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Optimization of Growth and Production of Brown Oyster Mushrooms (*Pleurotus cystidiosus*) through Additional Nutrients of Rice Washing Water and Rice Groats

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

This study aims to determine the optimization of growth and production of brown oyster mushroom (*P. cystidionsus)* plants with additional nutrients of rice washing water and to determine the optimization of growth and production of chocolate oyster mushroom *(P. cystidionsus)* plants through additional nutrients of rice groats. This study used a factorial Complete Randomized Design (RAL) method consisting of two factors, namely, the first factor is rice washing water / leri water (L) and the second factor is rice groats (G). Each treatment is repeated 3 times. Leri water factor consists of 4 levels, namely: A0=0 ml, A1= 30 ml, A2= 50 ml, A3=70 ml. Rice groats factor consists

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of 4 levels, namely: M0=0 g, M1=60 g, M2= 80 g, M3= 100 g. Data was analyzed using variance analysis (Anova) at 5%. The results showed no effect of rice washing water and rice groats on the growth rate of brown oyster mushroom mycelim, will be at a rice washing water concentration of 70ml / baglog + rice groats 100g / baglog affects the parameters of mushroom stalk height (cm), mushroom hood diameter (cm), mushroom hood thickness (cm), number of mushrooms (clump), and fresh weight of mushrooms / baglog (g).

Keywords: Rice washing water; rice groats; brown oyster mushrooms; concentrate.

1. INTRODUCTION

Brown oyster mushrooms *(P. cystidionsus)* is one source of vegetable protein that has high quality [1]. So that it is directly beneficial to human health. There is a public penchant for mushroom consumption, evidenced by data from [2], namely in 2015 the level of mushroom consumption was 0.278 ounces / capita / year, followed in 2016 and 2017 by 1,773 and 1.9 ounces / capita / year. This level of consumption tends to fluctuate but increases every year. This is supported by research [3] which states that the increase in mushroom consumption is caused by the emergence of many household industries processing mushrooms into processed products. One alternative business that tends to be easily developed by housewives is the food business, because business in this field does not require a lot of time and can be done on the sidelines of housewives' free time [4]. The expected result is that respondents gain knowledge from academics on how to calculate production costs and revenues, and are able to make business financial statements [5]. Simply in business, the Company buys raw materials, creates added value by converting it into something of value for others (customers) [6].

In general, the mushroom cultivation process includes four stages of making seeds, namely pure culture (F0), parent culture (F1), parent seed (F2) and production seed (F3) [7]. Pure culture seeds (F0) are obtained from good fresh mushroom broodstock and then isolated spores in a sterile state. This isolation is performed on Petridish containing PDA media. The spores then germinate and form hyphae, increasingly complex hyphae then form a mycelium. One of the most important stages in making a pure culture is the culture medium [8].

The medium commonly used to breed oyster mushrooms is wood sawdust [9]. The availability of durian sawdust is a problem for mushroom farmers who want to cultivate oyster mushrooms, but in the area where they live there are no or few places to produce sawdust [10]; Therefore, it is necessary to conduct a study on materials that can replace durian sawdust as the main ingredient of artificial media for oyster mushroom cultivation. The material used should have almost the same criteria and characteristics as sawdust and have sufficient nutritional content to support the growth of oyster mushrooms [11]. Durian contains essential oils, flavonoids, saponins, cellulose, lignin, as well as starch.

In addition to durian sawdust, the addition of rice washing water can also be used as additional nutrients to determine the optimization of growth and production of brown oyster mushroom plants. Rice washing water is one of the wastes that we will easily encounter in our lives. High rice consumption in daily life causes a lot of rice washing water that is wasted and rarely used [12]. Research on the potential of rice washing water waste and its use has been carried out by many researchers. There are many ways and methods in making treatment of rice washing water so that it can be used as liquid organic fertilizer.

Research conducted by Fadilah compared the ferrmentation period of rice washing water between 1 day and 15 days fermentation with a composition between 50% and 100% showing a fermentation duration of 15 days with a composition of 100% has an influence on plants [13]. Rice washing water can also increase the total chlorophyll count and plant height growth [14]. Some of the contents possessed by rice washing water include carbohydrates, nitrogen, phosphorus, potassium, magnesium, sulfur, iron, and Vitamin B1 [15]. The benefits of rice washing water for plants are very diverse, including increasing fruit weight [16].

