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Cultivation of Lingzhi Fungi (Ganoderma Lucidum P. Karst) on Saw Dust Media with Molasses and Corn Flour Formulation Using Convective Mixing Technology

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ABSTRACT

Fungal growth is influenced by various types of additional nutrients provided, including the addition of molasses and corn flour. This research aimed to determine the effect of molasses and corn flour formulations in baglog media on the growth of lingzhi fungus (*Ganoderma Lucidium*). This research was carried out from December 2023 to March 2024 at the Agriculture Department, University of Pembangunan Panca Budi, Medan. This research method used a factorial Completely Randomized Design (CRD) consisting of 2 factors, 16 treatments, and 3 replications. The first factor has 4 treatment levels, M0 : 0 ml/baglog , M1: 1 ml/baglog, M2 : 2 ml/baglog and M3 : 3 ml/baglog. The second factor has 4 treatment levels, T0 : 0 gr/baglog, T1: 1 gr/baglog, T2: 2 gr/baglog and T3: 3 gr/baglog. The parameters observed were mycelium growth (cm), the height of the mushroom (cm), the diameter of the mushroom cap (cm), the thickness of the mushroom cap (mm), the number of branches/ clump mushrooms, and tightly wet (g). The highest mycelium growth rate results were in the T3 treatment at 19.33 cm. The highest data stem height results in the M1 treatment were 3.74 cm. The highest data hood diameter results in the M 3 treatment were 10.06 cm. The highest data of hood thickness results were in the M 3 treatment (32.83 mm). The highest number of branches/clumps of data in the T2 treatment was 1.50 branches. The highest data of wet weight (g) results were in treatment T1 (45.11g).

Keywords: *Fungi Lingzhi, Molasses, Grand Flour.*

INTRODUCTION

Indonesia has approximately 20,000 medicinal ingredients, but only around 300 types of ingredients are used as treatment. Mushrooms not only provide nutritious and protein-rich food, but some species also produce medicinally effective compounds (Kibar, 2021). One of the ingredients that has medicinal properties is the lingzhi mushroom (Handrianto, 2017). More than one hundred compound triterpenoids have been found in the extract Ganoderma lucidum, divided into Ganoderma acid (GA) or Ganoderma Alcohol (GAlc). Various triterpenoids contain large amounts of lucidenoic acid (Bharadwaj et al., 2019).

Ganoderma lucidum contains high levels of germanium, which own a characteristic antimutagenic, antitumor, increased immunity body, and antioxidant (Aly Farag El Sheikha, 2022). Mold lingzhi (*Ganoderma lucidum*) is a plant drug that lives on a stem tree, own body which is hard on surface. The flat red mushroom Ganoderma lucidium is a species of Lingzi (Hasanuddin, 2018); (Pardosi et al., 2020).

Ganoderma lucidum contains a number of compounds that determine the bioactive and pharmacological properties of mushrooms such as antiviral activity (Linnakoski et al., 2018). Body fruit, spores, And mycelium mold drug contain Lots component bioactive which become source efficacy drug (Seweryn et al., 2021) . Substance Which there is on mushrooms between other triterpenoids, polysaccharides, nucleotides, sterols, steroids, acids fat And protein/peptide, and lots of effect therapy (Sindhu et al., 2021).

The main source of fungal growth is contains of medium. Main media in the cultivation of lingzhi mushrooms is saw dust. Composition of mushroom growing media need given innovation with change composition media grow like addition of supporting nutrients, including the addition of microelements such as Fe and Mg contained in molasses or molasses (Mardhika Wulansari, Sudarti, 2017). Apart from molasses, the addition of other ingredients can be used in media growth mold is rice bran (Nasution et al, 2022). According to (Muchsin et al., 2017), stated that the addition of bran can increase the number of fruit bodies more Lots. Rice bran on media plant can multiply nutrition contained in the media so that the fungus can meet its nutritional needs. One of the nutrients needed by fungi to degrade lignocellulose is thiamin (vitamin B1) which functions as a cofactor for ligninolytic enzymes so that the cellulose degradation process occurs. And hemicellulose more optimal.

There are environmental factors that can influence growth and The formation of fruiting bodies or fungal mycelium is humidity, temperature, O2, CO2, light as well as pest and disease attacks. Nutritional factors that influence the growth of fungal fruiting bodies are water content, pH, extractive content, hemicellulose content, cellulose content, lignin content, and C/N ratio. (Perdana et al., 2021). The fungus can survive at temperatures between 22 and 35 °C. The ideal pH range for fungi is between 5.5 and 7.5, with relative humidity between 80 and 90% (Grace et al., 2019) .

