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The Effect of Bran and Corn Flour Composition on Swadust Media Materials Towards the Growth and Result of White Oyster Mushroom (*Pleurotus ostreatus*)

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ABSTRACT

This research provides basic scientific information about the growth and results of white oyster mushrooms to the dosage of bran and corn flour as source of nutritious white oyster mushroom plant. In addition, it is expected to be a reference for future researchers about mushrooms white oyster. The method of this study was arranged in the design of this the study using Completely Randomized Design (RAL) with 7 as follows: D0 = media sawdust (100%), as control, D1 = sawdust (80%), and bran (20%), D2 = mixture of sawdust media (75%), and bran (25%), D3 = mixed sawdust (70%), and bran (30%), D4 = mixture of sawdust (80%), and cornstarch (20%), D5 = mixture of sawdust media (75%) and corn flour (25%), D6 = mixed sawdust (70%), and corn flour (30%). The results of this study showed that the addition of dosage of bran and corn flour to each treatment of sawdust media had a very significant effect on all parameters of observation that is on the first observation parameter growing mycelium, the number of white oyster mushroom fruit body, white fruits oyster mushroom cap dry weight of white oyster mushrooms.

Keywords: Oyster mushrooms, sawdust

INTRODUCTION

White oyster mushroom is belong to the consumption mushroom group that lives on wood that has decayed, but varieties that exist in nature are very numerous and have different characteristics. Based on the nature, it can be divided into poisonous and non-toxic mushrooms. The non-toxic mushrooms is good to eat and have high economic value (Hendrarto, Roni, and Totok, 2008). White oyster mushrooms can be grown on sawdust media, straw waste, cotton waste, cardboard paper, or even other organics (Maulana, 2012), so that it can be developed as a diversification of food ingredients and nutritional content equivalent for meat and fish (Kalsum et al. 2011) .

According to Piryadi (2013), white oyster mushrooms contains a nutrient content of 100 grams of dry weight which is 27% protein, 16% fat, 58% carbohydrate and 7.5 <8.7% fiber.The current market opportunity for white oyster mushrooms is quite high, the needs of the domestic market are around 35% and foreign markets are 65%. Every year, domestic and foreign market demand increases, furtheremore high demand has not been balanced with high production.This is due to the lack of public interest because of the difficulty of obtaining raw materials, and usually the farming community that cultivates oyster mushrooms only uses sawdust as a medium for their growth but they do not yet understand the white oyster mushroom cultivation techniques using alternative media (Maulana 2012).

White oyster mushroom cultivation is a business opportunity that is still wide open in agriculture and is considered a commodity in the agribusiness sector (Abdul, 2002). White oyster mushroom cultivation is still rare in most parts of Indonesia, including Central Sulawesi.

One of the growing medium of white oyster mushrooms is sawdust (Seswati, et al, 2013). A sawdust is a waste from a wood factory that is very abundant, less valuable and easily obtained. With such media, mushrooms are considered a healthy food commodity, because these mushrooms are cultivated almost without using artificial fertilizers and pesticides (Winarni, 2002).The addition of nutrients to sawdust that will be used as a medium for growing white oyster mushrooms needs to be done considering the limited nutrition contained in sawdust, one of the ingredients used is bran and corn flour.Bran is the result of the remaining rice mill. Used as an additional ingredient in planting media that functions as a nutrient and source of carbohydrates, carbon and nitrogen. Rice bran is also rich in vitamin B complex, a part that plays a role in the growth and development of mushroom's mycelium and also functions as a trigger for the growth of the fruit body (Soenanto, 2000).

Corn flour is an additional medium as a substitute for bran. The usefulness of adding corn flour is a source of carbohydrate 13.435%, protein 6.30%, fat 3.79%, water 9.01%, and ash 3.79% (wahyuni, 2005). Based on the description above, the author tries to conduct a research on the effect of dose of bran and corn flour on sawdust media on growth and result of white oyster mushroom (Pleurotus ostreatus). This research intends to determine the effect of doses of bran and corn flour on sawdust media on the growth and result of white oyster mushrooms.

RESEARCH METODOLOGHY

This research was conducted in Mpanau village Sigi Biromaru Sub-district Sigi Regency on 26th March to May 2016.

Tools used were hoes, spades, sieves, meters, handsprayers, steaming drums, baglog racks, pounding bottles, candles, analytical scales, parallel pipes, water hoses, scissors, cutters, spoons, rubber bands, documentation tools, and writing instruments. The ingredients used were seeds of white oyster mushrooms (F3), polypropylene plastic of 18 x 35 cm size, sawdust, rice bran, corn flour, limestone, water, 70% alcohol, paper, and label paper.

