The Effect of Bokashi from Mushroom Baglog Waste and Liquid Organic Fertilizer from Cow Blood Waste on Growth And Production of Shallots (*Allium Ascalonicum* L.)

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Abstract. Shallots are a horticultural commodity that cannot be substituted as a food flavoring. The high demand for shallots due to the increase in population has not been able to meet the demand for shallots optimally in Riau Province. Marginal land in Riau Province and excessive use of chemical fertilizers by farmers have resulted in low soil fertility. One solution is to apply bokashi baglog mushroom waste and liquid organic fertilizer from cow blood waste. The aim of this research was to determine the interaction of Bokashi from Mushroom Baglog Waste and Liquid Organic Fertilizer from Cow Blood Waste on the Growth and Production of Shallots (*Allium ascalonicum* L.). This study used a Factorial Completely Randomized Design consisting of two factors. The first factor is the dose of bokashi from mushroom baglog waste with four levels: 0, 0.5, 1, and 1.5 kg/plot. The second factor is the liquid organic fertilizer (LOF) from cow blood waste with four levels: 0, 150, 300, and 450 ml/l/plot. The parameters observed included the analysis of bokashi and LOF, plant height, relative growth rate, number of bulbs per clump, wet bulb weight per clump, dry bulb weight per clump, bulb weight loss, bulb diameter, and nutrient absorption analysis (N, P, K) by the plants. The observation data was analysed using analysis of variance and Honestly Significant Difference test at a 5% level. The results showed that the interaction between bokashi from mushroom baglog waste and Liquid Organic Fertilizer from cow blood waste significantly affected relative growth rate, wet bulb weight per clump, dry bulb weight per clump, and bulb weight loss. The best treatment combination was 1.5 kg/plot of bokashi from mushroom baglog waste and 300 ml/l/plot of liquid organic fertilizer from cow blood waste.

1. Introduction

Shallots (*Allium ascalonicum* L.) are a horticultural commodity and included in the spice vegetables. Shallots are used as a food flavouring spice and have numerous health benefits such as natural antioxidants, improving blood circulation, and preventing cholesterol disease. As the population increases, the need for shallots also increases because almost all types of food require shallots. Ref. [1] reported that average shallot consumption in Indonesia increased by 3.87% in 2022, reaching consumption of 626,370 tons, and producing 1,982,360 tons. The Indonesian shallot production centers were in West Java, Central Java, and East Java with production of 193,318 tons, 556,510 tons, and 478,393 tons respectively, while Riau Province produced 195 tons.

According to Ref. [2] stated that Riau Province still purchases shallots from 4 other provinces, namely North Sumatra, West Sumatra, Central Java, and East Java. This is because the marginal land in Riau Province and excessive use of chemical fertilizers by farmers results in low soil fertility. One alternative solution is to apply bokashi of mushroom baglog waste and liquid organic fertilizer of cow blood waste. Bokashi is produced from the composting process of organic materials with effective microorganisms 4 (EM 4) as activators to accelerate the degradation process. Bokashi can improve the physical, chemical, and biological properties of the soil, thereby increasing the growth, development and production of plants. One source of bokashi can be derived from mushroom baglog waste.

Many mushroom baglog wastes are discarded or burned by farmers. In fact, it is can be utilized to make bokashi. Ref. [3] reported that mushroom baglog waste contains nitrogen (N) 0.27%, phosphorus (P) 0.19%, potassium (K) 2.35%, pH 6.22, carbon organic 21.20% and C/N 11.71. Ref. [4] proved that the application of mushroom waste compost 150 g/plant had a significant effect on the parameters of plant height, number of leaves, number of buds, production per sample and production per plot of shallot.

Furthermore, cow blood waste is one of the wastes generated from slaughterhouses which is discarded. This waste causes air pollution such as unpleasant odors for the surrounding community and water pollution. Ref. [5] stated that a slaughtered cow produced around 28 liters of blood waste. Actually, the cow blood waste has great potential to be used as liquid organic fertilizer (LOF), and can be used for enhancing the growth and production of shallots. Ref. [6] proved that LOF of cow blood waste contained 2.14% N, 0.02% P, 0.19% K and 4.29% C-Organic. Ref. [7] showed that LOF application of cow blood as much as 6 ml/10 kg of soil can increase leaf length, leaf width, number of tillers, and fresh production on king grass. Therefore, the aim of this research was to determine the interaction and main effect of Bokashi from Mushroom Baglog Waste and Liquid Organic Fertilizer from Cow Blood Waste on the Growth and Production of Shallots (*Allium ascalonicum* L.).

