



# Test of Consistency, Hardness, And Water Absorption on Innovative Planting Media (Block Compost) As A Solution for Utilization of Oyster Mushroom Baglog Waste

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**Abstract.** This study aims to try and examine the potential utilization of mushroom baglog waste into block compost, with research parameters namely consistency, hardness, water absorption, pH value and Electrical Conductivity. The materials used are baglog waste, granulated sugar, EM4, and water. Before being molded into blocks, the compost is fermented for 14 days with a ratio of baglog waste composition of 500, 750 and 1000 gr. The composition of water, EM4, sugar, and tapioca flour in each sample is 1L:20ml:10gr:30gr. After the compost is fermented, it is molded into blocks and dried in the sun. The composition of baglog waste affects the value of consistency, hardness, water absorption, pH and EC. The best value for consistency and hardness was at the composition of 750 g, while the best absorption was at the composition of 500 g.

**Keywords:** Mushroom Baglog Waste, Block Compost, Growth Media.

## 1 Introduction

Compost is the decomposition of organic materials or the process of overhauling complex compounds into simple compounds with the help of microorganisms. Compost is one of the best soil and root covers and natural soil correctors. The manufacture of compost usually utilizes organic waste. Garbage is one of the complex problems faced by developing countries and developed countries in the world, including Indonesia. It was estimated that Indonesia will produce 64 million tons of waste every year [1]. Based on data from the Ministry of Environment and Forestry, the composition of waste was dominated by organic waste, which reaches 60% of the total waste [2].

The white oyster mushroom business is one of the businesses that is becoming a current trend as an effort to increase income and improve community nutrition. Oyster

mushrooms can be cultivated through an artificial medium whose term is baglog. Baglog is an artificial medium derived from wood or lignin material that has been weathered and stored or wrapped in plastic and has been sterilized as a medium for growing mushrooms [3].

Mushroom cultivation in Indonesia has developed very rapidly. According to data from the Directorate General of Horticulture the area of mushroom cultivation in Indonesia is 584 ha with an average production yield of 9% increasing to 76.28 tons/ha in 2013 [4]. One type of mushroom that has increased production is oyster mushroom [5]. The high production of oyster mushrooms causes new problems in the form of oyster mushroom baglog waste. According to the results of observations on one of the mushroom SMEs in Lombok, it provides information that baglog that is not active to grow is usually thrown into the fields as additional nutrients for plants and if it is not utilized, the baglog waste will be burned.

Baglog waste contains nutrients such as N, P, K and C-organic. According to [6] the nutrient content of contaminated baglog is higher than that of old baglog. This is because most of the nutrients in the old baglog waste have been utilized by fungi for the growth process. Nevertheless, the remaining nutrients in baglog waste can still be managed into compost, animal feed, new baglog media, eel media, worm livestock media and as fuel [7]

Because of the nutritional content as explained above, this is the background for the author to utilize mushroom baglog waste into block compost as an effort to deal with organic and inorganic waste problems. The purpose of this research is to try and study the consistency, hardness, and water absorption on innovative planting media (block compost) as a solution for utilization of oyster mushroom baglog waste.

## 2 Research Methods

The tools used are containers/buckets, plastics, printers, analytical scales, measuring cups, saucers, stirrers, beakers, pH meters, TDS/EC meters, stationery and computers. The materials used are oyster mushroom baglog waste, EM4, granulated sugar and tapioca flour.

Before being made into block compost, baglog waste is first fermented for 14 days with a ratio of 500, 750 and 1000 gr of baglog waste composition. The composition of water, EM4, sugar and tapioca flour in each sample is 1L:20ml:10gr:30gr. After the compost is fermented, it is molded into blocks and dried in the sun. Block compost which is test in figure 1.



**Fig. 1.** Block compost from oyster mushroom baglog waste.

The parameters observed are as follows:

**Consistency.** The consistency of the impact is done by dropping the media from a height of 75 cm. The weight of the media before and after being dropped was weighed. Impact consistency is calculated based on the percent weight after being dropped and calculated by Equation 1.

$$Kb = \frac{W_2}{W_1} \times 100 \quad (1)$$

Information:

$Kb$  = Impact consistency (%)

$W_1$  = Weight of media before dropping (gr)

$W_2$  = Weight of media after dropping (gr)

**Hardness.** Hardness is measured by placing a load on the media. Hardness is then calculated by dividing the weight of the load ( $W$ ) by the area ( $A$ ) of its contact area by the equation of the quotient between the weight ( $W$ ) of the load and the surface area of the media ( $A$ ), or by Equation 2:

$$\text{Hardness} = \frac{W}{A} \quad (2)$$

Information:

$W$  = Weight of the load (N)

$A$  = Area of contact area ( $m^2$ )

**Water Absorption.** Water absorption is measured by measuring the maximum amount of water that can be absorbed by the media when immersed. The water absorption of the media is calculated using Equation 3:

$$DSA = \frac{W_1 - W_2}{W_2} \times 100\% \quad (3)$$

Information:

DSA = Water Absorption (%)

W1 = Weight of media before soaking (gr)

W2 = Weight of media after soaking (gr)

### 3 Result and Discussion

#### 3.1 Consistency of the Block compost

The consistency of block compost is close to 100%. The highest consistency value is in the composition of 750 gr, while the lowest consistency value is in the composition of 1000 gr. The composition of the material slightly affects the consistency value of the block compost. The interaction between the adhesive and the material can affect the level of consistency of the impact of the planting media [8]. The graph of the consistency value can be seen in Figure 2.

