

Introduction to Shiitake (*Lentinus edodes*) Cultivation

Writer: Kyung Wha Choi (Ivy) / Date :2000-05-07 / hits: 605

Wild, parasitic shiitakes form on broadleaf trees like black oaks, and in Korea, Japan, and China the mushrooms have been artificially cultivated from ancient times. Shiitakes have been introduced only recently to the west, but in China there are documents about artificial cultivation of the mushrooms up to 1,000 years old. Shiitakes are the second most consumed mushrooms in the world next to white mushrooms.



The Shiitake is a delicious mushroom that has a strong aroma and meaty texture, but the mushroom is popular among consumers more for its nutritional value and health benefits than its taste. Protein makes up about 18% of the dry weight of the mushroom, and its protein contains all kinds of amino acids including essentials. It also contains minerals such as calcium, phosphorus, potassium, and magnesium and a large quantity of vitamin B, and vitamin D2. Vitamin D2, especially, helps the bones to become stronger making it easy to absorb calcium, and is effective in preventing osteoporosis and rachitis.

The pharmaceutical value of shiitakes has been known since ancient times. Lentinan, which is abstracted from the fruit bodies of the mushroom, has already been commercialized. It has been found that when continuously taken, shiitakes lowers cholesterol and blood pressure.

Ways of cultivating shiitakes can be classified into three large categories: cultivation using logs, sawdust, and materials like wheat straw.



The log cultivation method, which is the most well-known and traditional method, consists of a process in which the mushroom spawn is inoculated inside holes drilled in appropriately-dried logs, and culture into mushrooms. Black oak trees that contain tannin substances are suitable for cultivation logs, and among them, logs that are about 1.0~1.2m long, and 10~20cm wide are the most convenient and economically efficient. In the spawn

inoculation process, holes are drilled in the logs at regular intervals first, and then the sawdust-spawn is inoculated into the holes. The process takes considerable manpower and time so these days, farmers use a machine that automates the whole process. For the spawn to culture period, the inoculated logs require a subtle regulation of temperature, humidity, and ventilation so they are piled up in various ways such as the shape of a cross or a pillow and placed on the ground.

The length of time in which the mushrooms appear differs according to species, but in general, in order to form mushrooms, the logs need from 6 months to 1 year of hyphal incubation period. The factors that affect the mushroom growing the most are temperature and water content of the inoculated wood log. Putting the logs in cold water or beating them often promotes mushroom formation. Lately, many mushroom farms are culturing and cultivating the mushrooms indoors in order to regulate the environmental surroundings and timing of the mushroom formation more freely. Some of the cultivators use logs cut into 30cm-long pieces, and there has been attempts to shorten the culture period by sterilizing the logs.

In the sawdust cultivation of shiitakes, a mixture of sawdust from broadleaf trees such as black oak trees, hulls of grain, and calcium dioxide is put into vinyl bags, pp bottles, or trays after the water content of the mixture is regulated. China and Japan, the main producing countries of shiitakes, produce more than 60~70% and 50% of the collective amount of shiitakes respectively using this



method. Shifting from the log cultivation method to the sawdust method is a worldwide trend these days.

The merits that the sawdust cultivation method has over the log cultivation method are as follows.

First, the first formation of mushrooms takes a year in the log cultivation, whereas in the sawdust cultivation it is possible in 3~4 months.

Second, it takes about 5 years to harvest all the mushrooms that can possibly be produced from the logs, while in the sawdust method, it takes 3~4 months for the formation of the mushrooms allowing for a faster reinvestment of funds.

Third, mushrooms making up about 20% of the weight of the logs can be produced in log cultivation while the sawdust method, production of mushrooms equals 40% of the weight of the sawdust giving a greater production efficiency.

Fourth, the variety of trees usable for log cultivation is limited, but for the making of sawdust, trees of various size and species can be used. This variety of choice helps solve the problem of deforestation, and the inexpensive materials used make it possible to lower the prices of the products.

On the other hand, the sawdust cultivation method requires more expenditure for facilities and equipment, and the necessary techniques are more difficult to learn than those needed for the log cultivation method.



The process of sawdust cultivation, after putting the substrate into some suitable container, consists of sterilization, refrigeration, spawn inoculation, culturing, browning, primordial inducing, and harvest in that order. Browning, also called light culturing or secondary culturing, is a process in which a brown membrane is formed on the surface of the substrate through

irradiation of the substrate after hyphal incubation while maintaining a temperature of 20~25 C. Hyphal incubation and mushroom culturing using medium made from sawdust is practiced in various facilities where environmental factors can be regulated such as a growing room in the woods free of sunlight and protected from rain or on the ground of a shaded cultivation house.

In addition to logs and sawdust, materials such as straw, corn cob, coffee pulp, and sugar cane bagasse are used for shiitake cultivation. These materials should be mixed with a little bit of sawdust or acorn powder containing tannin substances, so they can become suitable for shiitake mycelium bacterium growth. Species suitable for these materials should be selected and bred. Generally, these materials are wrapped in vinyl bags and put in the shape of a block, column, or log.