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Baglog Position Manipulation and Combination of Several Planting Media on the Growth of White Oyster Mushroom (Pleurotus ostreatus)

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Abstract. The purpose of this study was to see the impact of the implementation of the development of baglog position manipulation and additional planting media as an alternative in increasing the growth of white oyster mushroom (Pleurotus ostreatus). The test was carried out by applying the vertical and horizontal baglog positions and the use of additional planting media with different compositions. Observation and data analysis included pinhead growth time (HSI), mushroom stalk length (cm) and mushroom hood diameter (cm). The results showed that the impact of the baglog position which gave an effective influence in the growth process of white oyster mushroom (Pleurotus ostreatus), namely the vertical baglog position which had the highest average composition with additional planting media with a balanced ratio presentation (M6) of wood powder 65% + bran 35% and (M2) 75% sawdust + 25% maize flour gave physical quality results with the highest average values for the parameters of pinhead growing time (HSI), mushroom stalk length (cm) and mushroom hood diameter (cm).

Keywords: Mushrooms, Planting Media, Baglog Position, Growth

INTRODUCTION

Indonesia is an agricultural country that has a lot of potential to develop the agricultural sector, especially food products and oyster mushroom horticulture. Oyster mushroom is one type of wood fungus that grows a lot on wood media, either logs or sawdust, and this type of white oyster mushroom is generally cultivated in Indonesia. It is said that the oyster mushroom is due to its rounded, oval and slightly curved shape like an oyster chakra. White oyster mushrooms also have health benefits and can be consumed with a variety of delicious dishes.

White oyster mushroom cultivation has good business prospects and is very promising in increasing people's income and improving nutritional conditions. Currently, oyster mushrooms have become the raw material needed daily to be processed into various healthy foods. However, the amount of demand for oyster mushroom commodities is not yet comparable to the products available in the

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market. This has sparked public interest in cultivating oyster mushrooms, this interest is in line with the increase in public knowledge in terms of cultivation techniques.

The need for mushrooms in Indonesia is quite high, the level of public consumption is still in the upper middle class and the large demand for oyster mushrooms for export needs. According to [1] states that the demand for mushrooms each year reaches around 7,000,000 kg with destinations to Taiwan, Japan and Hong Kong. However, if you look at supermarkets and in traditional markets, oyster mushrooms are still quite a step. This proves that the cultivation has not been carried out optimally so that the amount of oyster mushroom production is still limited. Oyster mushroom cultivation was initiated since 1988 with a small number of farmers. However, in accordance with technological developments, it has begun to be cultivated on a large scale with modern technological engineering methods, namely planting oyster mushrooms in baglogs using wood dust, rice straw, soybean dregs and bagasse, because fungi are plants that do not have chlorophyll so they cannot carry out the photosynthesis process. to produce their own food. Fungi live by taking food substances such as cellulose, glucose, lignin, protein and starch compounds from other organisms [2]. The wood powder used as a mushroom growing area contains organic fibers such as cellulose, fiber and lignin which are ingredients that can accelerate the growth of fungi. Completing the content of the elements needed by mushrooms, it is necessary to engineer planting media that can be used as an alternative to media mixtures to meet the needs of oyster mushroom cultivation such as the use of corn flour and bran. Corn flour can be used as fertilizer because it contains nutrients such as carbohydrates, protein, fat, fiber (hemicellulose, cellulose, lignin), minerals (P, K, Ca, Mg, Na, Fe, Cu, Mn, Zn, Se) and vitamins [3].Another mixed media that can also be used to meet the nutritional needs of the growth and development of oyster mushrooms is bran which is a waste of rice milling which is the outer part or rice bran which is a byproduct of the rice milling process. Even though bran is a waste from rice mills, it has quite high nutrient, vitamin and protein content [1]. In addition to planting media that can be engineered to meet the needs of mushroom cultivation, the baglog position can also be tested so that it is necessary to do an manipulation experiment to compare the baglog position both vertical and horizontal positions in increasing the growth of white oyster mushroom (Pleurotus ostreatus).

RESEARCH METHODS

Types Of Research

This type of research is experimental. The design used in this experiment was a factorial randomized block design (RBD), consisting of 2 factors and 4 replications. The first factor is the baglog sitting position, namely P1 = vertical position and P2 = horizontal position. The second factor is the type of media, namely: MK = 100% wood powder, M1 = 65% wood powder + 35% corn flour, M2 = 75% wood powder

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+ 25% corn flour, M3 = 85% + 15%, M4 = wood powder 65% + 15% bran, M5 = 75% sawdust + 25% bran, M6 = 85% + 15%.

Data Analysis Technique

The data that has been obtained will then be analyzed using the SPSS version 20 application. After data analysis is carried out, it is followed by the DMRT (Duncan's Multiple Range Test) test with a level of 5% if the analysis results show that there is a significant effect on the treatment given.