The stage in utilizing wood sawdust waste is the initial stage to produce a mushroom growing medium or baglog (Chuang et al., 2021); (Taylor et al., 2018). Choosing the right sawdust can maintain the sustainability of the use of planting media (Wardani, 2017).

One source of nutrition that can be added to the media is by adding corn flour. The addition of corn flour is a flour that has a high carbohydrate content, where 100 grams of flour contains 85 grams of carbohydrates (Ayuningtyas, 2019). Based on the background above, it is necessary to carry out research regarding the cultivation of lingzhi fungus (Ganoderma lucidium) on sawdust media. by adding molasses and corn flour to baglog media.

MATERIALS & METHODS

Tools and Materials

This research was carried out from December 2023 to March 2024 in the Department of Agrotechnology, the University of Pembangunan Panca Budi, Medan. The research carried out included preparing mushroom houses, sieving, mixing, filling baglogs, sterilizing planting media, cooling, seed inoculation, incubation, opening newspaper covers, maintenance which included misting lingzhi mushrooms, temperature regulation, and harvesting.

Materials used in this research were lingzhi mushroom seeds, wood dust, rice bran/rice bran, lime, water, molasses, corn flour, alcohol, spirit, and newsprint. The tools used in this research were plastic baglogs measuring 18 cm x 35 cm and 0.5 pp thickness, baglog rings, shovels, baglog pressing machines, rubber bands, sterilization drums, gas stoves, gas cylinders, plastic sterilization covers, Bunsen fire, spatula spoon, measuring cup, scale, ruler, micrometer, caliper and writing tools.

RESEARCH METHODS

This research used a completely randomized factorial design (CRD) consisting of 2 treatment factors, 16 treatments, 3 replications, and 48 logs. The first factor is the administration of Molasses concentration which is given the symbol " M " and consists of 4 levels, namely: K0 = 0 ml / baglog (control), M 1 = 1 ml /baglog, M 2 = 2 ml /baglog, M3 = 3 ml /baglog. The second factor is the provision of Corn Starch concentration which is given the symbol " T " and consists of 4 levels, namely: T 0 = 0 ml/baglog (control), T 1 = 1 gr / baglog, T 2 = 2 gr /baglog, T 3 = 3 gr /baglog.

Observation Parameters

The observation parameters carried out included: Mycelium growth rate (cm), mushroom stem height (cm), cap diameter (cm), cap thickness (mm), number of branches/clumps and wet weight of the mushroom (g).

RESULT

Results of Observing Mycelium Growth Rate (cm)

The results of the research after statistical analysis showed that the administration of molasses and corn flour formulations had an influence on the mycelium growth rate at the ages of 1, 2, 3, 4, 5, and 6 weeks after inoculation (MSI). For more details, see the table and graph below.

Table 1. The Average Growth Rate of Mycelium in the Cultivation of Lingzhi Fungus (*Ganoderma Lucidiu P.Karst*) in Molasses and Corn Flour Formulations based on Convective Mixing Technology Aged 1 to 6 Weeks after Inoculation (MSI)

Treatment	Mycelium Growth Rate (cm)					
Molasses Concentration (M)	1 AI	2 AI	3 AI	4 AI	5 AI	6 A1
M0 = 0 ml/baglog	2.82 bB	5.18 bB	9.71 bB	12.4 bB	13,67 Bb	15,38 bB
M1 = 1 ml/baglog	2.93 bB	6,29 bAB	9.75 bAB	12.64 bB	14.06 bB	15.64 bAB
M2 = 2 ml/baglog	3.54 bAB	6.35 bAB	10,25 bAB	14,33 bAB	16,79 bAB	17,57 bAB
M3 = 3 ml/baglog	3.6 aA	7.04 aA	11.84 aA	15.45 aA	18.01 aA	19.02 aA
Corn Flour (T)						
T0 = 0 g/baglog	2.38 chAP	5.4 bB	9.21 bB	11.79 bB	13.5 bB	15.51 bB
T1 = 1 g/baglog	3.61 chapter	5.84 bB	9.53 bB	13.71 bB	15,38 bAB	15,85 bAB
T2 = 2 g/baglog	3.24 bAB	6.3 bAB	10.84 bAB	14,45 bAb	16,31 bAB	16,91 bAB
T3 = 3 g/baglog	3.67 aA	7.33 aA	11.96 aA	14,87 aA	17,34 aA	19,33 aA
Note: Numbers in the same column followed by the same letter are not significantly different at the 5% level (lowercase letters) and very significantly different at the 1% level (uppercase letters).						