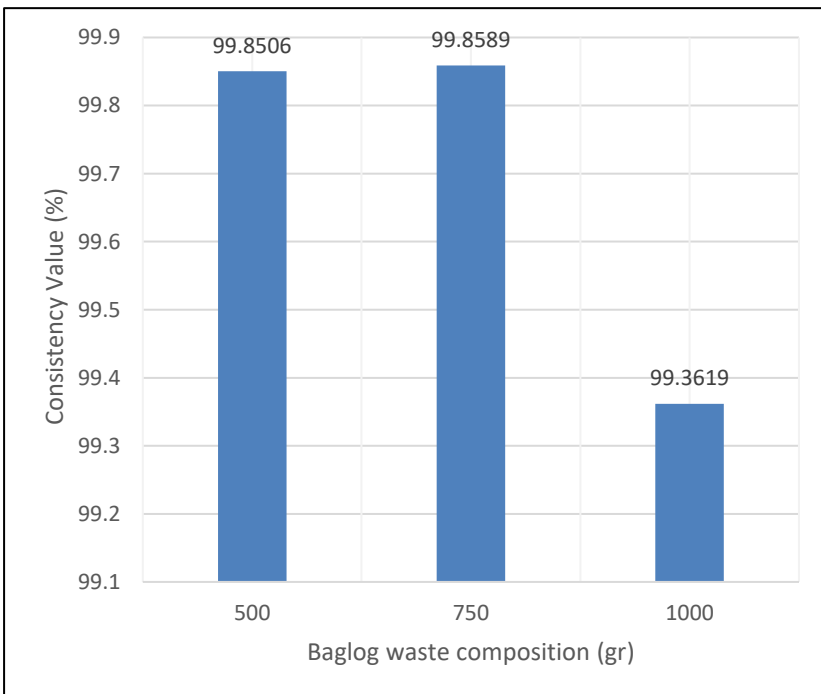
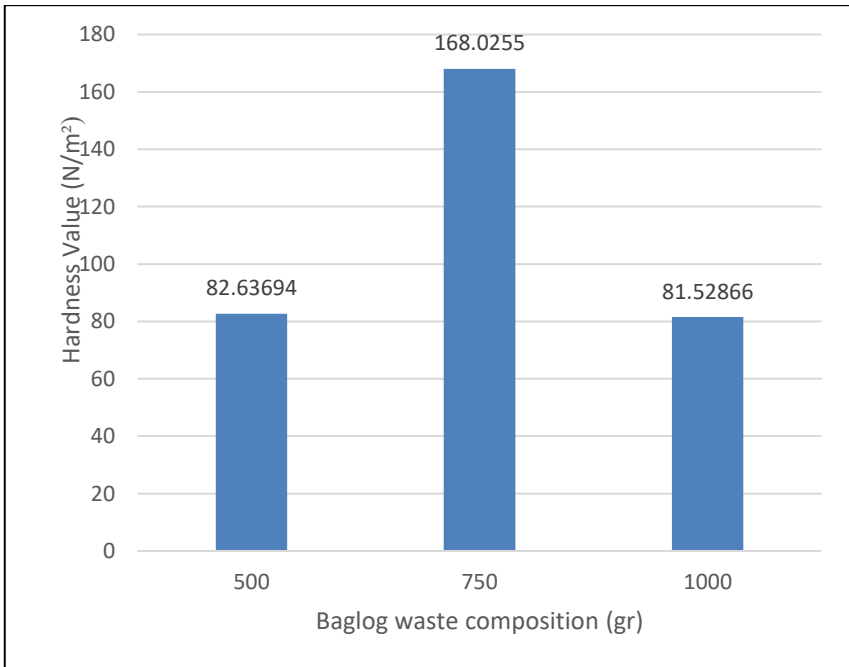


