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RESEARCH ARTICLE

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The effect of dosage of vermicompost and biourine plus on growth and yield of organic shallot (*Allium ascalonicum* L.)

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Abstract
Shallot is a common horticultural crop, providing a number of benefits. Effect of organic manure and liquid organic fertilizer and their interaction on growth and yield of shallot was studied. The purpose of this study was to determine the effectiveness increase organic shallot yield with dose fertilizer vermicompost and biourine plus. A two factor experiment with three replications, arranged in factorial randomized block design, was carried out. First factor was dose of vermicompost i.e without vermicompost, vermicompost 10 t/ha, vermicompost 15 t/ha. Second factor was dose of biourine Plus i.e without biourine plus, biourine plus 1500 l/ha, biourine plus 2000 l/ha. Observed variables were height plants, numbers of leaves, number of tubers, fresh weight of tuber, and dry tuber weight. Data were analysed by F test followed by LSD at 5%. It was concluded that the vermicompost and biourine plus dose treatment produced a significant impact on plant height and number of shallot leaves but had no effect on shallot yields. Vermicompost 15 t/ha is able to increase the harvest weight of shallots (fresh weight) by 14% and increase the dry weight of tubers by 17.45%.

KEYWORDS
Biourine plus, fertilizer, organic, shallot, vermicompost

1. INTRODUCTION

Allium ascalonicum L. or shallot, is horticulture product which used in all layer society and offers a number superiority. Shallot plant placed in a suitable planting medium for spur its growth. Increase fertility land with utilise repairer land experience like fertilizer Vermicompost is very crucial use increase growth and yield of shallot (Luta et al ., 2019). Apart from pushing development and production shallot , also important for own supply adequate and comparable nutrition , especially nitrogen , phosphorus and potassium (Sumarni and Rosliani, 2012) . The Bima variety was varieties used in this research. Variety onion Bima 's red allegedly more easy adapt with environment and more stand to attack pest shallot (Basuki, 2005) .

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Shallot in a way traditional planted with dependence on fertilizer chemistry, which has an impact bad for environment If used in a way excessive or wrong. Therefore that is necessary source fertilizer replacement, for one is fertilizer

vermicompost. The so called organic material vermicompost produced directly by worms land and own form congested. Because of fertilizer vermicompost very effective in raise productivity ground and pushed development plants, then fertilizer vermicompost chosen as the only one treatment study for shallot (Hussain and Abbasi, 2018) . The largest size of shallot bulbs was obtained in the vermicompost treatment inoculated with biofertilizer in the second year. This harvest is equivalent to shallot with chemical fertilizer treatment inoculated with biofertilizer in the second year (Arouiee & Ghasemi Pirbalooti, 2023).

Because of fertilizer vermicompost very effective in raise productivity ground and pushed development plants, then fertilizer vermicompost chosen as the only one treatment study for shallot

For fulfil need nutrition plant and reduce use material chemistry, use biourine is the right step for replace fertilizer plant artificial factory costs affordable for farmers. Source biourine plus is biourine made from combination dirt cow solid, material fermented organics, and cow urine. The use of cow urine and added with other organic materials, this organic fertilizer can be known as liquid organic fertilizer biourin plus. Biourine plus comes from cow urine mixed with other organic materials that are fermented into biourine which is then given to plants as a plant fertilizer is expected to be able to replace the use of factory-made plant fertilizers so that the needs of plant nutrients are met and ultimately can reduce the use of chemicals as plant nutrients. The results of (Santosa et al., 2015) research showed that the application of biourine combined inorganic fertilizer increased growth and yield of shallot. Treatment with biourine 1000 L ha-1 showed the highest bulb yield. Biourin Then supplied to plant as fertilizer. Vermicompost and biourine when combined will have an impact increased Ultisol pH, resulting in an increase in shallot growth and yield (Barchia & Inoriah, 2021).

For fulfil need nutrition plant and reduce use material chemistry, use biourine is the right step for replace fertilizer plant artificial factory costs affordable for farmers

Many studies have been conducted on increasing the yield of shallots, but those that specifically study organic shallot cultivation techniques by adding a combination of solid worm manure fertilizer and biourine are still rare, especially in studies on providing the right dosage. Remember description previous, research this must done For determine effectiveness increase results shallot organic (Allium ascalonicum L.) with dose fertilizer vermicompost and biourine plus. Height yields believed will generated from giving proper nutrition For help fulfil need growth plant. Growth and development shallot plant will hampered If the dose No sufficient so that produce production below standard. This study aims to examine the effectiveness of worm manure and biourine plus fertilizer at various doses on increasing the yield of shallots cultivated organically.

