GROWTH AND PRODUCTION STIMULATION OF YOUNG RED OYSTER MUSHROOMS (Pleurotus flabellatus) THROUGH $CaCO_3$ SUPPLEMENTATION FROM SHELLFISH SHELLS AND COCONUT WATER

ABSTRACT

Pink oyster mushroom (*Pleurotusflabellatus*) is one of the oyster mushroom varieties that has a distinctive aroma similar to lingzhi mushroom, pink color, numerous clusters, and a slightly firm texture. The aim of this research was to determine the growth and production stimulation of pink oyster mushrooms (*P. flabellatus*) through supplementation of $CaCO_3$ from shellfish shells and coconut water. This study utilized a Completely Randomized Design (CRD) arranged in factorial with two factors, consisting of four levels with three replications. The first factor was $CaCO_3$ supplementation from shellfish shells with four levels: K_0: 0 gr/baglog, K_1: 5 gr $CaCO_3$ from shellfish shells/baglog, K_2: 10 gr $CaCO_3$ from shellfish shells/baglog, K_3: 15 gr $CaCO_3$ from shellfish shells/baglog. The second factor was coconut water supplementation with four levels: A_0: 0 ml/baglog, A_1: 20 ml coconut water/baglog, A_2: 40 ml coconut water/baglog, A_3: 60 ml coconut water/baglog. The results showed significant differences in mycelium growth rate and highly significant differences in pileus number, pileus width, pileus thickness, stalk height, and mushroom fresh weight. Supplementation of 10 gr $CaCO_3$ from shellfish shells/baglog and 40 ml coconut water/baglog showed the best interaction for all parameters.

Keywords: Oyster Mushroom, $CaCO_3$ from shellfish shells, coconut water.

1. INTRODUCTION

Oyster mushrooms (*P.flabellatus*) are one of the types of mushrooms favored by the community. Oyster mushrooms contain higher levels of protein, fat, phosphorus, iron, thiamine, and riboflavin compared to other mushroom varieties[1].

Oyster mushrooms are a commodity with very promising prospects for development because people are beginning to understand the nutritional value of oyster mushrooms. Therefore, there are increasingly more people in the community engaging in oyster mushroom cultivation[2].The amount of production is one of the factors that influences farmer income[3]. The ability of farmers to increase their business production will increase their income [4].High agricultural production results will affect the value chain of these commodities [5].North Sumatra is one of the provinces in Indonesia that produces oyster mushrooms. Oyster mushroom production in North Sumatra has experienced a decline from 2021 to 2022. In 2021, oyster mushroom production was 3.025 kg, and in 2022, it decreased to 2.348 kg. This indicates a decrease in mushroom production. Meanwhile, the demand for mushrooms from the community has been increasing every year because mushrooms are an alternative food ingredient that is in demand and promising for farmers[6].

Pink oyster mushroom (*P. flabellatus*) is one of the oyster mushroom varieties that is suitable for cultivation. It hasa distinctive aroma reminiscent of lingzhi mushrooms, pink coloration, numerous clusters, and a somewhat firm texture. This mushroom is rich in protein, fiber, carbohydrates, vitamins (thiamine, riboflavin, folic acid, and niacin), minerals (calcium, phosphorus, iron, potassium, and sodium), and low in calories and fat[7]. Pink

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oyster mushrooms contain approximately 88.75% water, 28.85% protein, 2.47% fat, 48.16% carbohydrates, and 12.87% fiber[8]. The growth of pink oyster mushrooms is faster compared to white oyster mushrooms [9].

Improving the quality of oyster mushroom production can be achieved by creating a growth medium for the mushrooms, commonly known as a "baglog." The main ingredients used for baglogs are sengon wood powder, rice husks, and lime. An effective wood powder for the growth of Pleurotus flabellatus is sengon wood powder (*Albizia chinensis*). Sengon wood has a lignin content of 5%, cellulose content of 27%, and hemicellulose content of 41%, which are important for the growth of pink oyster mushrooms[9]. Another main ingredient used is rice husks, which serves as a source of nutrition and carbohydrates, as well as a source of carbon and nitrogen. Rice husksis also rich in B-complex vitamins, which play a crucial role in the growth and development of mushroom mycelium, and it functions as a trigger for mushroom fruiting body growth[10].

