

## Book Review: Organic Mushroom Farming and Mycoremediation

By Tradd Cotter

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This book is designed to help you build skill and confidence in both indoor and outdoor cultivation of edible mushrooms using purchased spawn (a form of mycelium that is packaged in sawdust, grain, or a wooden dowel and is physically “plantable”). In part IV of the book are profiles on nearly 30 different species of mushrooms. But the book focuses on *Lentinus edodes* (shiitake mushroom) and species of the genus *Pleurotus* (oyster mushrooms) because these are 2 of the easiest and most satisfying mushrooms to grow.

The 4 key components that comprise the essential needs of a mushroom in order to produce prolifically are food, water, gas exchange, and light. If any one of these variables is missing or neglected, the mushroom biomass suffers greatly. Many mushrooms prefer wood and plant debris as their main food source, whereas others consume manure-based substrates. Mushrooms also need high moisture and humidity levels (90–95%) to sustain their growth. The mushroom biomass also needs contact with fresh air to transport oxygen deep within and to channel carbon dioxide out. Finally, almost all mushroom species require diffuse natural or fluorescent light. Deviation from these essentials that mushroom mycelia need to develop edible mushrooms can result in extremely poor yields or even total crop failure.

There are 7 basic stages of mushroom cultivation: media preparation, inoculation and container filling, the spawn run, complete colonization, initiation and pinning, maturation and harvest, and rest. Tradd recommends monitoring all stages of mushroom cultivation daily using a low-cost digital thermometer. Identifying contamination early in mushroom development is critical. You need to be tuned into the different stages of competing molds, yeasts, and bacteria to prevent them from out-competing the mushrooms.

Which mushrooms should you choose to cultivate? Tradd recommends that beginners start with

the easiest species and the most readily available substrates. This means starting with 3 particular species on 3 basic substrates: *Lentinus edodes* on logs, *Stropharia rugosoannulata* on wood chips, and oyster mushrooms on agricultural waste. Practicing and perfecting your techniques and skills with these more simple cultivation combinations is a good strategy for initial success.

The author then goes on to discuss spawn. Spawn is simply a form of mushroom mycelium that is ready to plant in a growth medium such as straw, sawdust, or compost. The spawn is broken up into pieces and scattered into the growth medium. Spawn can be collected wild or purchased in the form of dowels, grain, and sawdust. Given the cost of spawn—approximately \$1 to \$2 per kilogram—many growers opt to buy their spawn in small quantities and then expand it. The rest of this chapter in the book discusses the different types of spawn (plug spawn, sawdust spawn, and grain spawn), how to handle the spawn, and how to ship and store it.

After discussing spawn, Tradd describes cultivating mushrooms outdoors on logs, stumps, and wood chips. In comparison to the rapid cycles of indoor fruiting, outdoor patches are produce more slowly, but they can eventually fruit several times a year for many years, and they require minimal labor and cost (compared with the infrastructure required for indoor cultivation), making them well worth the investment. One of the pages in this chapter shows the step-by-step process of cultivating *L. edodes* (along with full-color photos of each step). It was nice to see the finished product: a plump, meaty *L. edodes* emerging from the bark surface 8 months after inoculation. It was also helpful to learn that these logs fruit for 5 to 8 years.

The author then moves on to discuss cultivating mushrooms on wood chips, on compost, on livestock

waste, and on pasteurized or sterilized media such as sawdust, cereal straws, and other forms of dried plant debris and vegetation. Mushrooms can even be cultivated on dried specimens of invasive weeds, such as kudzu (*Pueraria lobata*) and water hyacinth (*Eichhornia crassipes*).

Pest control and disease management are important issues to consider. Your main goal should be to prevent outbreaks and contamination before they happen by following protocols for proper media treatments, cleanliness, and tool sanitation. Pests can be defined as any living organisms that compete with and cause harm to your mushroom-growing operation. They can be other fungi, such as molds, or insects that feed on or lay eggs in the developing mushrooms. A mixture of soap and vinegar can attract and trap airborne insects (though not beetles or sciarids) feeding on mushrooms. Second, an inexpensive wet/dry vacuum can be used. Fill the vacuum about one-third full with soapy water and point it gently upward toward the bottoms of the mushroom gills. Third, other animal predators such as spiders, anole lizards, and tree frogs can be used to attack the mushroom pests.

The rest of the book provides a few novel ideas such as recycling, composting, and vermicomposting with mushrooms; growing mushrooms off the grid; brewing mushroom-infused beer, wine, and spirits; mushroom marketing; and fungi in classrooms.

*Organic Mushroom Farming and Mycoremediation* also includes much information about the medicinal benefits of mushrooms. Species of genera *Agaricus*, *Flammulina*, *Ganoderma*, and *Grifola* have been shown to be effective in boosting the immune system. The species of genera *Agaricus*, *Coprinus*, *Flammulina*, *Ganoderma*, *Grifola*, *Laetiporus*, and *Lentinus* have been shown to be effective in regulating blood pressure and glucose levels. Species of genera *Agaricus*, *Flammulina*, *Ganoderma*, *Grifola*, and *Lentinus* have been shown

to be effective in lowering cholesterol and in providing cardiovascular and digestive support. Finally, species of genera *Agaricus*, *Agrocybe*, *Flammulina*, *Ganoderma*, *Grifola*, and *Lentinus* have been shown to have effective antiviral, antibacterial, and anti-inflammatory properties and be effective in suppressing cancer.

In addition to the medicinal properties above, *Auricularia* species have anticoagulant properties (i.e., they are commonly used as blood thinners) and are used to treat pancreatic imbalances. *Lepista nuda* (the blewit mushroom) contains compounds that inhibit both gram-positive and gram-negative bacteria and are effective against tuberculosis. *Clitocybe* species have been shown to suppress the growth of *Candida albicans* and *Serratia*. *Fistulina hepatica* is loaded with ascorbic acid (vitamin C). These mushrooms, along with *Laetiporus sulphureus*, help suppress serious infections caused by *Staphylococcus aureus*. *Ganoderma* species have one of the highest  $\beta$ -glucan levels of any medicinal mushroom. *Grifola frondosa* (maitake mushroom) contains the highest vitamin D concentrations of any known mushroom, with more than 1250 IU/100 g. Studies have found that *Hericium erinaceus* is highly oxidative, which can help in cases of nerve cell damage. It has been shown to reduce symptoms in patients with Alzheimer and Parkinson diseases.

The book ends with a helpful glossary; a bibliography; a list of resources and suppliers of mushroom spawn, pure mushroom cultures, cultivation supplies; plans for solar dehydrators; magazines and newsletters related to mushrooms; and a resource listing mushroom hunting clubs in North America. I recommend this book to anyone interested in raising mushrooms as part of an effort in sustainable living or raising mushrooms for sale as an income supplement.

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