2. MATERIALS AND METHODS

This research was carried out at an altitude of 16 meters above sea level , in Bogangin Village, Sumberrejo District, Bojonegoro Regency, East Java, Indonesia. Study carried out from February to May 2023 . The tools used are hoes, rulers , nameplates, meters , writing tools, cameras/tools, digital scales, spray equipment . The materials used are vermicompost fertilizer, biourine plus from cow urine, Bima variety shallot seeds, pesticides, fungicides and insecticides to control pests and diseases.

2.1 Research Methods

This research was carried out using the factorial randomized block design (RBD). The dose of vermicompost fertilizer is the first factor, and the dose of biourine plus is the second factor. Each factor was repeated three times. The first factor is

without vermicompost fertilizer (control), 10 t/ha, 15 t/ha. Second factor namely without biourine (control), 1500 l/ ha, and 2000 l/ha .

2.2 Implementation Study

Place study cleaned with hoe from lower to on land . Land cleared from weeds , and left during seven day . After get loose soil make plot as many as 27 plots , long 1 m 2 , wide 1 m 2 , height 40 cm and distance plot 50 cm. Manufacturing biourine plus is done before preparation land . 1 liter of cow urine , 5 kilograms of manure cow solid , 1 kg residue rice , 1 liter EM4 , 220 cc molasses , 50 liters of water composition 50 lt biourine plus. Place rubbish plastic as place biourine , filled and closed . EM4 and molasses mixed moreover first 10 minutes before mixed with material other . Every day opened and stirred during not enough more than 15 minutes . Biourine Ready applied after left or fermented for 2 weeks . Application biourine plus with Mix with water accordingly dose . Application fertilizer vermicompost done at the time processing land that is One Sunday before planting . Dose fertilizer vermicompost used as much as 10 and 15 t/ha, with wide plot namely 1 m 2, so need fertilizer vermicompost is 1 kg/ plot or 1000 gr/ plot and 1.5 kg/ plot or 1500 gr/ plot . Standard Planting size used is 15 cm × 15 cm.

Application fertilizer vermicompost done at the time processing land that is One Sunday before planting

2.3 Maintenance Plant

Irrigation done If land dry . Watering done morning and evening. On growth at seven day executed weeding with manual method . Stitching plant done If shallot plant some do n't grow . Plant embroidered moment at seven day . Fertilization done in a way gradually that is four times. Fertilization First until fertilization fourth at 17, 24, 31 and 38 dap with 7 day intervals use fertilizer treatment dose biourine plus. Control done If there is attack pest disease . Harvesting shallot carried out at the of 52 dap.

2.4 Observed variables and sampling

Measurement tall plant start surface land until end leaf longest . Starting 14 dap until at 35. Calculation amount leaves stated in unit strands and counted start at 14 until 35. Calculation amount tubers per sample done moment plant experience harvesting . Weight wet tubers weighed without leaf. Weight wet tubers per hectare weighed all post harvested . Weight dry tubers weighed after harvesting and after tubers dried and peeled onion Already peeling . Weight dry tubers per hectare measured after harvesting and after dried . Measurement done after all plant harvested and dried . Shallots were planted on land with an area of 65 km2, the total number of plots was 27. The total population of shallots was 972 and the total number of sample plants observed was 135.

2.5 Data analysis

Results data observation of Least Significant Difference Test (LSD 5%) is carried out for example there is significant difference after Fisher's test analysis (F test) level 5% and 1%. Data was processed using SPSS software version 23.0.

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3. RESULTS AND DISCUSSION

3.1 Plant Height

Analysis results variance show interaction treatment dose fertilizer vermicompost and biourine plus 28 dap and 35 dap and signifficant different at 14 dap and 21 dap at height plant. Table 1 shows the results of the F test and LSD 5% height plants at 28 and 35 dap.

