Jurnal Biotik. P-ISSN: 2337-9812, E-ISSN: 2549-1768
Vol. 12, No.1 Ed. April 2024, Page. 84-95

THE EFFECT OF USING SAGU DRUGS (*Metroxylon sagu*) and DRIED BANANA LEAVES (*Musa paradisiaca*) ON THE GROWTH OF WHITE OYSTER MUSHROOM (*Pleurotus ostreatus*)

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DOI: 10.22373/biotik.v12i1.22942

ABSTRAK

Jamur tiram (*Pleurotus osteorotus*) merupakan jamur kayu yang tumbuh menyamping pada batang kayu lapuk. Jamur dengan mengambil makanan yang sudah dibuat oleh organisme lain yang telah mati (saprofit), karena tidak memiliki klorofil, semua jenis saprofit khususnya yang tumbuh pada kayu dapat dengan mudah dibudidayakan. Budidaya jamur tiram putih mudah untuk dilakukan karena tidak membutuhkan biaya perawatan mahal serta tidak memerlukan lahan yang luas. Tujuan penelitian ini adalah untuk menguji pengaruh penggunaan ampas sagu dan daun pisang kering terhadap pertumbuhan jamur tiram putih. Hasil penelitian ini menunjukkan bahwa terdapat perbedaan pertumbuhan jamur tiram putih berdasarkan konsentrasi media tanam yang berbeda. Rata-rata pertumbuhan miselium, tinggi batang, diameter *pileus*, jumlah tubuh buah, berat basah dan berat kering jamur tiram putih terbaik terdapat pada media konsentrasi 100% serbuk kayu sedangkan muncul *pind head* pada konsetrasi 100% ampas sagu.

Kata Kunci: Jamur Tiram, Ampas Sagu, Daun Pisang Kering.

ABSTRACT

Oyster mushrooms (*Pleurotus ostreatus*) are wood fungi that grow sideways on rotting wood stems. Mushrooms take food that has been made by other dead organisms (saprophyte), because they do not have chlorophyll, all types of saprophytes, especially those that grow on wood, can be easily cultivated. White oyster mushroom cultivation is easy to do because it does not require expensive maintenance costs and does not require spacious land. The aim of this research was to test the effect of using sago dregs and dried banana leaves on the growth of white oyster mushrooms. The results of this research indicate that there are differences in the growth of white oyster mushrooms based on different concentrations of growing media. The average mycelium growth, stem height, pileus diameter, number of fruit bodies, wet weight and dry weight of the best

white oyster mushrooms were found in media with a concentration of 100% sawdust, while pend heads appeared in a concentration of 100% sago dregs.

Keyword: Oyster Mushrooms, Sago Dregs, Dried Banana Leaves.

INTRODUCTION

Oyster mushrooms (*Pleurotus osteorotus*) are wood fungi that grow sideways on rotting wood stems. Fungi take food that has been made by other dead organisms (saprophytes), because they do not have chlorophyll, all types of saprophytes, especially those that grow on wood, can be easily cultivated. The characteristics of oyster mushrooms are that they have thick, white flesh, firm but soft, generally have hair or cotton wool at least at the base [1]; [2].

The name white oyster mushroom (*Pleurotus ostreatus*) is because it has the characteristic shape of the mushroom cap, such as rounded, oval and curved. The surface of the white oyster mushroom cap is smooth, slightly shiny in damp conditions, and has wavy edges. The diameter of the hood can reach 3-15 cm. The stem or stalk of the oyster mushroom is not exactly in the middle of the hood. The fruit bodies form clumps that have many branches and are united in one medium [3].

Several reasons underlying the importance of oyster mushroom cultivation in Indonesia include its large and varied natural resource potential, the large population that depends on this sector for its livelihood and mushroom cultivation as a basis for growth in rural areas [4]; [5]. Cultivating oyster mushrooms can improve the economic level of the community, apart from that, you can also use leftover materials to reduce waste in the environment. When cultivating oyster mushrooms, a growing medium is needed so that the mushrooms can grow well.