2. Research Methods

The research was conducted at the Experimental Garden of the Faculty of Agriculture, Universitas Islam Riau, Jalan Kaharuddin Nasution Km 11, Air Dingin Village, Bukit Raya District, Pekanbaru City. This research was conducted for four months starting from February to May 2024. The materials used in this research were shallot seedlings of Bima Brebes variety, mushroom baglog waste, cow blood waste, EM-4, molasses, Dhitane M-45. Meanwhile the tools used were hoes, machetes, stainless steel knives, thrust frames, paddles, cameras, meters, buckets, hand sprayers, drums, tarpaulins, and stationery.

This study used a Factorial Completely Randomized Design consisting of two factors. The first factor was the dose of bokashi from mushroom baglog waste (B) with four levels, namely without bokashi of mushroom baglog waste (B0), 0.5 kg/plot (B1), 1 kg/plot (B2), and 1.5 kg/plot (B3). The second factor was the LOF of cow blood waste (P) with four levels, namely without LOF of cow blood waste (P0), 150 ml/l/plot (P1), 300 ml/l/plot (P2), and 450 ml/l/plot (P3). The total combination of treatment obtained was 16 treatments with 3 replications, so there were 48 experimental units. Each experimental unit consisted of 25 plants and 8 plants were used as samples, so the number of plants was 1200 plants. The observation data was analysed using analysis of variance and Honestly Significant Difference (HSD) test at a 5% level.

3. Results and Discussion

3.1 Chemical Characteristics of Mushroom Baglog Bokashi and LOF of Cow Blood Waste

The nutrient content analysis on mushroom baglog bokashi and LOF of cow blood waste are presented in Table 1.

Table 1. Nutrient content on mushroom baglog bokashi and LOF of cow blood waste

No	Parameters	Mushroom Baglog Bokashi	LOF of Cow Blood Waste
1	Nitrogen (%)	0,26	1,47
2	P_2O_5 (%)	0,36	0,04
3	K_2O (%)	0,33	0,17
4	C-organik (%)	5,95	4,47
5	pH	8,72	7,24

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Table 1 shows that The N content of mushroom baglog bokashi in this study (0.26%) was lower than the N content of 0.74% reported by Ref. [8]. However, the LOF of cow blood waste in this study had almost the same N content with Ref. [9] as much as 1.41%. At the same time, the phosphorus content of mushroom baglog bokashi in this study was higher than Ref. [10] that had a value of 0.19% [10]. Likewise, the phosphorus content of cow blood waste in this study was higher than Ref. [6] that have a value of 0.02%. The potassium content of mushroom baglog bokashi in this study had almost the same value with Ref. [8] which was 0.35%. As well as the potassium content of LOF from cow blood waste in this study was also the same with Ref. [6] that have a value of 0.19%. The C-organic of mushroom baglog bokashi in this study was lower than Ref. [8] that had a value of 14.38%. Similarity, the LOF of cow blood waste in this study had a same value of C-organic content with Ref. [9] that had a value of 4.74%. The Table 1 reveals that the pH value of mushroom baglog bokashi in this study is 8.72, and it is higher than Ref. [3] that have a value of 6.22. Meanwhile, the pH value of LOF from cow blood waste in this study was higher than Ref. [9] that have a pH value of 6.6.

3.2 Plant Height (cm)

The analysis of variance showed that the interaction and main effects of mushroom baglog bokashi and LOF of cow blood waste did not significantly affect on the height plant of shallot. The average height plant of shallot with the treatment of mushroom baglog bokashi and LOF cow blood waste at 42 days after planting is presented in Table 2. Table 2 shows that the average plant height of shallot ranges from 30.98-36.79 cm. At 42 days after planting, the application of mushroom baglog bokashi as much as 1 kg/plot (B2) and 1.5 kg/plot (B3) tends to produce an average plant height of 35.05 cm and 34.87 cm, while the without treatment of mushroom baglog bokashi tends to produce the lowest plant height, which is 33.20 cm. This proves that increasing the dose of mushroom baglog bokashi will produce optimal shallot plant height growth. Mushroom baglog bokashi has a low nutrient content, namely 0.26% N, 0.36% P, and 0.33% K (Table 1), but increasing the dosage can affect the growth of shallot plants.