Table 1. The average shallot's height of plants (cm) observations 28 DAP and 35 DAP

Treatment	Plant height (cm)	
	28 dap	35 dap
Vermicompost 0 t /ha + biourine plus 0 l/ha	26.3 3 bc	31.97 bcd
Vermicompost 0 t /ha + biourine plus 1500 l/ha	26.57 bc	30.57 d
Vermicompost 0 t /ha + biourine plus 2000 l/ha	27.17 bc	32.63 bcd
Vermicompost 10 t /ha + biourine plus 0 l/ha	27.40 bc	31.8 3 bcd
Vermicompost 10 t / ha + biourine plus 1500 l/ha	26.73 bc	33.87 ab
Vermicompost 10 t/ha + biourine plus 2000 l/ha	24.43 c	31.33 cd
Vermicompost 15 t/ha + biourine plus 0 l/ha	27.80 bc	33.13 abc
Vermicompost 15 t/ha + biourine plus 1500 l/ha	27,27 bc	32.23 bcd
Vermicompost 15 t/ha + biourine plus 2000 l/ha	31.47 a	35.46 a
F test	*	*
LSD 5%	3.24	2.23

Notes : numbers followed by the same letter in the same column No signifficant different with 5% LSD test.

Based on height parameters plants at 28 and 35 dap, table 1 shows interaction dose fertilizer vermicompost and biourine plus. Giving fertilizer vermicompost through dose 15 t/ha and dose biourin plus 2000 l/ha provides results best amounting to 31.47 cm at the 28 DAP. At 35 dap treatment fertilizer vermicompost with dose 15 t/ha and dose biourin plus 2000 l/ha also provides results best of 35.46 cm. This matter because giving fertilizer vermicompost as fertilizer the base is very suitable For help guard stability and aeration land at a time repair structure land . Fertilizer vermicompost contains nitrogen of 1.79%, potassium of 1.79%, phosphate of 0.85%, calcium of 30.52%, and carbon amounting to 27.13% as well other nutrients . Apart from that , fertilizer vermicompost contain microbes soil and substances regulator grow . (Hidayatullah et al ., 2020) . Besides that giving biourine also affects growth shallot plant so that impact on results Plants are good at growing plant . Statement the in line degan statement Sutari (2010) that 704.26 mg L-1 is Indole Acetic Acid (IAA) has nutrients . Table 2 shows the results of the F test and LSD test are 5% height plants 14 and 21 DAP

Table 2. The average shallot's height of plants (cm) observations 14 DAP and 21 DAP.

Treatment	Plant height (cm)	
	14 dap	21 dap
Vermicompost 0 t/ha	14.38 b	23.51 b
Vermicompost 10 t/ha	15.58 ab	23.66 b
Vermicompost 15 t/d	17.14 a	24.98 a
F test	*	*
LSD 5%	1.84	1.19
Biourine plus 0 t/ha	15.26	23.24 b
Biourine plus 1500 l /ha	15.27	24.14 ab
Biourine plus 2000 l /ha	16.58	24.76 a
F test	TN	*
LSD 5%	-	1.19

Notes : numbers followed by the same letter in the same column No significant different with the 5% LSD test.

Table 2 shows exists significant different tall significant plant consequence usage fertilizer vermicompost as much as 15 t/ha against shallot at 14 DAP with results best of 17.14 cm and at 21 DAP namely 24.98 cm. In 21 dap with treatment dose biourine plus 2000 l/ha provides results best of 24.76 cm. According to Syafruddin et al . (2012) , minerals in N, P, and K, namely including nutrition it's important to have impact real growth plant in a way overall moment phase vegetative . This matter because giving fertilizer very good basics For growth shallot . Based table 2, displays tall plant at 21 dap significant different in treatment dose biourin plus 2000 l/ha with results best namely 24.76 cm. This is due to the large number of nutrients contained in biourine. Claim This supported by the findings study Elisabeth et al . (2013) state fertilizer liquid made from biourine cow This Lots contain nutrients , including nitrogen. The advantages of using cow biourine for organic fertilizer include relatively low cost, ease of application and acquisition, and higher N and K content compared to solid cow dung (Sutoto et al ., 2021) .

Minerals in N, P, and K, namely including nutrition it's important to have impact real growth plant in a way overall moment phase vegetative

3.2 Number of Leaves

Analysis of variance showed an interaction between the doses of vermicompost and biourin plus at 28 and 35 dap , while at 14 and 21 dap there were significant treatment variations in the number of shallot plant leaves. In table 3, the results of the F test and LSD test for 5% number of leaves at 28 and 35 dap are shown .