In addition to rice washing water, the addition of rice groats is also beneficial for the growth of brown oyster mushrooms, where rice groats contain protein of 13.11 - 17.19%, fat of 2.52 - 5.05%, carbohydrates of 67.58 - 72.74%, and crude fiber of 370.91 -387.3 calories and rich in vitamin B, especially vitamin B1 which is good for the growth of brown oyster mushrooms.

One of the nutrients that are good for the growth of oyster mushrooms is molasses. Molasses contains simpler carbohydrates than a mixture of sawdust and bran, so the carbohydrates in molasses can be used for the growth of brown oyster mushrooms. Molasses also contains glucose, fructose, nitrogen, calcium, magnesium, potassium and iron which can be used to meet the nutritional needs of White Oyster Mushrooms. Molasses is an essential energy source that contains sugar, so molasses is used as an additional ingredient in nutritious and nutritious feed and fertilizer. The nutritional value of molasses is water content of 23%, dry matter of 77%, crude protein of 4.2%, crude fat of 0.2%, crude fiber of 7.7%, Ca of 0.84%, P of 0.09%, BETN (Extract Without Nitrogen) of 57.1%, and ash of 0.2%. Molasses has a high enough nutrient content for the growth of oyster mushroom mycelium, so in addition to rice flour, carbohydrates that can be added to stimulate the growth of oyster mushrooms in the growth medium are molasses [17].

Based on the above background, it is necessary to conduct research on optimizing the growth and production of brown oyster mushrooms through additional nutrients of rice washing water and rice groats against mushroom media.

2. METHODS

This research will be carried out from November to December 2023 in laboratory rooms C106 and C108 of Universitas Pembangunan Panca Budi Medan, Jl. Gatot Subroto No.Km, Simpang Tj., Kec. Medan Sunggal, Medan City, North Sumatra 20122. The materials used in this study were brown oyster mushroom seeds, durian sawdust, rice bran (rice groats), lime (tohor), rice washing water, molasses, alcohol, spirtus, and newsprint. And the tools used in this study are plastic baglogs measuring 18 cm x 35 cm and 0.5 pp thick, baglog rings / rings, shovels, baglog presses, rubber bands, sterilization drums, gas stoves, gas cylinders, plastic sterilization covers, fire bunsen, spatula spoons, measuring cups, scales, rulers, micrometers and stationery.
This research method uses a factorial Complete Random Design (RAL) consisting of 2 factors, 16 combinations, 3 repetitions, and 48 baglogs, namely: The first factor is the provision of rice washing water which is given the symbol "A" consists of 4 levels, namely: A0 = 0 ml/baglog (Control) A1 = 30 ml/baglog A2 = 50ml/baglog A3 = 70ml/baglog. The second factor is the provision of rice groats which are given the symbol "M" which consists of 4 levels, namely: M0 = 0gr / baglog (Control) M1 = 60gr / baglog M2 = 80gr / baglog M3 = 100gr / baglog.

2.1 Research Implementation

The stages of implementation carried out in this study are: preparation of mushroom houses, sieving, mixing planting media, filling baglogs, sterilization of planting media, cooling, inoculation of seedlings, incubation of seedlings, opening newspaper lids, maintenance and harvesting. The plant maintenance carried out in this study are: Oyster Mushroom Fog/Watering, Temperature Regulation, Baglog Insertion, Pest and Disease Control and finally Harvesting. The parameters observed in this study were mysellium growth rate (cm), stalk height (cm), hood diameter (cm), hood thickness (mm), number of branches/clumps, and wet weight (gr).

3. RESULTS AND DISCUSSION

3.1 Observation Data of Brown Oyster Mushroom Mycelium Growth Rate (cm)

Lack of significant influence on the growth rate of mycelium in brown oyster mushroom plants *(P. cystidionsus),* It can be seen in the addition of the concentration of rice washing water and rice groats, which is aimed at measuring the growth rate of mycelium in centimeters. The impact of combining rice washing water and rice groats into the growth medium was not statistically significant based on the results obtained from the Duncan distance test conducted on the growth rate of mycelium. Table 1 displays observational data on the mycelium of brown oyster mushroom plants due to the provision of rice washing water and rice groats.