Growing media is one of the important aspects that determines the level of success of mushroom cultivation. The white oyster mushroom media used must contain the nutrients needed for growth and production, including lignin, carbohydrate (cellulose and glucose),

protein, nitrogen, fiber and vitamins. This compound is obtained from wood sawdust, rice bran, straw, husks and rice flour. The nutritional content in these ingredients can accelerate the growth of mycelium [6]; [7]; [8].

Sawdust or wood dust can be used as a good planting medium. Planting media made from sawdust can optimize the absorption of water and nutrients in plants. Wood dust which is generally used as a medium for oyster mushrooms contains cellulose (49.40%), hemicellulose (24.59%), lignin (26.8%), ash (0.60%), silica (0.20%) . Sago dregs also contain 64% starch, the remaining 3.3% crude protein, 14% crude fiber, 0.3% fat and 5.0% ash [6]. Apart from that, dried banana leaves also contain 2.8% - 3.1% nitrogen, 18% - 0.21% phosphorus, 0.6% - 1% calcium, 0.22% - 0.25% sulfur and 3.2% - potassium. 3.5%. Dried banana leaves also contain 10.58% cellulose, 18.21% lignin and 19.95% hemicellulose [9].

Research was carried out in Biology Education Mushrooms to develop, especially oyster mushrooms into an activity that provides benefits, experiences and new insights for students. This activity includes making planting media up to the harvesting process. Observations were carried out to test the effect of using sago dregs and dried banana leaves on the growth of white oyster mushrooms. The formulation of the research problem is how does the use of sago dregs (*Metroxylon sago*) and dried banana leaves (*Musa paradisiaca*) affect the growth of white oyster mushrooms.

RESEARCH METHOD

This research is an experimental study using quantitative methods using a design in the form of a Completely Randomized Design (CRD/*RAL*) [10] consisting of 6 treatments and 4 replications, namely 3 treatments as control and 3 treatments with varying percentages of sago dregs and dried banana leaves, a total of experimental units is 24 unit using sawdust, sago dregs and dry banana leaves as media. In this research, treatments P01, P02 and P03 were wood dust, sago dregs and 100% dry banana leaves as a control, treatment P1 was 80% sago dregs + 20% dry banana leaves, P2 was 50% dregs + 50% banana leaves, P3 is

20% sago dregs + 80% dry banana leaf media.

Data collected; observation techniques were used. Observations are carried out on the objects studied directly, with the aim of collecting data in research. Researchers made observations and recorded research results in the form of mycelium growth, fruit body emergence, fruit stalk height, fruit cap diameter, number of fruits, wet weight and dry weight. This research activity was carried out from 27 October 2023 to 30 January 2024 in the Biology Education Mushroom, Faculty of Education and Teaching, Islamic University of Ar-Raniry Banda Aceh, Indonesia.

RESULTS AND DISCUSSION

Mycelium Growth

Based on the results of observations of the growth of white oyster mushroom mycelium for 33 days, the total amount for each treatment was obtained. The differences in white oyster mushroom mycelium growth in each treatment can be seen in the following **Table 1**:

Table 1 White Oyster Mushroom (*Pleurotus ostreatus*) *Mycelium* Growth

Treatment	repetition (cm)				Total length of mycelium	Average length of Mycelium
	1	2	3	4		
T01	170.5	204.1	187.2	200.7	762.5	190.63=190[d]
T02	118.6	137.9	121.9	137.2	515.6	128.90=128[b]
T03	147.5	144.2	167.2	168.9	627.8	156.95=156[c]
T1	133.5	106	129.6	122.5	491.6	122.90=122[ab]
T2	105.3	92.5	105.6	141.2	444.6	111.15=111[ab]
T3	115.2	107.7	87.9	107.7	418.5	104.63=104[a]
Total	790.6	792.4	799.4	878.2	3260.6	815.15

