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OPTIMIZATION OF COMPOSTING GROWING MEDIA TIME AND RICE HUSK ADDITION IN *Auricularia auricula* CULTIVATION

OPTIMASI WAKTU PENGOMPOSAN MEDIA TANAM DAN PENAMBAHAN SEKAM PADI PADA BUDI DAYA *Auricularia auricula*

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Abstract

Auricularia auricula is a wood mushroom that is commonly consumed and is in demand by the people as a food ingredient because it contains many nutrients and health benefits. Cultivation of *A. auricula* was carried out using growing media and controlled environmental conditions. This study objective to determine the optimal combination of composting time and the rice husks addition in the *A. auricula* production. The treatment in this study was the composting time of the growing media for 0, 2, 4, 6, and 8 days, as well as the addition of rice husks as much as 0, 25, and 50%. This research consisted of the preparation of growing media, spawning and incubation of *A. auricula*, and harvesting of fruit bodies. The success of mushroom cultivation is seen from the value of biological efficiency in each treatment. The combination treatment of 8 days composting time with the addition of 50% rice husk resulted in *A. auricula* production as much as 52.37%, while the combination of 4 days composting time treatment and the addition of 25% rice husks resulted in the best production of *A. auricula*, as it produced the mushroom weight of 340 ± 16.95 g with biological efficiency value as much as 68% for five harvest durations within four months after first watering. The treatment of composting media tie and the addition of rice husks to *A. auricularia*'s were successfully carried out.

Keywords**:** *Auricularia auricula*; Biological efficiency; Composting; Mushroom cultivation; Rice husk

Abstrak

Auricularia auricula merupakan jamur kayu yang umum dikonsumsi dan diminati oleh masyarakat sebagai bahan pangan karena mengandung nutrisi dan banyak manfaat. Budi daya A. auricula dilakukan dengan menggunakan media tanam dalam kondisi lingkungan yang terkontrol. Penelitian ini bertujuan menentukan kombinasi perlakuan waktu pengomposan dan penambahan sekam padi yang optimum terhadap produksi A. auricula. Perlakuan pada penelitian ini adalah waktu pengomposan media tanam selama 0, 2, 4, 6, dan 8 hari, serta penambahan sekam padi sebanyak 0, 25, dan 50%. Penelitian ini tersusun atas pembuatan media tanam, pembibitan dan inkubasi A. auricula, dan pemanenan tubuh buah. Keberhasilan budi daya jamur dilihat dari nilai efisiensi biologi pada setiap perlakuan. Kombinasi perlakuan pengomposan 8 hari dengan penambahan sekam padi 50% menghasilkan produksi A. auricula sebesar 52,37%, sedangkan kombinasi perlakuan waktu pengomposan 4 hari dan penambahan sekam padi 25% menghasilkan produksi A. auricula terbaik karena menghasilkan berat jamur sebanyak 340 ± 16,95 g dengan nilai efisiensi biologi sebesar 68% selama lima durasi panen dengan waktu empat bulan setelah dilakukan penyiraman pertama. Secara keseluruhan, perlakuan waktu pengomposan media dan penambahan sekam padi pada media pertumbuhan A. auricula berhasil dilakukan.

Kata Kunci*: Auricularia auricula; Budi daya jamur; Efisiensi biologi; Pengomposan; Sekam padi*

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INTRODUCTION

Auricularia auricula is one of the wood mushrooms that is widely consumed and cultivated by the community. This mushroom can produce ligninolytic enzymes and has nutritional value, the content of bioactive compounds, and good taste as food ingredients. The nutritional value of *A. auricula* are proteins, fats, carbohydrates, it is also rich in vitamins and minerals (Kadnikova et al., 2015). The bioactive compound of *A. auricula* are flavonoid that are useful as antioxidant, β-glucan as an anticancer, and crude polysaccharide as antimicrobial (Islam et al., 2021). In addition, *A. auricula* have a crunchy and chewy texture, can be dried, and stored for a long time, moreover it can be grown in lowlands.

Based on the data from General Horticulture Indonesia (2020), there was an increase in the export value of mushrooms commodities by 5.56% from 2019. Thus, the cultivation of *A. auricula* can be a promising business in the future. The benefit of cultivating mushrooms is that the material is easy to obtain at an affordable price and the results can be sold. Then, the cultivation medium using waste can reduce agricultural waste in the environment (Ferdousi et al., 2019).