3.2 Observation Data of Brown Oyster Mushroom Stalk Height (cm)

The results of high observations of brown oyster mushrooms show that the provision of rice washing water has an influence on the height of brown oyster mushroom *plants (P. cystidionsus*), as well as the provision of rice groats has an influence on the height of brown oyster mushroom plants *(P. cystidionsus).* The impact of combining rice washing water and rice groats into the growth medium was not statistically significant based on the Duncan distance test conducted on the applied treatment. Table 2 displays Duncan's distance test results.

Table 1. Observation data on the growth rate of mycelium (cm) of brown oyster mushrooms due to the provision of rice washing water (A) and rice groats (M)

Treatment	Mycelium (fruit)				
	1	2	3	4	5
Rice Washing Water (A)					
A0 = 0 ml/baglog	2.01 aA	10.99 aA	14.33 aA	16.66 aA	24.49 aA
A1 = 30 ml/baglog	3.63 aA	11.10 aA	14.45 aA	16.78 aA	24.67 aA
A2 = 50 ml/baglog	3.86 aA	11.24 aA	14.58 aA	16.91 aA	25.35 aA
A3 = 70 ml/baglog	4.65 aA	11.60 aA	14.94 aA	17.28 aA	26.39 aA
Rice Groats (M)					
M0 = 0 g/baglog	2.30 aA	10.73 aA	14.07 aA	4.40pm aA	24.48 aA
M1 = 60 g/baglog	3.48 aA	11.17 aA	14.53 aA	16.86 aA	25.53 aA
M2 = 80 g/baglog	3.94 aA	11.19 aA	14.53 aA	16.87 aA	25.61 aA
M3 = 100 g/baglog	4.44 aA	11.84 aA	15.17 aA	5.50pm aA	25.29 aA

Ket: Numbers in the same column followed by the same letter mean intangible differences at the level of 5% (lowercase) and at the level of 1% (uppercase)

Table 2. Observation data on the height of mushrooms (cm) of brown oyster mushrooms due to the provision of rice washing water (A) and rice groats (M)

Treatment	Mushroom Height (cm)	
	1	2
Rice Washing Water (A)		
A0 = 0 ml/baglog	4,627 cB	6,020 bB
A1 = 30 ml/baglog	5,596 bcA	6,459 bAB
A2 = 50 ml/baglog	6,583 abA	6,664 abA
A3 = 70 ml/baglog	6,866 aA	7,367 aA
Rice Groats (M)		
M0 = 0 g/baglog	5,279 bB	6,317 Ba
M1 = 60 g/baglog	5,387 bB	6,391 bA
M2 = 80 g/baglog	5,816 bAB	6,559 abA
M3 = 100 g/baglog	7,189 aA	7,243 aA

Ket: Numbers in the same column followed by the same letter mean intangible differences at the level of 5% (lowercase) and at the level of 1% (uppercase)

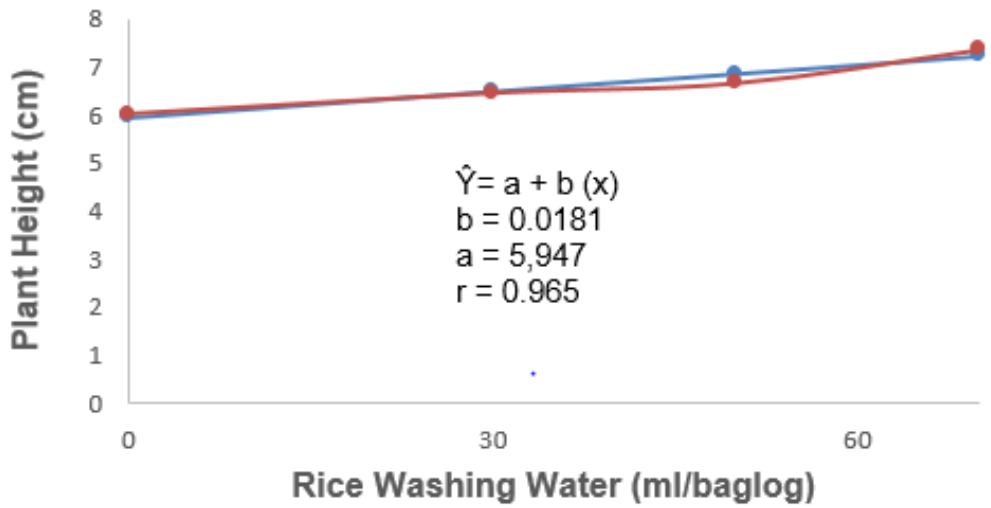

Fig. 1. Mushroom Height (cm)

