Types of Compost and Varieties to Increase Shallot Growth and Yield in Pidie District

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ABSTRACT
Currently, the use of organic compost, whose material is easily available, is not widely used by farmers because it takes time to make it; instant chemical fertilisers are thereby preferable for them. This research aims to investigate the effect of compost types and varieties on the growth and yield of shallots. This research was conducted in Gampong Panjoe, Kembang Tanjong District, Pidie Regency. This study used the Group Random Design (RAK) Factorial Pattern with two factors studied: compost types and varieties. The compost types comprise three levels: K0 (without compost), K1 (straw compost), K2 (forage compost), and K3 (household compost). The varieties include V1 (Brebes), V2 (Philippine), and V3 (Thailand). The observed variable consists of plant height, number of onion cloves, wet stash weight in the plot, dry stash weight, and yield in hectares. The findings showed that the use of compost can increase the yield per hectare of shallots up to 49.5% compared to those without composting. The variety that gives the best results due to composting is the Brebes variety reaching 35.6%.

Keywords: *Organic compost, Varieties, Shallot*

1. INTRODUCTION

Currently, in Pidie Regency, planting shallots with suitable varieties has been initiated. It will become a new source of income for farmers apart from rice so that the planting area is increasingly expanded, including in Pidie Regency. This effort has been cultivated intensively by farmers and has received serious attention from the government for its development.

Compost is an organic fertiliser that plants need to get good growth and also helps to improve the soil condition where plants grow and develop. Research [1] using organic fertilisers from various animal manure and agricultural waste can increase tomato yields, shelf life and fruit nutrition and improve soil quality. According to some researchers, organic composting can improve soil fertility and crop production [2].

Organic compost is mostly obtained from agricultural and livestock industry waste, which is left to rot naturally [3]. Compost application from combined animal manure can enhance soil physicochemical properties, soil biology, and crop production even in dry conditions in a short period of time [4]. Agricultural waste such as straw, forage and household waste is a cheap and easily available material to use as raw materials to make compost. Agricultural products which do not reach consumers and become damaged can be used as liquid organic fertiliser and compost, which have high nutrient elements for plant growth [5].

The previous research reported that the application of different types of compost to mung bean plants increases the total leaf N content and all observed parameters [6]. Furthermore, another research showed that composting from household waste can boost the growth and yield of sweet corn compared to residual brassica compost [7].

The use of manure compost and biochar from wood can improve morphophysiological and biochemical properties and increase groundwater holding capacity and availability of nitrogen, phosphorus and potassium in the soil in supporting plant growth *Onobrychis viciifolia* [8]. The use of organic waste for the need to protect the environment also produces value-added organic fertilisers and biofuels that will help in achieving high energy security and the economic value of goods that have been wasted [9]. The past research on the yield of shallots due to the application of shallot residue compost, cow dung and tea residue compost showed a dose of compost 300 kg ha^{-1} and compost from tea plant waste gave significant results on tuber weight and yield as well as pH, salinity, and nutrient soil also increased [10].

Compost application to the field earlier in the right amount will help fertilise the soil and plants. According to Zhan et al. [11], the use of organic compost for a long time on agricultural land can affect the activity of microorganisms in the natural soil to be better for soil fertility. The use of organic compost can increase high

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yields in plants and can improve the soil and environment [3], [12]. According to a study by Dróżdż et al. [13], composting from fish pond deposits material and biochar in planting media has increased the growth of white beans.

Moreover, the selection of the right and appropriate variety will determine the results obtained by farmers. Past research revealed that, of the three onion varieties tested, the Thai variety gave higher growth than the others [4]. Meanwhile, Red Bhima varieties are more tolerant of sodicity stress and have a minimum stress tolerance index [15]. Researchers suggest that gayo shallots are one of the local shallots in Central Aceh Province, which have the varieties of gayo, header, and ijo [16].

