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The Combination Test Between of Waste Mushroom Logs, Cow Manure Fertilizer and Decomposers to Growth and Yield Of Red Onions (*Allium cepa car philipine*)

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ABSTRACT

Red onion production can be increased by fertilization. Fertilization serves to provide nutrients for plant growth. Chemical fertilizer provides a bad impact on the environment in the long term so that the application of organic fertilizer can be a recommendation. Organic fertilizers are fertilizers derived from animal matter, animal manure, human excreta, and vegetable matter (e.g. compost and crop residues). Waste mushroom logs, cow manure fertilizer, and decomposers used in this research. All of the matter in this research can be a source of nutrients for growing plants and an increase of production and yield of red onions. The objective of this research was to study the combination test between of waste mushroom logs, cow manure fertilizer, and decomposers to growth and yield of red onion. This research was arranged in a Randomized Block Design (RBD), where the main plot is cow manure fertilizer and waste mushroom log, the subplot in the form of a decomposer. The results showed that there was not interaction between cow manure fertilizer and decomposer waste on all parameters of observed growth and yield of red onion. Special decomposer real treatment of the growth of the number of leaves of plant ages 15 HST (18.98), 20 HST (20.33), 25 HST (23.47), 30 HST (25.76), and 35 HST (26.11), and plant height is 35 HST (33.21 cm). The treatment of waste mushroom logs 100% produces a relatively large number of tubers compared to others, which is 8.89 tubers.

Keyword: *Allium cepa var philipine, Waste mushroom logs, cow manure fertilizer, and decomposers.*

INTRODUCTION

According to the Directorate General of Horticulture (2004), the consumption of shallots in Indonesia reached 160,800,000 tons/year, but this has not been able to meet the national demand for shallots. One of the efforts to improve the onion yield is through fertilization. Fertilization is an action to provide additional nutrients to the soil both directly and indirectly so that it can provide nutrients for plants. Plant growth and development are strongly influenced by fertilizer application and availability of nutrients in the soil (Irvan, 2013). The aim of this research was to study the combination of the waste mushroom log, cow manure fertilizer and decomposer on growth and onion yield (*Allium cepa var philipine*).

Ahmed, 2008 reported waste mashroom log is present study proved almost all the substrate showed has the same nutritive values and can be grown on locally available waste for free and to conserve our environment by recycling the spent substrate. While To fulfill the nutrient demand of the crop, additional input is

necessary and it can be supplemented with cow manure fertilizer and decomposer. Sudarsono 2014 reported cow manure produced higher dry weight of straw per plant because Potassium (K) affects quality of grain production, especially during the grain filling process.

METHOD

This research was arranged in a Randomized Block Design (RBD), where the main plot is cow manure fertilizer and waste mushroom log with 5 levels and a ratio of 1: 1 ie :

- P0: 100% manure and soil
- P1: Manure (cattle) 75% + waste mushroom logs 25% and soil
- P2: Manure (cow) 50% + waste mushroom logs 50% and soil
- P3: Manure (cattle) 25% + waste mushroom logs 75% and soil
- P4: 100% waste mushroom logs and soil

the subplot in the form of a decomposer with 2 level ie:

- D0: No decomposer
- D1: OrgaDec decomposer

Each treatment was repeated 3 times so that there were 30 units of experiments, samples of plants amounted to 3 poly bags per trial unit, plant reserves amounted to 2 poly bags per unit experiment.

Observation variables were the number of leaves, plant height (cm), overall fresh weight of cropping (g), dry weight of crop stover (g) Number of tubers, fresh weight of planting tubers (g), dry weight of planting tubers (g), analyzing waste fertilizer content log of mushrooms before planting done in the Laboratory.

The observed data were analyzed using variance analysis (ANOVA), to know the existence or absence of interaction between factor and influence of each factor. As well as BNJ test 5% level to see the difference between treatments. Presentation of data using tables or curves.

RESULTS AND DISCUSSION

Waste mushroom log treatment + manure and decomposer treatment can affect the growth and production of shallots. The treatment significantly affected the number of leaves, plant height, and the number of tubers. Whereas for the observers the overall fresh weight, the dry weight of the stover, the dry weight of the tuber, and the fresh weight of the tuber showed no real effect.