Based on **Table 1** above, it can be seen that the average value of the analysis of variance (ANOVA) for mycelium growth resulted in $F_{count} \geq F_{table}$ at the 95% confidence level ($\alpha = 0.05$), namely $23.48 \geq 2.77$, So it can be stated that sawdust media, sago dregs and dried banana leaves have a significant effect on the growth of white oyster mushroom mycelium, which means that there is an influence of different planting media treatments on the growth of oyster mushroom mycelium. Below are the results of the average amount of mycelium growth of white oyster mushrooms (*Pleurotus ostreatus*) presented.

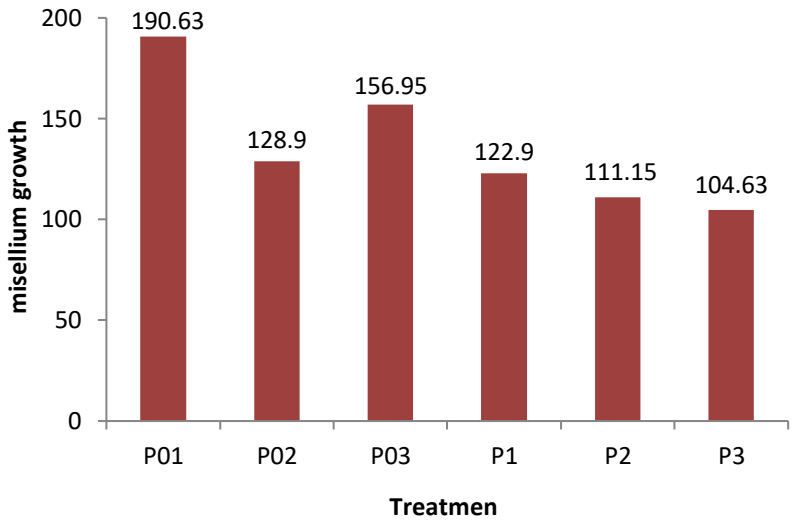

Figure.1 Oyster Mushroom (*Pleurotus ostratus*) Mycelium Growth

There were differences in the average number of mycelium in each treatment. The highest average amount of white oyster mushroom mycelium was found in treatment P1 (80% sago dregs + 20% dried banana leaves) with a total of 122 cm of mycelium, followed by treatment P2 (50% sago dregs + 50% dried banana leaves) with a total of 111 cm. It can be seen that treatment P1 with 80% sago dregs and 20% dried banana leaves had a significant impact on mycelium growth The lowest average amount of mycelium was found in P3 (20% sago palm + 80% dry banana leaves) with an amount of 104 cm. In the control treatment, the best mycelium growth was at P01 (100% sawdust) at 190 cm, then at P03 at 156 cm. The lowest average mycelium in controls was at P02 with an average amount of

mycelium of 128 cm. The average length of P01 mycelium is better when compared to other treatments.

Analysis of variance in the amount of mycelium growth on days 3 to 33 is an analysis of variance in the amount of mycelium growth in white oyster mushrooms produced from the six treatments. A recapitulation of the results of the variance analysis is presented in **Table. 2.**

Tabel 2 Analysis of Growth Variants of White Oyster Mushroom Mycelium

SK	DB	JK	KT	Fhit	Ftab		Note
					0.05	0.01	
Treatment	5	8852.676	1770.535	23.48956	2.77	4.25	*
Error/remnant	18	1356.757	75.37542				
Total	23	10209.43					

Note: (*) = real impact

Based on the results that have been carried out, it can be seen that the growth of white oyster mushroom mycelium (*Pleurotus ostreatus*) on sawdust, sago dregs and dry banana leaves has a significant effect on the length of white oyster mushroom mycelium (*Pleurotus ostreatus*). The amount of mycelium was long in the P01 treatment (100% wood powder) because the medium used was wood powder which has the general conditions needed for its growth. The highest average length of mycelium for white oyster mushrooms (*Pleurotus ostreatus*) was found in treatment P01 (100% sawdust) with a total of 190.63 cm of oyster mushrooms.