Table 3. The average number of shallot leaves at 28 dap and 35 dap

Treatment	Number of leaves	
	28 dap	35 dap
Vermicompost 0 t /ha + biourine plus 0 l/ha	25.13 bc	25.67 c
Vermicompost 0 t /ha + biourine plus 1500 l/ha	26.93 bc	31.13 b
Vermicompost 0 t /ha + biourine plus 2000 l/ha	21.93 d	30.13 bc
Vermicompost 10 t /ha + biourine plus 0 l/ha	24.53 bcd	28.80 bc
Vermicompost 10 t / ha + biourine plus 1500 l/ha	27.07 b	29.53 bc
Vermicompost 10 t/ha + biourine plus 2000 l/ha	22.53 cd	27.47 bc
Vermicompost 15 t/ha + biourine plus 0 l/ha	26.13 b	30.60 b
Vermicompost 15 t/ha + biourine plus 1500 l/ha	25.93 b	30.87 b
Vermicompost 15 t/ha + biourine plus 2000 l/ha	31.07 a	36.93 a
F test	**	*
LSD 5%	3.20	4.56

Notes : Numbers followed by the same letter in the same column No significant different with the 5% LSD tes

Table 3 shows numbers of leaves at 28 DAP and 35 DAP show interactions with fertilizer vermicompost and biourin plus. Giving dose fertilizer vermicompost 15 t/ha and biourine plus 20 00 l/ha share results best i.e. p exists at 28 dap results best amounting to 31.07 strands, while at of 35 DAT produce results best that is amounting to 36.93 strands . Availability nutrients are met from addition dose fertilizer vermicompost, and if sufficient nutrients so growing leaves wide will the more influence results photosynthesis. If the plant's nutrient needs are met, photosynthate production will increase. Sahari (2006) claim that amount leaves a plant impact straight to how much Good

plant the absorb nutrients, which in turn will influence capacity plant For grow and produce. In addition, fermented biourine can be used to fertilize the leaves, this is possible raise the strength of the plant against pest and disease attacks, distinctive odor can resist pests and diseases (Amalia, 2018). Biourine has the advantage of having a potassium content of 3.8%, Phosphorus of 2.4%, Nitrogen of 2.7%, and Ca of 5.8% contained in fermented cow urine (Sutoto et al ., 2021). Table 4 displays the results of the F test and 5% LSD test for the number of leaves at 14 and 21 dap.

Availability nutrients are met from addition dose fertilizer vermicompost, and if sufficient nutrients so growing leaves wide will the more influence results photosynthesis

Table 4. Average number of shallot's leaves observations at 14 dap and 21 dap

Treatment	Number of leaves	
	14 dap	21 dap
Vermicompost 0 t/ha	12.11 b	15.84 b
Vermicompost 10 t/ha	12.16 b	16.96 a
Vermicompost 15 t/d	13.33 a	17.69 a
F test	*	*
LSD 5%	1.06	1.10
Biourine plus 0 t/ha	12.24	16.29 b
Biourine plus 1500 l /ha	12.49	16.56 ab
Biourine plus 2000 l /ha	12.87	17.64 a
F test	TN	*
LSD 5%	-	1.10

Notes : Numbers followed by the same letter in the same column No significant different with the 5% LSD test.

Table 4 shows variation real tall significant plant consequence usage fertilizer vermicompost as much as 15 t/ha on plants shallot at 14 DAP with results best amounting to 13.33 strands and 21 dap namely 17.69 strands. On plants at 21 dap treatment dose biourine plus 2000 lha give results best amounting to 17.64 strands . This matter caused exists bacteria soil and substances regulator growing included in vermicompost (Hidayatullah et al., 2020) . According to Dewanto et al . (2017) that the nutrient content is lower in the soil after harvest than at the start of plant cultivation, because plants will utilize nutrients for growth and production. Structure land can repaired with method giving fertilizer organic . Statement the prove that fertilizer vermicompost capable increase amount leaves on shallot. Allegedly because biourine have content available nutrition increase results amount leaves. Shallot plant capable adapt with success because exists necessary particles (Afrilliana et al ., 2017). Plant order onion red grow fertile , the cells must elongates and divides so that need nutrition, water, hormones certain, and carbohydrates.