Generally, cultivation of *A. auricula* is carried out by utilizing compacted Sengon wood sawdust waste such as log and the substrate is composted for three to five days before use (Suprapti & Djarwanto, 2013). Sengon wood has a high lignocellulose content, easily absorbs water, and does not contain sap. The lignocellulose contents are 45.42% cellulose, 21% hemicellulose, and 26.50% lignin (Hartati et al., 2010). In addition, the mushroom cultivation can also be done using other waste, such as rice husk.

Rice husk is generated every year. According to Statistics Indonesia (2023), Indonesia produced approximately 54 tons rice in a year. Therefore, waste such as rice husks will certainly exist. Rice husk is a waste from the rice milling process and has a high lignocellulosic content, such as 35% cellulose, 25% hemicellulose, and 20% lignin making it difficult to degrade directly. Degradation of rice husks can be done with the help of microbes that can produce lignocellulose enzymes to break down these compounds. Thus, rice husk can potentially be used to become a substrate in mushroom cultivation to reduce the waste accumulation.

Cultivation using rice husk as oyster mushroom cultivation has been carried out by Rosnina et al. (2017). Based on that study, 20% rice husk were added to produce the best mushroom fruit body. Therefore, research on the addition of rice husks to *A. auricula* cultivation needs to be carried out. Hadiyanti et al. (2020) stated that the success of *A. auricula* cultivation is influenced by the type of substrate and the duration of media composting. Compost growing medium is needed to break down organic matter into simple nutrients that can be used for mushroom production.

According to previous studies, it is necessary to study the effect of adding rice husks with concentrations of 0, 25, and 50%, as well as the composting time of *A. auricula* growing medium with intervals of 0, 2, 4, 6, and 8 days. The addition of rice husks to growing medium of *A. auricula* is expected to accelerate the growth of mushroom mycelium. Furthermore, the addition of rice husks to other components of the growing medium and composed together is expected to provide greater nutrition for the *A. auricula* production. The objective of this study is to determine the optimal combination of composting time and the addition of rice husks in the *A. auricula* production.

MATERIALS AND METHODS

The research method used was a completely randomized design (CRD) with composting growing media time treatment for 0 (K0), 2 (K2), 4 (K4), 6 (K6), and 8 (K8) days, and addition of rice husk by 0% (S0), 25% (S25), and 50% (S50). Each treatment was repeated as many as seven repetitions (U).

Preparation of Mushroom Growing Medium

The growing media was made by mixing 82% Sengon wood sawdust and rice husk (0, 25, and 50%), 10% bran, 1.5% $CaSO_4$, and 1.5% $CaCO_3$. Water was gradually added until the mixture was homogeneous. The composting of growing media was carried out by putting the mixture in sacks and let stand for 0, 2, 4, 6, and 8 days (Table 1). A total of 1 kg of the substrate mixture was compacted in an 18 cm × 35 cm polypropylene plastic and sterilized using an autoclave at 121℃ for 60 minutes (Figure 1).

Table 1. Growing medium composition

Code	Composting time (days)	Substrates	
		Sawdust (%)	Rice husk (%)
K0S0		100	0
K0S25	0	75	25
K0S50		50	50
K2S0		100	0
K2S25	2	75	25
K2S50		50	50
K4S0		100	0
K4S25	4	75	25
K4S50		50	50
K6S0		100	0
K6S25	6	75	25
K6S50		50	50
K8S0		100	0
K8S25	8	75	25
K8S50		50	50

Figure 1. The packaging of 1 kg *A. auricula* growing medium consisting of 82% Sengon wood sawdust, 10% bran, 1.5% $CaSO_4$, 1.5% $CaCO_3$, and water

Spawning and Incubation of Mushroom Mycelium

Sterile mushroom growing medium was inoculated with commercial *A. auricula* F1 spawn (Biotrop, Bogor) under sterile and aseptic condition. The mushroom spawn was inserted into the medium by 5 g. The growing medium was incubated on an incubation shelf with dark and clean condition for growing mushroom mycelium within 32 days.

Incubation of Auricularia auricula Fruiting Body

The mature growing medium was transferred to a mushroom house. The mushroom house was made from Glass Reinforced Concrete (GRC) which is equipped with electricity and water (Figure 2). The mushroom house (200 × 200 × 250 cm) was conditioned to a clean, moist, and dark state before the cotton cover was opened. The temperature in the mushroom house is maintained at 25 °C ± 0.73 and the humidity is 90% by watering at 08:00, 13:00, 18:00, and 01:00 for 30 minutes. After the primordium develops into fruiting bodies, the fruiting bodies are harvested 5 times. The mushroom fruiting bodies were weighed and counted.

