Mushroom Farming @ PSU

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PLANT 461

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Mushrooms & PSU Student Farm

3 main species

- Letinula edodes (Shiitake)
- Pleurotus ostreatus (Oyster)
- Stropharia rugosoannulata (Wine Cap)

Mushrooms are: high in protein, low in fat, contain all essential amino acids, contain vitamin D and healthy compounds.

Penn State has a fungal culture library with many strains of these three species.

Fungi would be integrated into the student farm a little after the initial phase of development, mainly because of the irrigation requirements and the desire for an existing storage and distribution infrastructure.

Three Ways to Grow

Stropharia beds
- Pasteurize straw, inoculate with spawn
- Mix inoculated, colonized straw with fresh hardwood chips in a bed in the forest
- Irrigate and maintain temperature

Oyster Totems
- Cut foot-thick logs of fresh-cut softer hardwoods (especially tulip poplar) into foot long slices
- Stack-clip these slices together with spawn/sawdust/ water paste between them
- Cover, irrigate, wait, uncover, harvest

Shiitake logs
- Logs with little heartwood, 1-1.3 meters long, 7-22cm diameter
- Oak, Hornbeam, Alder, Hickory
- Many ways to stack the logs: bulk pile, low crib, lean-to, A-frame, vertical bulk stacking
- Periodically turn or move logs to allow for even growth and water distribution

Three Phases to Growing

Spawn/Spawn run
Shiitake: 22-25C, log moisture content 35-55%. 60-85% shade
Oyster: 24-29C, RH around log 90-100%, 100% shade
Wine Cap: 25-27C, RH 90+%, underground, so 100% shade

Primordia formation
Shiitake: 13-20C, LMC 55-65%
Oyster: 20C, saturate with H20 10 days before harvest, maintain high RH
Wine Cap: 12.7-17C, 95+%, misting 1x-2x/day, some light

Fruitbody formation/harvest

Shiitake: Temp: High temp = ↑ maturation, ↓quality; Low temp = ↑ density, ↑ flavor
RH 60-85%: High RH = ↑ sogginess, ↓ shelf life
Light required for proper cap color: ↑T= ↑ light required; ↓T= ↓ light required

Oyster: Soak logs, stop irrigation 1-2 days before harvest, fruiting takes 5-6 days. Harvest at 5 cm cap width

Wine Cap:12.7-17, RH 85-92, indirect light, harvest before or as the partial veil tears

Educational Opportunties

- Penn State has a history of mushroom studies.
- There is a mushroom cultivation course; a discussion with the professor who teaches it shows that he would love to have such a resource on campus to educate students.
- There is a mushroom minor.
- There is almost certainly funding available from the industry to educate the next generation of mushroom growers.
- Long crop cycles can lead to disappointment if students never get to see a harvest.
- Luckily, much cropping is done in fall and spring.

IPM

Competitor fungi

- Maintain good airflow and vigorous mycelial growth

Insects and snails/slugs

- Harvest quickly, spread gravel around the fruiting logs, allow birds to eat insects between harvests

Vertebrates

- Fencing or scare tactics

Bacteria

- Maintain good airflow, use healthy logs and maintain healthy mycelium

Storage

- Mushrooms can either be stored fresh for a few weeks in refrigeration or dried and stored for months, they can also be canned or pickled

- Shiitake dries better than Oyster or Wine Cap

- Oyster and Wine Cap are more suitable for canning and pickling

Marketing

- CSA shares would probably love the addition of fungus to their shares
- Local markets like groceries and restaurants
- Individual buyers; people are passionate about their mushrooms
- Dry and bag Shiitake for the off-season
- Can and store Wine Cap and Oyster for the off-season