This is because wood powder contains the highest composition of 49.40% cellulose, 24.59% hemicellulose and 26.8% lignin compared to other media. Even though sawdust media is the growing medium with the highest average number of mycelium, the amount of mycelium length is not much different from using P03 dry banana leaf media. Dried banana leaves contain 10.58% cellulose, 18.21% lignin and 19.95% hemicellulose, so banana leaves are able to supply good nutrition for the growth of white oyster mushroom mycelium. Meanwhile, sago dregs contain 36.3% cellulose, 14.6% hemicellulose and 9.7% lignin [11].

Using P3 media (20% sago dregs + 80% dried banana leaves) resulted in the lowest amount of mushroom mycelium length, namely 104.63 cm for white oyster mushrooms. From the results of the data analysis that has been carried out, it can be seen that the combination of sago dregs and dried banana leaves has a significant effect on the growth rate of white oyster mushroom mycelium. In testing the Ha hypothesis, it was accepted, so that the combination of dried banana leaf sago pulp had an effect on the growth rate of white oyster mushroom mycelium. The growth rate of mycelium is influenced by several factors, namely environmental factors in the form of Ph, temperature, light intensity and humidity required by mushrooms of around 90%[12]. The level of bag log density also influences the speed of mycelium growth. The denser the bag log, the longer the mycelium will propagate in the bag log. Other factors include the quality of the white oyster mushroom seeds and the water content in the bag log.

Figure 2. Mycelium growth

Pinhead Appears

Based on the results of observations of the appearance of pinhead white oyster mushrooms on the 6th to the 30th day after the baglog was opened, the total number for each treatment was obtained. The difference in days when pinheads appeared in each treatment can be seen in the following **Table 3.**

Tabel 3. Observation of the Growth of Pinhead White Oyster Mushrooms.

Treatment	Repetition (cm)				Total	Average
	1	2	3	4		
	Day					
T01	29	30	30	30	119	29.75=30^{c}
T02	6	12	23	23	64	16=16^{a}
T03	13	19	26	26	84	21=21^{ab}
T1	20	20	20	28	88	22=22^{ab}
T2	20	20	23	23	86	21.5=22^{ab}
T3	26	27	27	27	107	26.75=27^{bc}
Total	114	128	149	157	548	137

Note: Numbers followed by the same letter are not significantly different based on Duncan's test at the 5% level

Based on Table 3, it was found that there were differences in the growth period of white oyster mushroom pinheads in each treatment. The treatment where pinheads appeared fastest was in treatment P2 (50% sago dregs + 50% dry banana leaves), namely on days 20 to 23 with an average of 22 days after opening Treatment P1 (80% sago dregs + 20% dried banana leaves) lasted an average of 22 days, while the slowest treatment was P3, an average of 27 days.

The fastest control treatment was P02 (100% sago dregs) with an average of 16 days, P03 (100% dried banana leaves) for 21 days and the longest was P01 (100% sawdust) with an average of 30 days. . However, overall the best pinheads appeared at P02, namely at an average of 16 days compared to all types of treatment. The following are the average results for the average height of the fruit body of oyster mushrooms (*Pleurotus ostreatus*).

