Mushroom Shelf: An Intervention on Mushroom Propagation

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Abstract

The use of alternative propagation method aside from mushroom beds has been the new area of research and development in the field of agriculture. A propagation method that is productive for both dry and wet season is the center ideology of this study. This study aimed to evaluate the performance of Rice Straw Mushroom (V. volvacea) when grown in mushroom shelf, an intervention for mushroom propagation. A completely randomized research design was used in the study with two treatments (T1 (100% corn cobs), T2 (20% maize stem + 80% corn cobs) and a control group (100 % banana leaves with replications in both mushroom shelf and non-mushroom shelf with a total of 18 beddings. Two-Way Factor ANOVA revealed that growing V. volvacea in mushroom shelf is comparable when grown in the non-shelf planting (traditional method) in terms of size of pileus, size of stipe, and weight of basidiocarp produced but not as to number of days to developed primordia. Further, no significant interaction exists between the performance of V. volvacea in the type of substrates and use of shelf in terms of the size of pileus, size of stipe and weight of basidiocarp produced but not as to number of days to developed primordia. Adaptation of mushroom shelf planting on mushroom propagation is one of the recommendations given in the study.

Keywords: Mushroom Shelf, Non-mushroom shelf, Propagation, Substrates, V. volvacea
INTRODUCTION

The trend on converting agricultural wastes into mushroom bedding substrate has been continuously gaining attention. Researchers found out that agricultural wastes is a good alternative to banana leaves or saw dust in mushroom propagation due to its high availability and cost-efficiency. It also satisfies the Sustainable Development Goals on the sustainable consumption and production.

Several studies to use agricultural wastes as mushroom bedding substrates include the following: One study used maize residues (maize stalks, maize husks and maize cobs) for cultivation of oyster mushroom [2], another study used corncobs in the cultivation of Pleurotus pulmonaris [5]. Further, the use of rice straw on the cultivation of V. volvacea [4], and the use of corncobs, and combination of corncobs and maize stalk in the cultivation of rice straw mushroom [7], which is found to be a good alternative to “rice straw” as bedding substrate for V. volvacea during rainy season where rice straws are not available.

However, despite of these successful usage of agricultural wastes as bedding substrates, the production of mushrooms like V. volvacea is still fluctuating, irregular and unstable. Studies revealed that production of V. volvacea during dry season is significantly higher than rainy season. This is because cultivation in mushroom beds, the traditional method is prone to natural calamities like flooding. So when, rain season strikes and flooding become frequent, mushroom bed cultivation will not be possible not unless there is an alternative propagation method.

The use of alternative propagation method other than mushroom beds cultivation is a new area of research and development. Recently, several authors suggested alternative mushroom cultivation methods like polyethylene bag wall cultivation [2], and movable beds and basket cultivation method [4]. However, despite of it being effective as alternative method, the productivity and cost efficiency of it is still below the traditional method and can’t still support the need of increasing mushroom production during rainy season.

In connection to that, this study aimed to evaluate the productivity and efficiency of “Mushroom Shelf” as an intervention in the cultivation of V. volvacea.

OBJECTIVES OF THE STUDY

Generally, this study aimed to evaluate the Performance of Rice Straw Mushroom when grown in “Mushroom Shelf”.

Specifically, this study sought answers to the following:

1. What is the mean performances of the rice straw mushroom (V. volvacea) grown in different substrates in shelf and non-shelf planting in terms of the following growth parameters:
   a. Number of days to develop primordia;
   b. Size of pileus of basidiocarp produced;
   c. Size of stipe of basidiocarp produced;
   d. Weight of basidiocarp produced; and
   e. Yield and Net income?

2. Is there a significant difference on the growth performance of V. volvacea grown in different type of substrates in shelf and non-shelf planting in terms of the growth parameters?
3. Is there a significant interaction between the two variables (type of substrate and use of shelf)?
MATERIALS AND METHODS

This study used corn cobs, combination of corncobs and maize stalk as the treatment groups while banana leaves as the control group adapting the recommendation of Retuya & Gacusan [7], to use corn cobs as alternative bedding substrates to rice straw, which is not available during rainy season. The agricultural wastes were collected at a Farm located in Sta. Maria, San Jacinto, Pangasinan while the V. volvacea spaws was purchased at PSU Mushroom Research and Development Center, Pangasinan State University – Sta. Maria, Pangasinan..

Experimental Site

The experimental site of the study was located at San Jacinto, Pangasinan. The site has a roof to avoid much exposure under the sun and rain but was kept open in all sides. The site holds the mushroom shelf and the mushroom beds.

Mushroom shelf

The Mushroom shelf was made from bamboo measuring six feet tall (6ft) with three compartments. Each compartment measures two-feet (2ft) tall, had a length of two-meters (2 m) and a width of one pint five ft (1.5ft).