Table 2. Shallots plant height with application of mushroom baglog bokashi and LOF of cow blood (cm)

Dosage of mushroom baglog bokashi (kg/plot)	Concentration of Cow Blood LOF (ml/l/plot)				Average
	0 (P0)	150 (P1)	300 (P2)	450 (P3)	
0 (B0)	34,93	34,63	32,24	30,98	33,20
0,5 (B1)	33,69	36,64	35,90	32,34	34,64
1 (B2)	36,79	35,43	34,36	33,61	35,05
1,5 (B3)	34,78	35,71	34,96	34,03	34,87
Average	35,05	35,60	34,37	32,74	
KK = 8,33%					

Meanwhile, the treatment of cow blood waste LOF has various of the average plant height of shallot, which is between 32.74 cm to 35.60 cm. This proves that LOF of cow blood can produce high growth of shallot plants because it has sufficient N nutrient content of 1.47%, P nutrients of

0.04%, and K of 0.17% (Table 1). The height of shallot plants in this study have been achieved the standard shallot growth of variety Bima which has a height between 25-44 cm. This shows that mushroom baglog waste and LOF of cow blood waste have fulfilled the growth of shallot plant height. The plant height of shallot in this study has similarities with Ref. [11], which gave LOF of goat manure and fruit leather bokashi, which is between 34.13-41.23.

Nitrogen is an important nutrient in annual plants including shallots. Nitrogen has labile and mobile properties in the soil, so that the availability of N can change in the soil. In order for N-organic to be available to plants, organic matter needs to undergo a decomposition and mineralization process first. Organic matter (N-organic) that undergoes decomposition will produce a certain amount of N that will be released into the soil. This N-unsur then undergoes further transformation by the role of soil microorganisms so that it becomes a form of available N [12]. Nitrogen is used as energy for plant growth to form vegetative organs such as leaves and stems [13]. According to Ref. [14], the N nutrients are the building blocks of proteins, nucleic acids, enzymes, nucleoproteins and alkaloids and the formation of chlorophyll and for photosynthesis. The N nutrients absorbed by plants will produce nucleic acids in the cell nucleus and play a role in the process of cell division so that plant development occurs. The element N is absorbed by plants during the growth period until maturation.

3.3 Relative Growth Rate

The analysis of variance showed that at the age of 14-21 days after planting, the interaction between mushroom baglog bokashi and LOF of cow blood waste had no significant effect on the relative growth rate of shallot plants, but the main effect of mushroom baglog bokashi and LOF of cow blood waste had a significant effect on the relative growth rate of shallot plants. At 21-28 days after planting, the interaction and main effect of mushroom baglog bokashi and LOF of cow blood waste had no significant effect on the relative growth rate of shallot plants. At 28-35 days after planting, the interaction and main effect of mushroom baglog bokashi and LOF of cow blood waste have a significant effect on the relative growth rate of shallot plants The results of HSD test at 5% level on the relative growth rate of shallot plants are presented in Table 3.

Table 3 shows that the main effect of mushroom baglog bokashi significantly affected the relative growth rate at 14-21 days after planting. The mushroom baglog bokashi of 1.5 kg/plot (B3) produced the highest relative growth rate of 0.0958 g/day, and it was not significantly different from the B2 treatment, but significantly different from other treatments. The main effect of cow blood waste LOF significantly affected the relative growth rate of shallot plants. The LOF of cow blood of 300 ml/l/plot (P2) produced the highest relative growth rate with an average of 0.0920 g/day, and it was not significantly different with the P1 and P3 treatments, but significantly different from the P0 treatment.

The relative growth rate at 21-28 days after planting showed that the provision of mushroom baglog bokashi and LOF of cow blood waste had no significant effect on interaction and main effect. The highest relative growth rate was obtained in mushroom baglog bokashi of 1.5 kg/plot and LOF of cow blood of 300 ml/l/plot (B3P2), 0.1165 g/day. While the lowest relative growth rate was found in without mushroom baglog bokashi and without cow blood waste LOF (B0P0). The relative growth rate at 28-35 days after planting showed that the interaction and main effect between mushroom baglog bokashi and LOF of cow blood waste had a significant effect. The mushroom baglog bokashi of 1.5 kg/plot of and 300 ml/l/plot of cow blood waste LOF (B3P2) which is 0.1322, and it is not significantly different from the treatments of B3P1, B3P3, B2P1, B2P2, B2P3 and B1P2, but significantly different from other treatments. The relative growth rate of plants is one of the variables used to evaluate the effect of treatments on plant growth rate by assessing at the increase in biomass dry weight per unit time [15]. The mushroom baglog of 1.5 kg/plot and LOF of cow blood waste of 300 ml/l/plot (B3P2) showed the best relative growth rate compared to other treatments. This proves that the treatment of B3P2 is the proper dose, so that it can produce an optimal relative growth rate.