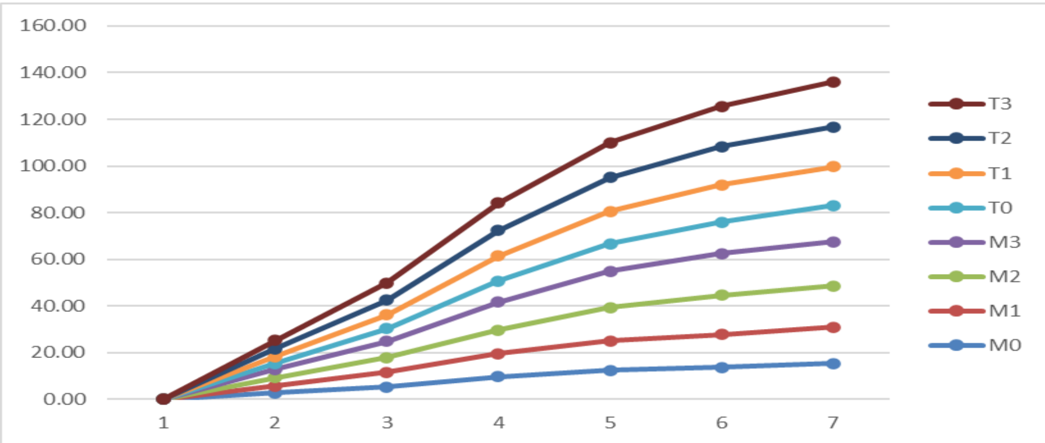


Figure 1 . Mycelium Growth Rate Graph (cm)

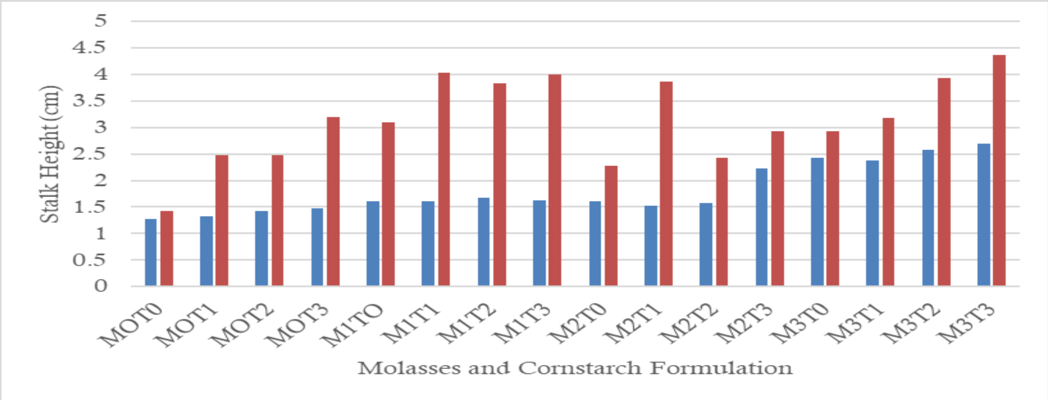
Fungi Stalk Height (cm)

Based on the results of observations of Lingzhi Fungi stalks (*Ganoderma lucidium P.Karst*) it can be seen that the results of research and analysis show that the level of administration of molasses and corn flour formulations has an influence on the height of the mushroom stalks at the age of 1 to 2 weeks. For more details, see the table and graph below.

Table 2. Average Fungi Stalk Height for Cultivation of Lingzhi Fungus (*Ganoderma Lucidium P.Karst*) Against Molasses and Corn Flour Formulations based on Convective Mixing Technology Aged 1 to 2 Weeks after Inoculation (MSI)

Treatment	Mushroom Stalk Height (cm)	
Molasses Concentration (M)	Week 1	Week 2
M0 = 0 ml/baglog	1.38 Bb	2.39 bAB
M1 = 1 ml/baglog	1.63 Bb	3.74 bAB
M2 = 2 ml/baglog	1.73 Bb	2.88 bAB
M3 = 3 ml/baglog	2.52 Aa	3.6 Aa
Corn Flour (T)		
T0 = 0 g/baglog	1.73 abA	2.43 bAB
T1 = 1 g/baglog	1.71 abA	3.38 bAB
T2 = 2 g/baglog	1.81 abA	3.17 bAB
T3 = 3 g/baglog	2.01 abA	3.63 aA

Note: Numbers in the same column followed by the same letter are not significantly different at the 5% level (lowercase letters) and very significantly different at the 1% level (uppercase letters).



Note: The blue graphic caption shows Week 1 and the red graphic caption shows week 2

Figure 2. Mushroom Stalk Height (cm)

Fungi Cap Diameter (cm)

Based on the results of observations of the cap diameter of the Lingzhi Fungi (Ganoderma lucidium P.Karst) it can be seen that the results of research and analysis show that the level of administration of molasses and corn flour formulations has an influence on the diameter of the fungus cap. For more details, see the table and graph below.