The growth of *P. flabellatus* also requires calcium carbonate ($CaCO_3$) as a source of calcium essential for mushroom growth. Crushed and processed shellfish shells contain pure calcium carbonate at 39%, with very fine particle sizes, approximately around 5 microns, and they dissolve in water very effectively, making them excellent for organic calcium fertilizer [11].Supplementation of organic calcium from powdered shellfish shells can accelerate the growth of oyster mushroom mycelium. The fruiting body yield is higher after adding substrate with 2% powdered shellfish shell compared to mushrooms grown on substrate without the addition of powdered shellfish shell. Additionally, the crude protein content and fiber of the fruiting body increase significantly after supplementation with powdered shellfish shell[12]. The results indicate that supplementing the substrate with powdered shellfish shell can be beneficial in improving the yield and nutritional content of oyster mushrooms.

The growth of oyster mushrooms requires a significant amount of carbohydrates, and a commonly used nutrient in oyster mushroom cultivation media is molasses. Molasses is an essential energy source containing sugars, making it utilized as a nutritious feed additive and fertilizer. The nutritional value of molasses includes a moisture content of 23%, crude protein content of 4.2%, crude fat content of 0.2%, crude fiber content of 7.7%, calcium (Ca) content of 0.84%, phosphorus (P) content of 0.09%, non-protein nitrogen extract (BETN) content of 57.1%, and ash content of 0.2%. Molasses possesses a sufficiently high nutrient content for the growth of oyster mushroom mycelium, and its addition can stimulate the growth and production of oyster mushrooms[13]

Additional nutrients required for mycelium and fruiting body growth include carbohydrates, protein, fats, vitamins, and minerals in the growing media. Coconut water contains growth-regulating substances such as auxin and gibberellin hormones, which can stimulate the growth of oyster mushrooms and result in faster budding, increased leaf count, longer shoots, and higher fresh weight[14]. The composition of coconut water depends on the variety, maturity level (age), and climatic factors. The volume of coconut water in each coconut fruit is usually around 300 mL, with a pH ranging from 3.5 to 6.1. Coconut water contains macro-nutrients such as carbohydrates (CHO), fats (F), and proteins (P). In young coconut water, carbohydrates are present at 4.11%, fats at 0.12%, and proteins at 0.13%. Micro-nutrients (vitamins and minerals) are also found in coconut water. Vitamins present in coconut water include vitamin B (B1, B2, B3, B5, B6, B7, B9) and vitamin C, with their levels decreasing as the coconut matures[15].

2. MATERIAL AND METHODS

This research was conducted from November to March 2023 at the Laboratory of Panca Budi University. The materials used in this study include pink oyster mushroom spawn, sengon wood powder, rice husks, lime ($CaCO_3$), shellfish shell powder, coconut water, molasses, alcohol, spirits, and newspaper. The equipment used in this research includes plastic bags measuring 18 cm x 35 cm with a thickness of 0.5 pp, baglog rings, a shovel, a baglog pressing machine, rubber bands, a sterilization drum, a gas stove, gas cylinders, sterilization plastic covers, a Bunsen burner, a spatula spoon, measuring cups, scales, rulers, micrometers, and writing utensils.

This research method utilized a Completely Randomized Design (CRD) factorial consisting of 2 factors, 16 treatments, 3 replications, and 48 baglogs, as follows: The first factor, supplementation of shellfish shell $CaCO_3$, denoted as "K," consisting of 4 levels: K_0 = 0 gr/baglog (Control), K_1 = 5 gr/baglog, K_2 = 10 gr/baglog, K_3 = 15 gr/baglog. The second factor, supplementation of coconut water, denoted as "A," consisting of 4 levels: A_0 = 0 ml/baglog (Control), A_1 = 20 ml/baglog, A_2 = 40 ml/baglog, A_3 = 60 ml/baglog.