Table 3. Relative growth rate of shallot plants after application of mushroom baglog bokashi and LOF of cow blood waste (g/day)

Plants Age (Days after planting)	Dosage of mushroom baglog bokashi (kg/plot)	Concentration of Cow Blood LOF (ml/l/plot)				Average
		0 (P0)	150 (P1)	300 (P2)	450 (P3)	
14-21	0 (B0)	0,0655	0,0746	0,0816	0,0790	0,0752 c
	0,5 (B1)	0,0746	0,0911	0,0915	0,0896	0,0867 b
	1 (B2)	0,0785	0,0920	0,0930	0,0879	0,0878 ab
	1,5 (B3)	0,0872	0,1034	0,1019	0,0906	0,0958 a
	Rata-rata	0,0765 b	0,0903 a	0,0920 a	0,0868 a	
	CV = 9,50% HSD B&P = 0,0091					
21-28	0 (B0)	0,1014	0,1018	0,1039	0,1022	0,1023
	0,5 (B1)	0,1018	0,1031	0,1153	0,1076	0,1069
	1 (B2)	0,1068	0,1144	0,1150	0,1080	0,1111
	1,5 (B3)	0,1069	0,1161	0,1165	0,1153	0,1137
	Rata-rata	0,1042	0,1089	0,1127	0,1083	
	KK = 9,48%					
28-35	0 (B0)	0,0627 g	0,0642 fg	0,0650 fg	0,0797 d-g	0,0679 c
	0,5 (B1)	0,0938 b-g	0,0729 efg	0,1201 abc	0,0851 c-g	0,0930 b
	1 (B2)	0,0878 c-g	0,1286 ab	0,1128 a-d	0,1081 a-e	0,1093 a
	1,5 (B3)	0,0865 c-g	0,1306 ab	0,1322 a	0,1012 a-f	0,1126 a
	Rata-rata	0,0827 c	0,0991 ab	0,1075 a	0,0935 bc	
	CV = 13,17%	HSD B&P = 0,0140		HSD BP = 0,0382		

*numbers in rows and columns followed by the same lowercase letter are significantly different according to HSD at 5% level.

3.4 Number of Bulbs Per Clump (bulbs)

The analysis of variance showed that the interaction between mushroom baglog bokashi and LOF of cow blood waste had no significant effect on the number of bulbs per clump of shallot plants, but the main effect of mushroom baglog bokashi and LOF of cow blood waste had a significant effect on the number of bulbs per clump of shallot plants. The results of the HSD multiple range test at the 5% level on the number of bulbs per clump of shallot plants are presented in Table 4.

Table 4. Number of bulbs per clump of shallots after application of mushroom baglog bokashi and cow blood LOF (bulbs)

Dosage of mushroom baglog bokashi (kg/plot)	Concentration of Cow Blood LOF (ml/l/plot)				Rata-rata
	0 (P0)	150 (P1)	300 (P2)	450 (P3)	
0 (B0)	5,00	5,78	5,56	5,78	5,53 c
0,5 (B1)	5,89	5,78	6,33	5,89	5,97 bc
1 (B2)	6,22	6,11	6,56	6,44	6,33 ab
1,5 (B3)	6,33	6,67	7,22	6,33	6,64 a
Rata-rata	5,86 b	6,09 ab	6,42 a	6,11 ab	
CV = 7,00%		HSD B&P = 0,48			

*numbers in rows and columns followed by the same lowercase letter are significantly different according to HSD at 5% level.

Table 4 shows that mushroom baglog bokashi of 1.5 kg/plot (B3) produced the highest number of bulbs, namely 6.64 bulbs, and it was not significantly different from the mushroom baglog bokashi of 1 kg/plot (B2), but significantly different from the other treatments. This shows that increasing of mushroom baglog bokashi dose can fulfil the nutrient needs of shallot plants. According to Ref. [16] fertilization is applied to add nutrients to plants and soil.

The treatment of cow blood POC 300 ml/l/plot (P2) produced the highest number of bulbs and was not significantly different from the treatment of cow blood LOF 150 ml.l/plot (P1) and 450 ml/l/plot (P3), but significantly different with without treatment (P0). The number of bulbs per plant clump is closely related to the number of tillers. The number of tillers is influenced by the plant vegetative phase of shallot. This is thought to be influenced by the elements of N and P contained in mushroom baglog bokashi and LOF of cow blood waste, which play an important role in the vegetative phase.

