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Design and Evaluation of Rice Straw Bag Filling Machine for Oyster Mushroom (*Pleurotus Florida*) Cultivation

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Oyster mushroom (*Pleurotus florida*) is a simple, fast, and cost-effective variety for cultivation, requiring minimal substrate preparation time and production technology when compared to other edible mushrooms. Its popularity has soared due to its exceptional culinary taste and flavor, surpassing even the well-known button mushroom (*Agaricus bisporus*). As a result, it has become highly recognized and preferred over button mushrooms in India. However, the current manual bag filling process of wet chopped rice straw substrate for *Pleurotus florida* cultivation is laborious and time-consuming, with limited bagging capacity. To address this challenge, a rice straw bag filling machine was designed and developed specifically for oyster mushroom cultivation. This machine comprises a main frame, truncated conical hopper, agitator, single flight tapered end screw conveyor, tubular trough, cylindrical drum, chain and sprocket drive mechanism, and an electric motor. The successful evaluation of this machine revealed that, the maximum bagging capacity of 293 bags/h was found at screw speed of 150 rpm and 200 mm pitch length for rice straw substrate.

Keywords: Agitator, Bagging capacity, Oyster mushroom, Pitch length, Screw conveyer

Introduction

Mushroom cultivation is an innovative practice in the current scenario. Due to its high nutritional value and medicinal properties, it is regarded as a significant horticultural crop. Nowadays mushrooms are considered as potential contributors to the world's food supply. They have the ability to transform nutritionally-useless wastes into rich protein food. The top mushroom-producing countries worldwide include China, USA, Netherlands, Poland, and Spain. Among them, China emerges as the dominant supplier in the global market, contributing to over 60% of the world's total mushroom production.[1] *Pleurotus* species, well known as oyster mushrooms are cultivated worldwide especially in South East Asia, India, Europe and Africa. Indeed, in India, button mushrooms hold a significant position as they are extensively cultivated. Following button mushrooms, oyster mushrooms also have a considerable presence in the country's cultivation practices. Absolutely, in recent times, oyster mushrooms (*Pleurotus florida*) have gained tremendous popularity in India, mainly due to their outstanding culinary taste and flavor. Their delectable attributes have made them a favorite choice among consumers and culinary enthusiasts alike.

Oyster mushroom (*Pleurotus florida*) is grown well at the temperature range of 18–28°C and relative humidity of 55–70%. It is exhibited remarkable versatility in their cultivation substrates. They can be cultivated on a wide range of materials, including pasteurized rice straw, instant coffee pulp, cotton seed hulls, cassava peels, corncobs, crushed bagasse, water hyacinth, water lily, beans, wheat straw, oil-palm fiber, as well as paper and cardboard. This adaptability to various substrates contributes to their popularity as they can be grown using a diverse range of organic materials, making them a sustainable choice for mushroom cultivation.[2,3]

Rice (*Oryzae sativa*) is the commercial crops in Asian countries, which contributes 90.10% of total world's production and 1/5th of the total production in India. It is reported that, in India, the total rice straw

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