



Culinary & Medicinal Mushroom *Cultivation For Family Farms*

**By David Demarest &
Green Mountain Mycosystems, LLC**

**www.vermontmushrooms.com
Underhill Center, VT 802-355-6637**

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

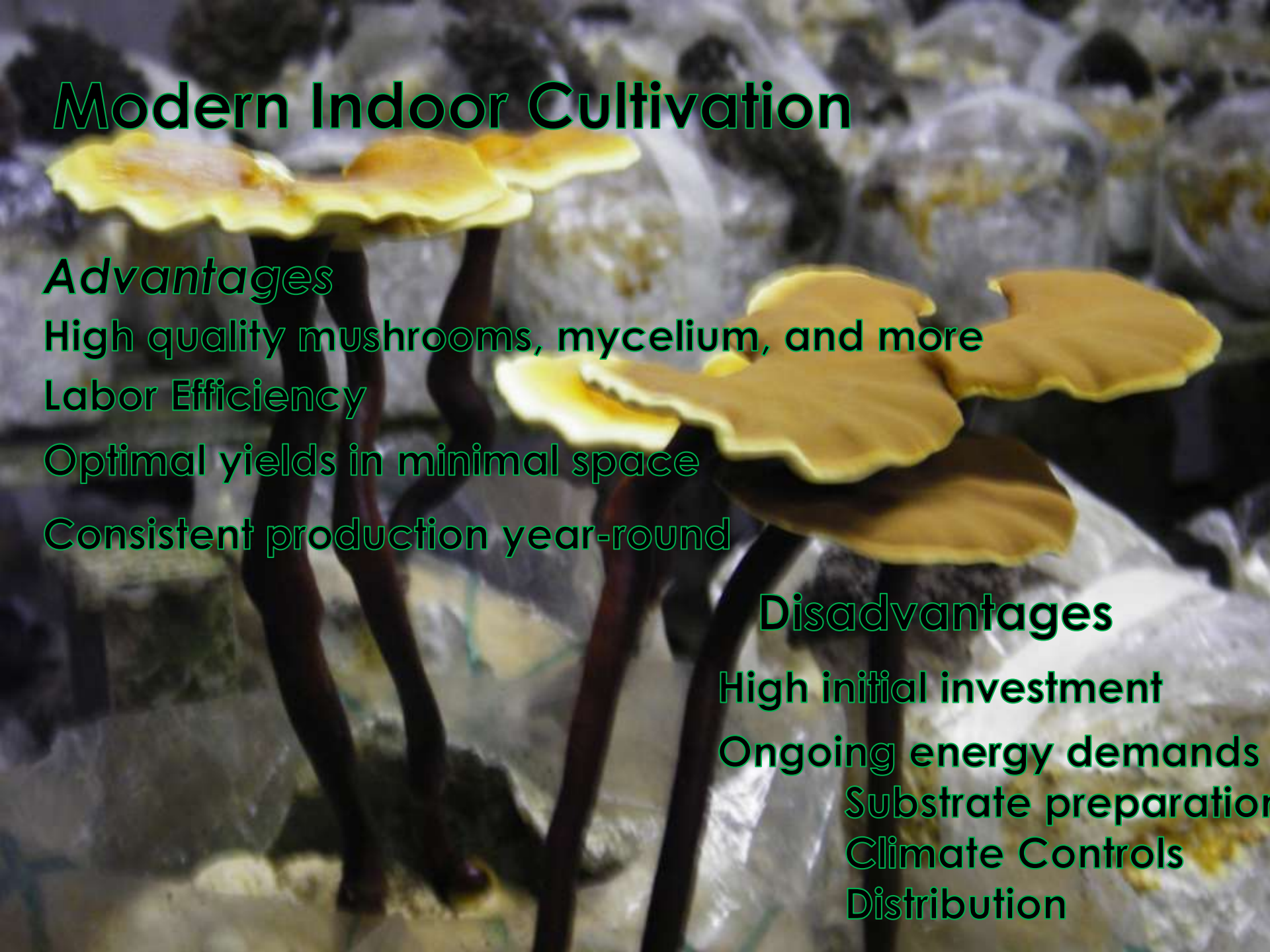
In 1905 mushroom spawn was first produced from mushroom tissue



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

A photograph of a log with several mushroom caps growing from it in a forest setting. The log is positioned diagonally across the frame. Several mushroom caps are visible, some with light-colored gills and others with darker, more textured surfaces. The background is a dense forest floor covered with fallen leaves and twigs.