This study uses a Completely Randomized Design (CRD) with 7 combinations treatment as follows:

D0 = Sawdust media (100%), control; D1 = Sawdust media (80%), and bran (20%); D2 = Sawdust media (75%), and bran (25%); D3 = Sawdust media (70%), and bran (30%); D4 = Sawdust media (80%), and corn flour (20%); D5 = Sawdust media (75%), and corn flour (25%);D6 = Sawdust media (70%), and corn flour (30%); The treatment was repeated 3 times, with 7 treatment combinations and each treatment combination represented 5 logins. So that the number of baglogs used is 105 baglogs. the data were analyzed by variance analysis. if there is a treatment effect then proceed with the middle test using a real honest difference test at the level of 5%

The linear mathematical model of this study is as follows:

Yij = μ + Ti + εij

Yij= the value of observations on the treatment of the composition of bran and corn flour to I, repeat to j

μ = general middle value

Ti = the effect of the treatment of the composition of bran and corn flour to i

εij = random influence (experimental error) on the treatment of the composition of bran and corn flour to i

RESULT AND DISCUSSION

The Growth of White Oyster Mushroom Mycelium.

The results of analysis of variance showed that the dose of bran and corn flour had a very significant effect on the initial growth of white oyster mushroom mycelium. The average initial growth of white oyster mushroom mycelium is presented in Table 1.

Treatment	Average of Growing Oyster Mushroom Mycelium (days)	HSD α 0,05
D0	1,87^{d}	0,40
D1	1,87^{d}	
D2	4,07^{c}	

D3	1,07[e]	
D4	3,67[c]	
D5	7,20[b]	
D6	11,00[a]	

Table 1. Average Initial Growth of Oyster Mushroom Mycelium (DAP)

Note: *The numbers followed by the same alphabet are not significantly different in the HSD test level of 5%.*

The HSD test results at 5% level in table 1. show that treatment D3 gives the best results for the initial growth of oyster mushroom mycelium, which is 1.07 days significantly different from the D0, D1, D2, D4, D5 and D6 treatments which give the most the duration of the growth of white oyster mushroom mycelium was 1.87 days, 1.87 days, 4.07 days, 3.67 days, 7.20 days and 11 days.

Body Amount of Oyster Mushroom.

The results of Variety prints showed that the different doses of bran and corn flour in sawdust media signifficantly affect the diameter of the body of the oyster mushroom fruit. The average number of bodies of white oyster mushrooms is presented in Table 2.

Treatment	Average Number of Oyster Mushroom Bodies (fruit)	HSD α 0,05
D0	20,53[ab]	10,86
D1	20,60[ab]	
D2	18,27[b]	
D3	30,33[a]	
D4	8,07[b]	
D5	14,93[b]	
D6	16,07[b]	

Table 2. Average Oyster Mushroom Body Number.

Note: The numbers followed by the same alphabet are not significantly different in the HSD test level of 5%

Results of HSD test 5% (Table 2) reveals that the treatment of D3 provides the highest number of mushroom fruit bodies which is 30.33 pieces, not significantly different from the treatment (D0) and (D1) which is 20.53 fruits and 20.60 fruits but the different in the real treatment was D2, D4, D5, and D6, which were 18.27 fruits, 8.07 fruits, 14.93 fruits, and 16.07 fruits respectively, giving the lowest result to the number of bodies of white oyster mushrooms.

Hood Diameter of Oyster Mushroom.

The results of Variety prints showed that the different doses of bran and corn flour in sawdust media had a very significant effect on the hood diameter of the oyster mushroom. The average diameter of white oyster mushroom caps is presented in Table 3.

Treatment	Average Diameter of Oyster Mushroom Fruit Hood (cm)	HSD α 0,05
D0	3,53[ab]	1.,61
D1	4,40[a]	
D2	2,13[b]	
D3	4,27[a]	
D4	2,47[b]	
D5	2,33[b]	
D6	2,80[ab]	

Table 3. Average Diameter of Oyster Mushroom Hoods.

Note: *The numbers followed by the same alphabet are not significantly different in the HSD test level of 5%.*

Table 3. from the results of the HSD test level of 5% shows that the best diameter of white oyster mushroom is produced in treatment (D1) which is 4.40 cm, followed by treatment (D3) which is 4.27 cm, but it was significantly different from the results of treatments D0, D2, D4, D5, and D6 which provided poor results on the diameter of the oyster mushrooms, which were 3.53 cm, 2.13 cm, 2.47 cm, 2.33 cm and 2.80 cm.

