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Using radiocarbon to determine the mycorrhizal status of fungi

Erik A. Hobbie1,3, Nancy S. Weber2, James M. Trappe2 and Gert J. van Klinken1

Summary

- Measurements of 13C in fungal sporocarps are useful in assessing mycorrhizal or saprotrophic status. Because 14C measurements can indicate the age of fungal carbon (C) and mycorrhizal fungi depend closely on recent photosynthate, 14C may provide additional insight into possible mycorrhizal status.
- Sporocarps, needles, and litter from Woods Creek, OR, USA together with archived sporocarps were measured for 14C content by accelerator mass spectrometry.
- Known mycorrhizal fungi resembled current-year needles (Amanita, Cantharellus and Gomphidius) or atmospheric CO2 (Tuber) in 14C and indicated an average age of 0–2 yr for incorporated C, whereas saprotrophic genera (Pleurocybella, Lepiota and Hypholoma) were composed of C at least 10 yr old. Of genera tentatively considered mycorrhizal from previous work with 13C, only Otidia and Sowerbyella appeared mycorrhizal from 14C measurements, whereas Aleuria, Clavulina, Paurocotylis and Ramaria (sensu lato) consisted of older carbon and were presumably saprotrophic.
- 14C clearly separated known mycorrhizal or saprotrophic fungi and indicated 13C measurements should be interpreted cautiously on species of unknown status. 14C results for needles and mycorrhizal fungi suggested that C sources other than atmospheric CO2 may contribute small amounts of C. Possible sources include storage of carbohydrates and amino acids, organic nitrogen uptake, and incorporation of soil-respired CO2 by anaplerotic or photosynthetic pathways.

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Mushrooms, Trees, and Money: Value Estimates of Commercial Mushrooms and Timber in the Pacific Northwest

SUSAN J. ALEXANDER, DAVID PILZ, NANCY S. WEBER, ED BROWN, VICTORIA A. ROCKWELL

A1 USDA Forest Service, Pacific Northwest Research Station, 3200 SW Jefferson Way, Corvallis, Oregon 97331, USA
A2 Department of Forest Science, Oregon State University, 321 Richardson Hall, Corvallis, Oregon 97331, USA
A3 USDA Forest Service, Winema National Forest, Chemult Ranger District, P.O. Box 150, Chemult, Oregon 97731, USA
A4 USDA Forest Service, Wallowa-Whitman National Forest, 1550 Dewey Avenue, Baker City, Oregon 97814, USA

Abstract

Wild edible mushrooms are harvested in the forests of the Pacific Northwest, where both trees and mushrooms grow in the same landscape. Although there has been some discussion about the value of trees and mushrooms individually, little information exists about the joint production of, and value for, these two forest products. Through four case studies, the information needed to determine production and value for three wild mushroom species in different forests of the Pacific Northwest is described, and present values for several different forest management scenarios are presented. The values for timber and for mushrooms are site- and species-specific. On the Olympic Peninsula in Washington, timber is highly valued and chanterelles are a low-value product by weight; timber has a soil expectation value (SEV) 12 to 200 times higher than chanterelles. In south-central Oregon, timber and American matsutake mushrooms have the potential to have about the same SEV. In eastern Oregon, timber is worth 20 to 110 times as much as the morels that grow in the forest. Production economics is concerned with choices about how much and what to produce with what resources. The choices are influenced by changes in technical and economic circumstances. Through our description and analysis of the necessary definitions and assumptions to assess value in joint production of timber and wild mushrooms, we found that values are sensitive to assumptions about changes in forest management, yields for mushrooms and trees, and costs.

Keywords:

KEY WORDS: Joint production; Resource value; Economics; Mushrooms; Nontimber forest products

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High-elevation gray morels and other Morchella species harvested as non-timber forest products in Idaho and Montana

ERIKA M. McFARLANE a1, DAVID PILZ a2 and NANCY S. WEBER a2
a1 349 S. Logan St., Denver, CO 80209, USA. Email: erikamark@hotmail.com

a2 Department of Forest Science, 321 Richardson Hall, Oregon State University, Corvallis, OR 97331 USA. Email: david.pilz@oregonstate.edu; nancy.weber@oregonstate.edu

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Abstract

We investigated post-fire morels (Morchella species), especially the “gray” morels of Idaho and Montana, by collecting ecological and genetic data and by interviewing commercial mushroom harvesters and buyers. Gray morels fruited exclusively in high-elevation Picea/Abies forests that had burned the preceding summer, predominantly in zones of moderate fire intensity as indicated by a layer of dead conifer needles on top of the fire ash. Genetic analysis revealed five varieties of morels among our specimens. Mushroom harvesters confirmed that gray morels are economically crucial to their business because they are typically large, heavy, and durable. Harvesters and buyers described the varieties of morels they encountered differently than mycologists did, but cooperative research could facilitate mutual understanding of morel diversity and benefit everyone involved.

