



SUSTAINABLE URBAN MUSHROOM CULTIVATION



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According to the Environmental Protection Agency, in just 2018 around 290 million tons of solid waste was produced and around only 30% was recycled or composted (EPA 2019).

Introduction

In urban communities, there are hundreds of tons of waste produced every year and finding ways to upcycle waste can be beneficial to the environment. Coffee grounds are a waste produced in coffee shops and 99% of the organic matter from coffee is discarded afterwards. Similarly, in urban communities, tree cuttings are discarded in landfills, and some are recycled. A solution to removing these organic products from the waste stream would be to cultivate mushrooms through the upcycling of these materials. This would also provide a source of fresh, nutritious food in urban food deserts.

Coffee Grounds



Tree Logs

Purpose

This research project aims to experimentally measure the mass of oyster mushrooms produced using coffee grounds and logs and compare it to the mass (g) produced from commercially available premade mushroom substrate to determine the feasibility of home-grown oyster mushrooms. The overall implications of the project encompasses the potential beneficial impact of the different growing options on the waste stream. Ten local coffee shop owners and urban forestry personnel in the Pittsburgh region were interviewed about the feasibility of upcycling both forms of waste.

Abstract

It is important to find different methods of reducing and repurposing waste, since over 60 percent of solid waste is organic waste which could all potentially be recycled, upcycled, or composted (EPA 2019). Used coffee grounds from urban coffee shops and tree cuttings from local tree services are two sources of organic waste products that end up in landfills, but they can be repurposed to grow mushrooms. Two experimental groups consisting of coffee ground substrate bags and wooden log substrates were inoculated with pearl oyster sawdust spawn along with a control group of oyster mushroom kits were used to compare mushroom growth and feasibility for individuals to grow their own mushrooms. The control kits were the only medium that produced mushrooms. Future experiments need to be conducted using coffee grounds and logs to find an optimal ratio, duration, and conditions to maximize mushroom yield.



Figure 1: Oyster mushrooms growing on a commercial medium

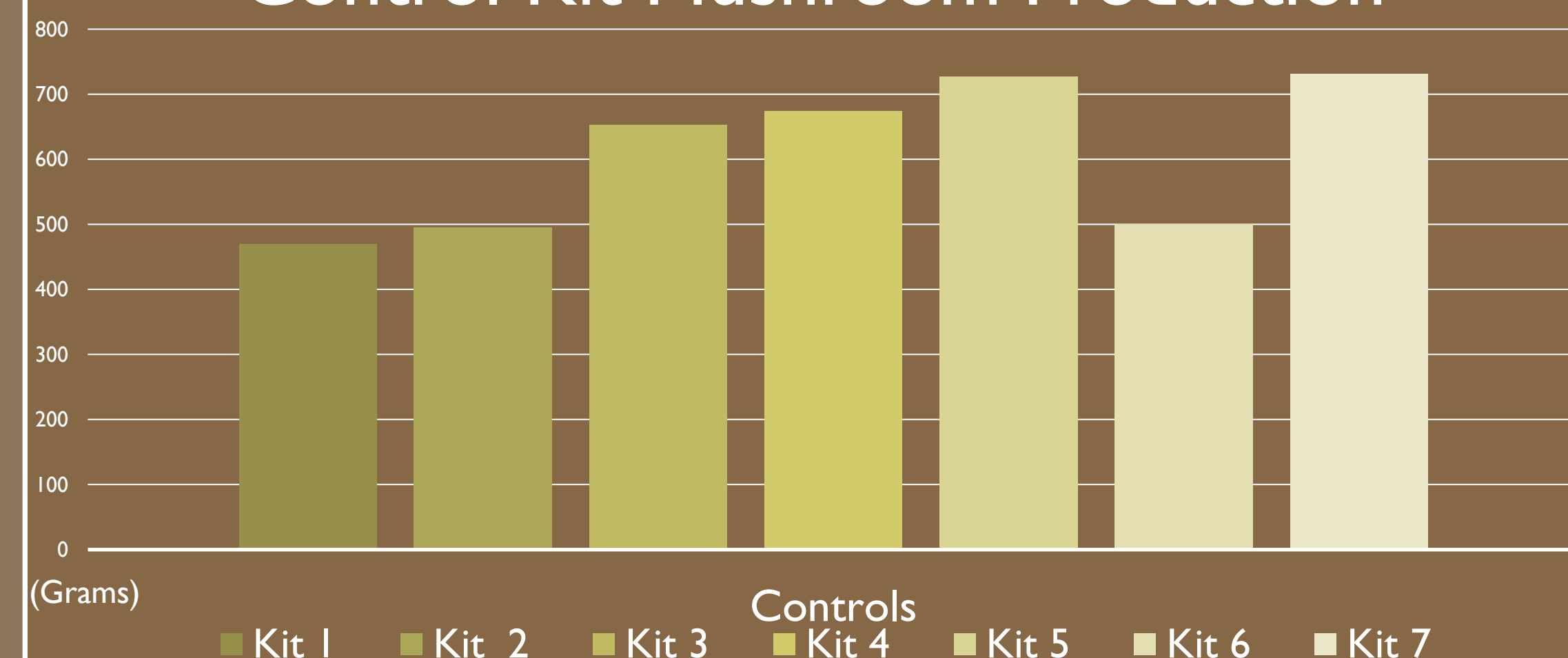
Interviews

Most coffee shop owners agree that sustainability and upcycling are important, and that their coffee grounds are accessible to the public.



"I think sustainability is a critical issue facing my business, and really all businesses right now honestly. At the same time, it is very unclear what is actually better for the environment" – Pittsburgh Local Coffee Shop Owner

Control Kit Mushroom Production



Field & Forest Products

Method

For the experiment, Pearl Oyster mushroom sawdust spawn, sourced from the website Field and Forest, was used to inoculate coffee grounds, logs, and a typical commercial medium. Three buckets of coffee grounds were sourced from local coffee shops. These coffee grounds were layered with sawdust spawn and packed into plastic sleeves to start the inoculation process. Eight 3-8" diameter by 36-40" logs were sourced from local tree disposal companies and drilled to be inoculated. Finally, seven oyster mushroom kits from Field & Forest was used as the control group. Ten coffee shops and local tree services were interviewed to gain insight on their views of growing mushrooms through upcycled waste products.

Results

- The eight control kits produced an average of **607.43 grams** of oyster mushrooms.
 - It averaged **25.30g** of mushroom per dollar value for the kit
- Both the Coffee grounds and Tree logs did not produce any mushrooms within the 8-week time frame.

Conclusion

- The data of 25.3g/\$ for oyster mushrooms produced by kits can be helpful for people looking to start growing oyster mushrooms and want to know the cost vs mass of mushrooms. The coffee grounds and logs might not have produced mushrooms due to time restraints or high moisture levels in the substrate.
- Further experiments must be done to find ideal conditions for growth since both these substrates are known to grow oyster mushrooms.
- Future studies can include finding a ratio of coffee grounds to straw substrate that would maximize mushroom yield to optimize the amount of labor that goes into growing mushrooms for the average individual.