RESULTS AND DISCUSSION

The results of research data in the application of baglog positions and planting media with different compositions on the growth of white oyster mushroom (Pleurotus ostreatus) show the same or homogeneous results, which means that the requirements for testing the next stage can be carried out and fulfilled to obtain treatment data that has a real effect on pinhead growth (HSI), mushroom hood diameter (cm) and stalk length (cm) In general, based on the calculation of the average baglog position results, it shows that the vertical position has the highest average for all parameters observed both in the harvest cycle 1 and 2.

Growing Time of White Oyster Mushroom Pinhead (Pleurotus ostreatus) (HSI).

Pinhead is a prospective mushroom fruiting body that will develop into an adult. The data from the research on the growing time of the pinhead were obtained when the observation was carried out after the inoculation process / the process of opening the ring on the oyster mushroom baglog until the first fruit body candidate was formed. The formation of prospective fruit bodies begins to be counted when a candidate for a small fruit body measuring ± 1 cm appears. The white oyster mushroom pinhead appeared simultaneously for all treatments. Observations were made only 3 times the pinhead was formed on the same baglog media, namely a total baglog of 42.

Based on the results of the analysis of variance obtained, baglog storage in vertical and horizontal positions did not have a significant effect. However, in contrast to the application of planting media with different compositions, it shows a significant effect on the growth time of mushroom pinhead (HSI). The results of the analysis also showed that there was no interaction between the two treatments. The results of the recapitulation of the DMRT (Duncan's Multiple Range Test) which were conducted to determine the location of the differences in treatment on the growing time of white oyster mushroom pinhead (Pleurotus ostreatus) (HSI) can be seen in Table 1.

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Table 1 Recapitulation of DMRT (Duncan's Multiple Range Test) Growing Time of White Mushroom Pinhead (Pleurotus ostreatus) (HSI)

Treatment	The average growing time of white oyster mushroom (Pleurotus ostreatus) pinhead (HSI)
M6	9.75a
M5	10.50b
M4	11.33c
M2	12.00cd
M1	12.50d
M3	13.83e
MK	15.50f

Note: Numbers followed by the same letter mean not significantly different, and if the numbers followed by a different letter mean significantly different at the 5% test level.

In Table 1, the results of the analysis of the DMRT (Duncan's Multiple Range Test) with a level of 5% were carried out to determine the location of the differences in treatment on the growing time of white oyster mushroom pinhead showing a significant difference in each treatment. The treatment that showed the longest pinhead appearance time was the control treatment (MK) with an average time of 15.5f (HSI) with the composition of 100% sawdust growing media. Whereas for the treatment which showed the fastest pinhead appearance time of all treatments, namely with an average time of 9.75a (HSI) on the composition of the planting medium for sawdust (M6) 65% + 35% bran.

Based on the analysis conducted, the appearance of the pinhead is influenced by several factors such as the substrate content, temperature and humidity. The composition of the media with a balanced presentation of the sawdust gives a contribution of cellulose, lignin, hemicellulose and the right elements for the formation of the first candidate fruit bodies in a fast time. The pinhead (body candidate) is fast forming even though the mycelium has not completely filled the baglog. This is due to the high amount of nutrients available in the media. This is in accordance with reference [4] which states that high nutritional content provides nutritional intake that can spur faster pinhead initiation. In addition, reference [5] also argues that if the phosphorus element in bran or corn flour is less, the energy fulfillment for mushrooms is less. As a result, fungal pinhead growth is inhibited. Reference [6] also suggested that the mushroom pinhead will begin to appear 10-15 days after opening the baglog.

Length of White Oyster Mushroom (Pleurotus ostreatus) (cm).

Measuring the length of the mushroom stalks is done vertically, starting from the bottom of the hood to the base of the mushroom. Mushroom length was measured by looking at the largest mushroom in each harvest for each treatment.

Based on the results of analysis of variance, it shows that the treatment of the baglog position and the treatment of planting media with different compositions

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have a significant effect on the length of the oyster mushroom stalk, which means that there is at least one treatment that is significantly different from other treatments. The results of the recapitulation of the DMRT (Duncan's Multiple Range Test) were carried out to determine the location of differences in treatment of the length of the white oyster mushroom stalk (Pleurotus ostreatus) (HSI) can be seen in Table 2.

Table 2. Recapitulation of DMRT (Duncan's Multiple Range Test) Stalk Length of White Oyster Mushroom (Pleurotus ostreatus) (cm).

Treatment	Average	Treatment	Average
MK	46.67a	MK	43.00 a
M4	53.17b	M1	49.33 b
M3	53.50b	M4	50.33b
M1	55.83c	M3	50.67b
M5	56.17c	M5	50.67b
M2	59.00d	M2	56.50c
M6	62.00e	M6	58.83d

Note: Numbers followed by the same letter mean not significantly different, and if the numbers followed by different letters mean significantly different at the 5% test level.