2.1 RESEARCH IMPLEMENTATION

The implementation carried out in this research includes the preparation of the mushroom house, sieving, mixing of growing media, filling baglogs, sterilization of growing media, cooling, inoculation of spawn, incubation of spawn, opening of newspaper covers, maintenance, and harvesting. The parameters observed in this research are the mycelium growth rate (cm), stalk height (cm), cap diameter (cm), cap thickness (mm), number of branches/clusters, and wet weight (g).

3. RESULTS AND DISCUSSION

Based on the observations made from the interaction of supplementation with shellfish shell $CaCO_3$ and coconut water in table 1, there is a highly significant influence on the stimulation and production of pink oyster mushrooms (ostreatus flabellatus) in each observed parameter.

Table 1. Mean stimulation of pink oyster mushrooms using growing media with shellfish shell $CaCO_3$ and coconut water.

Interaction K * A	Mycelium Growth Rate (cm)	Fresh Weight (g)	Cap Thickness (mm)	Number of Clusters (Stalks)	Cap Diameter (cm)	Mushroom Stalk Height (cm)
K_0A_0	22.72 cde	48.37 e	8.9 e	4.67 h	11.13 i	7.31 e
K_0A_1	24.94 abcd	81.27 cd	9.57 cd	5.33 h	12.17 ghi	7.63 de
K_0A_2	19.08 e	124.5 abc	10.23 cd	10 defg	12.37 ghi	8.11 bcde
K_0A_3	28.12 ab	125.77 abc	9.5 cd	11.67 de	14.17 efgh	7.12 e
K_1A_0	26.84 abc	82.5 cd	9.9 cd	5.67 h	11.8 hi	7.39 e
K_1A_1	26.9 abc	110.57 bc	10.87 bc	7 gh	15.5 def	7.23 e
K_1A_2	25.76 abcd	116.3 abc	10.87 bc	11 def	17.33 bcd	7.23 e
K_1A_3	28.17 ab	127 ab	10.07 cd	12.67 cd	18.87 bc	7.94 cde
K_2A_0	21.98 de	111.57 bc	10.83 bc	8 fgh	13.53 fghi	7.27 e
K_2A_1	24.51 bcd	128.27 ab	10.63 bcd	9.67 defg	14.1 efgh	8.06 bcde
K_2A_2	28.98 a	136.07 ab	14.67 a	19.33 a	19.87 b	11.61 a
K_2A_3	28.3 ab	124.17 abc	1127 bc	15.67 bc	24.57 a	8.48 bcd
K_3A_0	25.93 abcd	123.07 abc	10.03 cd	9 defg	14.8 defg	8.74 bc
K_3A_1	28.35 ab	116.97 abc	10.87 bc	10 defg	16.47 cde	8.62 bcd
K_3A_2	27.19 ab	141.2 a	10.23 cd	16.67 ab	19.7 b	8.93 bc
K_3A_3	25.85 abcd	100.77 cd	12.37 b	12.67 cd	19.8 b	9.08 b

Note: Numbers in the same column followed by the same letter indicate no significant difference at the 5% level.