Fresh Weight of Oyster Mushroom.

The results of analysis of variance showed that the doses of bran and corn flour in sawdust media had a very significant effect on the fresh weight of white oyster mushrooms. The average fresh weight of white oyster mushrooms is presented in Table 4.

Treatment	Average Fresh Oyster Mushroom Weight (g)	HSD α 0,05

D0	84,47[ab]	57,81
D1	104,20[a]	
D2	69,07[ab]	
D3	118,33[a]	
D4	49,47[b]	
D5	44,93[b]	
D6	24,33[b]	

Table 4. Average Weight of Fresh East Mushrooms

Note: *The numbers followed by the same alphabet are not significantly different in the HSD test level of 5%.*

The HSD test results at the level of 5% (Table 4) showed that the treatment that gave the best effect was treatment (D3) which was 118.33 g, and the treatment (D1) was 104.20 g, not significantly different with treatment (D0) and treatment (D2) but significantly different for treatment (D4), (D5), and (D6) which gave the lowest result to the fresh weight of white oyster mushrooms, respectively 49.47 g, 44.93 g and 24.33 g.

Dry Weight of Oyster Mushroom.

The results of variance analysis showed that doses of bran and corn flour in sawdust media affects signifficantly on the dry weight of white oyster mushrooms. The average dry weight of white oyster mushrooms is presented in Table 5.

Treatment	Average Oyster Mushroom Dry Weight (g)	HSD α 0,05
D0	18,68[ab]	22,41
D1	24,74[a]	
D2	22,53[a]	
D3	26,80[a]	
D4	12,27[ab]	
D5	12,95[ab]	
D6	4,93[b]	

Table 5. Average Dry Weight of White Oyster Mushrooms.

Note: *The numbers followed by the same alphabet are not significantly different in the HSD test level of 5%.*

Based on Table 5. the results of the 5% HSD test showed that the treatment that gave the best effect on the dry weight of the white oyster mushroom was treatment (D3) which was 26.80 g, not significantly different from treatment (D1) and treatment (D2), which were 24.74 g and 22.53 g respectively, but were significantly different from the treatment (D0), (D4), (D5), and (D6) which provide low result to the result of dry weight of oyster mushroom 18.68 g, 12.27 g, 12.95 g, and 4.93 g.

In general, one of the factors that influence the growth of white oyster mushrooms is its plant media with the nutrients contained therein which suitable for the growth and the development of mushroom. The most rapid vegetative growth of white oyster mushroom mycelium obtained in treatment (D3) is 1.07 days, significantly different from treatment (D0), (D1), (D3), (D4), (D5) and (D6). This is because treatment (D3) has sufficient nutrition for mycelium growth. Winarni and Ucu (2002) stated that the higher the treatment of bran doses the faster the mushroom mycelium grows, because the speed of mycelium growth in the growing media can be influenced by several factors, such as pH, moisture content, nutrients and mushrooms seedlings. The addition of bran and corn flour doses in the media had a very significant effect on the initial growth of mushroom mycelium. The addition of low dose of bran slower the growth of the mycelium due to the lack of nutrients contained in it, while the treatment with doses of corn flour had poor results due to the presence of aci content contained in corn flour so the growth of mycelium with concentrations was higher causes mushroom mycelium grows slower.Estrada et al. (2009) stated that supplementation of substrates is very important in order to increase the production of white oyster mushrooms and obtain better results (Carvalho et al., 2010).The pin head is a prospective mushroom fruit body which appears calculated from the planting period to the size of a pin that comes out of the ring's mouth (Yanuati, 2007).

According to the results obtained from observing the number of oyster mushroom fruit bodies, the treatment (D3) provides the highest number of fruit bodies not significantly different from the treatment (D0) and (D1) but significantly different from the treatment (D2), (D4), (D5) and (D6). This is due to the need for nutritional requirements in the formation of fruit bodies and the low result may be due to factors such as carbon contamination and the balance of nitrogen and substrate. According to Suryani and Hanifah (2003) without adequate nutrition, the number of fruiting bodies that grow will be small, because oyster mushrooms require nutrients in the form of carbon compounds, nitrogen, vitamins and minerals.The process of forming a fruiting body is strongly influenced by the growth of the

mycelium, the more nutrients absorbed, the more fruiting bodies are produced. Zadrazil (1980) states that low nitrogen content substrates will get high growth and yield. The average number of oyster mushroom fruit bodies grows a lot because the fruiting bodies that are formed usually depend on the number of primordia that grow. If the primordial mushroom is abundant, the number of fruiting bodies formed is also many because the nutrients contained in the growing media are spread in every primordia that forms a fruiting body (Ningsih, 2008).