Then, after planting each bed was covered using propylene bag to build up the required temperature and humidity for the growth of mushrooms fruit. The site was monitored every day to check if there is no insect around the mushroom beds. The surrounding of the site was watered twice a day, one in the morning and one in the afternoon to avoid pest around the mushroom bed and to maintain the humidity level of the site. After two weeks, the harvesting period starts.

Harvesting was done early in the morning and late in the afternoon. The harvested buttons and open caps were measured, weighed, counted and recorded. All the data that were gathered was recorded, tabulated and subjected to data analysis using Two-Way Factor ANOVA using Data Analysis toolkit of MS Excel 2010.
RESULTS AND DISCUSSIONS

Growth Performance of *V. volvacea* when grown in Mushroom Shelf and in Non-shelf planting

Table 1: Mean Performance of Rice Straw Mushroom grown in different substrates in Mushroom Shelf and Non-Mushroom Shelf

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Mushroom Shelf</th>
<th>Non Mushroom Shelf</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of days to Developed primordia</td>
<td>28, 17, 10, 11.1</td>
<td>10, 10, 60, 67, 9, 27, 23</td>
</tr>
<tr>
<td>Size of pileus of basidiocarp produced (cm)</td>
<td>5.8, 5.8, 5.6, 5.48</td>
<td>5.6, 5.6, 8, 8</td>
</tr>
<tr>
<td>Size of stipe of basidiocarp produced (cm)</td>
<td>8.6, 9.7, 8.9, 8.4</td>
<td>3, 9.2, 9.2, 9.2</td>
</tr>
<tr>
<td>Weight of basidiocarp produced (kg)</td>
<td>1.4, 1.73, 1.9</td>
<td>3, 5, 1.9, 5</td>
</tr>
</tbody>
</table>

The table displays that Co (Non-mushroom shelf) registered the earliest day to develop primordia with a mean of 10.23, while T1 (Mushroom shelf) recorded the longest. The pure cobs (T1) (mushroom shelf) and combination of maize stem and corn cobs (T2) (mushroom shelf) had the biggest size of pileus of 5.85 cm. Also, T2 (Mushroom shelf) registered the highest size of stipe with a mean of 9.74. While the Co (Mushroom shelf) obtained the highest weight of basidiocarp produced with a mean of 2.01 kg. The results approves with the study of Retuya, J.R. et al. [7], that using corn cobs as bedding substrates would result to a bigger size of pileus and its combination with maize stem could register the highest size of stipe.

The Two-Way factor ANOVA showed that there is no significant difference on the type of substrates and use of shelf in the performance of *V. volvacea* in terms of the size of stipe, size of pileus, and weight of basidiocarp produced. But it showed that there is a significant difference on the performance of *V. Volvacea* in number of days to developed primordia. The results approves with the study of Retuya, et. al [7] that corn cobs as bedding substrates performed significantly the same with banana leaves in terms of the size of pileus, size of stipe and weight of basidiocarp produced but not as to the number of days to developed primordia.

Further, the Two-Way factor ANOVA showed that there is no interaction exists between the performance of *V. Volvacea* on type of substrate and use of shelf in the performance of *V. volvacea* in terms of the size of stipe, size of pileus, and weight of basidiocarp produced. The results implies that growing *V. volvacea* in Non-shelf planting (Traditional) is comparable to *V. volvacea* when grown in mushroom shelf in terms of size of pileus, stipe and weight of basidiocarp produced. However, as to number of days to developed primordia it showed that there is an interaction exist. This means that growing...
V. volvacea in non-shelf is significantly better than in mushroom shelf propagation in terms of the number of days to develop primordia.

Yield and Net Income

In terms of the highest yield or harvested mushroom and Net Income, the results shows that Co (Banana leaves) in the mushroom shelf registered the highest weight produced of 6.05 Kg with the highest net income of 465.33. The results implies that growing V. volvacea in mushroom shelf is as productive as growing it in the traditional method.

CONCLUSIONS AND RECOMMENDATIONS

Based on the findings, the researchers conclude the following:

1. The use of shelf in the cultivation of V. volvacea is found to be comparable in the Non-shelf planting (Traditional method) in terms of size of the pileus, size of stipe and weight of basidiocarp produced. However, V. volvacea grown in Non-shelf significantly developed primordia earlier than those grown in the Mushroom shelf;

2. A significant interaction between the use of shelf and types of substrates was found as to number of days to developed primordia, but no significant interaction was found among other growth parameters; and

3. The mushroom shelf is found to be effective as intervention in the V. volvacea cultivation in terms of its production rate and in terms of the growth parameters characteristics of the produced mushrooms.

Based on the conclusions, the researchers recommend the following:

1. The use of Shelf in mushroom propagation is recommended to be be adapted by the mushroom growers, primarily to aid the low production rate of mushroom in rainy seasons; and

2. The use of Shelf in a controlled site (controlled temperature and humidity) is encouraged to further study.

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