

## **Mushroom Cultivation in Makwanpur District**

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Mushrooms are edible fungus belonging to the members of plant kingdom. Mushrooms have both boon of economic and nutritional value. Mushrooms are not only rich in most essential amino acids but also have ability to degrade cellulose, hemicelluloses and lignin. Mushrooms are rich in lysine and tryptophan which are lacking in cereals highlighting its importance in Nepalese diet. There are more than 1000 edible mushrooms in world and more than 110 species of edible mushrooms are identified in Nepal. Nepalese climate and cultural practices in Nepal has commercialized the major four types of mushroom cultivation as button mushroom (*Agaricus bisporus*), oyster mushroom (*Pleurotus sajor-caju*), paddy straw mushroom (*Volvariella volvacea*) and Shiitake mushroom (*Lentinula edodes*). Mushrooms are rich in flavor, aroma, having good texture and high productivity per unit area. Nepal is best place for mushrooms cultivation. Button mushroom and Shiitake mushrooms are suitable for cool temperature whereas paddy straw mushrooms are best grown in tropical region and oyster mushrooms are found better in subtropical region.

Makwanpur district is very suitable for mushroom cultivation in Nepal. This district is rich in climatic variability and different soil availability for cultivation of different types of mushrooms. The different climates of Makwanpur district are temperate, subtropical and tropical on some plain area. The average temperature of Makwanpur district is maximum around 30.30°C on an average and minimum on an average is 16.60°C. The average rainfall of Makwanpur is around 2535ml per year (DADO Report-2072/73). Major commercial mushroom cultivation area of Makwanpur are Chatiban, Hatiya and Hetauda. But as due to the climatic suitability there is possibility of year around production of mushroom in the municipality of Makwanpur District. For year 2073/74 District Agricultural Development Office (DADO) provides around 50% subsidy for spawn production of 1000 packets also there is subsidy from DADO for mushroom spawn production plant establishment. Due to low cost of production and easy access to market button mushroom and oyster mushroom cultivation is getting popular in this district. The major markets of Mushroom produced in Makwanpur district are Kathmandu, Narayanghad and within district itself (Hetauda, Shirkharkot, Hatiya, Vaise, Basamadi, Bajra Barahi, Markhu, Lothar, Bhimphedi, Chatiban, Namtar etc.)

### **Cultivation of Button Mushroom**

For production of button mushroom in effective way, good quality spawn is prime important part. While on other hand composting should be done. The first step of composting is wetting of straw which is done by spreading the straw on floor and sprinkling the water gently. The straw is then turned and

again water is sprinkled till the straw absorbs maximum water( around 75 % of total water content in water). The supplements like urea, chicken manure are uniformly mixed over straw. Then the whole mixture is finally stacked in heap firmly but not compactly. The temperature in case of composting plays very important role for composting . The temperature at the center of heap should be reach 70-75°C .Turning is very important cultural operation in cultivation of button mushroom. At 4<sup>th</sup> day, first turning is to be done followed by 8<sup>th</sup> day, 12<sup>th</sup> day,16<sup>th</sup> day,20<sup>th</sup> day as respective turnings. Gypsum is usually mixed at 3<sup>rd</sup> and 4<sup>th</sup> turning in equal quantities. During final turning safer insecticides as Malathion 2ml/lit can be sprayed to prevent the attack of insects. Then the compost prepared are spread on ground floor bed or on individual wooden tray or shelves in layers or on polythene bags. Mostly in Makwanpur district, button mushroom are sprayed in ground floor beds and shelves in layers. Then spawning is done by sowing mycelium of mushroom on prepared beds .After spawning the surface of compost bed is covered with old newspapers which are sprinkled with water to maintain humidity. The casing is another important operation to be performed after 15 days of spawning where the bed would be uniformly covered with white mycelium of fungus. During the spawn growth time the temperature of compost should not go 24°C. The soil selection for casing is important to be considered .The soil should be of good water holding ,neutral or slightly alkaline pH. Soil depth used for casing should not exceed more than 3 cm. The bed temperature should be 24°C and relative humidity should be 100% after casing. It takes around 8-12 days from first appearance of mushroom to attain its full growth and ready for harvesting. These mushroom could be harvested continuously for about 6-8 weeks.

