



Small-Scale Shiitake Mushroom Production in Florida

Shiitake (pronounced “shee-tah-kay” and spelled the same whether singular or plural) is the #1 export from Japan. Besides Japan, other large producers include China, Taiwan, and Korea.

Since 1972, when the US Department of Agriculture (USDA) first allowed shiitake spawn into the United States, production has grown steadily. During the 1991-92 season, USDA’s National Agricultural Statistics Service (NASS) estimated that over 2.7 million pounds of Shiitake were grown in the United States. This compares to an estimated 738.8 million pounds of the common button mushroom. Several approaches to shiitake mushroom production is discussed in the literature. There is the nutrient amended sawdust block grown in controlled environment (CO₂ and O₂ monitored). There is the log production geared towards forced fruiting (discussed later) and there is the log production utilizing natural or irrigation to supply water when fruiting conditions are optimum. (temperature and moisture).

For the sake of this discussion we will use the last approach which minimizes labor handling logs for force fruiting and utilize the spawn run site as the fruiting site as well.

Shiitake mushroom strains are all specific to the type of production you are planning to do. (sawdust, forcing, soaking, and irrigation). Spawn should be hard before logs are cut and kept cool but not frozen.

Growing Shiitake

Shiitake can be grown either on natural logs or on artificial logs made of a special combination of oak sawdust bran, millet, and other additives. Most small-scale farmers will want to start with natural logs because they require less environmental control. There are five basic steps in cultivating shiitake on logs:

Ordering good-quality culture, which is called spawn or inoculum, so that it will be on hand when needed. The mushroom that will grow from the log is the fruiting body of the whole fungus. Most of the fungus is a mat of white strands (mycelia) that grow through the log to collect the nutrients necessary for fruiting. The spawn that you will purchase is nothing more than a pure strain of living mycelia, growing either in sawdust or in hardwood dowels. Contact your county extension agent for help in locating a spawn supplier near you.

- **Obtaining suitable hardwood logs.** Deciduous Oaks cut in dormancy are always the superior substrate for log production. (Quercus species in Florida - turkey black jack, water laurel, etc.) . Straight wood is preferable for handling. Branches or main stem are all suitable for production. Some production will occur in maple, beech, ironwood, chestnut, or alder are used. The logs are cut green during the winter when the sap is down and are cut to 3 to 6 foot lengths for easy handling. Diameters from 2 to 6 inches seem to work well. Be careful to avoid

damaging the bark. Torn bark can allow other organisms to enter the log and compete with the shiitake for nutrients.

- **Inoculating the logs.** Inoculation should take place in the absence of UV light (sunlight) as spawn is damaged by UV. Inoculate the logs with the spawn between 1 and 3 weeks after cutting to ensure optimal moisture content. Inoculate the log by drilling holes partway into the log. Then carefully pack these holes with the spawn and seal them with wax to retain moisture and keep out competing organisms.

Allowing shiitake to colonize the wood. In Florida particularly in April and May (or any other dry period) logs will need to be irrigated for the spawn run to progress. Irrigation or 20 minutes 2-3 times per week may be necessary during periods of high temperature (>90 F), high wind and low humidity. Once the mushroom has been introduced to the log via inoculation, it takes 4-9 months, depending upon climate and strain, for the mycelia to spread throughout the log. During this “spawn run” period the logs are stacked and shaded and irrigated to avoid moisture.



- **Fruiting.** Yields are quite variable. In some cases the spawn will not run through the log and no mushrooms will be produced. The highest yields are not only attainable when all conditions are near ideal. The logs can be re-fruited several times without additional inoculation and can produce mushroom for several years, depending upon how often they are fruited.

There are several additional steps that must be pursued by an entrepreneur to bring the shiitake crop to the market and ultimate sale. Crop harvesting, packaging, storing, transporting, and marketing are some of the vital and important steps that are necessary. However, there are a host of different procedures practiced because factors such as the grower's location, time limitations, financial considerations, etc., necessarily dictate the technique pursued.

Information Sources

Several books are available that can provide additional details on growing shiitake.