2. MATERIALS AND METHODS

The study was conducted in Gampong Pajoe, Kembang Tanjong District, Sigli Regency. The ingredients used are shallots Brebes varieties, Philippines, Thailand, straw manure, forage, household waste, brown sugar, EM4, bran, rice husks, sawdust and enough water. The tools employed are machetes, hoes, rakes, plastics, scales, meters, raffia ropes, tarpaulins, buckets, drills, cameras and research signboards. A randomised block design (GRD) was used for this study. Compost factors consist of three levels, including K0 (without compost), K1 (straw compost), K2 (Hijuan compost) and K3 (Household Waste Compost). The varietal factor also consists of three levels: V1 (Brebes Variety), V2 (Philippine Variety) and V3 (Thai Vareitas). Each combination of treatments is carried out on beds with a size of 80cm x 80 cm, a height of 25 cm, and a planting distance of 20cm x 20cm. Planting one tuber per planting hole. Compost application is given 15 results before planting by sprinkling compost on the soil surface as much as 2 kg. Observations were made on number of onion cloves, plant height, dry stash weight, wet stash weight and yield per hectare.

3. RESULTS AND DISCUSSION

The results of this study will be discussed separately based on the effect of compost and the effect of variety. Each section is provided in the following.

3. 1 Effects of Compost

3.1.1 Plant Height

The results of the analysis show that compost has a very significant influence on the height of onion plants at the age of 15 and 45 DAP (days after planting), as shown in Table 1.

Table 1. Average to the Height of Onion Plants Aged 15 and 45 DAP

Compost	Plant Height (cm)	
	15	45 DAP
K0	10.53 a	34.39 a
K1	11.14 a	37.11 b
K2	11.69 b	37.78 b
K3	10.92 a	37.28 b
BNJ 0.05	0.82	1.43

Forage compost increases plant growth compared to no compost. Forage compost and compost from cow dung combined with biochar can improve cornflower plants [17]. Meanwhile, compost and biochar can increase the height of Rosela plants [18]. Applying biochar and biocompost as much as 0.3 -6% (MM) can affect the growth of argan trees [19]. Furthermore, the application of biochar significantly improves the growth and yield of rice plants [20]. Coffee husk compost affects the height of tomato plants [21].

3.1.2 Number of Onion Cloves

The results of the analysis showed that composting has a very significant effect on the number of onion cloves. The result is listed in Table 2.

Table 2. Average number of onion cloves due to Compost Treatment

Compost	Number of onion cloves (tubers)
K0	8.22 a
K1	8.72 a
K2	9.81 b
K3	8.86 a
BNJ 0.05	1.25

Forage compost gets more tubers per grass than other compost and without compost. The previous study [22] showed the results of tomato plants given compost resulted in a greater green index of leaves and ripe fruits and better nutritional value compared to controls. The higher dose of coffee compost given will have a very noticeable effect on the number of onion cloves [21]. Compost of oil palm bunches of 5 – 10 tons/ha can increase the productivity of maise on Ultisol soil [23].

3.3.3 Wet Stash Weight and Dry Stash Weight

Analysis showed that the type of compost had a very real effect on the weight of wet and dry stamps. The result is described in Table 3 below.

Table 3. Average Wet Stash weight and Dry stash Weight Due to Composting

Compost	Wet Stash weight (gr)	Dry stash Weight (gr)
K0	412.22 a	357.78 a
K1	568.89 b	526.67 b

Compost	Wet Stash weight (gr)	Dry stash Weight (gr)
K2	615.56 b	565.56 b
K3	556.67 b	494.44 b
BNJ 0.05	79.33	86.47

Table 3 shows that the highest wet and dry stash weights are found in forage compost which is not significantly different from other composts, but the lowest is found in no-compost treatment. Thus, compost can increase the dry stash weight and wet stash weight of shallots of Brebes and Bima [24].

3.1.4. Yield Per Hectare

The analysis results show compost treatment has a real impact on yield per hectare of onion plants. The result is depicted in Table 4.