Table 3. Average Diameter of Fungal Caps for Cultivation of Lingzhi Fungus (*Ganoderma Lucidiu P.Karst)* for Molasses and Corn Flour Formulations based on Convective Mixing Technology

Treatment	Cap Diameter (cm)
Molasses Concentration (M)	**Average**
M0 = 0 ml/baglog	7.32 bB
M1 = 1 ml/baglog	8.43 bAB
M2 = 2 ml/baglog	7.95 bAB
M3 = 3 ml/baglog	10.06 aA
Corn Flour (T)	
T0 = 0 g/baglog	7.04 bA
T1 = 1 g/baglog	9.23 bA
T2 = 2 g/baglog	8.16 bA
T3 = 3 g/baglog	9.32 aA

Note: Numbers in the same column followed by the same letter are not significantly different at the 5% level (lowercase letters) and very significantly different at the 1% level (uppercase letters).

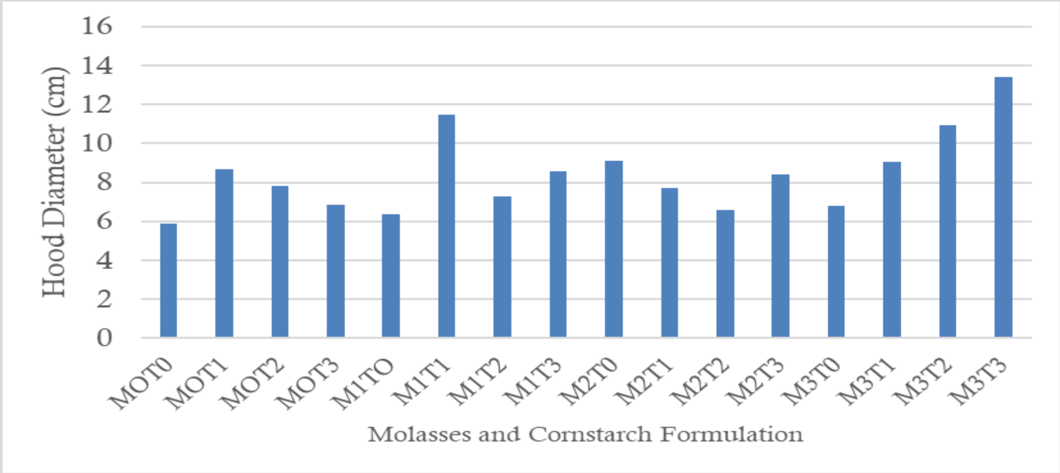


Figure 3. Mushroom Cap Diameter (cm).

Mushroom Cap Thickness (mm)

Based on the results of observations of the thickness of the cap of the Lingzhi Fungi (Ganoderma Lucidium P.Karst) it can be seen that the results of research and analysis show that the level of application of the molasses and corn flour formulation influences the thickness of the fungus cap. For more details, see the table and graph below.

Table 4. Average Hood Thickness for Cultivation of Lingzhi Fungus (*Ganoderma Lucidium P.Karst*) for Molasses and Corn Flour Formulations based on Convective Mixing Technology

Treatment	Mushroom Cap Thickness (mm)
Molasses Concentration (M)	**Average**
M0 = 0 ml/baglog	21.39 ^{bB}
M1 = 1 ml/baglog	22.50 ^{Bb}
M2 = 2 ml/baglog	23.87 ^{Bab}
M3 = 3 ml/baglog	32.83 ^{Aa}
Corn Flour (T)	
T0 = 0 g/baglog	19.04 ^{bAB}
T1 = 1 g/baglog	28.58 ^{bAB}
T2 = 2 g/baglog	26.03 ^{bAB}
T3 = 3 g/baglog	26.93 ^{aA}

Note: Numbers in the same column followed by the same letter are not significantly different at the 5% level (lowercase letters) and very significantly different at the 1% level (uppercase letters).