Nutrient content is lower in the soil after harvest than at the start of plant cultivation, because plants will utilize nutrients for growth and production

3.3 Number of Tubers Per Sample

The F test and LSD test values are 5% total tubers shown in table 5. Based on analysis variants , there are interaction treatment dose fertilizer

vermicompostand biourine plus influence to amount tubers per sample .

Table 5. The Average of shallots's number of tuber per sample

Treatment	Number of tubers per sample
	52 dap
Vermicompost 0 t /ha + biourine plus 0 l/ha	6.20 d
Vermicompost 0 t /ha + biourine plus 1500 l/ha	6.13 d
Vermicompost 0 t /ha + biourine plus 2000 l/ha	6.67 cd
Vermicompost 10 t /ha + biourine plus 0 l/ha	7.93 b
Vermicompost 10 t / ha + biourine plus 1500 l/ha	6.60 cd
Vermicompost 10 t/ha + biourine plus 2000 l/ha	6.87 cd
Vermicompost 15 t/ha + biourine plus 0 l/ha	7.13 bcd
Vermicompost 15 t/ha + biourine plus 1500 l/ha	7.20 bc
Vermicompost 15 t/ha + biourine plus 2000 l/ha	9.80 a
F test	*
LSD 5%	0.85

Note : Numbers followed by the same letter in the same column are not significantly different with the 5% LSD test

Observation results Table 5 displays interactions in calculating the number of tubers per sample. Vermicompost fertilizer 15 t/ha with a dose of biourin plus 2000 l/ha had the best results with an average value of 9.80 cloves/tuber. This is because More tubers are formed because the number of tubers is influenced by the variety and planting of the tuber seeds. Apart from that, vermicompost fertilizer treatment also has an impact on the development of shallot plants. Azobacter sp., non-symbiotic N-increasing bacteria, and nutrition plant (Ca, N, P, K, and Mg) are both found in vermicompost fertilizer, thereby enriching the nutrients it contains. Hormones such as gibberellins, cytokinins, and auxins are also found in vermicompost. (Farida et al ., 2018) .

Azobacter sp., non-symbiotic N-increasing bacteria, and nutrition plant (Ca, N, P, K, and Mg) are both found in vermicompost fertilizer, thereby enriching the nutrients it contains.

Giving biourine in shallot plants is very important Because have content nutrition and plants need element calcium , phosphorus , nitrogen, and potassium. Nutrition in biourine stimulating cow development plant with fast are nitrogen and phosphorus (Sutoto et al ., 2021) . Besides that biourine plus also contains sufficient phosphate nutrients tall . Total tuber growth and weight wet tubers onion red can influenced by giving fertilizer organic liquid (Setiyowati et al ., 2010) .

Giving biourine in shallot plants is very important Because have content nutrition and plants need element calcium , phosphorus , nitrogen, and potassium

Decomposition compost can caused by biourine Plus and can result increase available nitrogen, phosphate , and potassium nutrients for plant For absorbed and used in metabolism plant (Yuliarta et al., 2014). Organic matter and nutrients will increase fertility land . Fermented cow urine will produce synthesis IAA hormone , one of them hormone compiler hormone auxin . According to Tandi et al . (2015) Amount component organic and inorganic in cell will increase consequence exists hormone auxin .

Decomposition compost can caused by biourine Plus and can result increase available nitrogen, phosphate , and potassium nutrients for plant For absorbed and used in metabolism plant

3.4 Fresh weight tubers Per Plot and Per Hectare

Dose fertilizer vermicompost have significant influence in a way statistics to weight fresh weight tubers per plot and per hectare, based on inspection various data. Table 6 shows results of the F test and 5% LSD test by weight fresh weight tubers and per hectare at 52 DAP.

Dose fertilizer vermicompost have significant influence in a way statistics to weight fresh weight tubers per plot and per hectare, based on inspection various data

Table 6 . The average of shallot's fresh weight tubers per plot and per hectare

Treatment	Weight of fresh tubers		
	Per plot (g)	Per hectare (t)	Improvement (%)
Vermicompost 0 t/ha	1012.56 b	10.125 b	-
Vermicompost 10 t/ha	1023.00 b	10.230 b	1,03
Vermicompost 15 t/d	1164.22 a	11.642 a	14.98
F test	*	*	
LSD 5%	62.75	627.5	
Biourine plus 0 t/ha	1010.89	10.108	
Biourine plus 1500 l /ha	1071.44	10.714	
Biourine plus 2000 l /ha	1117.44	11.174	
F test	TN	TN	
LSD 5%	-	-	

Notes : Numbers followed by the same letter in the same column No significant different with the 5% LSD test.