Table 4. Average Yield Per Hectare due to Compost treatment

Compost	Yield Per Hectare (tons)
K0	4.12 a
K1	5.69 b
K2	6.16 b
K3	5.57 b
BNJ 0.05	0.79

Table 4 indicates that the yield per hectare of shallots is highest in forage compost, which is not significantly different from other composts, but is lowest in non-compost treatment [4]. The results of his research revealed that the use of organic compost, either singly or mixed with half NPK fertiliser, has a good impact on soil fertility and crop yields.

The types of compost (i.e., straw compost, husk charcoal compost and market waste compost) have an influence on the production of shallots grown on Inceptisol soil and market waste compost, given Trichoderma is the best in increasing onion production [25].

3.2 The Effect of Varieties

3.2.1 Plant Height

The results of the analysis showed that the variety had a significant impact on the height of plants aged 15 and 45 DAP, as listed in Table 5.

Table 5. Average Plant Height Age 15 and 45 DAP due to Variety

Variety	Plant Height (cm)	
	14 DAP	15 DAP
V1	11.67 b	38.04 b
V2	11.31 b	36.92 b
V3	10.23 a	34.96 a
BNJ 0,05	0.64	1.12

Brebes and Philippine varieties have more plant height than Thai varieties. Philippine varieties and Keta monca varieties can influence dry weight, plant height and wet weight of onion plants [26].

3.2.2 Number of Onion cloves

The results of the analysis show that several varieties have a significant effect on the number of onion cloves in onion plants, as shown in Table 6.

Table 6. Average Number of onion cloves Due to Variety

Variety	Number of Onion Cloves (tubers)
V1	9.54 a
V2	6.25 b
V3	10.92 c
BNJ 0.05	0.97

Table 6 shows that Thai varieties produce more tubers per grass compared to other varieties. The study [27] showed that the Super Philips and Thai onion varieties showed higher bulb weights and yields. In research [28] onion Lokananta variety can increase the dry weight of the onion and the weight of bulbs. In line with what was found by [24], the ijo variety of shallots has better growth and yield of bulbs compared to the gayo and header varieties

3.2.3 Wet Stash Weight and Dry Stash Weight

Data analysis shows that variations have a significant effect on wet stash weight and dry stash weight. The result is listed in Table 7.

Table 7. Average Wet Stamp Weight and Dry Stamp Weight due to Variety

Variety	Wet Stash Weight(gr)	Dry Stash Weight (gr)
V1	668.33 c	622.50 c
V2	542.50 b	485.00 b
V3	404.17 a	350.83 a
BNJ 0.05	62.06	67.64

Thai varieties have the lowest wet and dry stash weights compared to Thai varieties have the lowest wet and dry stash weight compared to other varieties. From the results of the study [29], it was found that the Bhima Super variety gave the best fresh weight of seedlings (344.16 mg), dry weight of seedlings (58.85 mg) and the number of leaves (3.77), at the age of 40 days after planting.

3.2.4. Yield Per Hectare

The results of the analysis showed that the treatment of several varieties had a significant effect on the yield per hectare of onion plants. The result is presented in Table 8.

Table 8. Average Yield Per Hectare Due to Variety

Variety	Yield Per Hectare (tons)
V1	6.31 b
V2	4.85 b
V3	3.51 a
BNJ 0.05	0.61

The Brebes variety gives a higher yield per hectare compared to the Thai variety. The results of previous research [30] showed that shallot varieties Minjar, Huruta, and Negelle provide the best growth and yield in all locations tested compared to local varieties.

4. CONCLUSION

The results of this study highlight several points. First, compost from forage gives different and better results than other composts on onion growth and yield. Second, composting has a significant effect on the number of onion cloves, plant height, dry stash weight and wet stash weight, and yield per hectare compared to those without composting. Third, Brebes varieties get more production in Philippine and Thai varieties. The study result implies that farmers and related parties should consider the compost types and varieties in planting shallots.

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