

COMPARATIVE LIVELIHOOD PERFORMANCE OF VOLVARIELLA VOLVACEA USING ALTERNATIVE AGRICULTURAL TECHNIQUES DURING PANDEMIC

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Abstract

Earning money for a living during pandemic becomes nearly impossible when one gets stuck at home, the need for alternative agricultural techniques is thus necessary to survive. This study attempted to compare the performance of the performance of Rice Straw Mushroom (*V. volvacea*) in different substrates grown in Mushroom Shelf and in Hanging Shelf. A quantitative research following experimental design was utilized in the study. A completely randomized design was also applied to the treatment and control groups. This study used corncobs (T1) and combination of corncobs and maize stem (T2) as treatment groups and banana leaves as control group. Both types of substrates were used in two mushroom propagation techniques – mushroom shelf and hanging shelf. Two Way factor ANOVA revealed that no significant difference exist on the performance of rice straw mushroom in terms of size of pileus, size of stipe and weight of basidiocarp produced on the type of substrate but significant difference was found on the type of shelf used. While a significant difference on the type of substrates and type of shelf used was both found on the performance of rice straw mushroom in terms of number of days to develop primordia. Further, Two-Way Factor ANOVA revealed no significant interaction on the type of substrate and type of shelf used on the performance of rice straw mushroom in terms of the growth parameters. In terms of Yield and Net income, control group grown in mushroom shelf obtained the highest net income as compared to other beds grown in mushroom shelf and in Hanging Shelf. Further development and improvement on the design of the hanging shelf is needed to further improve its effectivity as mushroom propagation technique is one of the recommendations given in the study. The use of the shelf for alternative agricultural technique to grow mushroom during pandemic is recommended.

Keywords: Alternative Agriculture, Corn, Comparative Performance, Growth Performance, Pandemic, *Volvariella volvacea*, Livelihood

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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 [10], another study used corncobs in the cultivation of *Pleurotus pulmonaris* [6]. Further, the use of rice straw on the cultivation of *V. volvacea* [7], and the use of corncobs, and combination of corncobs and maize stalk in the cultivation of rice straw mushroom [3], 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. It was also the under study solution on the lack of space problems and being prone to natural calamities. Recently, several authors suggested alternative mushroom cultivation methods like

polyethylene bag wall cultivation [10], and movable beds and basket cultivation method [7]. 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, Retuya et. al (2020) [2] proposed another alternative method for mushroom propagation that is cost efficient and with high productivity in dry or rain season which is the “Mushroom Shelf”. And results revealed that this method is comparable to the traditional method in terms of the growth parameters and Yield and Net Income. With that, this study was conducted to compare this mushroom shelf to a new and proposed mushroom propagation method “Hanging Shelf” on the performance of rice straw mushroom in terms of the growth parameters and Yield and Net Income

STATEMENT OF THE PROBLEM

This study aimed to compare the performance of Rice Straw Mushroom (*Volvariella volvacea*) in different substrates when grown in Mushroom Shelf and in Hanging Shelf. Specifically, it answered the following questions:

1. What is the mean performances of the rice straw mushroom (*V. volvacea*) grown in different substrates in Mushroom Shelf and in Hanging Shelf in terms of the following 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* in different type of substrates grown in

mushroom shelf and hanging-shelf planting in terms of the growth parameters?

- Is there a significant interaction between the two variables (types of substrates and type of shelf used)?

METHODOLOGY

Research Design

This study is a quantitative research following the experimental design as it measures different parameters that show the comparative performance of rice straw mushroom in two propagation methods. This study compared the performance of rice straw mushroom grown in mushroom shelf and in hanging shelf with the same type and formulation of bedding substrates in terms of the growth parameters. This study employed the completely randomized design with two treatments and a control group with three replicates. There were two sets of mushroom propagation techniques in the study namely the use of mushroom shelf and the proposed hanging shelf. Both had the same number and type of substrates and have the same number of replicates.

Materials and Methods

This study used the bedding substrates formulation applied by Retuya et. al (2020) in their study namely corncobs and

combination of corncobs and maize stem as treatment groups and banana leaves as control group. The rice straw mushroom spawn was purchased at PSU Mushroom Research Development Center, Pangasinan State University – Sta. Maria campus. Adapting the recommendation of Retuya et. al (2020) on the use of mushroom shelf, the current study compared this mushroom shelf to the proposed hanging shelf of the study.

The Hanging Shelf

The Hanging shelf was designed in lined with mushroom shelf which was made from bamboo measuring two meters in length and a width of one point five ft. (1.5 ft.). The shelves were hanged 8 ft. above the ground.

Data Collection

To compare the growth performance of rice straw mushroom in two propagation methods the researcher recorded the number of days primordia was developed, the size of stipe and pileus of the basidiocarp produced and the total weight of basidiocarp produced during the harvesting period. All the data that were gathered and recorded was subjected to data analysis Using Two-Way Factor ANOVA with replications using Data Analysis toolkit of MS Excel 2013.