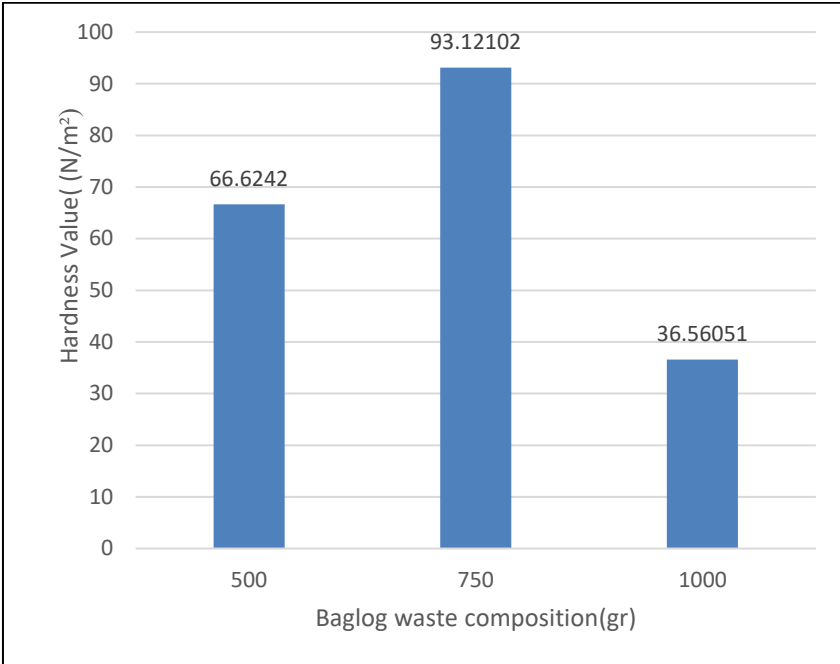
Fig. 2. Comparison of Compost Block Consistency Values.

### 3.2 Hardness of the block compost

The hardness level of the block compost was measured through the top and sides of the media. The results show that the composition of 750 gr has the highest hardness, both measured from the top and sides. Meanwhile, the lowest hardness value is in the composition of 1000 gr. The level of hardness will determine the life of the media but it must also be noted that the harder the planting medium, the more difficult it will be for roots to penetrate [9]. The hardness of block compost is directly proportional to its consistency.



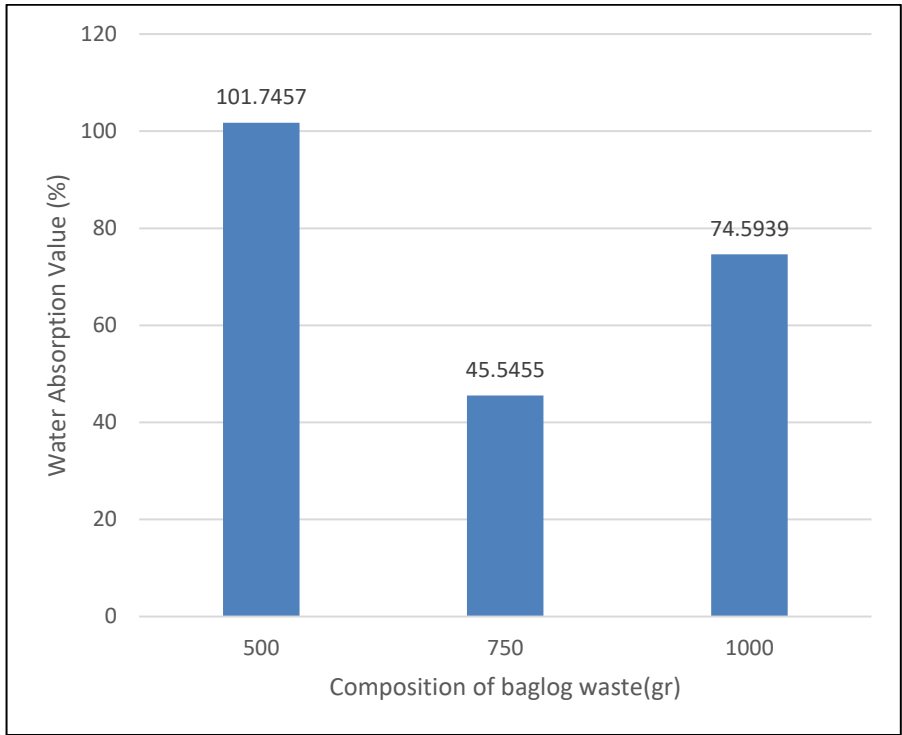
**Fig. 3.** Hardness value (N/m<sup>2</sup>) measured through the top of the media.



**Fig. 4.** Hardness value (N/m²) measured through the side of the media.

### 3.3 Water Absorption

The highest water absorption is at the composition of 500 gr and the lowest absorption is at the composition of 750 gr. The ability of the media to absorb water is strongly influenced by the density of the media. The closer they are, the smaller the pores, so that it will be difficult for water to penetrate the media and vice versa.



**Fig. 5.** Value of Water Absorption (%).

## 4 Conclusion

The composition of baglog waste affects the value of consistency, hardness, water absorption. The best value for consistency and hardness is at the composition of 750 g, while the best absorption is at the composition of 500 g.

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