Biological Efficiency

Biological efficiency (BE) was calculated to determine the yield obtained from the first to the fifth mushroom harvest period. The BE of each treatment was calculated using the following equation $BE = \left(\frac{\text{Mushroom fresh weight (g)}}{\text{Substrate dry weight (g)}}\right) \times 100\%$ (Ingale & Ramteke, 2010).

Figure 2. Mushroom house, view from the side (a) and the position of growing medium placement (b)

Statistical Analysis

Statistical analysis was performed using IBM SPSS Statistics version 23. Statistical tests were considered significant if $p < 0.05$. The parameters measured in this study included the weight and the number of *A. auricula* fruiting bodies. All data were tested using the Kolmogorov Smirnov test for normal distribution and the Levene's test for homogeneity of variance. After passing the normality and homogeneity test, they were analyzed using a two-way Anova with a Tukey post-hoc test. If not, the data were analyzed using non-parametric Friedman's test.

RESULTS

Auricularia auricula Mycelium Growth on Growing Medium

Incubation of mycelium was carried out for 6 weeks until the mycelium fills the medium and matures (32 days of mycelium growth and 7 days of maturation). Mushroom mycelium in media with rice husk addition by 0% can be seen on Figure 3a, K0S0 growth on days 16 and 24 was seen faster than other treatments. Figure 3b represents the growth of mycelium in media with the addition of 25% rice husks with various compost treatments. K8S25 media showed slow growth when compared to compost time treatment in 25% rice husk media. Similar results were also seen in K8S50 with slower mycelium growth on days 16 and 24 (Figure 3c). However, on the 32nd day the entire growth medium is already overgrown with mycelium. The incubation temperature was 24 to 27 °C and the humidity was 66%. Mycelium growth can be seen from the growing medium turning into white (Figure 4).

Growth of *Auricularia auricula* Fruiting Body

The mycelium development into primordium occurred for almost 4 weeks in all treatments. Afterwards, the primordium becomes a mature fruit body and is ready for harvested within 2 weeks (Figure 5). After the first harvest, the primordium grows 3 days later and was harvested after 2 weeks.

The Weight and Number of Mushroom Fruiting Body

The weight that has been observed was the mushroom fruiting bodies. The combination of composting growth medium time and rice husks addition showed no significant difference as well as the single treatment of composting growth medium time in the first and third harvests. However, the treatment of rice husks addition and composting growth medium time showed differences in the second, fourth, and fifth harvests.

The S0 and S25 tend to have the heaviest mushroom weight (318.39 g and 319.11 g) and S50 produces the lowest mushroom weight (281.17 g) on each harvest. In the second harvest (p:0.00), S0 weighed the heaviest mushroom. In the fourth harvest (p:0.028), S25 weighed the heaviest mushroom (80.23 g). For the fifth harvest (p:0.02), the heaviest weight was on S25 (98.34 g). The mushroom weight from the first to the third harvest decreases, however, the third from fifth harvest increases (Table 2).