The results obtained from observing the diameter of the oyster mushroom hood showed that treatment (D1) produced a larger diameter of the fruit mushroom hood followed by treatment (D3), significantly different from the results in treatment (D2), treatment (D4), treatment (D5), and treatment (D6) which provides the results of the average diameter of the lower oyster mushroom hood. This is because high nitrogen content can inhibit the growth of mushroom if there is an excessive amount in the substrate.Darlina et al. (2005) stated that the protein content that is a nutritional factor for oyster mushrooms is a source of nitrogrene needed to compose system which actively grows and affects the diameter of the mushroom fruit hood.Purwaningsih (2014) added that if the phosphorus element in bran or corn flour is less then the fulfillment of energy for mushrooms is less. As a result the growth of primordia mushroom is inhibited and produces smaller fruit diamets.

The results obtained from the observation of the fresh weight of oyster mushrooms, showed that the fresh weight yield that gave the best results was treatment (D3), but significantly different from the treatment (D4), (D5), and (D6) which provides less results for the fresh weight of the white oyster mushroom. The large number of bodies of fresh white oyster mushroom fruit is very influential on the fresh weight of white oyster mushrooms (Simatupang, Muniarti and Sikemi, 2012).From the results of the observation it can also be seen that in treatment (D0) as control and treatment (D2) was not significantly different, this was due to treatment (D0) and (D2) not fulfilling nutrition for fruit growth and body weight. So the results obtained on the fresh weight of white oyster mushrooms are low compared to the results obtained by treatment (D3) and (D1).While the treatment with dosing cornstarch can be seen that the results are very low compared to the treatment with the administration of bran doses. This is due to the fact that corn flour cannot provide nutrients to the substrate that is needed by white oyster mushrooms.

Yang, G., Guo & Wan (2013) stated that the provision of nutrients with certain comparisons would be able to supply nutrients, but the increasing supply cause a decrease in the total lignocellulose content needed in mushroom growth so that wet weight tended to be better and more efficient in mushroom growth. Suriawiria (2006) adds that the nutrients available in the growing media that are able to be absorbed by the mushroom will be able to increase the wet weight of the mushroom. In addition to the growing media, environmental factors also play an important role in the growth of white oyster mushrooms that affect the wet oyster mushroom weight.

If the kumbung temperature is too low, it will cause the fruiting body to evaporate so that the fruiting body of the oyster mushroom shrinks and dries before being harvested (Djariyah 2001).

The results of the parameters of observing the dry weight of white oyster mushrooms indicate that treatment (D3) gives better results compared to other treatments. This is due to the fulfillment of the nutrients provided by the treatment (D3) sufficient for the growth and dry weight of white oyster mushrooms. In treatment (D3) it provides nutrients such as carbohydrates, large amounts of carbon nitrogen needed by the white oyster mushroom.

Whereas the other treatments that gave the lowest or less good results were obtained in the treatment (D6) with a dose of 30% corn flour. Because the dosage treatment of corn flour cannot fulfill the nutrients needed by white oyster mushrooms so that the results obtained are not good or low or the treatment using doses of corn flour cannot provide nutrients that are more compared with the treatment using bran doses.

Hanafi (2003) states that mushroom biomass is influenced by effective nutrient uptake, where the higher nutrient content or nutrient availability in this case the cellulose and lignin content, the mushroom growth will also be higher.

CONCLUSIONS

Based on the results of the discussion above, conclusions can be drawn as follows:

The additional composition of bran and corn flour on each treatment of sawdust media affects signifficantly on all parameters of the observation. The treatment with 30% bran composition provides the best results for all observational parameters except for the observed parameters of the diameter of the white oyster mushroom hood. Unlike the case with treatment using the composition of corn flour gives a low yield on all parameters of observation.

In accordance with the results obtained, it can be suggested that for growth and yield of white oyster mushrooms, treatment (D3) can be used with 30% bran media to get better results.