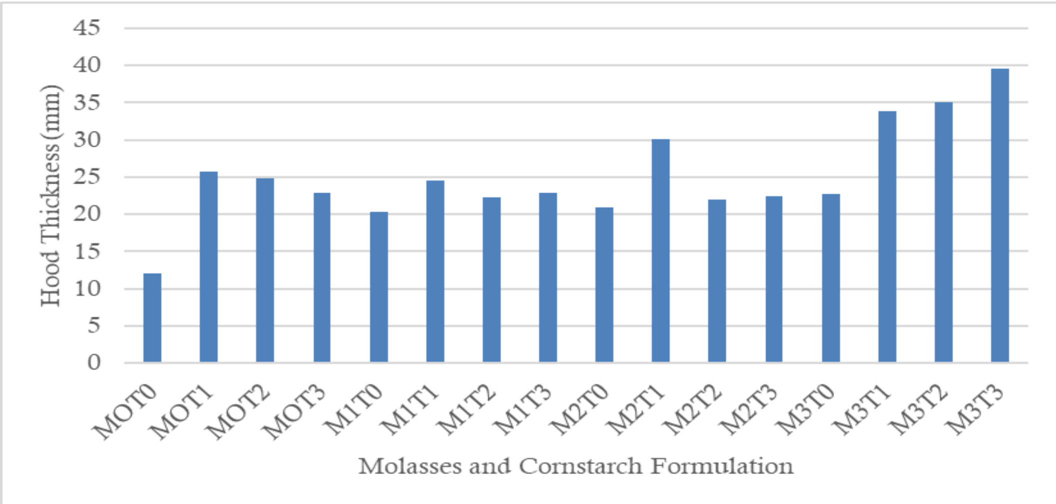


Figure 4. Mushroom Cap Thickness Graph (mm)

Number of Branches/Clumps

Based on the results of observations and analysis of variance, it is known that the effect of molasses and corn flour formulations in sawdust media on the cultivation of lingzhi fungus (Ganoderma lucidium P.Karst) has an insignificantly different effect on the number of branches/clumps. The interaction of molasses formulation and corn flour had no significant effect on the data measuring the number of branches/clumps of lingzhi fungus cultivation (Ganoderma lucidium P.Karst) after being tested using the Duncan Distance Test. For more details, see the table and graph below.

Table 5. Average Number of Branches/Clumps for Cultivation of Lingzhi Fungus (Ganoderma Lucidium P.Karst) in Molasses (M) and Corn Flour (T) Formulations based on Convective Mixing Technology

Treatment	Number of Clumps
Molasses Concentration (M)	Average
M0 = 0 ml/baglog	1.25 aA
M1 = 1 ml/baglog	1.50 aA
M2 = 2 ml/baglog	1.25 aA
M3 = 3 ml/baglog	1.00 aA
Corn Flour (T)	
T0 = 0 g/baglog	1.33 aA
T1 = 1 g/baglog	1.00 aA
T2 = 2 g/baglog	1.50 aA
T3 = 3 g/baglog	1.17 Aa

Note: Numbers in the same column followed by letters that are not the same are significantly different at the 5% level (lowercase letters) and very significantly different at the 1% level (uppercase letters).

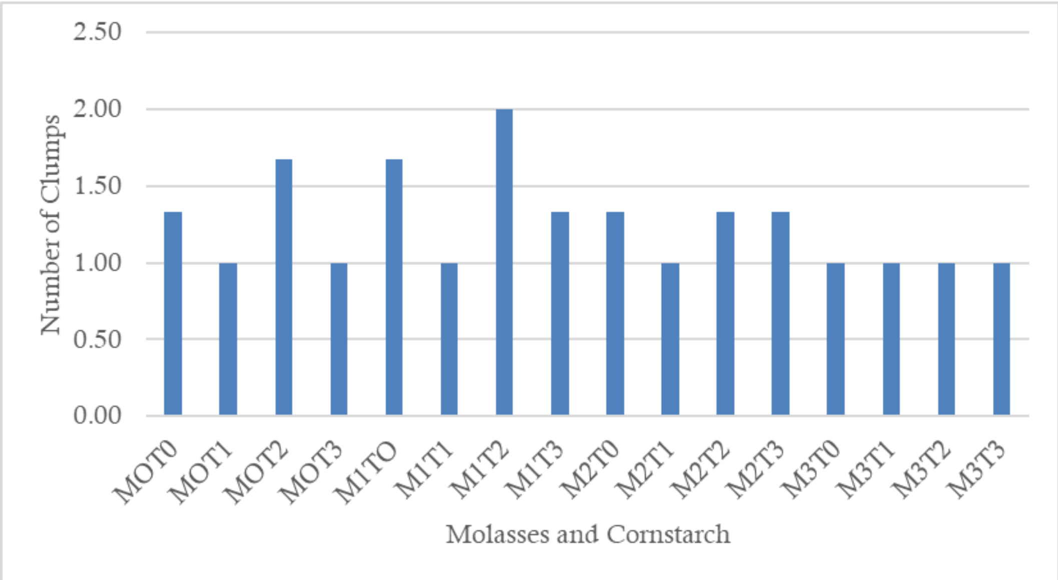


Figure 5. Graph of Number of Mushrooms (clumps)

Wet Weight (gr)

Based on the results of observations of the wet weight of Lingzhi Fungi (Ganoderma lucidium P.Karst) it can be seen that the results of research and analysis show that the level of administration of molasses and corn flour formulations influences the wet weight of the fungus. For more details, see the table and graph below.