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Based on Table 1, the graph can be presented as follows: Figure 1 shows the interaction ofsupplementation with shellfish shell $CaCO_3$ and coconut water, indicating a significant effect on the growth rate of pink oyster mushrooms at 3 weeks after inoculation. The highest average value, K_2A_2 (10g shellfish shell $CaCO_3$ + 40 ml coconut water/baglog), is 28.98 cm, while the lowest, K_0A_2 (0g shellfish shell $CaCO_3$ + 40 ml coconut water/baglog), is 19.08 cm. Figure 2 demonstrates a highly significant interaction effect on the height of mushroom stalks, with the highest observed in K_2A_2 (10g shellfish shell $CaCO_3$ + 40 ml coconut water/baglog) at 11.61 cm and the lowest in K_0A_3 (0g shellfish shell $CaCO_3$ + 60 ml coconut water/baglog) at 7.12 cm. Figure 3 illustrates a highly significant interaction effect on cap diameter, with the widest observed in K_2A_3 (10g shellfish shell $CaCO_3$ + 60 ml coconut water/baglog) at 24.57 cm and the narrowest in K_0A_0 (0g shellfish shell $CaCO_3$ + 0 ml coconut water/baglog) at 11.13 cm. Figure 4 displays a highly significant interaction effect on the number of cap stalks, with the highest observed in K_2A_2 (10g shellfish shell $CaCO_3$ + 40ml coconut water/baglog) at 19.33 stalks and the lowest in K_0A_0 (0g shellfish shell $CaCO_3$ + 0 ml coconut water/baglog) at 4.67 stalks. Figure 5 depicts a highly significant interaction effect on the fresh weight of oyster mushrooms, with the highest observed in K_3A_2 (15g shellfish shell $CaCO_3$ + 40 ml coconut water/baglog) at 141.2 g and the lowest in K_0A_0 (0g shellfish shell $CaCO_3$ + 0 ml coconut water/baglog) at 48.37 g. Figure 6 reveals a highly significant interaction effect on the thickness of oyster mushroom caps, with the highest observed in K_2A_2 (10g shellfish shell $CaCO_3$ + 40 ml coconut water/baglog) at 14.67 mm and the lowest in K_0A_0 (0g shellfish shell $CaCO_3$ + 0 ml coconut water/baglog) at 8.9 mm.

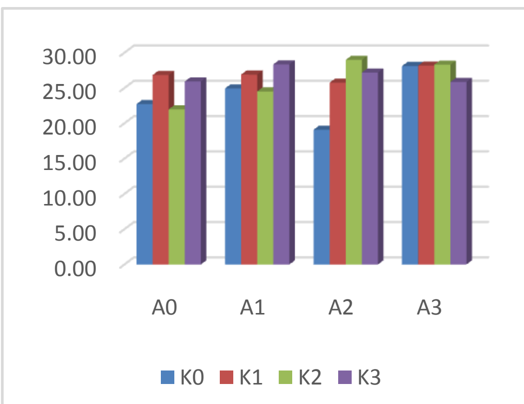

Fig 1.Mycelium Growth Rate (cm)

Fig 2.Stalk Height (cm)

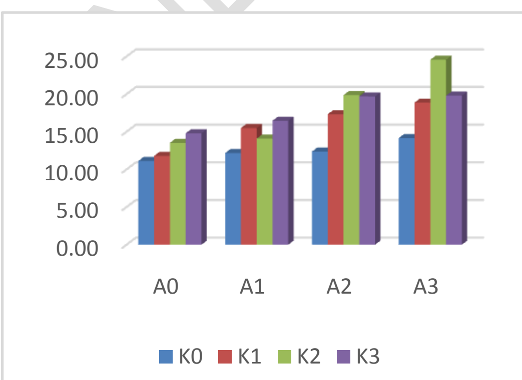

Fig 3. Cap Diameter (cm)

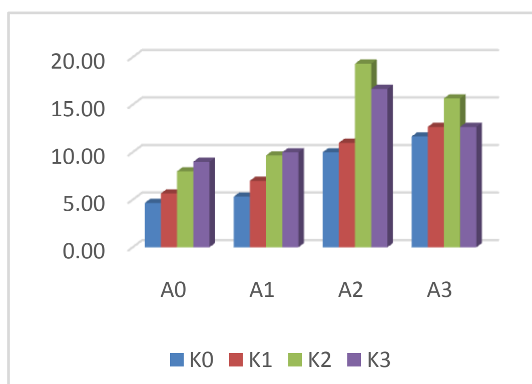

Fig 4. Clusters (Stalks)

Fig 5. Fresh Weight (g)

Fig 6. Cap Thickness (mm)

Mycelium growth rate (cm)

Based on the observations of mycelium growth rate, the research results and analysis indicate a significant difference in the level of supplementation with shellfish shell $CaCO_3$ and coconut water after being tested using the DMRT 5% test. For more details, please refer to the Table below.

Table 2. Mean supplementation of shellfish shell $CaCO_3$ and coconut water in baglog media on mycelium growth rate (cm) in three weeks after inoculation.