Appropriate Temperature:10-25°C

Humidity:80-90%

### **Cultivation of Oyster Mushroom**

Oyster mushroom is mostly produced mushroom in Makwanpur district as it has less time of production ,more palatability and economic to consumption. It can be produced in all most all parts of district with suitability in climatic conditions. The important consideration for Oyster mushroom cultivation is the substrate preparation. These substrate includes cereal straw, corncobs ,sugarcane bagasse ,banana leaves ,leaf litter etc. But most commonly used substrate for commercial mushroom production in Makawanpur district is paddy straw. Clean paddy straw is chopped to about 5cm and soaked in water overnight. Then after draining water from soaked straw ,it is immersed in boiling water for 2 hrs and again excess water is drained off. Oyster mushroom is usually grown indoors and in well ventilated room or domed bamboo tunnels with maintained temperature. Spawn is mixed throughly with substrate in

layers which is filled in plastic bag for mushroom cultivation. Over and under spawning on substrate is injurious as it may lead to fluctuation in temperature. The plastic bags used for spawning should not exceed more than 6 kg of weight(1.5 kg dry straw) per bag. The plastic bags should be perforated so as to permit ventilation and to cool down the temperature. The temperature inside the cultivation room should be maintained around 25°C and humidity around 80-85%. The mycelium would completely cover the substrate within 12-24 days, forming a compact block of substrate. The polythene covering is then removed then after completely or cuts in various parts to allow the mycelium to grow properly. Humidity is then maintained by timely irrigation. The first yield could be obtained within 2 weeks and second yield could be obtained within 7-10 days after first yield. Then the same substrate could be used as fertilizer .

Temperature:20-30°C

Humidity:80-85%

### **Cultivation of Paddy straw Mushroom**

Paddy straw mushroom is very fast growing mushroom which is a slender fleshy stripe of 3-8 cm in length and is characterized by presence of dark gray cap of 6-12 cm in diameter. It is mostly suitable for southern belt of Makwanpur district and is lessly grown in Makwanpur district due to its low time of storeability(only about 48hrs as well of climatic unsuitability). The most common substrate is paddy straw but somehow sugarcane bagasse, banana leaves ,sawdust ,cotton waste could be alternate source of substrate. The straw bundles are made and placed in different layers ,watered and pressed physically so as sufficient aeration could be maintained. The spawn is deposited at a depth of 10-14cm apart all over the bed. Paddy straw mushroom could be seen within 10-14 days after spawning.

Appropriate Temperature:30-35 °c

Humidity:70-80%

### **Cultivation of Shiitake Mushroom**

Shiitake mushroom is one of very nutritious mushroom for human consumption and is one of the expensive mushroom in Nepal. Mostly the northern hilly region of Makwanpur district is suitable for its cultivation. This type of mushroom has great climatic opportunity to be commercialized in Makwanpur district. But due to lack of awareness, unavailability of spawn and long period of production ,it is grown in only countable parts of district. It is rich in Vitamin D2 (Ergosterol), which is measure for healing bone disorder .It also decreases cholesterol level in blood and believed to have anti cancerous function. The spawn of Shiitake Mushroom is to be inserted into drilled holes in

the logs of Oaks, Chestnuts, Uttis etc. The mycelia growth is obtained only after one year at 24-28°c. The logs after spawning are covered with plastic sheets in winter months and left opened during summer months so as to maintain the temperature of spawn. During first months the logs are to be sprinkled irrigated 1-2 times and from 3<sup>rd</sup> months the logs are to be irrigated 2-3 times . This type of mushroom can be harvested for more than 3 years.

Appropriate Temperature: 15-25°c

Humidity: 70-90%