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 Cultivaion 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

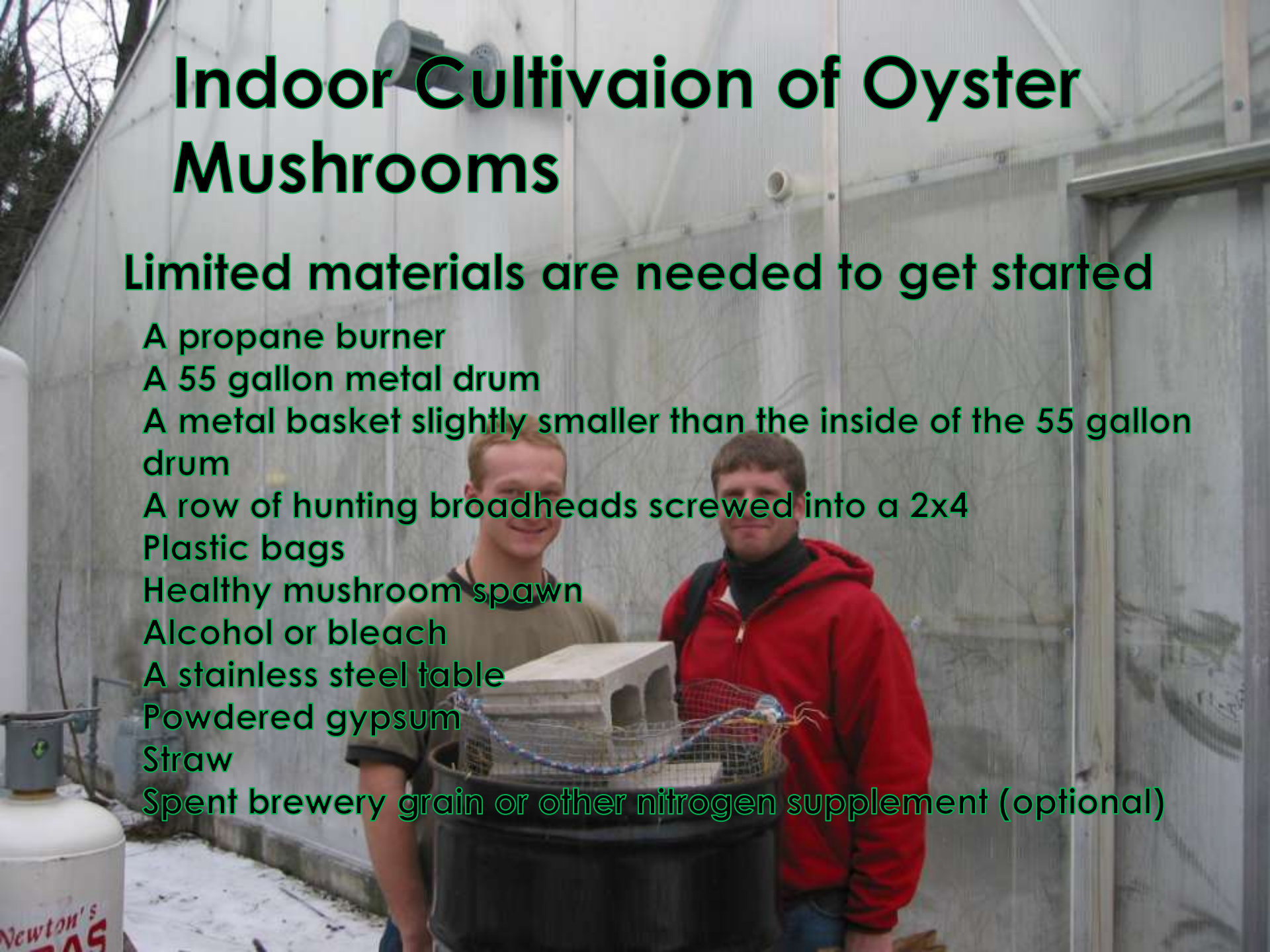
Alcohol or bleach

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)