Among them are:

- *Growing Shiitake Commercially*, by Bob Harris
- *The Mushroom Cultivator*, by Paul Stamets and J.S. Chilton
- *Growing Shiitake Mushrooms in a Continental Climate*, by ME Kozak and J. Krawczyk
- *Shiitake Grower's Handbook: The Art and Science of Mushroom Cultivation*, by Paul Przybylowicz and John Donaghue

Economics

The cost of producing the mushrooms vary considerably. Major items to consider are the cost of the wood, the cost of the spawn, and the cost of the labor. Typically, labor will be the largest consideration.

Returns are also quite variable and depend heavily upon your growing climate. The Forest Resource Center reported results of field trial in the March 1992 edition of its newsletter, *Shiitake News*. Depending upon the species of log and the strain of shiitake used, it reports yields of 0.4% to 12.6% of the green weight of the logs. With a cord of oak which weighs 2,200-pounds and contains 300 logs and an average yield of 7%, one could expect to grow 154 pounds of shiitake over 3 seasons. At \$4 per pound, this cord would gross \$616 over 3 years. These are conservative estimates based upon the Minnesota experience. Higher yields on the order of 20% of the weight of the logs can be produced in warmer, more

humid climates and with the proper choice of logs and spawn.

Market Prices

Wholesale market prices for fresh shiitake vary seasonally and according to the market serviced. During the fall and spring when most outdoor growers are picking their mushrooms, prices tend to be lower (say \$4 per pound) since only those with climate-controlled growing facilities will be producing the mushrooms.

The 1991-92 NASS report mentioned above showed the average price nationwide for shiitake at \$4.11 per pound.

Jim Gwynn of the USDA's Agricultural Marketing Services Fruit and Vegetable Division (Market News Branch, Room 2501-S, P.O. Box 96456, Washington, DC, 20090-6456) reports that AMS has employees in most major markets obtaining market prices daily. Daily products can be obtained by subscription at \$15 per month per market city. Weekly reports are \$8 per month. Markets currently reporting shiitake sales include San Francisco, New York, Chicago, Atlanta, Boston, and Los Angeles. The lack of reports from other markets indicates potential opportunities for growers in those areas.

Marketing Points

Shiitake have some strong selling points. Fresh, the caps, 2 to 5 inches in diameter, have a chewy texture and a full-bodied aromatic flavor. They are low in calories (125 per fresh pound) and low in fat.

Reports indicate that tree-grown mushrooms, like shiitake, have about twice the fiber content of the common white button mushroom (*agaricus bisporus*). The particular type of fiber found in these mushrooms feeds the beneficial bacteria in the colon and enhances colon health.

According to Dr. Shu-Ting Chang, Professor of Biology, Chinese University of Hong Kong, and Dr. Phillip G. Miles, Professor of Biology at the State University of New York in Buffalo (in their 1990 book of *Edible Mushrooms and Their Cultivation*), shiitake contain all of the 9 essential amino acids of protein required in the human diet.

More Information

The American Mushroom Institute (907 East Baltimore Pike, Kennett Square, PA 19348) publishes *Mushroom News* and *Mushroom News Flash* for their members on a monthly basis. Associate memberships are \$300 per year and grower memberships start at \$350 per year.

Successful Farming Magazine has published two articles on shiitake in its ADAPT series. One describes the initial experience of Geode RC&D's shiitake project. The second shares the experience of a Virginia shiitake farm. Copies of these articles can be obtained from Betsy Freese at *Successful Farming* (ADAPT), 1716 Locust Street, Des Moines, IA 50309-3023.

Shiitake News is published three times a year by the nonprofit Forest Resource Center at Rt. 2, Box 156A, Lanesboro, MN 55949. The 16 page newsletter costs \$25 for an initial subscription, which also includes three back issues. Renewals are \$15 per year.

The Mushroom Grower's Newsletter (P.O. Box 5065, Klamath Falls, OR 97601) is published monthly and includes production and marketing information (including prices) on other cultivated mushroom as well as shiitake in its 6 pages. The current issue is \$3 each and subscriptions are \$24 per year.