The giving of organic matter to soil is able to improve soil structure so that air aeration and water movement smoothly, thereby can increase water absorption in soil and can increase growth and crop production (Widiawati et al., 2002), but in this case the treatment is not really influenced to onion plants, but the provision of organic fertilizers can provide several advantages, such as better soil structure, increase available nutrients for plants, and increase population and soil microbial activities (Suliasih et al. 2010).

Whereas there was no significant effect on some treatments due to the lack

of dose of Orgadec decomposer administration. This is made possible by the high competition between microbes in obtaining food which causes microbial nutritional needs to be poorly fulfilled so that microbes work less optimally (Simanungkalit et al., 2006).

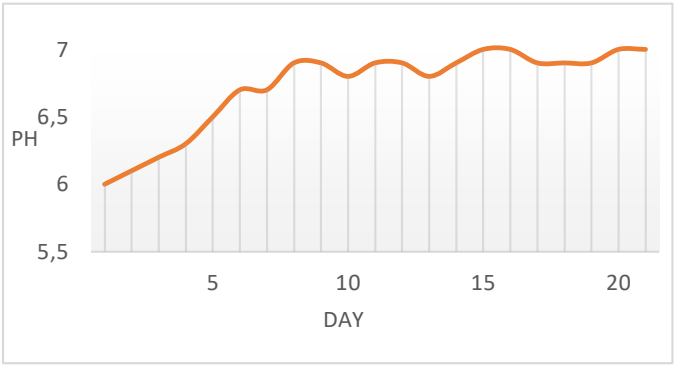


Figure 1. Graph of pH compost baglog mushroom for 20 days.

One indication of compost maturity is memepunyai level of acidity or pH is neutral. Figure 1 shows the level of acidity (pH) of the mushroom log compost on day 1 is 6, then on the 15th day of the 20th pH, the compost is 7 or in neutral. The humid environment is indispensable in the microbial activity of decomposers.

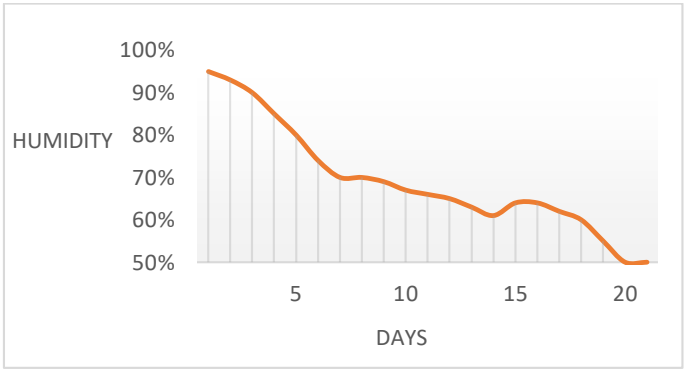
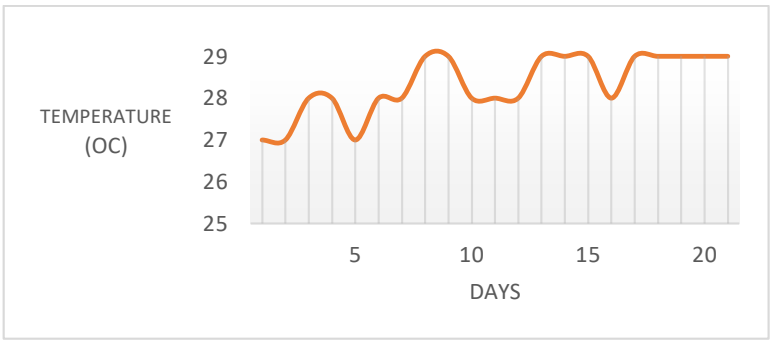


Figure 2. Graph of moisture compost baglog mushroom for 20 days.

Figure 2 shows that compost has matured moisture level of compost of mushroom log waste at the beginning of composting is relatively high that is in the range of 90%, then one day to 15 - 20 has decreased that is 50%.



Graph 3. The temperature of the mushroom log compost for 20 days

Figure 3 shows the temperature level of the composting process from day 1 to day 20 shows stable results. The process of decomposition of organic matter produces heat as a result of metabolism in decomposing microbes. The higher the temperature that can be achieved by the faster the composting process. Based on the above that explain can be seen that waste mushroom log has been well composting.