Key Words: Morels; non-timber forest products; wildfire; forest ecology; taxonomy; commercial harvesters; mushroom buyers.

http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=15316884&itool=iconabstr&query_hl=1&itool=pubmed_docsum

Mycorrhiza. 2005 Mar;15(2):79-86. Epub 2004 Aug 13. Related Articles, Links
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Pezizalean mycorrhizas and sporocarps in ponderosa pine (Pinus ponderosa) after prescribed fires in eastern Oregon, USA.

Fujimura KE, Smith JE, Horton TR, Weber NS, Spatafora JW.

Department of Forest Science, Oregon State University , Richardson Hall, Corvallis, OR 97331, USA.

Post-fire Pezizales fruit commonly in many forest types after fire. The objectives of this study were to determine which Pezizales appeared as sporocarps after a prescribed fire in the Blue Mountains of eastern Oregon, and whether species of Pezizales formed mycorrhizas on ponderosa pine, whether or not they were detected from sporocarps. Forty-two sporocarp collections in five genera (Anthracobia, Morchella, Peziza, Scutellinia, Tricharina) of post-fire Pezizales produced ten restriction fragment length polymorphism (RFLP) types. We found no root tips colonized by species of post-fire Pezizales fruiting at our site. However, 15% (6/39) of the RFLP

types obtained from mycorrhizal roots within 32 soil cores were ascomycetes. Phylogenetic analyses of the 18S nuclear ribosomal DNA gene indicated that four of the six RFLP types clustered with two genera of the Pezizales, Wilcoxina and Geopora. Subsequent analyses indicated that two of these mycobionts were probably Wilcoxina rehmii, one Geopora cooperi, and one Geopora sp. The identities of two types were not successfully determined with PCR-based methods. Results contribute knowledge about the above- and below-ground ascomycete community in a ponderosa pine forest after a low intensity fire.

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Environ Manage. 2002 Jul;30(1):129-41. Related Articles, Links

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Mushrooms, trees, and money: value estimates of commercial mushrooms and timber in the pacific northwest.

Alexander SJ, Pilz D, Weber NS, Brown E, Rockwell VA.

USDA Forest Service, Pacific Northwest Research Station, 3200 SW Jefferson Way, Corvallis, Oregon 97331, USA.

Wild edible mushrooms are harvested in the forests of the Pacific Northwest, where both trees and mushrooms grow in the same landscape. Although there has been some discussion about the value of trees and mushrooms individually, little information exists about the joint production of, and value for, these two forest products. Through four case studies, the information needed to determine production and value for three wild mushroom species in different forests of the Pacific Northwest is described, and present values for several different forest management scenarios are presented. The values for timber and for mushrooms are site- and species-specific. On the Olympic Peninsula in Washington, timber is highly valued and chanterelles are a low-value product by weight; timber has a soil expectation value (SEV) 12 to 200 times higher than chanterelles. In south-central Oregon, timber and American matsutake mushrooms have the potential to have about the same SEV. In eastern Oregon, timber is worth 20 to 110 times as much as the morels that grow in the forest. Production economics is concerned with choices about how much and what to produce with what resources. The choices are influenced by changes in technical and economic circumstances. Through our description and analysis of the necessary definitions and assumptions to assess value in joint production of timber and wild mushrooms, we found that values are sensitive to assumptions about changes in forest management, yields for mushrooms and trees, and costs.

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Mycorrhiza-like interaction by Morchella with species of the Pinaceae in pure culture synthesis

J. L. Dahlstrom, J. E. Smith, N. S. Weber

A1 Marlboro College, Marlboro, VT 05344, USA
A2 US Department of Agriculture, Forest Service, Pacific Northwest Research Station, Forestry Sciences Laboratory, 3200 SW Jefferson Way, Corvallis, OR 97331, USA e-mail: smithj@fsl.orst.edu Fax: +1-541-750-7329
A3 Department of Forest Science, Oregon State University, Corvallis, OR 97331, USA

Abstract:

Abstract Isolates from two species of Morchella were tested for ability to form mycorrhizae in pure culture synthesis with Arbutus menziesii, Larix occidentalis, Pinus contorta, Pinus ponderosa, andPseudotsuga menziesii. Ectomycorrhizal structures (mantle and Hartig net) formed with the four species of the Pinaceae but not with A. menziesii. Results are compared to previous studies on morel mycorrhizae and discussed in an ecological context.

Keywords:

Key words Morchella · Pinus contorta · Pinus ponderosa · Pseudotsuga menziesii · Larix occidentalis