

## Agro-Based Spent Mushroom Substrate (SMS): An Overview

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### SUMMARY

Mushrooms are known for their delicacy and nutritional values but the substrate released after mushroom crop harvest, better known as ‘Spent Mushroom Substrate’ is also the subject of great importance. The recomposted spent mushroom substrate has been found to be a good growing medium for majority of the vegetables and the field crops, and has shown multifacet utilities in improving the yield and quality of the crop, and management of the diseases, which is really encouraging for the mushroom industry. Considering the diversified uses of spent mushroom substrate, an urgent need was felt to compile the all available information pertaining to the traits of SMS, its effect on surrounding environment and uses particularly for the benefit of farmers.

### INTRODUCTION

Mushroom is edible fungus that can provide several important nutrients. The structure that you normally see above the ground is the part of the mushroom that is producing and dispersing spores. Each spore is a single cell that is capable of sending out a hypha that will develop into a group and form its own mycelium. The many kind of mushroom have varying compositions and nutritional profiles. Unlike plants, mushrooms are heterotrophic organisms which require external nutrients to grow.

#### Types of different mushroom

Two types of mushroom e.g. edible and non-edible. Among them different types of edible mushrooms grown around the world are white button mushroom, oyster mushroom, cremini mushroom, enokitake mushroom, porcini mushroom, milky mushroom, paddy straw mushroom, maitake mushroom. Three major types of mushrooms in India used for cultivation are button mushroom, straw mushroom and oyster mushroom are the. Paddy straw mushrooms can grow in temperatures ranging from 35° to 40°C. Button mushrooms grow during winter. Oyster mushrooms are grown in the northern plains.

#### Production of mushroom in India and world

The global production of cultivated mushrooms is about 34 million tons. At present, the total mushroom production in India is approximately 0.13 million tons. From 2010-2017, the mushroom industry in India showed average growth rate of 4.3% per annum.. It must be known that China is the largest producer of edible mushrooms accounting for over 50 percent of the world's edible mushroom production.

#### Future production target

India is not a major producer of any of the mushroom varieties, but it does cultivate all edible and medicinal mushrooms in one or other part, due to its diverse climatic conditions. India is approximately produced 0.13 million tons out of the total mushroom produced, white button mushroom share is 73% followed by oyster mushroom (16%), paddy straw mushroom (7%) and milky mushroom (3%). According to estimates of National Research Centre for Mushrooms the production in India was 40,000 MT during 1996-97 which is expected to increase to 1 lack MT by the year 2002. It is further estimated that this production would increase to 3 lakh MT. by year 2010 and 6 lakh MT by the year 2025. In the year 2016-2017, Indian mushroom industry generated revenue of Rs. 7282.26 lacs by exporting 1054 quintals of white button mushroom in canned and frozen form.

### **Mushroom waste production generates**

Mushrooms are known for their delicacy and nutritional values but the substrate released after mushroom crop harvest, better known as ‘Spent Mushroom Substrate’ is also the subject of great importance. Agricultural residues such as rice straw, mustard residue, toria residue, sesame residue with capsule shell, arhar pod shell, pea haulms, black gram/green gram pod shell, hulled maize cob as well as saw dust of saw mill are very good substrate for mushroom cultivation. The recomposted spent mushroom substrate has been found to be a good growing medium for majority of the vegetables and the field crops, animal husbandry and for aquaculture and has shown multifacet utilities in improving the yield and quality of the crop, and management of the diseases, which is really encouraging for the mushroom industry. The other utilities of spent mushroom substrate, like in vermicomposting, bioremediation and as organic-mineral fertilizer are boon to the country’s farming system.

### **Nutritional value of mushroom waste**

Spent mushroom substrate (SMS) normally contains 1.9:0.4:2.4%, N-P-K before weathering and 1.9:0.6:1.0, N-P-K after weathering for 8-16 months. Nitrogen and phosphorus do not leach out during weathering but potassium being more leachable is lost in significant amount during weathering. The fresh SMS properly sized by sieving, leached of salts and blended with vermiculture acts as an ideal growth medium for plants and offers exceptional aeration, porosity, water holding capacity and nitrogen. SMS can be a promising new fertilizer material with advantageous properties, such as the preferred C:N ratio, assimilable forms of nutrients, and high content of organic matter (Garrido, 2012). SMS naturally contains macronutrients in high concentrations, especially P (1.0%), S (3.1 %), Ca (8.2%), and K (0.2%).

### **Use of mushroom waste, spent mushroom substrate (SMS)**

Plant waste is the basic substrate utilized for cultivation of different edible mushrooms. Mushroom industry needs to dispose off more than 50 million tons of used mushroom compost each year called Spent Mushroom Substrate (SMS). Every kilogram of mushrooms produced results in 5–6 kg of by-product (Ma et.al., 2014). After about 2–3 weeks of mushroom harvest, the growing material is considered spent. Mushrooms are proteinaceous and the substrate formulations may include cereal straws and various grains that are components of animal diets. Spent mushroom compost, in general, has been widely used as “manure” in India with great success.

### **CONCLUSION**

The spent substrate from different mushrooms varies in its physical, chemical and biological properties and each one has its own specific utility. The spent substrate has been found to be nutritionally rich with respect to its N:P:K contents, and being having high cation exchange capacity, it has the ability to replace Farm Yard Manure for the purpose of raising horticultural and cereal crops. The other utilities of spent mushroom substrate, like in vermicomposting, bioremediation and as organic-mineral fertilizer are boon to the country’s farming system.

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