DISCUSSION OF FINDINGS

On the Mean Performance of *V. volvacea* in different Substrates grown in Mushroom shelf and Hanging shelf

Table 1: Mean Performance of Rice Straw Mushroom (*V. volvacea*) in different substrates grown in Mushroom Shelf and Hanging Shelf.

Factor B	Factor A					
	Mushroom Shelf			Hanging Shelf		
Parameters	T1	T2	Co	T1	T2	Co
No. of days To Developed primordia	22.6	14.8	9.77	34.1	20.57	11.06
Size of pileus of basidiocarp produced (cm)	6.05	5.91	5.64	5.06	5.18	4.98
Size of stipe of basidiocarp produced (cm)	8.7	9.87	9.07	7.18	8.18	7.94
Weight of Basidiocarp produced (kg)	1.8	1.48	2.27	1.16	1.15	1.47

Table 1 displayed that control group grown in mushroom shelf registered the earliest day to develop primordia with a mean of 9.77, while T1 of the hanging Shelf recorded the longest (34.17). Treatment 1 or the corncobs substrate grown in mushroom shelf obtained the biggest size of pileus with a mean of 6.05, while the control group of hanging shelf obtained the smallest size of pileus (4.98). The combination of corncobs and maize stem as

bedding substrate grown in mushroom shelf obtained the highest size of stipe with a mean of 9.87, while T1 of hanging shelf got the lowest size of stipe (7.18); and The Control group of mushroom shelf obtained the highest amount of basidiocarp produced with a mean of 2.27, while T2 of hanging shelf got the smallest production (1.15).

Table 2: Two-Way Factor ANOVA p-values on the significant difference and interaction on the performance of *V. volvacea* in different substrates grown in Mushroom Shelf and Hanging Shelf

Parameters	P-value		
	Type of Shelf	Type of Substrate	Interaction
Number of days to develop primordia	0.0133	0.00006	0.1859
Size of Pileus	0.0124	0.7133	0.8721
Size of Stipe	0.0051	0.1537	0.8616
Weight of Basidiocarp produced	0.0125	0.1129	0.6405

On the significant difference and interaction on the performance of *V. volvacea* in different substrates grown in Mushroom Shelf and Hanging Shelf

Two Way Factor ANOVA showed that no significant difference exist on the performance of rice straw mushroom in terms of size of pileus, size of stipe and weight of basidiocarp produced when grown in different substrates. Which means that, the use of corncobs and the combination of corncobs and maize stem is comparable to the control group banana leaves. However, a significant difference was found on the type of shelf used in terms of size of pileus, size of stipe and weight of basidiocarp produced. This means that mushroom planted in mushroom shelf performs better as compared on the hanging shelf in terms of the size of stipe, size of pileus and weight of the basidiocarp produced.

Further, a significant difference was found on the type of substrate and type of shelf used on the performance of rice straw mushroom in terms of the number of days to develop primordia. This means to say that the type of substrate had an effect on the number of days a primordia will be developed, in this study the results shows that using corncobs as bedding substrate takes longer time to develop primordia as compared to the banana leaves substrate and the combination of corncobs and maize stem substrate. Also, this study found that though mushroom shelf takes primordia development longer than traditional method, primordia still develop faster in this method as compared to the hanging shelf method.

Furthermore, the Two-Way Factor ANOVA showed that no significant interaction exists between the performance of *V. volvacea* on the type of substrate and type of shelf used in terms of the size of pileus, size of stipe, number of days to develop primordia and weight of basidiocarp produced. This means that growing rice straw mushroom in different substrate doesn't necessarily be affected on the type of shelf used, it further means that though both type of substrate and type of shelf have their own effect on the growth of the mushroom, a relationship or connection between the two was not found nor proven in the study.

Yield and Net Income

In terms of the highest yield or harvested mushroom and Net Income, the results shows that Banana leaves or the control group grown in Mushroom Shelf registered the highest weight production of 6.8 kg with highest equivalent net income of 570.33. This means that Mushroom Shelf as mushroom propagation method is more productive as compared to Hanging Shelf.

CONCLUSIONS

The following are concluded:

1. The use of Mushroom Shelf is mor effective in the growth of *V. volvacea* as an alterative agricultural technique;
2. A significant interaction was not found on the type of substrates and type of shelf used on the growth performance of rice straw mushroom in terms of the growth parameters; and
3. The use of Mushroom shelf was found to be more productive as compared to Hanging shelf in terms of Yield and Net Income,

RECOMMENDATIONS

The following are recommended:

1. The search and development on the mushroom propagation method remained to be one of the central topics in the field of agriculture, so the mushroom shelf should still be further studied and reviewed
2. Hanging Shelf as propagation method shows a huge potential for agricultural practice in the Philippines in mushroom production and could help ease financial burden during pandemic.

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