Table 3. Observation data of clumps (units) of brown oyster mushrooms due to additional nutrition of rice washing water (A) and rice groats (M)

Treatment	Number of Clumps (clumps)	
	1	2
Rice Washing Water (A)		
A0 = 0 ml/baglog	2.92 bB	2.67 Bb
A1 = 30 ml/baglog	3.08 bB	2.92 bB
A2 = 50 ml/baglog	3.92 bB	2.92 bB
A3 = 70 ml/baglog	7.92 aA	6.50 aA
Rice Groats (M)		
M0 = 0 g/baglog	3.42 bA	2.42 bB
M1 = 60 g/baglog	4.00 bA	3.75 bB
M2 = 80 g/baglog	4.83 bA	3.92 bB
M3 = 100 g/baglog	5.58 aA	4.92 aA

Ket: Numbers in the same column followed by the same letter mean intangible differences at the level of 5% (lowercase) and at the level of 1% (uppercase)
The difference is not noticeable at the level of 5% (lowercase) and at the level of 1% (uppercase)

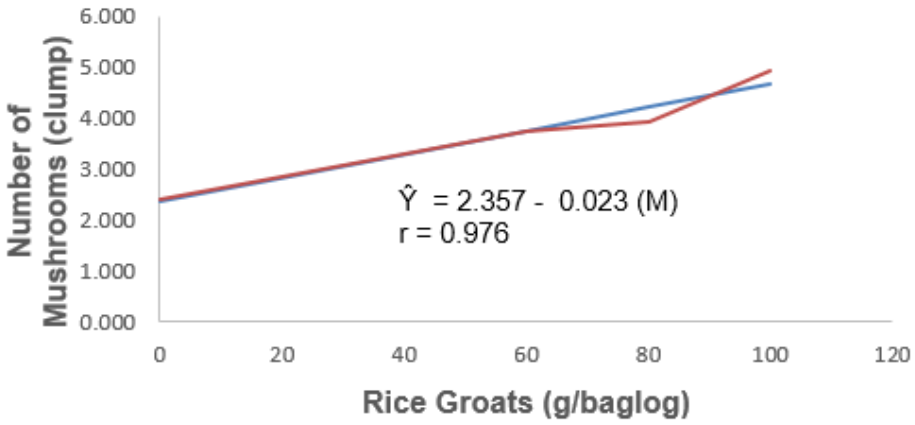

Fig. 2. Number of Mushrooms (clumps)

3.3 Observation Data on the Number of Perbaglog Fungi (Clumps)

The results of high observations of brown oyster mushrooms show that the provision of rice washing water has an influence on the number of fungi (brown oyster mushroom perbaglog clumps *(P. cystidionsus)*, as well as the provision of rice groats has an influence on the number of brown oyster mushroom perbaglog clumps *x*. The impact of combining rice washing water and rice groats into the growth medium was not statistically significant based on the Duncan distance test conducted on the applied treatment. Table 3 shows Duncan's distance test results.

3.4 Mushroom Hood Diameter Observation Data (cm)

The results of high observations of brown oyster mushrooms show that the application of rice washing water affects the diameter of the hood of brown oyster mushrooms *(P. cystidionsus),* as well as the application of rice groats affects the diameter of the hood of brown oyster mushrooms *(P. cystidionsus).* The impact of combining rice washing water and rice groats into the growth medium was not statistically significant based on the Duncan distance test conducted on the applied treatment. Table 4 displays Duncan's distance test results.

