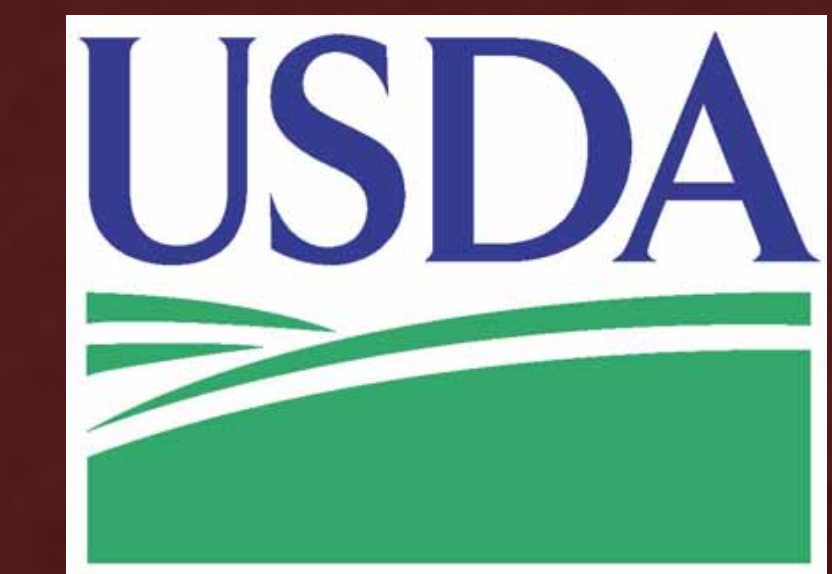


# Adding Value to Hydroponic Production with Oyster Mushrooms

Marisol Soza, Eric Wendt, Dr. Ken Mix, and Dr. Nicole Wagner

Department of Agriculture, College of Applied Arts, Texas State University



## Introduction

### Hydroponics

Hydroponics is a fast growing field that allows for year round production of crops. These high-tech systems are able to mimic climates that would otherwise only occur seasonally. Also, due to their potential more dense nutritional value, aesthetic appeal, and sustainable growing tactics, hydroponic crops have some advantages over field grown crops.

### Mushrooms

Specialty mushrooms, such as shiitakes and oysters, are a high value crop which totaled 96 million in sales in 2017. Oyster mushrooms are sold at \$3.10/pound, illustrating their economic value (USDA,2017). To produce these specialty mushrooms, specific environments must be curated to produce moderate to high humidity and temperature.

### Integrating

This project explores vertically integrating a layer of high value mushroom crops into a hydroponic plant-production system to increase the economic return per area. Specifically we will compare the viability, compatibility and competitiveness of traditional mushroom production.

## Methodology

The experimental design will include three plots. The first two of which will mimic traditional mushroom production: 1) HVAC controlled environment with no light, 2) no HVAC with no light, and 3) a Buddha Box hydroponic unit that is a controlled environment with high humidity and is lit by LEDs.

Ten medium mushroom grow bags, with a 0.2 micron filter, will be placed in each one of the above environments. The substrate will be composed of 24 % chopped wheat straw (2-6cm), 75% cotton seed hulls, and 1% ground limestone (PennState Extension). Before inoculation we will pasteurize and aerate the substrate for one hour at 65 degrees Celsius. To inoculate the substrate, a pink oyster mushroom culture (*Pleurotus djamor var. roseus*) syringe will be used to obtain a 5% spawn rate (i.e. the ratio of the liquid mushroom culture weight over the total wet substrate weight). Once inoculated, fruiting should occur within 12-14 days, and mushrooms will be harvested 3-4 weeks after spawning. After harvest, yields will be weighed and analyzed.



## Research Questions/Objectives

### Questions

1. Can mushrooms be integrated into functioning hydroponic systems in order to increase value/utilize unused space per square footage?
2. If mushrooms can be grown in a hydroponic setting, what is the most efficient method of doing so?
3. Do LED lights produce a higher yield of oyster mushrooms compared to fluorescent lights?

### Objectives

Determine if a hydroponic setting is viable and beneficial for mushroom production as compared to traditional agricultural techniques by producing mushrooms under different light exposures, temperatures, and humidities; while also monitoring the growth rates and overall yield.

Evaluate the monetary value of adding a high dollar specialty crop, such as oyster mushrooms, into a functioning hydroponic system.

## Further Research

One might expand on this topic by observing the effects of different wavelengths of light on mushroom growth. Alternative mushroom varieties could also be investigated, in order to find the efficiency of those varieties in different environments.

Furthermore we know *Pleurotus* species can grow on a variety of plant wastes. The invasive water hyacinth that pollutes the San Marcos river could potentially offer a way to transform plant waste residues into a protein rich food.