Table 6. Average Wet Weight of Lingzhi Fungus (Ganoderma Lucidium P.Karst) Cultivation of Molasses and Corn Flour Formulations based on Convective Mixing Technology

Treatment	Wet Weight (gr)
Molasses Concentration (M)	**Average**
M0 = 0 ml/baglog	31.43 bB
M1 = 1 ml/baglog	40.10 bB
M2 = 2 ml/baglog	33.18 bB
M3 = 3 ml/baglog	42.77 Aa
Corn Flour (T)	
T0 = 0 g/baglog	31.68 bB
T1 = 1 g/baglog	45.11 bB
T2 = 2 g/baglog	36.20 bB
T3 = 3 g/baglog	34.50 aA

Note: Numbers in the same column followed by the same letter are not significantly different at the 5% level (lowercase letters) and very significantly different at the 1% level (uppercase letters).

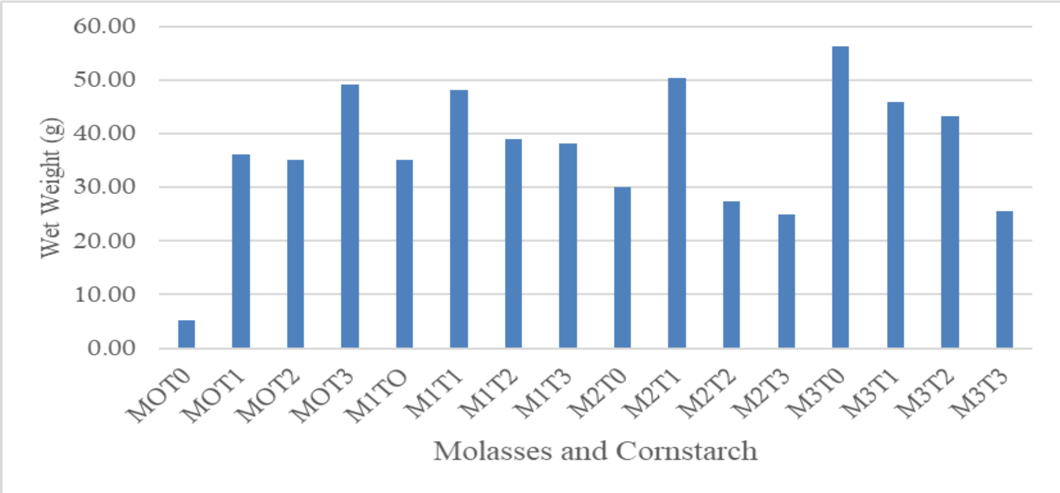


Figure 6. Wet Weight Graph (G)

a **b** **c**

Figure 7. Growth of The Fruiting Body of the Lingzhi Fungus (A). Control: (B). Treatment M 2 T 3 : Molasses 2 Ml/Baglog + 2 G/Baglog Corn Flour; (C). M 3 T 3 : Molasses 3 Ml/Baglog +3 G/Baglog Corn Flour

DISCUSSION

Mycelium Growth Rate (cm)

Based on the results of observations on the mycelium growth rate, it is known that when giving the molasses formulation, the highest mycelium growth rate was in the M3 treatment =3ml/baglog= 19.02 cm, which was significantly different in the M2 treatment =2ml/baglog= 17.57. cm, M1 =1ml/baglog=15.64 cm and very significantly different in treatment M0 =0ml/baglog=15.38 cm.

Based on the results of observations on the mycelium growth rate, it is known that when giving corn flour, the highest mycelium growth rate was in the M3 treatment = 3ml/baglog= 19.33 cm which was significantly different in the M2 = 2ml/baglog= 16.91 cm treatment., M1 =1ml/baglog= 15.85 cm, and very significantly different in treatment M0 =0ml/baglog=15.51 cm.

This shows that the application of molasses formulation to the growth medium can increase the biomass and production of bioactive compounds from lingzhi mushrooms significantly compared to without the application of molasses formulation (Zhao et al., 2019) .The effect of adding minerals such as potassium, magnesium and iron from the molasses formulation on the growth of lingzhi mushroom mycelium shows that it can increase extracellular enzyme activity and mycelium growth rate (Wang et al., 2021).