3.5 Mushroom Hood Stocking Observation Data (mm)

The results of high observations of brown oyster mushrooms show that the provision of rice washing water has an influence on the stocking of the hood of brown oyster mushroom *plants (P. cystidionsus),* as well as the application of rice groats has an influence on the width of the hood of brown oyster mushroom plants *(P.*

cystidionsus). The impact of combining rice washing water and rice groats into the growth medium was not statistically significant based on the Duncan distance test conducted on the applied treatment. Table 5 shows Duncan's distance test results.

Table 4. Observation Data of Hood Diameter (cm) of Brown Oyster Mushrooms Due to Rice Washing Water (A) and Rice Groats (M)

Treatment	Hood Diameter (cm)	
	1	2
Rice Washing Water (A)		
A0 = 0 ml/baglog	3.09 bB	2.69 bB
A1 = 30 ml/baglog	3.16 bB	2.73 bB
A2 = 50 ml/baglog	3.28 bB	2.81 bB
A3 = 70 ml/baglog	6.37 aA	4.45 aA
Rice Groats (M)		
M0 = 0 g/baglog	2.75 bAB	2.61 bB
M1 = 60 g/baglog	3.70 bAB	2.80 bAB
M2 = 80 g/baglog	4.57 aA	3.68 bAB
M3 = 100 g/baglog	4.88 aA	3.60 aA

Ket: Numbers in the same column followed by the same letter mean intangible differences at the level of 5% (lowercase) and at the level of 1% (uppercase)

Table 5. Observation Data on Stocking Hood (cm) of Brown Oyster Mushrooms Due to Rice Washing Water (A) and Rice Groats (M)

Treatment	Hood Width (cm)	
	1	2
Rice Washing Water (A)		
A0 = 0 ml/baglog	5.80 bB	5.47 bB
A1 = 30 ml/baglog	6.42 bAB	7.22 bB
A2 = 50 ml/baglog	7.37 bAB	7.20 bB
A3 = 70 ml/baglog	8.85 aA	10.33 aA
Rice Groats (M)		
M0 = 0 g/baglog	6.21 aA	6.77 bB
M1 = 60 g/baglog	6.88 aA	7.13 bB
M2 = 80 g/baglog	7.48 bA	7.80 bAB
M3 = 100 g/baglog	7.87 aA	8.51 aA

Ket: Numbers in the same column followed by the same letter mean intangible differences at the level of 5% (lowercase) and at the level of 1% (uppercase)

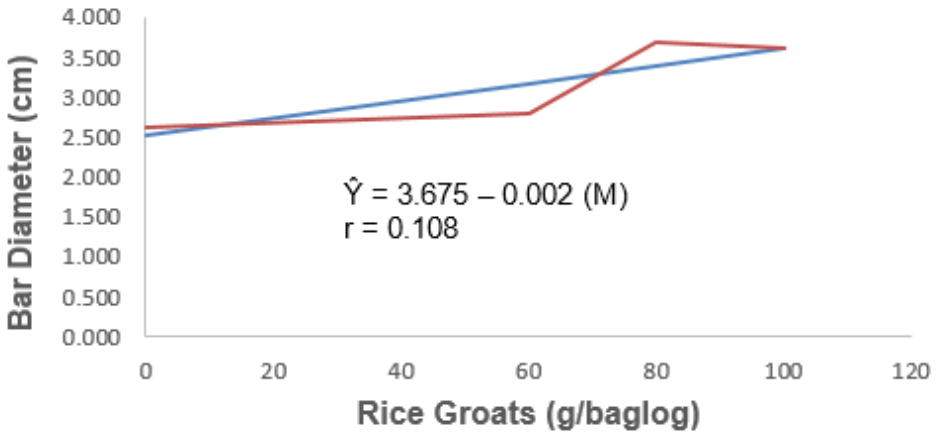

Fig. 3. Bar diameter (cm)