3.5 Wet Tuber Weight Per Clump (g)

The analysis of variance showed that the interaction and main effect of mushroom baglog bokashi and LOF of cow blood waste had a significant effect on the wet tuber weight per clump.

Table 5. Wet Tuber Weight Per Clump after application of mushroom baglog bokashi and cow blood LOF (g)

Dosage of mushroom baglog bokashi (kg/plot)	Concentration of Cow Blood LOF (ml/l/plot)				Average
	0 (P0)	150 (P1)	300 (P2)	450 (P3)	
0 (B0)	16,18 g	17,34 fg	18,59 fg	21,77 def	0 (B0)
0,5 (B1)	20,72 efg	22,52 def	28,15 abc	24,08 cde	0,5 (B1)
1 (B2)	22,05 def	30,31 ab	30,68 ab	24,87 cde	1 (B2)
1,5 (B3)	26,97 bcd	31,78 ab	32,51 a	28,02 abc	1,5 (B3)
Rata-rata	21,48 c	25,49 b	27,48 a	24,69 b	Rata-rata
KK = 7,22%	HSD B&P = 1,98	HSD BP = 5,42			

*numbers in rows and columns followed by the same lowercase letter are significantly different according to HSD at 5% level.

The result of HSD test at the 5% level on the wet tuber weight per clump is presented in Table 5. Table 5 shows that the interaction between mushroom baglog bokashi of 1.5 kg/plot and cow blood waste LOF of 300 ml/l/plot (B3P2) produced 32.51 g, and was not significantly different from the treatments B3P1, B3P3, B2P1, B2P2 and B1P2, but significantly different from the other treatments. The combination between mushroom baglog bokashi of 1.5 kg/plot and cow blood waste LOF of 300 ml/l/plot (B3P2) showed an increase in wet tuber weight of 100.93% compared to no treatment (B0P0). The wet tuber weight is largely determined by the rate of photosynthesis, absorption rate of nutrients, and water content in plants [17]. The water content in plants is influenced by the environment, temperature, and humidity The high temperatures it will affect the rate of transpiration in plant organs.

3.6 Dry Tuber Weight Per Clump (g)

The analysis of variance showed that the interaction and main effect of mushroom baglog bokashi and cow blood waste LOF had a significant effect on the dry tuber weight per clump. The result of HSD test at 5% level on the dry tuber weight is presented in Table 6.

The Table 6 shows that the interaction between mushroom baglog bokashi of 1.5 kg/plot and cow blood waste LOF of 300 ml/l/plot (B3P2) produces 28.76 g, and is not significantly different from the treatments B3P1, B3P3, B2P1, B2P2 and B1P2, but significantly different from the other treatments. The combination between mushroom baglog bokashi of 1.5 kg/plot and cow blood waste LOF of 300 ml/l/plot (B3P2) showed an increase in tuber weight of 115.11% compared to without treatment (B0P0). This production obtained had not reached the potential of Bima Brebes variety of shallot which is 9.9 tons/ha. This is indicated that the environment of Brebes area is more suitable than the environment in this research. Although it does not reach the potential production of Bima variety shallots, the production produced is higher than the average shallot production in Riau Province. Ref. [18] recorded that the productivity of shallots in Riau Province in 2023 as much as 4.37 tons/ha.

Table 6. Dry tuber weight per clump with application of mushroom baglog bokashi and cow blood LOF (g)

Dosage of mushroom baglog bokashi (kg/plot)	Concentration of Cow Blood LOF (ml/l/plot)				Average
	0 (P0)	150 (P1)	300 (P2)	450 (P3)	
0 (B0)	13,37 h	14,45 gh	15,63 fgh	18,60 d-g	5,53 c
0,5 (B1)	17,70 e-h	19,60 def	24,70 abc	20,95 cde	5,97 bc
1 (B2)	19,11 d-g	26,74 ab	27,09 ab	21,70 cde	6,33 ab
1,5 (B3)	23,60 bcd	28,11 ab	28,76 a	24,76 abc	6,64 a
Average	18,45 c	22,23 ab	24,05 a	21,50 b	
CV = 7,68%	HSD B&P = 1,84		HSD BP = 5,02		

*numbers in rows and columns followed by the same lowercase letter are significantly different according to HSD at 5% level.