Treatment		Mean		
Supplementation of Shellfish Shell $CaCO_3$ (K)		Week 1	Week 2	Week 3
K_0	= 0 g/baglog	9.39 a	18.61 ab	23.71 b
K_1	= 5 g/baglog	9.55 a	20.27 a	26.92 a
K_2	= 10 g/baglog	9.03 a	17.29 b	25.94 a
K_3	= 15 g/baglog	9.80 a	18.28 ab	26.83 a
Supplementation of Coconut Water (A)				
A_0	= 0 ml/baglog	9.19 a	19.10 a	24.37 b
A_1	= 20 ml/baglog	9.38 a	18.74 a	26.17 ab
A_2	= 40 ml/baglog	9.48 a	18.25 a	25.25 b
A_3	= 60 ml/baglog	9.73 a	18.36 a	27.61 a

Note: Numbers in the same column followed by the same letter indicate no significant difference at the 5% level.

Based on the data in Table 2, for the shellfish shell $CaCO_3$ treatment, there was no significant difference in results 1 week after inoculation. However, the results showed a significant difference 3 weeks after inoculation, with the highest data for treatment K_1 (5 g/baglog) at 26.92 cm and the lowest data for K_0 (0g/baglog) at 23.71 cm. Regarding coconut water supplementation, there was a significant effect in the 3rd week, with the highest data for treatment A_3 at 27.61 cm and the lowest for treatment A_0 at 24.37 cm. Different concentrations can affect the duration of mycelium growth in oyster mushrooms.

Mushroom stalk height (cm)

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Table 3. Mean mushroom stalk height (cm) through supplementation of shellfish shell $CaCO_3$and coconut water in baglogs on the stimulation and production of pink oyster mushrooms for 2 harvest periods.

Treatment	Meant
Supplementation of Shellfish Shell $CaCO_3$ (K)	
K_0 = 0 g/baglog	7.54 b
K_1 = 5 g/baglog	7.43 b
K_2 = 10 g/baglog	8.85 a
K_3 = 15 g/baglog	8.84 a
Supplementation of Coconut Water (A)	
A_0 = 0 ml/baglog	7.67 b
A_1 = 20 ml/baglog	7.88 b
A_2 = 40 ml/baglog	8.96 a
A_3 = 60 ml/baglog	8.15 b

Note: Numbers in the same column followed by the same letter indicate no significant difference at the 5% level.

Based on the table above, it is stated that supplementation of shellfish shell $CaCO_3$ has a highly significant effect on the height of mushroom stalks, with the highest data observed in treatment K_2 (10g shellfish shell $CaCO_3$/baglog) at 8.85cm and the lowest data in treatment K_0 (0g shellfish shell $CaCO_3$/baglog) at 7.54cm. This research reveals that the calcium provided by shellfish shell powder can enhance the yield and nutritional content of pink oyster mushrooms.

In the supplementation of coconut water in oyster mushroom baglogs, there is also a highly significant effect on the height of oyster mushrooms, with the highest data recorded at 8.96 cm from treatment A_2 (40ml coconut water/baglog), while the lowest data is 7.67 cm from treatment A_0 (0ml coconut water/baglog). The difference in stalk height is attributed to the varying doses added to the baglogs, which consequently affect the growth of pink oyster mushrooms (*P.flabellatus*). The appropriate dosage in the baglog provides sufficient nutrients for the oyster mushrooms, stimulating their growth and increasing stalk height.

Mushroom Cap Diameter (cm)

Based on the observations of the mushroom cap diameter, it can be concluded that the supplementation levels of shellfish shell $CaCO_3$ and coconut water significantly influence the results, as evidenced by the Duncan's Range Test.

Table 4. Mean supplementation of shellfish shell $CaCO_3$ and coconut water in baglog media on cap diameter (cm)

Treatment	Means
Supplementation of Shellfish Shell $CaCO_3$ (K)	
K_0 = 0 g/baglog	12.46 c
K_1 = 5 g/baglog	15.88 b
K_2 = 10 g/baglog	18.02 a
K_3 = 15 g/baglog	17.69 a
Supplementation of Coconut Water (A)	

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A_0 = 0 ml/baglog	12.82 d
A_1 = 20 ml/baglog	14.56 c
A_2 = 40 ml/baglog	17.32 b
A_3 = 60 ml/baglog	19.35 a

Note: Numbers in the same column followed by the same letter indicate no significant difference at the 5% level.