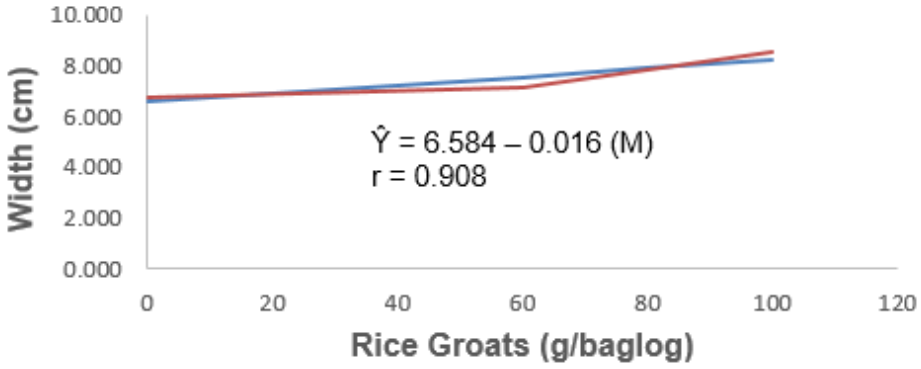

Fig. 4. Hood Width (cm)

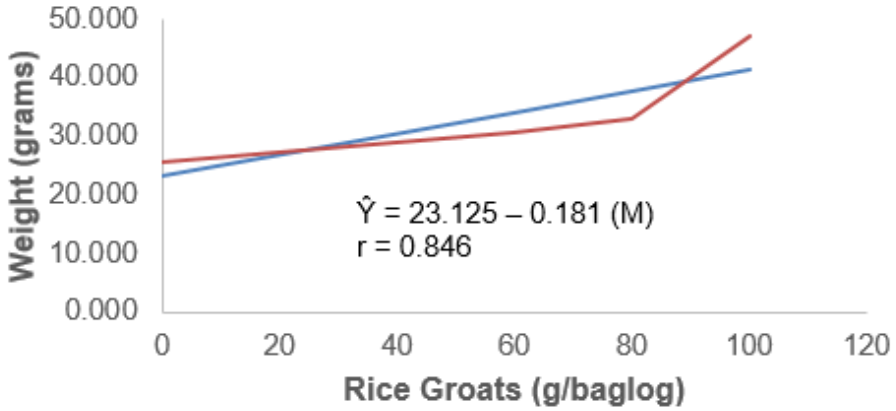

Fig. 5. Fresh Weight (grams)

Table 6. Observation Data of Fresh Weight (g) of Brown Oyster Mushrooms Due to Rice Washing Water (A) and Rice Groats (M)

Treatment	Fresh Weight (g)	
	1	2
Rice Washing Water (A)		
A0 = 0 ml/baglog	24.91 bB	25.55 bB
A1 = 30 ml/baglog	27.13 bB	26.51 bB
A2 = 50 ml/baglog	32.05 bB	27.64 bB
A3 = 70 ml/baglog	58.61 aA	56.45 Aa
Rice Groats (M)		
M0 = 0 g/baglog	28.25 bB	25.43 bB
M1 = 60 g/baglog	31.28 bAB	30.64 bB
M2 = 80 g/baglog	42.52 bAB	32.93 bB
M3 = 100 g/baglog	40.66 aA	47.15 aA

Ket: Numbers in the same column followed by the same letter mean intangible differences at the level of 5% (lowercase) and at the level of 1% (uppercase)

3.6 Observation Data of Fresh Weight of Jamut (grams)

The results of high observations of brown oyster mushrooms show that the provision of rice washing water affects the fresh weight of brown oyster mushroom plants *(P. cystidionsus),* as well as the provision of rice groats affects the fresh weight of brown oyster mushroom plants *(P. cystidionsus)*. The impact of combining rice

washing water and rice groats into the growth medium was not statistically significant based on the Duncan distance test conducted on the applied treatment. Table 6 shows Duncan's distance test results.

3.7 Discussion

3.7.1 Mysellium growth rate (cm)

Based on data obtained from the duncan test distance table, the mycelium growth rate in Table 1 shows that the application of rice washing water and rice groats does not have a real effect. According to research [18] shows that the growth of brown oyster mushroom mycelium is strongly influenced by the availability of carbon and nitrogen sources in the growing medium. Although rice washing water and rice groats contain nutrients, their composition may not be suitable to meet the specific nutirisi needs of brown oyster mushrooms.

In addition to the content contained in rice washing water and rice groats, mycelium growth is also influenced by physical factors. Where physical factors consist of temperature, PH, humidity, light intensity and air circulation (aeration). According [19] the temperature and humidity required during mycelium growth are between 22°C -28°C and 60%-70%. The intensity of Light required during mycelium growth is 10%. The pH range required during the growth of fungal mycelium is between 4-7. Mycelium growth requires an environment containing CO2 and O2 in an environment containing CO2 of 15-20%. Light intensity, pH and air circulation will affect the needs of vitamins contained in the media, which functions as coenzymes or constituents that catalyze specific reactions and are not used as energy sources or protoplasmic structural matter.

