New Hampshire Mushroom Company supplies specialty mushrooms to supermarkets and restaurants. They also sell at farmer’s markets. They came with a number of their produce fruiting from bags: *Hericium erinaceus* (Lion’s Mane or Bear’s Head), *Pleurotus eryngii* (King Oyster), *Pleurotus ostreatus* (Oyster mushroom) *Pleurotus ostreatus* var. *columbinus* (Blue oyster) *Pholiotus adiposa* (Chestnut mushroom), *Hypsizygus ulmarius* (Elm Oyster), and *Ganoderma lucidum* (Reishi Mushroom). There were two *Pleurotus eryngii* (King Oyster): one originating from Southern Russia and the other from the Mediterranean. They differ in their growth habits even though they are the same species.

Of these mushrooms, some grow naturally on live wood. The King Oyster grows on the roots of umbelliferous (carrot family) plants, while the *Hericium* and *Pleurotus ostreatus* grow both on live and dead trees.

Eric began by giving us an account of his experiences in growing mushroom commercially.

**Growth Media**

They grow their mushrooms in bags. They purchase their spawn, and their bags and they make up their growth medium, which consist of red oak sawdust, organic wheat middlings, limestone and water. They found that 2 - 5 % of lime works well.

They obtain their red oak sawdust from operations that use band saws so as to avoid oils because they are an organic grower. Different species of mushroom grow best in different proportions of red oak sawdust and wheat middlings. (They will not disclose any further information beyond this.)

The mixture is sterilized with steam. *Tricoderma*, a green mold, which is used in organic wheat as a biological control against plant pathogen is difficult to eliminate. The presence of this mold will lower the production of mushrooms.

For home growers, they recommend using a pressure cooker at 250°F and 15 psi for 1 hour, making sure that the steam heat reaches the interior enough to sterilize. However, do not over-sterilize because overcooking will degrade the sugars in the mix.
Inoculation and Incubation
After sterilization the bags are cooled to below 100°F before inoculation. Their inoculation is done in a sterile environment: spawn is poured into the mixture in the bag, the bag is heat sealed and placed in an incubation room. Incubation temperature and duration differs for different species. 60°F worked well for their Pholiotus.

After the mycelium penetrates the growing mix and looks white all over, a cut is made on the top of the bag to encourage fruiting at the opening. They are then transferred to their grow rooms.

Grow rooms
The grow rooms are equipped with four-foot deep shelves made of metal electrical conduits; misting systems to control humidity; ventilation systems to remove the carbon dioxide generated by the mushrooms; and heating systems to regulate temperature (a range of 55°F - 57°F). All these have to be carefully controlled to maximize mushroom production. Light is provided by full spectrum fluorescent grow light for 24 hours because mushroom fruiting is phototropic. In addition to all these controls, they look for microclimate variations in their growing conditions and match it with the requirements of different species at different time in their cycle.

King oysters need a high humidity – 80% and plenty of air flow. Different strains of King Oyster also requires different levels of light, the Mediterranean strain requires high light. Temperature affects the color of oyster mushroom: the colder the temperature the darker the color.

The time mushrooms spent in the growing room differs with species. Hericium takes 45 days in the grow room before fruiting. Chestnut mushroom stays 4 week in the grow rooms while King Oyster varies from 7-14 days depending on temperature. A variation of 2.5°F could double their growth cycle.

Harvesting.
The time of harvesting is critical to the longevity of the self-life of the mushroom. Chestnut mushroom should be cut before the veil breaks and this can happen in a matter of hours. King oyster, if cut before sporulation, could have a shelf-life of 35-40 days. Hericium is harvested very young when it is still fairly solid and will keep for 5 days.

The mushrooms are harvested with scissors or knives. If they are looking for a second flush, they are replaced on the shelves.

While the homeowner could go for as many flushes as the bag would produce. They do not go for more than two flushes because the yield decreases.
Waste: After the mushrooms have been harvested, the compost is sold for soil enrichment in gardens.

Books that they found helpful:
Paul Stamets, Growing Gourmet & Medicinal Mushrooms
Paul Stamets, Mycelium Running
Tradd Cotter, Organic Mushroom Farming and Mycoremediation: Simple to Advanced and Experimental Techniques for Indoor and Outdoor Cultivation
Shu-Ting Chang & Philip G. Miles, Mushrooms: Cultivation, Nutritional Value, Medicinal Effect, and Environmental Impact [Second Edition]

Author's Comments:
While there is an obsession to find the best environment, the perfect timing, etc. in Eric Milligan's approach, we as home growers can relax a little. We are not constantly looking at the bottom line. A few mushroom less may mean a mouthful less at the dinner table and not the collapse of a company. His experiences reveal the importance of different variety or strains of a species in relationship to the growing conditions. So tweak your microenvironment to suit your mushroom, or change the strain or species to suit your environment, as you wish. Have fun! Do enjoy each mouthful you produce. Don’t forget the butter, shallots, garlic...........My husband thinks that they would make rocks taste better.

Anna Seitz

Participants rip up cardboard to fill bags and use as growth medium.

Workshop leader, Eric Milligan, tips Stropharia spawn (on millet) into filled bags, which will then be sealed.
Our Project: Growing Stropharia rugosoannulata

**Material:**
- Mushroom bag (available from Northwest Mycological Consultants, Unicorn mushroom bags)
- Cardboard
- Water
- Stropharia rugosoannulata spawn (in millet)
- Cardboard box

**Method:**

Preparation and incubation
- Tare up cardboard and place in mushroom bag.
- Wet cardboard with tap water.
- Pour in some spawn. Mix. Seal top with tape. Place in cardboard box.
- Allow to grow for a couple of weeks

When ready cut open on top

(Left) mushroom bag – made of polypropylene with a patch of micron filter and autoclavable, (ed. comment: small quantities available through Amazon)

(Right) mushroom bag filled with grow medium, spawn and sealed with tape. Note medium must be below the patch.

**For bag culture indoors:**
- Cover with woodchips* 1- 1 ½ inch deep to keep the mixture moist and to provide more food
- Spray water 2-3X a day to keep it moist.
- Place in light or sun when they start to fruit.
- 2-3 months later when they start pinning, decrease the spraying of water (mushroom do not like water)

**For growing outdoors, in the garden:**
- Dig a hole and place mushroom bag in box in the hole cover with 3-5 inches of woodchips.
- Other materials like peat mixed with hardwood chips. Coco coir, peat, Promix, garden soil could also be used to cover the mycelium
- Keep moist.
- Pick before veil open.