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REFERENCES

1. Abdul K.P, 2002. *Karakteristik Pertumbuhan dan Produksi Jamur Tiram*. FakultasPertanian, Universitas Riau, Pekanbaru.Jurnal Natur Indonesia 5 (2) : 152 – 156 (2003)
2. Darlina, E. dan Darliana, I. 2005. Pengaruh Dosis Dedak Dalam Media Tanam Terhadap Pertumbuhan dan Hasil Jamur Tiram Putih (*Pleurotus Floridae*). *Majalah Ilmiah*. Program Studi Agroteknologi Universitas Bandung Raya. Bandung.
3. Djariyah N.M. dan Djarijah A.s. 2001. *Budidaya Jamur Tiram*. Kanisius. Yogyakarta.
4. Kalsum, U., Siti, F. dan Catur, W. 2011. Efektivitas Pemberian Air Leri Terhadap Pertumbuhan dan Hasil Jamur Tiram Putih. *Jurnal agrovigor* 4(2): 86-92.
5. Maulana, E. 2012. *Panen Jamur Tiap Musim*. Lampung: Lily Publisher.
6. Maulana, Erie Sy. 2012. Panduan Lengkap Bisnis dan Budidaya Jamur Tiram. Lili Publisher, Yogyakarta. Hal 183.
7. Ningsih, L. 2008. *Pengaruh jenis media tanam dan konsentrasi terhadap pertumbuhan dan produksi jamur tiram merah (Pleurotus flabellatus)*. Skripsi. UIN. Malang.
8. Piryadi T.U. 2013.Bisnis Jamur Tiram. Agromedia Pustaka. Jakarta. Hal.122.
9. Purwaningsih, E. 2014. Pertumbuhan dan Produktivitas Jamur Tiram Putih (*Pleurotus ostreatus*) Pada Media Tumbuh Limbah Blotong dan Ampas Tebu dengan Tambahan Bekatul. *Jurnal MIPA* 1(2): 87-99.
10. Seswati, R., Nurmiati dan Periadnadi. 2013. Pengaruh Keasaman Media Serbuk Gergaji Terhadap Pertumbuhan dan Produksi Jamur Tiram Coklat. *Jurnal Biologi Universitas Andalas* 2(1): 31-36.
11. Simatupang, E., Murniati dan Sukemi, I. S. 2012. Pengaruh Pemberian Beberapa Dosis Bekatul Pada Medium Serbuk Gergaji Terhadap Pertumbuhan dan Produksi Jamur Tiram Putih (*Pleurotus ostreatus*). *Skripsi.* Jurusan Agroteknologi Fakultas Pertanian Universitas Riau. Riau
12. Suriawiria, U. 2002. Budidaya Jamur Tiram. Yogyakarta: Kanisius.
13. Suryani, T. dan Hanifah, E. 2003. Pertumbuhan dan Hasil Jamur Tiram Putih (*Pleurotus ostreatus*) Pada Komposisi Media Tanam Serbuk Gergaji, Ampas Tebu dan Jantung Pisang Yang Berbeda. *Skripsi*. Program Studi Biologi Sains Fakultas Keguruan dan Ilmu Pendidikan Universitas Sebelas Maret. Surakarta.
14. Soenanto, H. 2000. *Jamur Tiram.* Aneka Ilmu. Semarang.
15. Wahyuni, 2005. Pengaruh macam serbuk Gergaji Terhadap Produksi dan Kandungan Nutrisi Tiga Jenis Jamur Kayu. Tropika.
16. Winarni, I. dan Ucu, R. 2002. Pengaruh Formula Media Tanam Dengan Bahan Dasar Serbuk Gergaji Terhadap Produksi jamur Tiram Putih. *Jurnal Matematika Sains dan Teknologi* 3(2): 20-27.
17. Yanuati, I. N. T. 2007. *Kajian perbedaan komposisi media tanam terhadap pertumbuhan dan hasil jamur tiram putih (Pleurotus florida)*. Skripsi. Universitas Brawijaya. Malang.
18. Yang,G., Guo F., & Wan, Z.(2013). Yield and size of oyster mushroom grown on rice/ wheat straw basal substrate supplemented with cotton seed hull. *Saudi Journal of Biological Sciences.*
19. Zadrazil F. 1978. Cultivation of Pleurotus in The Biology and Cultivation of Edible Mushroom. Academic Press Inc. UK.
20. Zadrazil, F. (1980). Influence of ammonium nitrate and organic supplements on the yield of *Pleurotus Sarjor-Caju (Fries),* Singer. *European Journal pf Applied Microbiology and Biotechnology, 9*(1), 31-