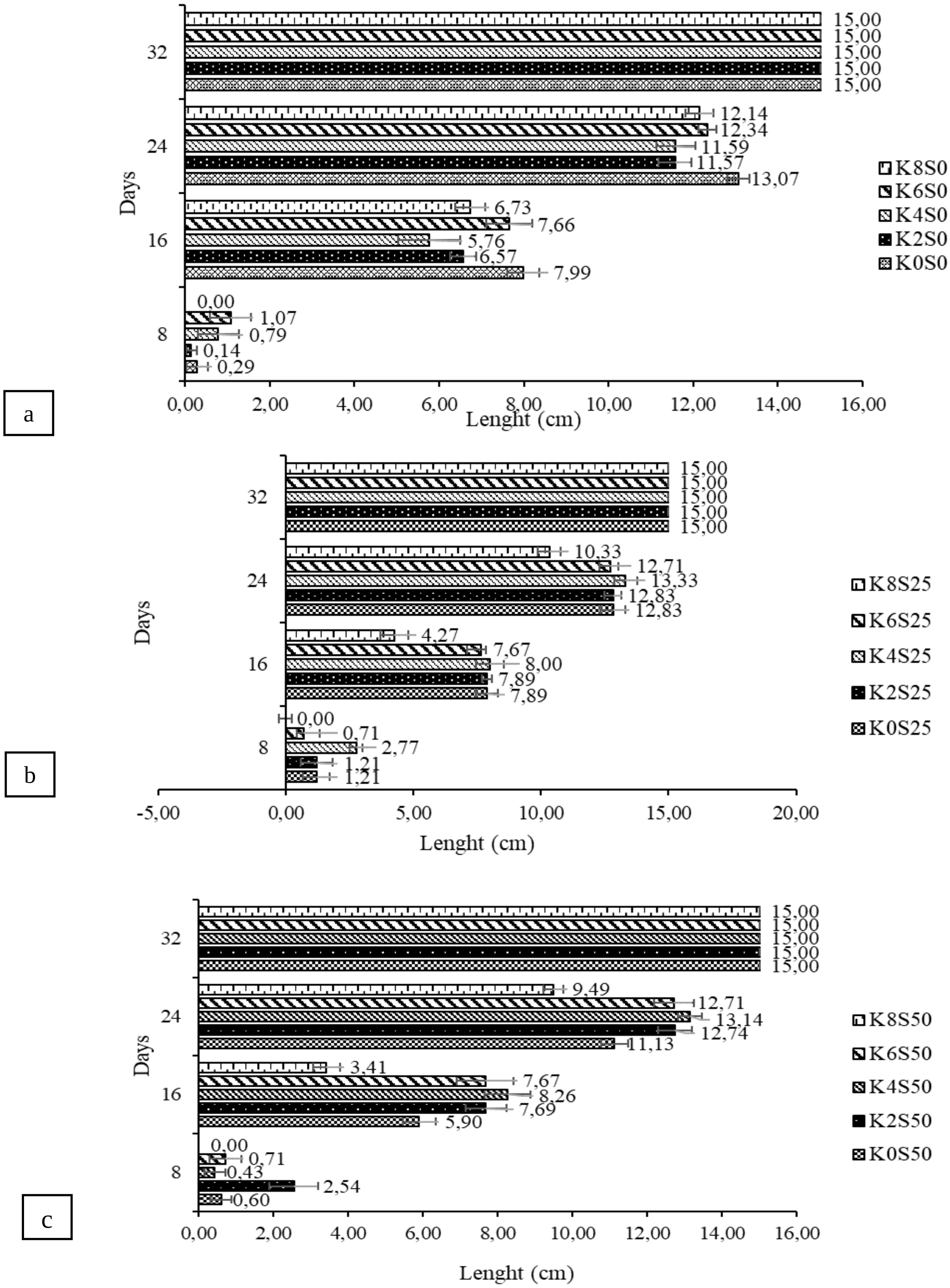


Figure 3. Mycelium growth on growing medium with variations of rice husk addition and composting time. The data shows mean ± standard deviation measured every 8 days until it fills the medium, 0% rice husk (S0) (a), 25% rice husks (S25) (b), and 50% rice husks (S50) (c)

Figure 4. Mycelium growth on the mushroom growing medium

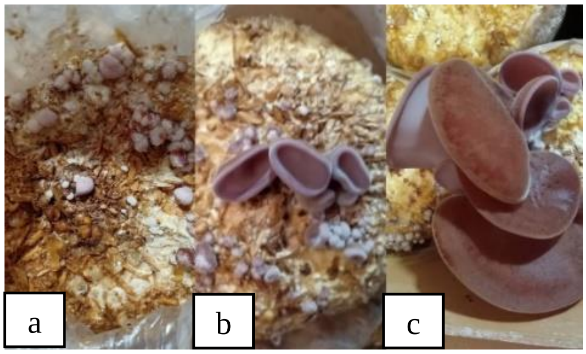


Figure 5. The development phase from primordium to fruiting body: primordium (a), young basidiocarp (b), and mature basidiocarp (c)

Table 2. The weight of *Auricularia auricula* fruiting bodies in the addition of rice husk medium treatment

Harvest	Rice husk addition (%)		
	0	25	50
1.	46.51 ±17.04[a]	49.06 ± 20.30[a]	47.71 ± 14.69[a]
2.	53.18 ± 17.03[b]	46.83 ± 20.12[b]	33.77 ± 14.82[a]
3.	46.56 ± 15.26[a]	44.63 ± 20.64[a]	38.03 ± 14.31[a]
4.	80.11 ± 13.17[b]	80.23 ± 11.09[b]	73.77 ± 10.56[a]
5.	92.03 ± 8.92[a,b]	98.34 ± 11.64[b]	87.89 ± 10.02[a]
Total	318.39	319.11	281.17

Note: Mean ± standard deviation followed by the same letter in the same line are not significantly different (p ≤0.05). This data weight is presented in units of gram