3.7.2 Brown oyster mushroom stalk height (cm)

Based on data obtained from the Duncan test distance table, the height of brown oyster mushroom stalks in Table 2 shows that the application of rice washing water and rice groats has an influence on the height of brown oyster mushroom stalks. Table 2 can be explained that the highest provision of rice washing water for mushroom stalks in the first harvest was in the A3=70 ml/baglog treatment, which was 6.87 cm, while the lowest was in the A0=0 ml/baglog treatment, which was 4.63 cm. Then in the second harvest, the highest mushroom stalk was in the A3=70 ml/baglog treatment, which was 7.37 cm, while the lowest was found in the A0=0ml/baglog treatment, which was 6.02 cm.

For rice groats, it can be explained that the highest mushroom stalk of the first harvest is in the M3 = 100g / baglog treatment, which is 7.19 cm, while the lowest is found in the M0 = Og / baglog treatment, which is 5.28 cm. Then in the second harvest, the highest mushroom stalks were in the M3 = 100g / baglog treatment, which was 7.24 cm, while the lowest was found in the M0 = Og / baglog treatment, which was 6.32 cm.

According to research [20] Nitrogen content of rice washing water and rice groats contain nitrogen in the form of organic compounds. Nitrogen is an essential nutrient for the growth of mushroom stalks, the addition of organic nitrogen sources can increase the height of oyster mushroom stalks. The availability of dissolved nutrients of rice washing water and rice groats contains dissolved nutrients such as carbon, nitrogen, phosphorus, and other minerals.

3.7.3 Number of clumps perbaglog (clumps)

Based on data obtained from the duncan test distance table, the number of clumps per baglog of brown oyster mushroom plants in Table 3 shows that the provision of rice washing water and rice groats has an influence on the number of brown oyster mushroom clumps. Table 3 can be explained that the influence on the highest number of clumps of the first harvest was in treatment A3 = 70ml / baglog which is 7.92 while the lowest is in treatment A0 = 0ml / baglog which is 2.92. Then in the second harvest, the highest number of clumps was in the treatment A3 = 70ml / baglog yatiu 6.50 while the lowest was in the treatment A0 = 0ml / baglog which was 2.6.

For rice groats, it can be explained that the highest number of clumps, the first harvest is in the M3 = 100g / baglog treatment, which is 5.58, while the lowest is in the M0 = 0g / baglog treatment, which is 3.42. Then in the second harvest, the highest number of clumps was in the M3= 100g/baglog treatment, which was 4.92, while the lowest was in the M0= 0g/baglog treatment, which was 2.42.

According to research [21] Additional Nutrient Sources Rice washing water and rice groats contain nutrients such as carbohydrates,

proteins, vitamins, and minerals that can support the growth and development of fungal mycelium, the availability of these additional nutrients can increase the formation of new clumps

Improvement of microenvironmental conditions, the addition of rice washing water and rice groats can increase the humidity of the substar and provide nutrients for beneficial microorganisms. Better microenvironment conditions can support the growth and development of fungal mycelium, thereby increasing the formation of new clumps [22].

3.7.4 Brown oyster mushroom hood diameter (cm)

Based on data obtained from the Duncan test distance table, the diameter of the brown oyster mushroom hood in Table 4 shows that the application of rice washing water and rice groats has an influence on the diameter of the brown oyster mushroom hood. Table 4 can be explained that the influence on the diameter of the widest mushroom hood in the first harvest was in the treatment A3 = 70 ml / baglog which is 6.37 cm while the lowest is in the treatment A0 = 0 ml / baglog which is 3.09 cm. Then the second harvest, the widest brown oyster mushroom hood diameter is in the A3 treatment of 70ml/baglog, which is 4.45 cm, while the lowest is in the A0= 0ml/baglog treatment, which is 2.61 cm.

