

Variation in mushroom frequency on woody debris in areas of different forest management techniques

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Introduction

Fungi are essential in decomposing organic matter and are indispensable in nutrient cycling and exchange. Previous research has shown that woody debris is a key factor for biodiversity, especially that of fungi (Jonsson and Kruys, 2001).

Much research has looked at species abundance on coarse woody debris (CWD; diameter >10 cm) versus fine woody debris (FWD; diameter <10 cm). Abundance of fungi is generally positively correlated with log diameter, however, Kruys and Jonsson (1999) found that at low volumes of woody debris, species abundance increased with the proportion of FWD.

Forests are managed in a variety of ways and this may affect the amount of woody debris in ways that affect fungi. In a managed forest, the largest trees, which would offer the most CWD, are taken out of the ecosystem. This may skew the size of woody debris toward smaller diameters. As a consequence, fungal species may decline.

The purpose of this study was to test three differently managed sites, sampling the proportion of coarse and fine woody debris that has fungal growth in each area.



Methods

We collected data from three MOFEP plots in Missouri in the summer of 2008. Deer Run, in Reynolds County, as well as Paint Rock and Cardareva, both of Shannon County. The sites have three different types of forest management practices. The Paint Rock Forest has even-age management, Cardareva has uneven-age management, and Deer Run is a control site with no cutting. The clearcuts (even-aged) and select cuts (uneven-aged) were eleven years old at the time of our study. Twenty circular plots, each twenty meters in diameter, were selected in the draws of each of the three management sites. Woody debris was divided into size categories of small (2 -10 cm) and large (>10 cm). Small woody debris constitutes fine woody debris (FWD) and large constitutes coarse woody debris (CWD). The number of each size of woody debris was recorded along with the number of woody debris that had fungi growing on them. An ANOVA test was used to compare the proportion of fungi growth on FWD and CWD between the management sites.

Average Proportion of Woody Debris with Fungi

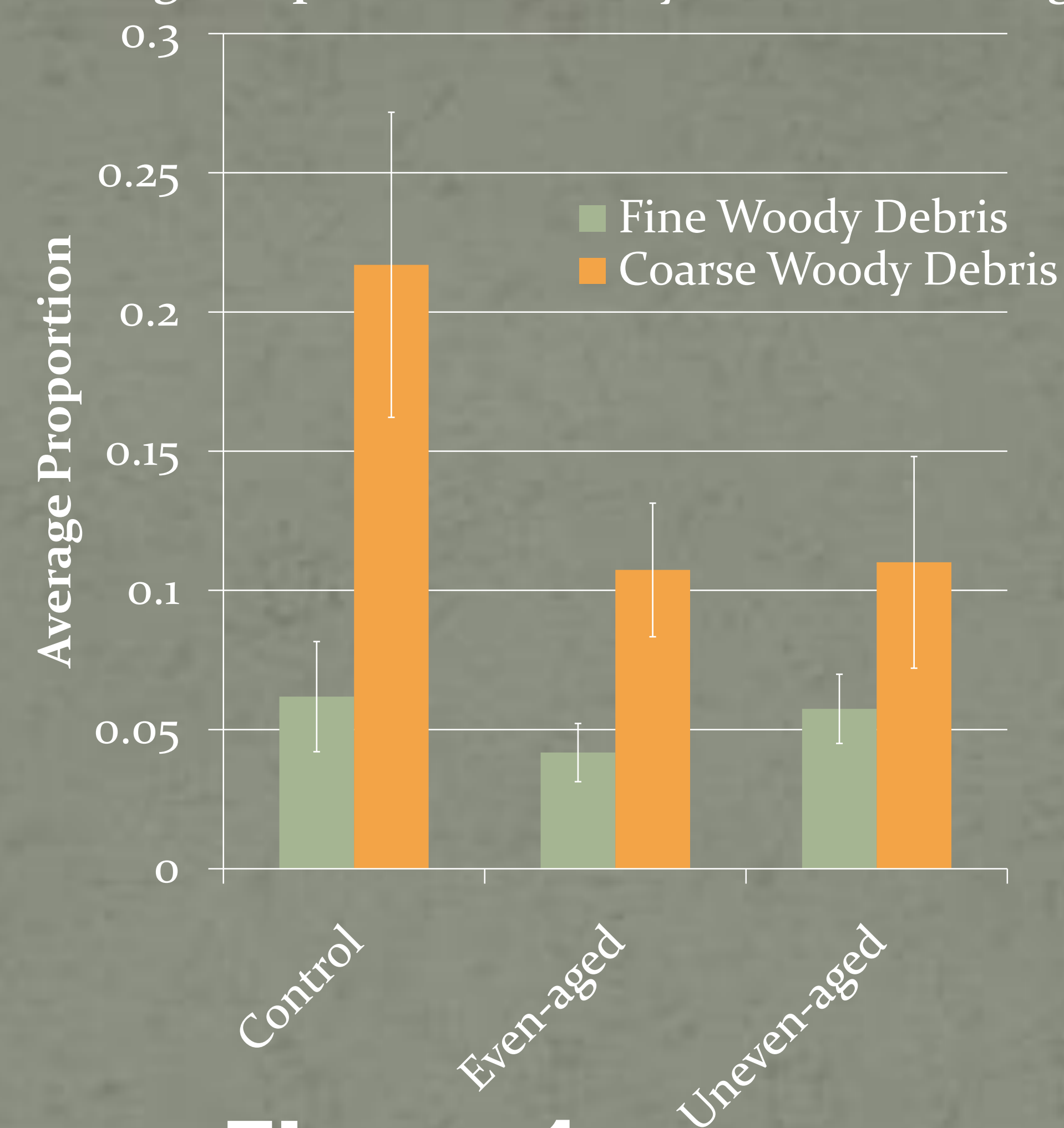


Figure 1

Results

We found a significant difference in the proportion of coarse woody debris with fungi between the three sites ($F = 8.63$; $df = 2, 57$; $p = .00053$). The control management site had a significantly higher proportion of CWD with fungi (Fig. 1). There was no significant difference in proportion of fine woody debris with fungi between the three management sites ($F = 0.868$; $df = 2, 57$; $p = 0.4252$, Fig. 1).



Discussion

While it is known that forest management takes CWD out of the ecosystem, our results also show that the CWD that remains in the harvested areas will have a lesser proportion of CWD with fungal growth than a no-harvest site. Both types of managed forests may have a lesser proportion of fungi growing on its CWD because of the relative age of any of the downed wood. Most of the CWD would be from the cuts eleven years prior. Most of the CWD on the no-harvest site would be from the gradual death of older or weakened trees. Fungi may tend to grow on newer dead CWD, rather than CWD that is many years old.

In all three management types of the forest, there was no significant difference in proportion of FWD with fungal growth. This may be due to a relative availability of new FWD from both mature trees and new growth trees.

In conclusion, our data suggest that harvesting CWD out of forests with both selective cuts and clearcuts may result in less prominent fungal growth on CWD in cut areas than in unharvested areas, possibly due to lack of new CWD. This contrasts with FWD, as it will be available for growth in a management site as well as a non-harvest site, allowing fungi's normal growth patterns on FWD in each management site.



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Literature Cited:

- Jonsson, B.G.; Kruys, N.; 2001. *Ecology of Woody Debris in Boreal Forests*
- Kruys, N.; Jonsson, B.G.; 1999. *Fine woody debris is important for species richness on logs in managed boreal spruce forests of northern Sweden.* Can. J. For. Res. 29(8): 1295-1299