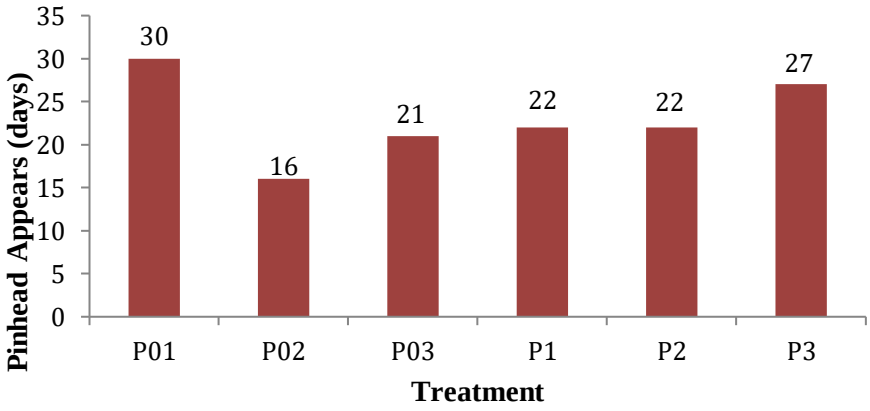

Figure 3. *Pinhead* Appears of White Oyster Mushroom (*Pleurotus ostreatus*)

Analysis of variance (ANOVA) of the emergence of white oyster mushroom pinheads on the first day they appeared was an analysis of variance in the emergence of white oyster mushroom pinheads produced from the six treatments. A recapitulation of the results of the variance analysis is presented in **Table 4**.

Table 4. Analysis of Variants in the Appearance of Pinhead Oyster Mushrooms (*Pleurotus ostreatus*)

SK	DB	JK	KT	Fhit	Ftab		Not
					0.05	0.01	
Treatment	5	10812.92	2162.583	5.88458	2.64	3.94	*
Error/remnant	23	390.5	367.5				
Total	18	11203.42					

Note: (*) = real effect

Based on Table 44 Analysis of Variance (ANOVA) for the height of white oyster mushrooms (*Pleurotus ostreatus*), the resulting $F_{count} \geq F_{table}$ at the 95% confidence level (α= 0.05) is $5.88 \geq 2.64$ so that it can be stated that the difference in the percentage of sawdust media , sago dregs and dried banana leaves have a significant effect on the emergence of white oyster mushroom pinheads, which means that there is a real influence from the different planting media treatments where each treatment has a different number of stem heights. The following are the average results for the average height of the fruit body of oyster mushrooms (*Pleurotus ostreatus*).

The results of Duncan's test showed that there was an interaction between various types of planting media and the type of nutrition on the average time for pinheads to appear on white oyster mushroom plants, but independently there was a significantly different but not significant effect on the treatment of the type of planting media. The composition of the planting media had a significant effect on the time parameters for the emergence of white oyster mushroom pinheads in all treatments. Even though it has a real effect, it is not significant. The difference in pinhead emergence was very low, with a tendency for the fastest pinhead emergence time to occur in the P02 treatment (100% sago dregs), namely 16 days after the bag

log was opened. Meanwhile, the tendency for the longest time for pinheads to appear was in the P01 (100% wood dust) treatment, namely 30 days. The tendency for the longest pinhead emergence time was in the P01 (100% wood dust) treatment. This situation is due to the high level of pinhead growth inhibitor compounds in P01 media. This is due to the presence of lignin compounds in sawdust which can inhibit the growth of white oyster mushroom pinheads. Media that have high lignin and cellulose content may take longer to start forming pinheads [13] However, the use of wood sawdust media will take a long time due to the high C/N value. This is in accordance with Nurul Hariadi's statement which states that the C/N level in sengon wood it is high, namely 69.33%, causing oyster mushrooms to take longer to decompose the media [14]. The appearance of pinhead is also influenced by the position of the bag log [15].

In this study, the bag log was positioned horizontally and had various lengths. It could be that the time and number of pinhead appearances are not the same.

Figure 2. Pinhead Appears

CONCLUSION

It can be concluded that differences in the percentage of sawdust media, sago dregs and dried banana leaves on average have an effect on the growth of mycelium length. The Analysis of Variance (ANOVA) figure for the growth of mycelium length F_{count} is greater than F_{table}, namely 23.48>2.77. Pin head growth was fastest in treatment P02 (100% sago dregs) with an average time of 16 days compared to all types of treatments.

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