Table 3. The weight of *Auricularia auricula* fruiting bodies in the composting growth medium time treatment

Harvest	K0	K2	K4	K6	K8
1	45.29 ± 17.61[a]	49.10 ± 17.64[a]	47.52 ± 18.53[a]	42.67 ± 12.28[a]	51.60 ± 14.67[a]
2	49.38 ± 22.04[a]	42.71 ± 17.45[a]	42.70 ± 16.20[a]	44.65 ± 17.86[a]	42.62 ± 20.94[a]
3	42.95 ± 18.51[a]	47.45 ± 19.51[a]	44.90 ± 15.85[a]	38.00 ± 14.19[a]	39.38 ± 18.36[a]
4	76.76 ± 12.38[a,b]	79.81 ± 11.89[a,b]	84.24 ± 8.73[b]	77.24 ± 11.62[a,b]	72.14 ± 11.88[a]
5	90.65 ± 7.51[a,b]	93.05 ± 9.98[a,b]	96.55 ± 8.03[b]	94.25 ± 7.79[a,b]	88.60 ± 11.44[a]
Total	305.03	312.12	315.91	296.81	294.34

Note: Mean ± standard deviation followed by the same letter in the same line are not significantly different (p ≤0.05). This data weight is presented in units of grams. K0= composting media time for 0 day; K2= composting media time for 2 days; K4= composting media time for 4 days; K6= composting media time for 6 days; and K8= composting media time for 8 days

In the composting treatment of growth medium, there were significant differences in the fourth and fifth harvests. In both harvests, the K4 produced the heaviest mushroom weight (315.91 g) compared to other compost time treatments, while the K8 produced the lowest weight of mushroom (294.34 g). While the K0, K2, and K6 did not show any significant differences to K4 and K8. The mushroom weight continues to increase with the composting time which increases by up to 4 days, however there was a decrease if the composting time is up to 6 and 8 days. Composting time treatment affects the weight of mushroom on the fourth harvest (p:0.016) and the fifth harvest (p:0.027) (Table 3). Nevertheless, there was a correlation between composting of growing media time treatment and the rice husk addition only in the fifth harvest (p:0.027). Overall, the highest mushroom weight resulted from the S25K4 by 340.00 ± 16.95 g (Table 4).

Table 4. The weight of *Auricularia auricula* fruiting bodies in the combination treatment

	S0	S25	S50
K0	314.00 ± 30.43	287.14 ± 46.57	301.43 ± 20.40
K2	329.00 ± 30.30	323.71 ± 41.49	281.00 ± 11.90
K4	311.43 ± 14.80	340.00 ± 16.95	291.29 ± 14.17
K6	295.14 ± 13.17	312.14 ± 15.78	283.00 ± 17.57
K8	310.43 ± 17.39	308.00 ± 37.31	268.86 ± 18.54

Note: Mean ± standard deviation for combination treatment is presented in units of grams. S0= addition of rice husk by 0%; S25= addition of rice husk by 25%; S50= addition of rice husk by 50%; K0= composting media time for 0 day; K2= composting media time for 2 days; K4= composting media time for 4 days; K6= composting media time for 6 days; and K8= composting media time for 8 days

Table 5. The number of *Auricularia auricula* fruiting bodies in the addition of rice husk medium treatment

Harvest	S0	S25	S50
1	3.66 ± 1.79[a]	3.79 ± 1.80[a]	3.86 ± 1.51[a]
2	4.06 ± 1.41[a]	3.54 ± 1.83[a]	3.43 ± 1.73[a]
3	3.40 ± 1.34[a]	3.71 ± 1.94[a]	3.54 ± 1.68[a]
4	5.03 ± 1.40[a]	5.60 ± 1.50[a]	4.60 ± 1.74[a]
5	5.74 ± 1.81[a]	6.11 ± 1.83[a]	5.40 ± 1.46[a]
Total	21.89	22.51	20.83

Note: Mean ± standard deviation followed by the same letter in the same line are not significantly different (p ≤0.05). This data is presented in units of fruit bodies. S0= addition of rice husk by 0%; S25= addition of rice husk by 25%; and S50= addition of rice husk by 50%

Table 6. The number of *Auricularia auricula* fruiting bodies in the addition of rice husk medium treatment