Table 1. Laboratory Observation Results After Waste Log Composting

No	Parameter	value	Standart**	Method
1	C - Organic	27,31%	Min 15 %	Method 967.05, 6000C Dry Drying *)
2	C/N ratio	40,16	15-25	Calculation
3	Water content	12,40 %	15 – 20 %	Method 950.01, Oven Heating 105^0C *)
4	pH	7,78	4 – 9	Method 994.18, pH Meter *)
5	Total N content	0,68 %	Min 4 %	Kjeldahl, titrimetry
6	P_20_5 level	2,46 %		Wet Oxidation (HNO3 + HClO4) molybdovanadate, spectrophotometry
7	K_2O level	0,36 %		Wet Oxidation (HNO_3 + $HClO_4$), AAS

*Information : * The values listed apply only to the samples analyzed at the time of the test*
A0AC 18th Ed., 2005
*** Regulation of the Minister of Agriculture No. 70 Year 2011 on Pure Organic Fertilizer*

Table 1. shows the results of log waste analysis after the composting process. Content C - Organic on log mushroom waste is in accordance with the standard with the number 27.31% where the standard is at least 15%. pH log mushroom after composting was 7.78 with standard ph 4 - 9. C / N content of log mushroom bargain ratio was found that 40,16 was high compared to the standard that is 15 - 25. While water content and NPK are low. The above results indicate that there is still a mineral content in the waste of mushroom log used by plants although little.

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Table 2. The Amount of Shallot Plant Leaves (*Allium cepa var philipine*) on the Combination of Waste Baglog Oyster Mushrooms and Cage Fertilizers with Decomposers in Plant Age 5 DAP - 35 DAP.

Treatment	Leaf Amount (DAP)						
	5	10	15	20	25	30	35
P0: 100% manure and soil	5,22a	11,28a	14,50a	16,28a	19,44a	21,67a	22,56a
P1: Manure (cattle) 75% + waste mushroom logs 25% and soil	4,27a	11,83a	16,72a	18,22a	21,11a	23,17a	23,78a
P2: Manure (cow) 50% + waste mushroom logs 50% and soil	4,89a	12,67a	16,17a	18,00a	21,28a	22,89a	23,39a
P3: Manure (cattle) 25% + waste mushroom logs 75% and soil	5,00a	13,61a	18,50a	19,56a	22,00a	23,56a	24,39a
P0: 100% manure and soil	6,17a	14,67a	17,44a	19,00a	22,28a	24,56a	25,33a
BNJ 5%	6,81	10,34	14,93	15,12	15,09	13,61	12,53
D0: No decomposer	4,84a	11,04a	14,36a	16,09a	18,98a	20,69a	21,67a
D1: OrgaDec decomposer	5,38a	14,58a	18,98b	20,33b	23,47b	25,76b	26,11b
BNJ 5%	3,40	8,58	9,14	8,51	7,38	7,06	6,11

Description: The numbers by the same letter show no real difference according to the 5% BNJ test

Table 2 shows that in the treatment of manure and baglog fungus at age 5 HST up to age 35 HST did not differ significantly to leaf number parameter. The treatment with decomposer was found to be significantly different at the age of 15 HST (18,98), 20 HST (20,33), 25 HST (23,47), 30 HST (25,76), and age 35 HST (26,11) . It shows that the different decomposer treatment is not significant on the number of red onion leaf.

Tabel 3. High Onion Onion (*Allium cepa var philipine*) On Combination Log Waste Oyster Mushroom and Manure Manure with Decomposer 5 DAP - 35 DAP.

Treatment	Plant height (DAP)						
	5	10	15	20	25	30	35
P0: 100% manure and soil	6,17a	20,69a	17,06a	25,81a	27,33a	29,08a	31,97a
P1: Manure (cattle) 75% + waste mushroom logs 25% and soil	6,61a	18,19a	18,14a	25,75a	26,25a	28,03a	30,19a
P2: Manure (cow) 50% + waste mushroom logs 50% and soil	6,00a	16,14a	19,17a	24,17a	26,67a	28,67a	31,08a
P3: Manure (cattle) 25% + waste mushroom logs 75% and soil	7,47a	18,11a	18,08a	24,89a	25,50a	27,33a	30,28a
P0: 100% manure and soil	6,42a	22,53a	18,97a	27,72a	29,75a	31,58a	34,28a
BNJ □ 5%	9,22	13,59	22,60	23,61	23,22	22,83	22,03
D0: No decomposer	6,60a	18,46a	18,16a	24,77a	26,44a	27,86a	29,91a
D1: OrgaDec decomposer	6,87a	19,81a	18,41a	26,57a	27,82a	30,02a	33,21b
BNJ □ 5%	3,25	8,58	9,14	8,51	7,38	7,06	6,11

Description: The numbers by the same letter show no real difference according to the 5% BNJ test

Table 3 shows that in the treatment of manure and baglog fungus at age 5 HST up to age 35 HST did not differ significantly to the parameters of plant height.