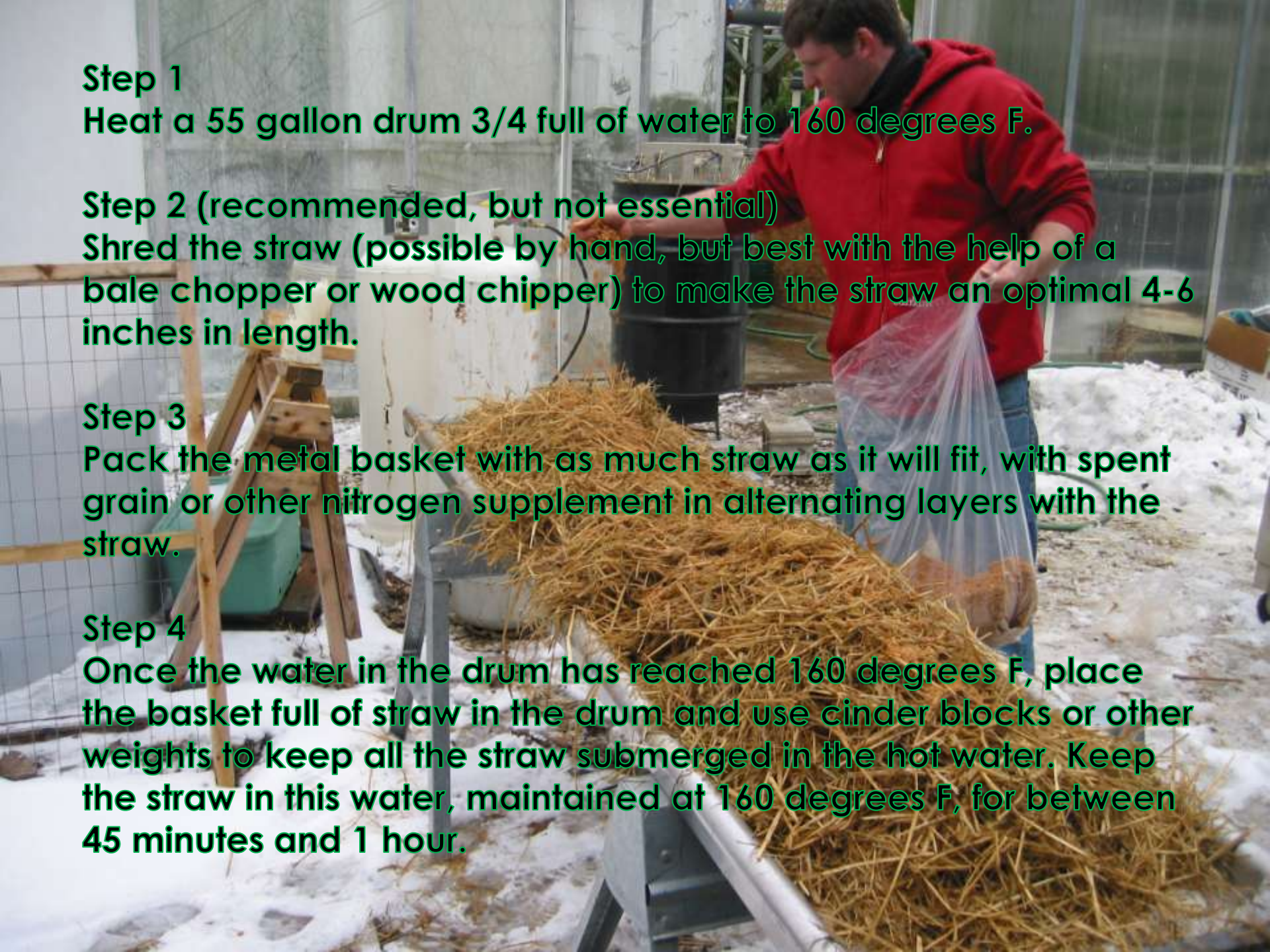
Shred the straw (possible by hand, but best with the help of a bale chopper or wood chipper) to make the straw an optimal 4-6 inches in length.

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 Cultivaion 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