According to research by Xu et al., 2020, comparing various carbon sources including molasses and corn flour formulations for the growth of lingzhi mushroom mycelium, the results show that the combination of molasses formulations with corn flour has a ratio of 1:1 to provide optimal mycelium growth rates.

Stalk Height (cm)

Based on the results of observations on stalk height, it was found that when giving the molasses formulation the highest stalk height was M3 = 3ml/baglog = 3.6 cm. What was significantly different was in the treatment M2 = 2ml /baglog = 2.88 cm, M1 = 1ml /baglog = 3.74 cm and M0 = 0 ml/baglog = 2.39 cm.

Based on the results of observations on stalk height, it is known that when corn flour was given, the highest stalk height was T3 = 3g/baglog = 3.63 cm. What was significantly different was in the treatment T2 = 2g/baglog = 3.17 cm, T1 = 1g/baglog = 3.38 cm and T0 = 0 g/baglog = 2.43 cm.

This shows that by administering the molasses formulation, it is rich in sugars such as sucrose, glucose, fructose, which are the main carbon sources for the growth of stem height in Lingzi mushrooms. According to research (Borde et al 2019) . Shows that the combination of molasses and corn flour formulations can produce stalk heights of around 2-5 cm than without application. The effect of adding minerals such as potassium, magnesium and iron from the molasses formulation on the growth of stalk height in lingzhi mushrooms has been shown to increase extracellular enzyme activity and increase stalk height growth in lingzhi mushrooms (Wang et al ., 2021) .

Hood Diameter (cm)

Based on the results of observations on the diameter of the hood, it is known that when giving the widest molasses formulation, M3 =3ml/baglog =10.06 cm. What is significantly different is in the treatment M2 = 2ml /baglog = 7.95 cm, M1 = 1ml/baglog = 8.43 cm and very significantly different M 0 = 0 ml/baglog = 2.39 cm.

Based on the results of observations on the diameter of the hood, it is known that when giving corn flour the widest T 3 = 3g/baglog = 9.32 cm. What is significantly different is in the treatment T2 = 2g/baglog = 8.16 cm, T1 = 1g/baglog = 9.23 cm and T0 = 0 g/baglog = 7.04 cm.

This shows that the mixture of molasses and corn flour formulation can produce a lingzhi mushroom diameter of 14.2% compared to other treatments, the high sugar content of molasses and nutrients from corn flour provide optimal carbon and nitrogen sources for the development of the cap (Kumari et al. , 2022) .

According to (Agrawal and Shrivastava 2020) , supplementation of 20% molasses and 18% corn flour into the growth medium can increase the diameter of the Lingzi mushroom cap by up to 12.5 cm compared to without treatment. Complete nutrition in these two ingredients stimulates the formation of a large hood.

Mushroom Cap Thickness (mm)

It is known that when given the thickest molasses formulation, M3 = 3ml/baglog =

32.83 mm. What was significantly different was in the treatment M2 = 2ml/baglog = 23.87 mm. What was very different was M1 = 1ml/baglog = 22.50 cm which is very significantly different from M 0 = 0 ml/baglog = 2.39 mm.

Based on the results of observations on the thick diameter of the mushroom cap, it is known that when given the thickest corn flour, T3 = 3g/baglog = 26.93 cm. What is significantly different is in the treatment, T2 = 2g/baglog = 26.03 cm, T1 = 1g /baglog = 28.58 cm and T 0 = 0 g/baglog = 19.04 cm.

This shows that the mixture of molasses and corn flour formulation in the growth medium produces the highest Lingzhi mushroom cap thickness of 2.8 cm. The nutritional content of carbohydrates, proteins and minerals in both ingredients supports the formation of more massive fruit bodies (Pandey et al ., 2021) .

According to research (Verma et al., 2019) reported that the hood with an average thickness of 2.4 cm in the molasses and corn starch formulation treatment was higher than in media without the molasses and corn flour formulation (1.7 cm). This indicates the positive influence of both nutrients on hood thickness. In general, the sugar content of molasses as carbon as well as carbohydrates, proteins and minerals from corn flour provide the nutrients needed for the development of thicker and more massive lingzhi mushroom caps. This shows that the molasses and corn flour formulation produces a maximum thickness of 2.7 cm (Rao et al ., 2018).

Number of Mushrooms (Clumps)

Based on the results of observations on the number of mushrooms, it is known that when giving the most molasses formulation, M3 = 3ml/baglog = 1.00. What was not significantly different was in the treatment M 2 = 2ml/baglog = 1.25 cm, M 1 = 1ml/baglog = 1.50 cm and M0 = 0 ml/baglog = 1.25 cm. Based on the results of observations on the number of fungi, it is known that when giving the most corn flour i T3 = 3g/baglog = 1.17 cm. What was not significantly different was in the treatment T2 = 2g/baglog = 1.50 cm, T1 = 1g/ baglog = 1.00 cm and T0 = 0 g/baglog = 1.33.

