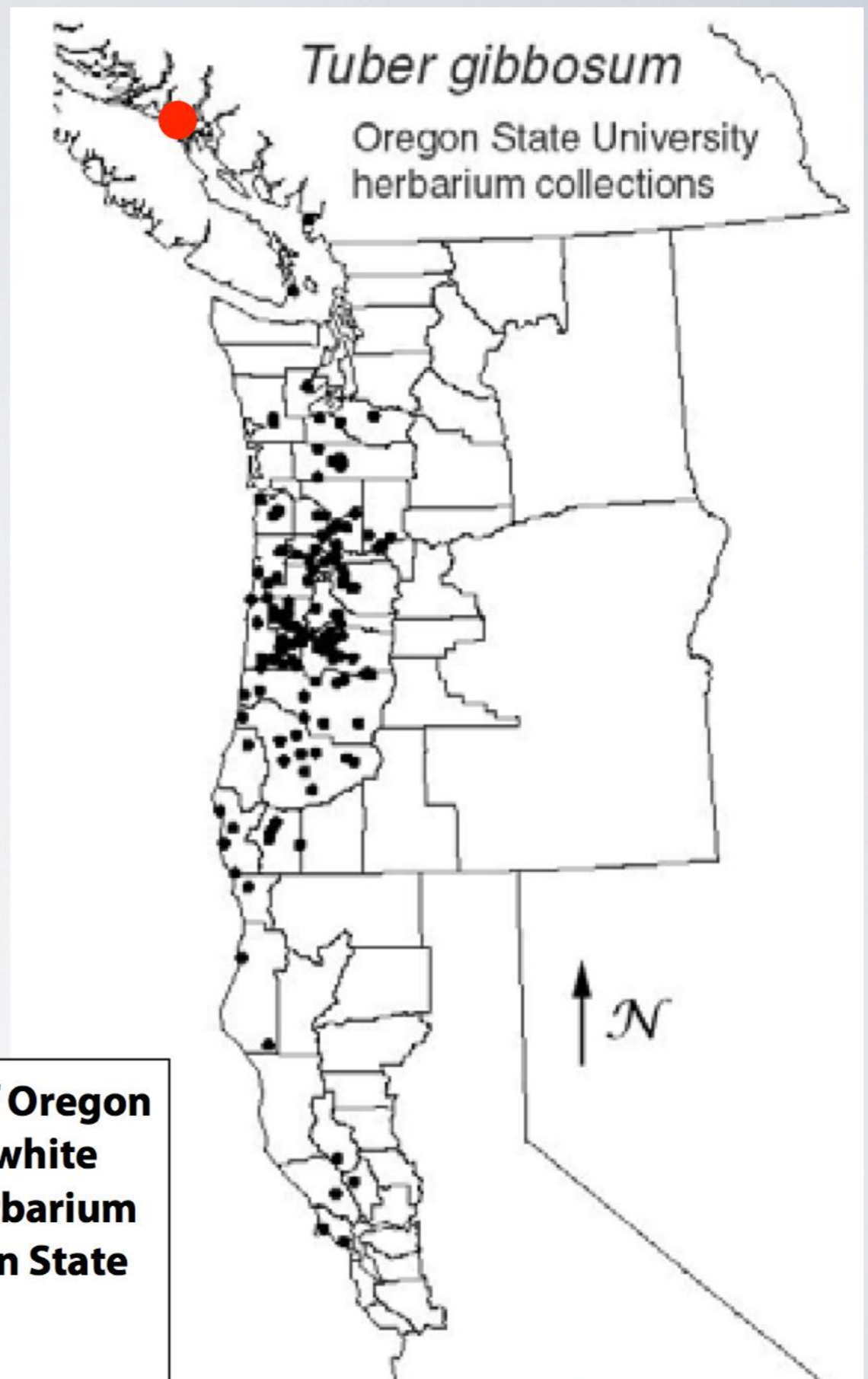
*Leucangium carthusianum*

Oregon State University  
herbarium collections



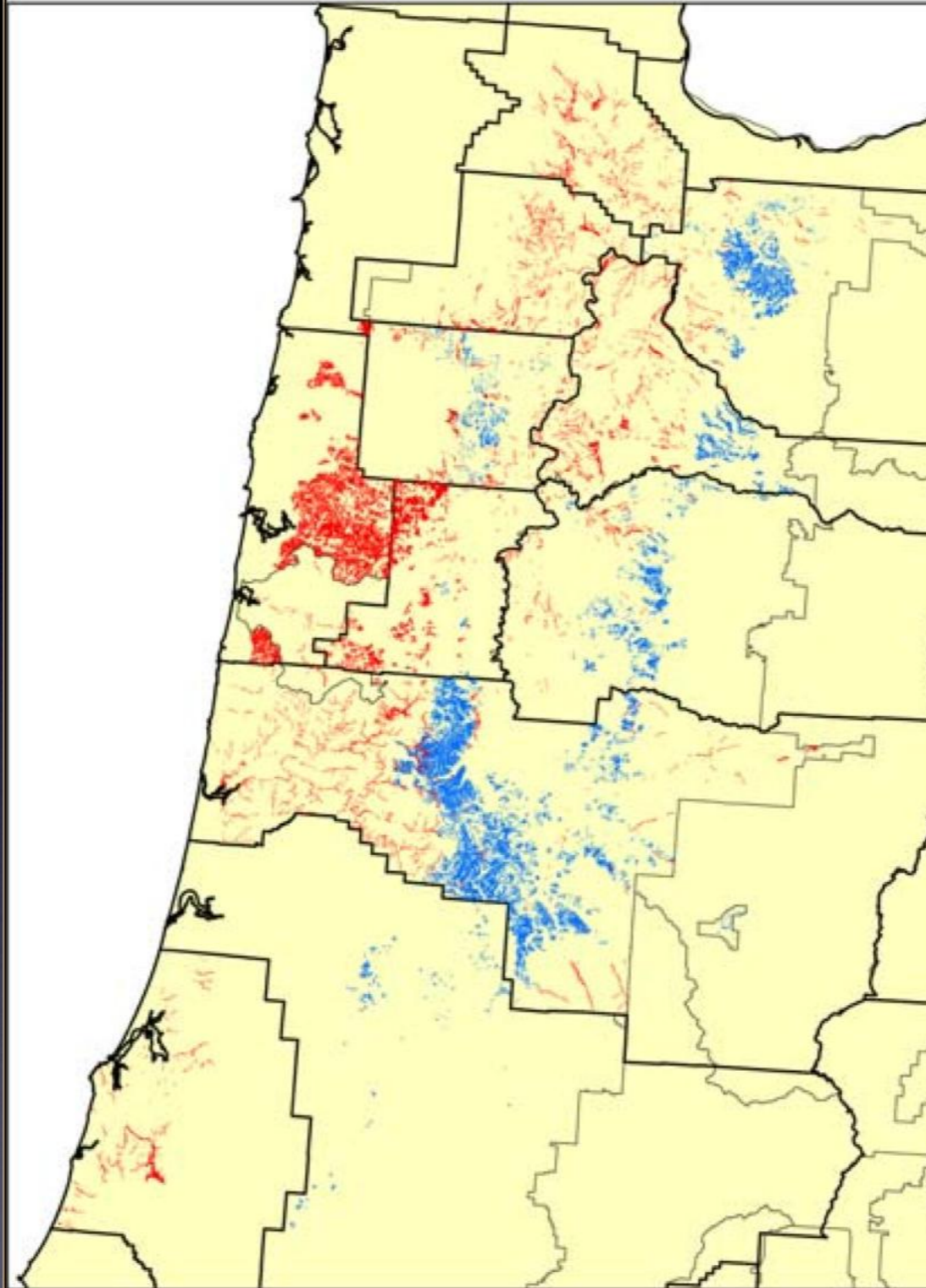
*Tuber gibbosum*

Oregon State University  
herbarium collections



**Geographic ranges of Oregon  
black and Oregon white  
truffles based on herbarium  
collections at Oregon State  
University.**

Oregon black truffles in red  
Oregon white truffles in blue



**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<sub>2</sub>.



Photo: Dan Luoma





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

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

Estimates modeled by James Julian, agricultural economist with the Agricultural Economics Research and Extension Service of Oregon State University in Pilz et al., 2009

- **Brief overview of European truffles**



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

# 1<sup>ST</sup> International Congress of TRUFFICULTURE



- 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.





\$250 – \$1,500 per pound



Potential need  
for development  
of processing  
facilities



Production of artificially inoculated seedlings







**MANJARES**®  
DE LA TIERRA

**TRUFA NEGRA DE TERUEL**  
**TUBER MELANOSPORUM**

ESPAÑA  
21.20572/TE  
C.E.E.

PESO:

36

LOTE:

1013

**CONSERVAR REFRIGERADA**

# QUESOS SIERRA DE ALBARRACIN



CHARCUTERIA  
AGUSTIN



# 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 Development 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.

ORGANISERS | ORGANIZADORES



SPONSOR | PATROCINADORES



COLLABORATORS | COLABORA



MEDIAPARTNER | MEDIO COLABORADOR





# 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.

United States  
Department of  
Agriculture

Forest Service

Pacific Northwest  
Research Station

General Technical Report  
PNW-GTR-772  
April 2009



# 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

