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Pleurotus Djamor Cultivation on Various Sustainable Waste Substrates

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ABSTRACT

Abstract

This experiment consisted of testing the productivity of 4 different recycled substrates and their ability to produce the largest final mass of *Pleurotus Djamor.* Oak mulch, palm mulch, coffee grounds, and a mix of all three were tested. The levels of mycelium growth were measured rather than mushroom mass due to time constraints. The mixed substrate was predicted to have the best results; however, coffee surpassed it and had the overall fastest development times. Oak mulch had barely any mycelium growth, never surpassing 20%. Even though this is a small-scale experiment, certain outcomes may lead to future large-scale changes, thus reducing the amount of waste in public spaces by a noticeable amount.

INTRODUCTION

Introduction

Mushrooms' impact on the 3 Pillars of Sustainability:

- People-convert waste into food production
- Planet- produce compost, closed loop system
- Profit- reduce cost by reusing materials

Benefits of using *Pleurotus djamor*:

- Decrease waste quantity
- Food production
- Medicine
- Compost/Fertilizer (Rinker, 2002)
- Adaptable and qiuick to colonize on many Substrate (Stamets, 2000)
- Bioremediation (Bressa et. al, 1988)

Figure 7. Sustainable Cycle of *Pleurotus Djamor*

OBJECTIVE

Which recycled substrate will produce the largest final mass of *Pleurotus djamor* mushroom through cultivation?

METHODS

Methods

A total of nine trials were performed for each substrate, creating 36 overall tests. The growing mediums were collected in separate five gallon buckets and soaked in water for 3 hours and were then sun dried. The moisture content of the sun dried substrates were then analyzed using the the Oven method (Stamets, 2000). The ideal moisture content was 55% to 65%. If the percentage was too low, water was added; if the percentage was too high, substrate was baked at 350°F for 15-minute intervals. The substrates were then pasteurized by baking them in trays and heating them to 160° F for at least one hour by oven. Each substrate was then placed in layers into wide mouth autoclaved glass quart jars with Pleurotus Djamor spawn in between to ensure thorough colonization. The capped jars were placed in a dark incubation room between 75-85° F. Over the colonization period, the amount of mycelium growth in each jar was observed every two days. The data was recorded based on the quickness and quality of mycelium growth per substrate. The jars were then uncapped and placed in a terrarium containing 100% humidity for fruiting.

Figure 1. Three substrates being tested from left to right: palm mulch, oak mulch, coffee grounds.

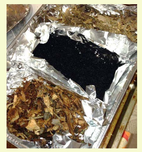


Figure 2. Substrates were soaked in water to raise moisture content.

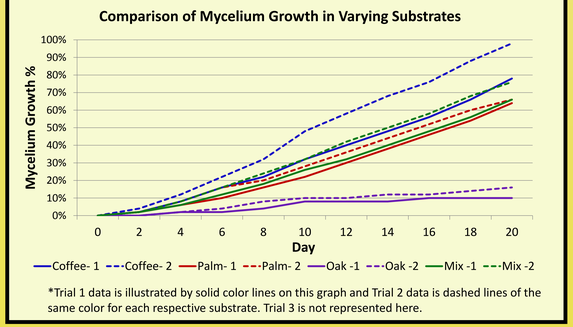
Figure 3. Substrates were placed in oven to adjust moisture content to 55-65%.

Figure 4. Palm mulch was cut into 3" pieces to maximize chance of mushroom colonization.

Figure 5. Jars were inoculated and placed in a terrarium outdoors.

Figure 6. Mycelium growth visible in the second trial in coffee grounds.

RESULTS



*Trial 1 data is illustrated by solid color lines on this graph and Trial 2 data is dashed lines of the same color for each respective substrate. Trial 3 is not represented here.

Results

Coffee had the fastest colonization times in this experiment. The mixed substrate had the second fastest times. Its second trial results developed at the same pace as the first trial of coffee, only being surpassed at the end. Palm mulch had just slightly less growth than coffee and mixed substrates. Its second trial surpassed the growth the first mixed trial. Oak mulch had barely any colonization. The second run of the experiment had a faster development time than the previous run. This held true for all four substrates being tested.

DISCUSSION

Discussion

The coffee grounds used as a substrate gave the quickest colonization times, contrary to the original hypothesis that the mixture of palm mulch, oak mulch, and coffee grounds would colonize at the fastest rate. The palm mulch never surpassed 20% of visual mycelium growth. As a result of this, it is believed that by palm mulch being in the mixture, it might have decreased the nutritional value enough to put it at a disadvantage when compared to coffee alone.

As well, there may be some bias in the mycelium growth results shown here as they were based on outward visual appearance, and inner growth in the jars could not be properly accounted for.

FUTURE WORK

Future Work

Due to time constraints of the project, the experimental data was collected before fruiting bodies emerged. Therefore, instead of determining the efficiency substrates by comparing mushroom mass, the mycelium growth was analyzed.

Mushrooms started to appear only a few days after the experimental cut off point, and shocking observations were reported. Even the oak mulch, which visually had the least mycelium growth produced mushrooms. A future experiment analyzing the mass Of fruiting bodies will provide more information about the effectiveness of substrates.

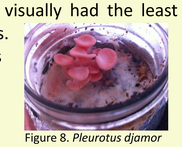


Figure 8. *Pleurotus djamor* growing on the coffee substrate.

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