In the treatment with decomposers known to differ significantly only at age 35 HST ie with plant height of 33.21. It shows that the different decomposer treatment is not significant to the height of onion plants at age 35 HST.

Table 4. Number of onion crop tubers (Allium cepa var philipine) on Combination of Waste Bag Oyster Mushroom Log and Manure with Decomposer.

Treatment	Average	
P0: 100% manure and soil	6,72	ab
P1: Manure (cattle) 75% + waste mushroom logs 25% and soil	7,44	ab
P2: Manure (cow) 50% + waste mushroom logs 50% and soil	5,78	a
P3: Manure (cattle) 25% + waste mushroom logs 75% and soil	7,33	ab
P0: 100% manure and soil	8,89	b
BNJ 5%	24,56	
D0: No decomposer	7,42	a
D1: OrgaDec decomposer	7,04	a
BNJ 5%	7,75	

Description: The mean followed by different letters in the same column shows the real difference according to the 5% BNJ test

Table 4 shows that decomposer treatment is not significantly different from the number of tubers. Treatment of manure and baglog waste of oyster mushrooms showed a significant difference in the number of onion plant tubers. In the treatment of mushroom baglog waste 100% produced a total of 8.89 tubers which were not significantly different from 50% manure treatment + baglog of 50% oyster mushroom produce 5.78 bulb count.

The results of this study indicate that baglog waste compost of white oyster mushrooms has sufficient quality both physically and chemically. Therefore, the disposal of this waste directly into the environment must be immediately abandoned; and its utilization must be promoted by mushroom farmers in particular and the community in general (Agustina, 2007).

The addition of compost and baglog waste has not been able to increase the growth and yield of shallots. Menurut (Yuwono, 2007) the main reason for giving compost and baglog mushroom waste to the soil is more aimed at improving the physical condition of the soil than to provide nutrients, even though the nutrients in the compost are already in small amounts.

According to Ginting et al. (2006), the plant obtains nutrients from the soil, fertilization, and the decomposition and mineralization of organic matter. Decomposer application is thought to play a role in accelerating the decomposition rate of organic matter. Soil microorganisms will break down unavailable organic material available and can be absorbed by plants.

Soil organic acids produced on the decomposition of organic matter can dissolve the unavailable nutrients available to plants (Munawar, 2011). The high competition between soil microbes and decomposer microbes in obtaining food can cause the microbial nutrient needs are less fulfilled so that microbes work less

optimally which causes the effect on the overall wet weight of the plant is also less than optimal (Simanungkit et al., 2006).

Environmental factors that also play a role in the optimization of tuber formation. According to Wijayani and Widodo (2005), the ability of shallots to produce tubers is very dependent on the interaction between plant growth and environmental factors. According to Zulfitri (2005), higher plants can provide better yields per plant compared to shorter plants.

This is because higher plants can prepare their vegetative organs better so that the resulting photosynthetic organs will be more. Observations that are less supportive above can also be caused by treatment of baglog mushroom waste + manure and decomposer administration does not work together or individually. Decomposers break down organic matter into simple inorganic materials which can then be used by plants as nutrients (Wetzel, 2001).

CONCLUSION

Based on the results of the study, the following conclusions can be drawn:

1. There is no interaction between the treatment of manure + mushroom baglog waste with the provision of decomposers on all parameters of observing growth and yield of shallots
2. In the 50% manure treatment + mushroom baglog waste 50% produces the best results with a dry weight of tubers 31.83 g, overall fresh weight 75.28 g, fresh weight of tubers 43.50 g.
3. In the decomposer treatment obtained the best results on the treatment using decomposer with the number of leaves 26.11, plant height 33.21, tuber weight 30.02 g, and fresh bulbs bulb 40.67 g.

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