Harvest	K0	K2	K4	K6	K8
1	3.71 ± 1.64[a]	4.24 ± 1.69[a]	3.60 ± 1.43[a]	3.33 ± 3.33[a]	3.95 ± 1.76[a]
2	4.05 ± 1.65[a]	3.24 ± 1.41[a]	3.57 ± 1.76[a]	3.64 ± 3.64[a]	3.71 ± 1.69[a]
3	3.67 ± 2.03[a]	3.18 ± 1.77[a]	3.62 ± 3.62[a]	3.65 ± 1.80[a]	3.52 ± 1.30[a]
4	4.57 ± 1.22[a]	5.10 ± 1.74[a]	5.52 ± 5.52[a]	5.05 ± 1.65[a]	5.14 ± 1.73[a]
5	5.24 ± 1.54[a]	5.67 ± 1.67[a]	5.81 ± 5.81[a]	6.14 ± 1.58[a]	5.90 ± 1.80[a]
Total	21.24	21.42	21.98	21.57	22.19

Note: Mean ± standard deviation followed by the same letter in the same line are not significantly different (p ≤0.05). This data is presented in units of fruit bodies. K0= composting media time for 0 day; K2= composting media time for 2 days; K4= composting media time for 4 days; K6= composting media time for 6 days; and K8= composting media time for 8 days

The mushroom fruit body is composed of a stalkless pileus. Each growth medium bag can produce 2 to 6 fruit bodies depending on the time of harvest and treatment in the growing medium.

Analysis of the combination of composting time and the addition of rice husks to the growing medium did not show any significant differences on the number of mushroom fruiting bodies (p >0.05) (Table 5, 6, & 7).

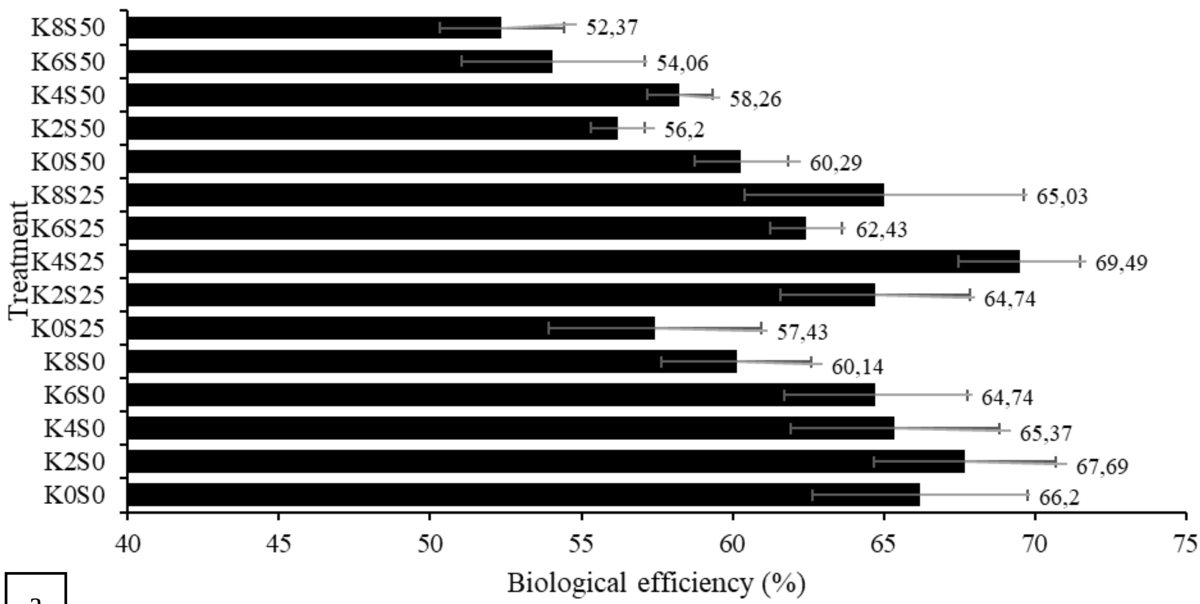
Table 7. The number of *Auricularia auricula* fruiting bodies in the combination treatment

	S0	S25	S50
K0	22.29 ± 3.77[a]	20.86 ± 3.87[a]	20.57 ± 1.99[a]
K2	20.57 ± 3.96[a]	23.86 ± 4.58[a]	20.29 ± 2.76[a]
K4	22.14 ± 3.18[a]	22.86 ± 3.60[a]	20.43 ± 3.42[a]
K6	20.00 ± 2.00[a]	23.29 ± 1.48[a]	21.86 ± 3.40[a]
K8	24.43 ± 3.29[a]	21.14 ± 3.27[a]	21.00 ± 3.46s[a]