Based on the table above, it is evident that supplementation of shellfish shell $CaCO_3$ and coconut water significantly influences the cap diameter. Observation of cap diameter shows the highest data in treatment K_2 at 18.02 cm and the lowest data in treatment K_0 at 12.46 cm. Meanwhile, treatments using coconut water show the highest data in treatment A_3 at 19.35 cm and the lowest data in treatment A_0 at 12.82 cm. According to research conducted by[16], The supplementation of coconut water significantly influences the growth and production of oyster mushrooms because coconut water is rich in potassium (up to 17 percent). Besides being rich in minerals, coconut water also contains sugar ranging from 1.7 to 2.6% and protein from 0.07 to 0.55%. In addition to minerals, coconut water also contains various vitamins and three natural hormones: auxin, gibberellin, and cytokinin, which serve as sources of energy in growth and stimulate cell division and elongation. In oyster mushroom cultivation, organic hormones will not have a significant effect if not supported by the nutritional requirements found in mushroom media, which generally contain cellulose. This can result in the expansion of the fruiting body. The diameter of the fruiting body of pink oyster mushrooms correlates with the number of fruiting bodies; the more fruiting bodies, the smaller the diameter of the fruiting body.

Number of Mushrooms (clusters)

In separate analyses, both shellfish shell $CaCO_3$ and coconut water supplementation showed a highly significant effect on harvests 1 and 2. The average number of fruiting bodies after supplementation of shellfish shell $CaCO_3$ and coconut water can be seen in the table below.

Table 5. Mean supplementation of shellfish shell $CaCO_3$ and coconut water in baglog media on the number of fruiting bodies (stalks)

Treatment	Means
Supplementation of Shellfish Shell $CaCO_3$ (K)	
K_0 = 0 g/baglog	7.92 b
K_1 = 5 g/baglog	9.08 b
K_2 = 10 g/baglog	13.17 a
K_3 = 15 g/baglog	12.08 a
Supplementation of Coconut Water (A)	
A_0 = 0 ml/baglog	6.83 b
A_1 = 20 ml/baglog	8.00 b
A_2 = 40 ml/baglog	14.25 a
A_3 = 60 ml/baglog	13.17 a

Note: Numbers in the same column followed by the same letter indicate no significant difference at the 5% level.

Based on the table above, the highest number of mushroom stalks produced through supplementation of shellfish shell $CaCO_3$ is in treatment K_2 (10 g/baglog), with 13.17

stalks, while the lowest is in treatment K_0 (0g/baglog), with 7.92 stalks. The highest number is obtained by pink oyster mushrooms at a harvest age of 2 days in the second harvest period. Meanwhile, the lowest number of stalks is produced by pink oyster mushrooms at a harvest age of 2 days in the first harvest period. Regarding coconut water supplementation in baglogs, the highest number is in treatment A_2 (40 ml/baglog) with 14.25 stalks, and the lowest data is in treatment A_0 (0 ml/baglog) with 6.83 stalks. This result corresponds to the research conducted by Tafzi[17]It is mentioned that the number of stalks of oyster mushrooms at 2 days of age is higher compared to other harvest ages.

Fresh Weight of Mushrooms (grams)

Based on the observations and analysis of the variance, it isfound that the supplementation of shellfish shell $CaCO_3$ and coconut water in baglogs significantly influences the stimulation of pink oyster mushrooms (*P.flabellatus*), as evidenced by the highly significant differences observed after conducting the DMRT 5%, as shown in Table 6.

Table 6. Mean supplementation of shellfish shell $CaCO_3$ and coconut water in baglog media on cap diameter (grams)

Treatment		Means
Supplementation of Shellfish Shell $CaCO_3$ (K)		
K_0	= 0 g/baglog	94.97 c
K_1	= 5 g/baglog	109.09 b
K_2	= 10 g/baglog	125.00 a
K_3	= 15 g/baglog	120.50 a
Supplementation of Coconut Water (A)		
A_0	= 0 ml/baglog	91.37 c
A_1	= 20 ml/baglog	109.25 b
A_2	= 40 ml/baglog	129.51 a
A_3	= 60 ml/baglog	119.42 ab

Note: Numbers in the same column followed by the same letter indicate no significant difference at the 5% level.