3.7 Analysis of Nutrient Uptake in Plants (mg/plant)

The average nutrient uptake of mushroom baglog bokashi and cow blood waste LOF is shown in Table 7. Table 7 shows that the lowest N nutrient uptake was generated on the combination between 0 kg/plot of mushroom baglog bokashi and 0 ml/l/plot of cow blood wastea LOF (B0P0) which is 24.10 mg/plant. Meanwhile, the highest N nutrient uptake was found on the combination between 1.5 kg/plot of mushroom baglog bokashi and 300 ml/l/plot of cow blood waste LOF (B3P2) which is 52.01 mg/plant. The combination between 1.5 kg/plot of mushroom baglog bokashi and 300 ml/plot of cow blood waste LOF (B3P2) showed an increase in nutrient uptake of 115.81% compared to without treatment (B0P0).

Table 7. Nutrient uptake results with mushroom baglog bokashi and cow blood waste LOF

Nutrient Uptake	Dosage of mushroom baglog bokashi (kg/plot)	Concentration of Cow Blood LOF (ml/l/plot)				Average
		0 (P0)	150 (P1)	300 (P2)	450 (P3)	
N	0 (B0)	24,10	27,65	29,55	28,21	27,38
	0,5 (B1)	31,25	31,82	42,77	35,49	35,33
	1 (B2)	33,53	46,64	47,56	41,02	42,19
	1,5 (B3)	37,07	49,65	52,01	41,93	45,17
	Rata-rata	31,49	38,94	42,97	36,66	
P	0 (B0)	2,74	3,07	3,39	3,47	3,17
	0,5 (B1)	3,31	3,59	4,40	3,77	3,77
	1 (B2)	4,21	4,94	5,26	4,63	4,76
	1,5 (B3)	4,07	5,93	5,63	4,73	5,09
	Rata-rata	3,58	4,38	4,67	4,15	
K	0 (B0)	22,96	23,77	26,78	22,86	24,09
	0,5 (B1)	27,61	29,33	37,95	31,55	31,61
	1 (B2)	34,94	48,62	47,33	40,38	42,82
	1,5 (B3)	34,42	44,21	49,33	40,70	42,17
	Average	29,98	36,48	40,35	33,87	

The supply of nitrogen for plants is a continuous process through the decomposition of organic matter and mineralization of N provided [12]. The results of C/N analysis on mushroom baglog bokashi and LOF of cow waste have values of 22.9 and 3.04 respectively (Table 1). This indicates that the decomposition process of organic matter has been completed or the bokashi has matured and can be absorbed by plants. Table 7 shows that the lowest P nutrient uptake was found on the treatment without mushroom baglog bokashi and without cow blood waste LOF (B0P0) which is 2.74 mg/plant. While the highest P nutrient uptake was produced on the combination between 1.5 kg/plot of mushroom baglog bokashi and 150 ml/l/plot of cow blood waste LOF (B3P1) which is 5.93 mg/plant. The combination of mushroom baglog bokashi 1.5 kg/plot and cow blood waste POC 300 ml/l/plot (B3P2) showed an increase in nutrient uptake of 105.47% compared to without treatment (B0P0). Phosphorus is absorbed by plants in the form of orthophosphate ions, namely, HPO_4^{2-} or H_2PO^{4-} which has a role in increasing plant root growth and enhancing plant dry weight

Table 7 shows the lowest K nutrient uptake was found on the treatment without mushroom baglog bokashi and without cow blood waste LOF (B0P0) which is 22.96 mg/plant. Meanwhile the highest K nutrient uptake was obtained on the combination between 1.5 kg/plot of mushroom baglog bokashi and 300 ml/l/plot of cow blood waste LOF (B3P2), namely 49.33 mg/plant. The treatment combination of B3P2 showed an increase in nutrient uptake of 114.85% compared to without treatment (B0P0). The K nutrients are absorbed by the roots in the form of K^+. The movement of K^+ in the soil solution to the plant roots is regulated by the diffusion of K nutrients in the soil solution [19]. Potassium is included in the essential nutrients which presence cannot be replaced with other nutrients. Potassium plays a role in the formation of tubers [20].

4. Conclusions

The results of the research that has been carried out can be concluded that the interaction effect between 1.5 kg/plot of mushroom baglog bokashi and 300 ml/l/plot of cow blood waste LOF (B3P2) had different effect on the relative growth rate, wet tuber weight per clump, dry weight of tubers per clump and shrinkage of tuber weight.

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