According to research (Kumar and Yadav, 2019) it was revealed that treatment with 27% molasses and 23% corn flour produced an average of 5.4 clumps/substrate, not significantly different from the control without molasses-corn flour (5.1 clumps/substrate). Researchers concluded that the presence of these two ingredients did not have a significant effect on increasing the number of lingzhi mushroom clumps.

According to (Verma and Singh, 2021) , media formulation with supplementation of 25% molasses and 20% corn starch produced an average of 5.2 clumps/substrate, not significantly different from the control (5.0 clumps/substrate). These findings indicate that the sugar and nutrient content of molasses and corn flour has less influence on the number of clumps formed.

Wet Weight (g)

Based on the results of observations on the wet weight, it is known that the heaviest molasses formulation given in the treatment M3 = 3ml/baglog = 4.77 g. What was very significantly different was in the treatment M2 = 2ml/baglog = 33.18 g, M1 = 1ml /baglog = 40.10 g and M0 = 0 ml/baglog = 31.43 g.

Based on the results of observations on wet weight, it is known that the heaviest corn flour given in the treatment T3 = 3g/baglog = 34.50 g. What was very significantly different was in the treatment T2 = 2g/baglog = 36.20 g, T1 = 1g /baglog = 45.11 g and T0 = 0 g/baglog = 31.68 g.

This shows that the application of molasses and corn flour formulations into the growing medium can produce an average wet weight of around 121g/clump, almost double compared to the control or no application. The presence of simple sugars and other components such as complex carbohydrates, proteins, vitamins, minerals has been proven to play a vital role in spurring the formation of more massive fresh fruit bodies (Kumar, D., and Jain, 2019) .

A study conducted by (Saxena et al. 2018) revealed that the highest wet weight of 133 g/clump was obtained in the treatment with 27% molasses and 20% corn flour, while the formulation without both ingredients was only 74 g/clump. The rich nutrients from these two ingredients are able to support optimal growth and development of fresh fruit bodies.

The sawdust used...is rubber wood sawdust consisting of: cellulose (42%-49%), hemicellulose (23%-34%) and lingli (3%-8)

Molasses is an essential energy source that contains sugar, so molasses is used as a nutritious feed and fertilizer additive. The nutritional value of molasses is 23% water content, 77% dry matter, 4.2% crude protein, 0.2% crude fat, 7.7% crude fiber, 0.84% Ca, 0.09% P, BETN 57, 1%, and ash 0.2%. Molasses has a high nutritional content for the growth of micelles from lingzhi mushrooms , oyster mushrooms and brown oyster mushrooms. So apart from corn flour , the carbohydrate that can be added to stimulate the growth of lingzhi fungus in the growth medium is molasses (Larangahen et al., 2016) .

Corn flour is a flour that has a high carbohydrate content, water content 5.45%, protein 8.78%, fat 5.48%, ash content 1.28%, starch 68.81%, viscosity 3.05 cP, and bulk density 0.0678 gr/cm 3, where 100 grams of flour contains 85 grams of carbohydrates (Ayuningtyas, 2019).

This lingzhi mushroom research uses rubber wood sawdust which contains cellulose (42%–49%), hemicellulose (23%–34%), lignin (20%–26%), extractives (3%–8%). One of the nutrients that fungi need for mycelium growth is carbohydrates, lignin and fiber (Fatmawati, 2017) . The results of this lignin degradation are used to form hyphae and mycelium. Therefore, when the mycelium grows and spreads, the fruiting bodies of the lingzhi mushroom will also form more quickly and develop more optimally (Pamungkas, 2018).

CONCLUSION

The results of the research conducted show that giving molasses has a very significant effect on the growth rate of mycelium. Meanwhile, the provision of corn flour had a very significant effect on the mycelium growth rate. The interaction between giving molasses and corn flour had no significant effect on the mycelium growth rate

Based on the research carried out, it can be concluded that the mycelium growth rate has no significant effect on the addition of rice washing water and rice groats, whereas for mushroom stalk height, mushroom cap diameter, mushroom cap thickness, number of mushrooms and fresh weight of mushrooms/baglog shows that there is an interaction between rice washing water and rice groats gave results that had an influence on rice washing water and rice groats, as for mushroom stalk height, mushroom cap diameter, mushroom cap thickness, number of mushrooms and fresh weight of mushrooms/baglog.

Declaration by Authors

Conflict of Interest: The authors declare no conflict of interest.

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