Table 6 illustrates with usage fertilizer vermicompost as much as 15 t/ha to plant shallot give the best result for fresh weight tubers parameters was 1164.22 g. Yield per hectare is 11, 642 t/ha. This is due to several advantages that vermicompost fertilizer offers to shallot plants. Plant become live and develop with Healthy if distributed nutrition capable absorbed with either by the roots plants under the required conditions (Suryana, 2008). According to explanation from Manahan (2016), profit use fertilizer vermicompost that is capable grow and soften land so suitable For planted, speed up development root plants, stems and leaves, can speed up formation flowers, make it easier harvesting, and developing results. Potassium is needed for photosynthesis, which can also make tubers heavier (Rawit, 2010). The more nutrients that are absorbed, the more assimilation occurs and the greater the supply food contained in fruit, tubers and seeds plants, claims Suryani (2011).

The more nutrients that are absorbed, the more assimilation occurs and the greater the supply food contained in fruit, tubers and seeds plants

3.5 Dry Bulb Weight Per Plot and Per Hectare

By using vermicompost fertilizer doses on the dry weight of bulbs per plot and per hectare of shallot plants, statistically significant changes were produced, based on the results of data variance analysis. Results of the F test and LSD test 5% weight dry tubers per plot and per hectare at 52 dap shown in table 7.

Table 7. The Average of shallot's dry weight tubers per plot and per hectare

Treatment	The Weight of shallot's dry tubers		
	Per plot (g)	Per hectare (t)	Improvement (%)
Vermicompost 0 t/ha	863.56 b	8.635 b	-
Vermicompost 10 t/ha	873.00 b	8.730 b	1,1
Vermicompost 15 t/d	1014.22 a	10.142 a	17,45
F test	*	*	
LSD 5%	61.48	614.8	
Biourine plus 0 t/ha	921.44	9214.44	
Biourine plus 1500 l /ha	861.89	8618.89	
Biourine plus 2000 l /ha	967.44	9674.44	
F test	TN	TN	
LSD 5%	-	-	

Notes : Numbers followed by the same letter in the same column No significant different with the 5% LSD test.

Table 7 shows weight tubers dry of shallot per plot and per hectare experience change significant consequence usage fertilizer vermicompost as much as 15 t/ha. With mark weight dry per plot 1014.22 g, and weight dry per hectare is 10,142 t/ha. This is so that the plants can obtain benefit from macro nutrients and micro nutrients N, P, K, C, Ca, Zn, Mg, Mn, Fe, and Fulfat , as well as regulator hormone growth plant like auxin , cytokinin , and gibberellin. According to Fahrudin (2009), fertilizer vermicompost keep necessary nutrients plants , and their applications Can fix texture soil , balancing the pH within land , holding water, and pushing development healthy plants. Hidayatullah et al. (2020), explains fertilizer vermicompost can has N, P, and K increasing Lots If matched with compost.

4. CONCLUSION

It could be concluded that an increase in vermicompost dose dan biourine plus dose was followed by an increase in plant growth. There was an interaction between the treatment doses of vermicompost and biourine plus on plant height, number of leaves (28 and 35 dap), and number of shallot bulbs. There were significant differences in the vermicompost treatment in plant height (14 dap, 21 dap), number of leaves (14 dap, 21 dap), fresh bulb weight, and dry bulb weight of shallots. The vermicompost and biourin plus dose treatment produced a significant impact on plant height and number of shallot leaves but had no effect on shallot yields. Vermicompost 15 t/ha is able to increase the harvest weight of shallots (fresh weight) by 14% and increase the dry weight of tubers by 17.45%.

CREDIT AUTHORSHIP CONTRIBUTION STATEMENT

Mariyatul Qibtiyah: Writing – original draft, Conceptualization, Writing – review & editing, Supervision. Istiqomah Istiqomah: Writing – original draft, data curation, Methodology. Sunarto Sunarto: Writing – review & editing, Conceptualization, Methodology, Supervision.

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CONFLICT OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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