Note: Mean ± standard deviation followed by the same letter in the same line and column are not significantly different (p≤0.05). This data is presented in units of fruit bodies. S0= addition of rice husk by 0%; S25= addition of rice husk by 25%; S50= addition of rice husk by 50%; K0= composting media time for 0 day; K2= composting media time for 2 days; K4= composting media time for 4 days; K6= composting media time for 6 days; and K8= composting media time for 8 days

Biological Efficiency

The weight of the mushroom from the first to the fifth harvest on a substrate with a dry weight of 500 g produces the BE shown in Figure 6. The highest BE value came from the K4S25 treatment of 68% and the lowest came from the K8S50 treatment as much as 52.37%. (Figure 6a). In the S0 treatment, it can be seen that the composting time of 0, 2, 4, and 6 days is not significantly different, while composting for 8 days results in low BE. The addition of 25% rice husks (S25) treated with compost for 0, 2, 4, 6, and 8 days have an unstable BE value. While the S50 treatment with composting 0, 2, 4, 6, and 8 days get a BE value that tends to be low when compared to S0 and S25. Based on a single treatment of rice husk addition, the S50 produced the lowest BE (56.23%); on the other hand, S25 does not differ significantly from S0. In the compost duration treatment, K4 produces the highest BE (64.37%) compared to other compost treatments, while K8 produces the lowest BE (59.18%) (Figure 6b) This proves that the addition of rice husks by 25% and composting growing medium for 4 days can increase the BE value.



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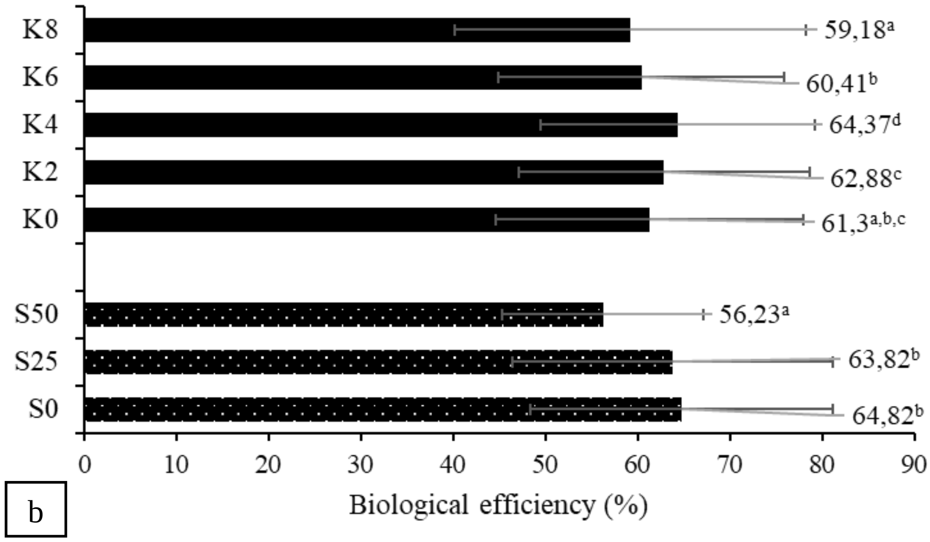

Figure 6. Biological efficiency (%) from each treatment. The bars present mean ± standard error followed by the same letter are not significantly different (p ≤0.05), combination treatment of composting of growing medium time and rice husk addition treatments (a) and data from each treatment (b), = rice husk addition treatment (S) and = composting growing media time treatment (K)

DISCUSSION

Auricularia auricula is a mushroom that is widely cultivated into food that contains nutrition and bioactive compounds that are beneficial for health. From the growing medium weighing 1 kg, almost 300 g of fresh mushrooms can be produced. This proves that consumption mushrooms can be produced from wood sawdust and rice husks. The growth and development of *A. auricula* initiated with the growth of mycelium, the formation of primordium, and the formation of a mature fruiting body. The fruiting body of the mushroom was formed due to the presence of a sexual reproductive process beginning with basidiospores that develop into hyphae. The hyphae with different genders of (+) and (-) will carry out mating process and develop into a dikaryotic mycelium (Liu et al., 2021).