The results of DMRT (Duncan's Multiple Range Test) with a level of 5% which were carried out at harvest cycles 1 and 2 in Table 2, show the composition of the planting medium (M6) wood powder 65% + bran 15%, both vertical and horizontal baglog positions have an average the longest average length of the stalk is 62.00e (cm); 58.83d (cm) and significantly different from other treatments. Treatment (M2) of 75% sawdust + 25% corn flour had an average length of the second mushroom stalk, namely 59.00d (cm); 56.50c (cm). While the average length of the smallest mushroom stalk in the treatment (MK) of 100% sawdust, namely 46.67a (cm); 43.00a (cm).

The length of white mushroom stalk in treatment (M6) resulted in harvest cycles 1 and 2 had the longest average size. This is due to the wood powder media 65% + 15% bran, able to fulfill the maximum nutritional requirements sufficient to spur the growth of oyster mushrooms so as to produce long stalk length compared to other treatments.

White Oyster Mushroom Hood Diameter (Pleurotus ostreatus) (cm)

Observation of the diameter of the mushroom caps was carried out by measuring the diameter of the fruit bodies at the bottom of the mushroom caps every 2 harvests. The results of the research conducted indicated that the diameter of the hoods varied. Based on the analysis of the research data, the application of the baglog position and planting media with different compositions had a significant effect on the diameter of the white oyster mushroom (Pleurotus ostreatus) hood both in harvest cycles 1 and 2.In harvest cycles 1 and 2 the highest average diameter was aimed at position sitting vertical baglog. The results of the recapitulation of the

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DMRT (Duncan's Multiple Range Test) were carried out to determine the location of the differences in treatment on the diameter of the white oyster mushroom (Pleurotus ostreatus) hood (HSI) can be seen in Table 3.

Table 3. Recapitulation of DMRT (Duncan's Multiple Range Test) Advanced Test Diameter of White Oyster Mushroom (Pleurotus ostreatus) (cm)

Treatment	Average Diameter White Oyster Mushroom Hood Harvest Cycle 1 (cm)	Average Diameter White Oyster Mushroom Hood Harvest Cycle 2 (cm)
MK	5.75a	4.75a
M6	7.50b	6.75b
M5	8.75c	8.00c
M4	10.5d	9.7d
M3	12.0e	11.2e
M2	13.2f	12.5f
M1	14.7g	14.2g

Note: Numbers followed by the same letter mean not significantly different, and if the numbers followed by a different letter mean significantly different at the 5% test level.

Based on Table 3, it shows that the average diameter of the white oyster mushroom caps in harvest cycle 1 varies and shows a significant difference in each treatment both in the vertical and horizontal position. In harvest cycles 1 and 2, the highest average diameter is aimed at the vertical baglog sitting position. In the harvest cycle 1 the average diameter of the mushroom caps was greatest in the treatment (M1) and (M2) 85% wood powder + 15% corn flour; 75% wood powder + 25% corn flour with an average cover diameter of 14.7g (cm); 13.2f (cm). While the treatment of the smallest average number of mushroom caps (MK) and (M6) with an average diameter of white oyster mushroom caps, namely 5.75a (cm) and 7.50b (cm). In harvest cycle 2, the largest average yield of hood diameter was aimed at treatment (M1) and (M2) of 85% sawdust + 15% corn flour; wood powder 75% + corn flour 25% with an average hood diameter of 14.2g (cm); 12.5f (cm) and treatment of the smallest average number of hoods (MK) and (M6) with an average hood diameter, namely 5.75a (cm) and 6.75b (cm). The average yield of the hood diameter obtained is in accordance with the opinion [7] that good yields are mushrooms that have a hood diameter of about 4-15 cm or even more.

The average yield of mushroom hood diameter in harvest cycles 1 and 2 indicated an interaction between the number of growing fruit bodies and the diameter of the caps. Treatments of M3, M1, M4, M2, M5, M6 showed that the treatment with the average diameter of the mushroom caps was correlated with the number of mushroom fruiting bodies. This is made clear by the results of Tutik's research, 2005 in reference [8] that the fungus grows to form clumps where if a large number of fruit bodies are formed in a clump, it will affect the diameter, namely the smaller the hood diameter. In addition, the difference in the average size of the

mushroom caps in each treatment both in the vertical and horizontal baglog positions with the planting medium was due to differences in available nutrients and also influenced by oxygen which could inhibit metabolism in fungi. The more oxygen is obtained, the larger the diameter will be.

CONCLUSION

1. The impact of the baglog position both vertically and horizontally has a significant effect on the length of the mushroom stalk (cm), the diameter of the mushroom cover (cm) and except for pinhead growing time (HSI). While the impact of the composition of the planting medium with a balanced ratio (M6) of wood powder 65% + bran 35% and (M2) wood powder 75% + corn flour 25% had a significant effect and physical quality results with the highest average value for growth time parameters. pinhead (HSI), mushroom stalk length (cm), mushroom cap diameter (cm).
2. The position that has an effective influence on the growth of white oyster mushroom (Pleurotus ostreatus) is the vertical baglog position

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