For rice groats, it can be explained that the widest diameter in the first harvest is in the M3 = 100g / baglog treatment, which is 4.88 cm, while the lowest is in the M0 = 0ml / baglog treatment, which is 2.75 cm. Then in the second harvest, the most diameter is in the M3 = 100g / baglog treatment, which is 3.60 cm, while the lowest is the M0 = 2.61 cm treatment.

According to [23] Sources of Nutrients Rice washing water and rice groats contain important nutrients such as carbohydrates, proteins, vitamins and minerals that can support the growth and development of the diameter of the mushroom hood. The availability of these additional nutrients can result in the diameter of the hood. Increased activity of rice washing water degrading enzymes and rice groats contain phenolic compounds that can increase the activity of degrading enzymes such as cellulase and ligninase in fungi. This enzyme helps the fungus better degrade the substrate, thus providing more nutrients for the development of the diameter of the fungus hood [24].

3.7.5 Brown oyster mushroom hood thickness (mm)

Based on the data obtained from the Duncan test distance table, the thickness of the brown oyster mushroom hood in Table 5 shows that the application of rice washing water and rice groats has an influence on the stocking diameter of the brown oyster hood. Table 5 can be explained that the widest influence on the oyster mushroom hood is in the treatment A3 = 70ml / baglog which is 8.85 cm, while the lowest is in the treatment A0 = 0ml / baglog which is 5.80 cm. Then in the second harvest, the widest oyster mushroom hood was given in the A3= 70ml/baglog treatment, which was 10.33 cm, while the lowest was in the A0=0ml/baglog treatment, which was 5.47 cm.

For rice groats, it can be explained that in the first harvest, the widest mushroom hood is in the M3=100g/baglog treatment, which is 7.87 cm, and the lowest is in the M0= 0g/baglog treatment, which is 6.21 cm. Then in the second harvest, the widest oyster mushroom hood was given in the M3=100g/baglog treatment, which was 8.51 cm and the lowest was in the M0=0g/baglog treatment, which was 6.77 cm

Increasing the efficiency of nutrient absorption of rice washing water and rice groats can contain compounds that increase the ability of fungi to absorb substrate nutrients more efficiently. Better nutrient absorption can support the formation of a wider mushroom hood [25].

3.7.6 Weight of oyster mushroom fresh weight (grams)

Based on data obtained from the Duncan test distance table, the weight of fresh weight of brown oyster mushrooms in Table 6 shows that the provision of rice washing water and rice groats has an influence on the weight of fresh weight of oyster mushrooms. Table 6 can be explained that the influence on the heaviest fresh weight weight is in the treatment A3 = 70ml / baglog which is 58.61 g while the lowest there is treatment A0 = 0ml / baglog which is 24.91 g. Then in the second harvest, the heaviest influence was on the treatment A3 = 70 ml / baglog which was 56.4 g while the lowest was on the treatment A0 = 0 ml / baglog which was 25.55 g.

For rice groats, it can be explained in the first harvest that the heaviest fresh weight of oyster

mushrooms is in the M3=100g/baglog treatment, which is 40.66 g, and the lowest is in the M0=0g/baglog treatment, which is 28.25 g. Then in the second harvest, the heaviest influence was on the M3=100g/baglog treatment, which was 47.15 g, and the lowest was on the M0=0g/baglog treatment, which was 28.25 g.

At first the mycelium absorbs existing nutrients then remodels other nutrients for its production. The nutrients available in the growing medium that are able to be absorbed by the fungus will be able to zincrease the wet weight of the white oyster mushroom according to [25]. In the first harvest produced 1712.4 grams and in the second harvest produced 1633.8 grams. And the total yield of brown oyster mushrooms harvested for two harvests was 3346.2 grams.

4. CONCLUSION

Based on the research conducted, it can be concluded that the growth rate of mycelium does not have a real effect on the addition of rice washing water and rice groats, while for the height of the mushroom stalk, the diameter of the mushroom hood, the thickness of the mushroom hood, the number of mushrooms and the fresh weight of mushrooms / baglog shows that there is an interaction between rice washing water and rice groats gives results that affect rice washing water and rice groats, As for the height of the mushroom stalk, the diameter of the mushroom hood, the thickness of the mushroom hood, the number of mushrooms and the fresh weight of mushrooms / baglogs.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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