In this study, the growth of mycelium in all treatments were in 32 days (Figure 3). The growth of the mushroom mycelium was influenced by environmental conditions, such as temperatures of 24 to 27 °C, dark and clean states, also affected by the C/N ratio in the medium, the faster the growth of mycelium (Rosnina et al., 2017). Composting of the substrate was carried out for 0, 2, 4, 6, and 8 days. Composting time has no effect on the speed of growth of the mycelium.This can be caused by optimal growing conditions

Auricularia auricula can use nutrients on the substrate since lignocellulose enzymes can break down lignin, cellulose, and hemicellulose compounds on substrate. Moreover, there was composting in the growing medium causes organic matter to decompose and provides simple nutrients, such as D-glucose, xylose, and D-mannitol, so that mycelium can used it in metabolic processes to form mushroom fruiting body. Composting of the substrate was carried out by microorganisms on the substrate and the environment. The composting treatment that produces the highest weight of the mushrooms was K4 because the breakdown of complex compounds occurs optimally. Too long composting can cause the microbes in the medium to die off, due to the heat generated at composting. This result was in accordance with the statement of Suprapti and Djarwanto (2013), composting of growing medium should be carried out for three to five days.

Composting on the growing medium belongs to the fermentation of the solid substrate carried out in a non-sterile state. This composting was carried out by stockpiling a large amount of mushroom growing medium material. Before packaging was carried out, stirring was carried out first to homogenize the substrate. Each level on the substrate heap had a different diversity of ligninolytic microbes and affected the degradation activity of each microorganism. The diversity of microbes in the composting process were divided into early and late consortia that include bacteria, protozoa, actinomycetes, yeast, and mold.

In early consortium microbes there were mesophilic microorganisms that broke down organic matter such as carbohydrates and nitrogen for growth. In the final consortium there were thermophilus microorganisms characterized by a rise in temperature in the medium (Fermor et al., 1979). This temperature rise was caused because the microbes will break down lignin on the substrate so that the mycelium can use cellulose contained in the wood sawdust substrate. Lignocellulose on the substrate was broken down into simple confectionery and will be utilized by mushroom as an energy source. This process produced carbon dioxide, ammonia, and heat (Adebayo & Carrera, 2015).

From this study, there was an increase in the weight of *A. auricula* in all treatment combinations during the fourth and fifth harvest periods. This is due to the texture and type of substrate used (Hadiyanti et al., 2020). Wood sawdust substrate has a smoother texture and is easy to absorb water; on the other hand, rice husk has a harder texture, so it takes longer to degrade. When the substrate of the medium is composted, wood sawdust will degrade first, while rice husks degrade in the fourth harvest period and produce nutrients that are broken down by *A. auricula* as its source of nutrients. Thus, by the fourth and fifth harvests, there are still nutrients that meet the nutritional needs of *A. auricula* to grow.

Based on the BE value data influenced by the fresh mushroom weight produced from the substrate dry weight, it was found that the highest BE value was generated on S25. This high BE value signifies the success of mushroom cultivation. If the BE value is high, then the success rate is also high (Ingale & Ramteke, 2010). The weights of harvested *A. auricula* in the S25 medium produces the heaviest mushroom weight due to the additional nutrients as much as 25% from rice husks. However, adding up to 50% of rice husks will reduce the weight, since rice husks contain less C/N ratio than wood sawdust. Sengon wood sawdust was used as the main substrate because it has high lignocellulosic contents with C/N ratio of 51.71:1 (Hoa et al., 2015). Rice husks are used as an additional substrate, with a C/N ratio of 30:1 and being an additional nutrient because it contains 1% nitrogen (N) and 2% potassium (K) (Kumla et al., 2020). Bran was used as an additional source of nutrition because it contains B-complex vitamins and as a source of nitrogen (N), with C/N ratio of 12:1 to form amino acids and play a role for tissue growth (Apriliani et al., 2021). $CaCO_3$ was added to maintain the pH, containing a C content of 12%. Therefore, the C content in the growing medium were 52.91 (S0); 47.48 (S25); and 42.06 (S50).

The nutrients for the mushroom growth are reduced and cause the weight to decrease. This can be seen from the reduced BE value when rice husks are added for 50%. In addition to nutrients in the medium, temperature and humidity also affect the growth and development of mushroom fruiting bodies. *A. auricula* grows optimally at an optimum temperature of 25 °C and 90% humidity (Utoyo, 2010). This condition was created by carrying out spraying in accordance with the specified time.

CONCLUSIONS AND SUGGESTIONS

Auricularia auricula cultivation with the treatment of rice husks addition and composting the growing medium was successful. The best combination treatments were the media composition of 75% wood sawdust and 25% rice husks with composting time for 4 days. This combination can increase the weight of the mushroom produced with a high success rate that can be seen from the biological efficiency.

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