Based on the observations from Table 6, it is evident that supplementation with different concentrations of shellfish shell $CaCO_3$ significantly affects the wet weight (grams). The highest data is observed in treatment K_2 (10 g/baglog) with a mean of 68.44 g, while the lowest data is observed in treatment K_0 (0 g/baglog) with a mean of 45.62 g. According to the research [11]It is stated that the treatment of shellfish shell $CaCO_3$ with a dose of 10g helps increase the fresh weight of oyster mushrooms. This indicates that lime can modify the acidity of the medium, thus increasing the acidity in the baglog. Meanwhile, the treatment using coconut water shows that the highest data is observed in treatment A_2 (40 ml/baglog) with a mean of 22.04 g, while the lowest data is observed in treatment A_0 (0 ml/baglog) with a mean of 17.87 g. This is in line with the research conducted[14]The statement indicates that coconut water contains growth-regulating substances in the form of auxin and gibberellin hormones, which can stimulate the growth of oyster mushrooms and result in high fresh weight.

Cap Thickness of Mushroom (mm)

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In separate analyses, both the shellfish shell $CaCO_3$ and coconut water treatments showed a very significant effect on harvests 1 and 2. The mean cap thickness due to shellfish shell $CaCO_3$ and coconut water treatments can be seen in Table 7.

Table 7. Average supplementation of shellfish shell $CaCO_3$ and coconut water on mushroom cap thickness (mm)

Treatment	Means
Supplementation of Shellfish Shell $CaCO_3$ (K)	
K_0 = 0 g/baglog	9.55 c
K_1 = 5 g/baglog	10.26 bc
K_2 = 10 g/baglog	11.85 a
K_3 = 15 g/baglog	10.87 b
Supplementation of Coconut Water (A)	
A_0 = 0 ml/baglog	9.92 c
A_1 = 20 ml/baglog	10.32 bc
A_2 = 40 ml/baglog	17.32 b
A_3 = 60 ml/baglog	11.50 a

Note: Numbers in the same column followed by the same letter indicate no significant difference at the 5% level.

Based on the table above, the thickest number of caps produced by pink oyster mushrooms through $CaCO_3$ supplementation, the thickest shells were in the K_2 treatment (10 gr/baglog) amounting to 11.85 mm stalks and the lowest in the K_0 treatment (0gr/baglog) amounting to 9.55mm. Coconut water supplementation in baglog resulted in the thickest amount in treatment A_2 (40ml/baglog) amounting to 17.32 mm, and the lowest data in treatment A_0 (0 ml/baglog) amounting to 9.92 mm. The high value observed for the thickness of the mushroom cap is because the oyster mushroom growth medium contains elements necessary for mushroom growth, such as nitrogen, calcium, potassium, phosphorus, carbon, protein and chitin. Nitrogen is a protein component that plays a role in the formation of active growing tissue and can influence the growth of herbal fruit caps[18].

4. CONCLUSION

Supplementation with $CaC0_3$ of clam shells and coconut water to stimulate and produce pink oyster mushrooms (*P.flabellatus*) had a significant effect on the growth rate of mycelium at the age of observation 3 weeks after inoculation in the K_2A_2 treatment (10gr $CaCO_3$ of clam shells + 40ml coconut water / baglog). The K_2A_2 treatment (10gr $CaCO_3$ clam shells + 40ml coconut water / baglog) had a very real influence on the parameters of mushroom stalk height, number of clumps and cap thickness. In the K_2A_3 treatment (10gr $CaCO_3$ clam shells + 60ml coconut water/baglog) showed a very significantly different interaction on the diameter of the cap and in K_3A_2 (15gr $CaCO_3$ clamshells + 40ml coconut water/baglog) showed a very significantly different interaction on the fresh weight of young red oyster mushrooms.

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