Culinary & Medicinal Mushroom Cultivation For Family Farms

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Mushrooms Farming Is Vastly Different Than Plant & Animal Farming

History of Mushroom Cultivation is only ~1400 years old

In 1886 relatively pure mushroom cultures were first obtained

In 1905 mushroom spawn was first produced from mushroom tissue
ENERGY
Modern Indoor Cultivation

Advantages
High quality mushrooms, mycelium, and more
Labor Efficiency
Optimal yields in minimal space
Consistent production year-round

Disadvantages
High initial investment
Ongoing energy demands
Substrate preparation
Climate Controls
Distribution
Traditional Outdoor Log Cultivation

Advantages
Low initial investment
VERY energy efficient
Enjoyable outdoor work
Provides economic return on forested land

Disadvantages
Much more labor intensive
Seasonal production
Length of time between inoculation and harvest
Timing of harvest essential for quality mushrooms
Outdoor Bed Cultivation

**Advantages**

Low initial investment
Energy efficiency, especially if non-pasteurized substrates
Provides economic return on forested and farm land
Enjoyable outdoor work

**Disadvantages**

Not suitable for many desirable species
Seasonal production and timing of harvest issues
Contamination risk in un- & over-pasteurized substrates
Wild-crafting Mushrooms

Advantages
Low initial investment
VERY energy efficient
Enjoyable outdoor work
Provides economic return on forested land

Disadvantages
Low harvest per acre
Seasonal harvest
Substantial seasonal variations
Timing of harvest even more essential for quality
Hybridizing Cultivation Methods

Consider:

- Desired product (food, medicine, etc.)
- Desired species and available strains
- Sustainable energy sources & energy efficient technologies
- Climate (and potential climate change impacts)
- Cost, seasonality, and quality of required labor
- Available market size and seasonality

& Countless more variables but most importantly don`t be afraid to experiment...
Wine Cap Stropharia
(Stropharia rugoso annulata)

Outdoor Cultivation
Produces exceptional yields in woodchip & straw outdoor beds

Indoor cultivation not recommended

Photo courtesy of Chris Chaisson
Cordyceps (Cordyceps sinensis and others)

Indoor Cultivation & Wild-crafted
Reishi (Ganoderma lucidum species complex)
Indoor & outdoor both good cultivation options
Fruitbody superior for triterpenoids
Shiitake (Lentinula edodes)

Indoor Cultivation
Requires substantial energy to sterilize substrate
Produces quality product

Outdoor Log Cultivation
Most sustainable option
Preferably oak, but red maple and beech also work. Lighter trees like poplar and birch produce lower yield for equal work.
Do not allow to dry out or stay wet too long
First fruiting in 6-24 months
A 40” log should produce 2 – 4 or more lbs of fresh shiitake over the course of 3-5 years
Wine Cap Stropharia
(Stropharia rugoso annulata)

Outdoor Cultivation
Produces exceptional yields in woodchip & straw outdoor beds

Hardwood chips and mulch

Indoor cultivation not recommended
Types of spawn

Grain Spawn

- Rye, millet, and other grains or grain blends colonized with living mycelium
- Mice and insects can pose problems if used outdoors
- Additional nutrients can increase yield indoors if other nutritional supplementation is not used
Types of spawn (cont)

Sawdust Spawn

Sawdust is used instead of grain

Usually most affordable type of spawn

Best option for inoculating logs by stacking log chunks >8” in diameter (and larger stumps) with layers of spawn between the log chunks, or when using a specially designed inoculation tool, use like plug spawn in 4-8” diameter logs
Types of spawn (cont)

Plug Spawn

Small wooden dowls colonized with mycelium

Least likely to fail in log cultivation

Peg & thimble spawn variations
Indoor Cultivation of Oyster Mushrooms

Limited materials are needed to get started

- A propane burner
- A 55 gallon metal drum
- A metal basket slightly smaller than the inside of the 55 gallon drum
- A row of hunting broadheads screwed into a 2x4
- Plastic bags
- Healthy mushroom spawn
- Alcohol or bleach
- A stainless steel table
- Powdered gypsum
- Straw
- Spent brewery grain or other nitrogen supplement (optional)
Step 1
Heat a 55 gallon drum 3/4 full of water to 160 degrees F.

Step 2 (recommended, but not essential)
Shred the straw (possible by hand, but best with the help of a bale chopper or wood chipper) to make the straw an optimal 4-6 inches in length.

Step 3
Pack the metal basket with as much straw as it will fit, with spent grain or other nitrogen supplement in alternating layers with the straw.

Step 4
Once the water in the drum has reached 160 degrees F, place the basket full of straw in the drum and use cinder blocks or other weights to keep all the straw submerged in the hot water. Keep the straw in this water, maintained at 160 degrees F, for between 45 minutes and 1 hour.
Step 5
Remove the basket of straw, laying the straw on a stainless steel table to cool. Once the straw is cool to the touch, add gypsum and mushroom spawn, mixing thoroughly and fill plastic bags with the substrate.

Step 6
Puncture the bags with arrow heads, with holes about every 4 inches from each other, and place the bags in a clean area at room temperature (75 deg F).

Step 7
Once the bags are fully colonized, it is important that they are placed in a high humidity environment, or a microhabitat that is high in humidity can be created around them.

Step 8
Enjoy! As a general rule of thumb you should get at least 1 lb of fresh oyster mushrooms per 10-12 lb bag of straw/spent brewery grain substrate.
Outdoor Cultivation of Shiitake

Materials needed

A drill and 5/16 inch drill bit or an angle grinder and special bit (HIGHLY RECOMMENDED)

Clean freshly cut oak logs

Healthy mushroom spawn

A rubber mallet (plugs) or palm inoculator (sawdust)

Beeswax and method to melt it
Marketing Suggestions

Fresh is BEST! But...

Details of harvest & shelf-life of fresh mushrooms
Timing, timing, timing
Species (and strains) of mushrooms chosen
Immediate refrigeration & packaging options

Cautiously maximize return on excess production
IF YOU UNDERCUT YOURSELF SHORT TERM,
YOU WILL LIKELY HAVE TO DO SO LONGTERM...
Dried
IQF
Value-added products
Wholesale distributor
Resources of Potential Interest
Appropriate Technology Transfer for Rural Areas
www.attra.ncat.org/attra-pub/mushroom.html
Green Mountain Mycosystems’ Website
www.vermontmushrooms.com

Additional Mycology Information:
www.namyco.org/education/index.html

Spawn suppliers include:
www.alohamedicinals.com
www.fieldforest.net
www.wildbranchmushrooms.com

Market Stats: www.americanmushroom.org/nass.htm