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Application of Petrovita Liquid Fertilizer on the Growth and Yield of Shallot Plants (*Allium Ascalonicum L.*)

Sri Purwanti♥, Budi Utomo, Joko Sri Mulyono
Faculty of Agriculture, Mayjen Sungkono University, Indonesia
♥Corresponding author email: iikpurwanti62@gmail.com

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Abstract. Red onion (*Allium ascalonicum L.*) is a kitchen spice used almost every day by Indonesian people, not to mention small restaurants to large restaurants. The purpose of this study was to determine the application of Petrovita Liquid Fertilizer to the growth and yield of shallot plants. This research research was conducted in 2019 within six months of the year starting from a method using a randomized block design (RBD) consisting of six doses of Petrovita Liquid Fertilizer, with three replications and two sample plants. Use of Liquid Petrovita at doses Z0 = no fertilizer/control, Z1 = 1 ml/l/plant, Z2 = 2 ml/l/plant, Z3 = 3 ml/l/plant, Z4= 4 ml/l/plant, and Z5 = 5 ml/l/plant. Observations consisted of plant length, number of leaves, fresh weight of plants, the weight of plant tubers, and number of plant tubers. The results showed that the dose of Petrovita Liquid Fertilizer Significantly affected all observation variables, namely plant length, number of leaves, number of bulbs, fresh weight of plants and wet weight of shallot bulbs. The treatment of Petrovita Liquid Fertilizer dose of 5 ml per liter of water showed the highest growth and yield with a yield of 30.16 cm plant length, 46.00 leaves, 68.33 grams of wet plant weight, 49.00 grams of tuber weight, and the number of tubers per plant 10.00 although statistically not significantly different from the Petrovita Fertilizer Liquid fertilizer treatment using a dose of 1 ml per liter of water with a plant length of 29.00 cm, number of leaves 34.83, plant wet weight 58.16 gram, tuber weight per plant 38.56 grams and the number of tubers planted were 8.16.
Keywords: liquid fertilizer; liquid petrovita; red onion

INTRODUCTION

Shallots (*Allium ascalonicum* L.) is a basic cooking spice that must be available in the kitchens of Indonesians and overseas because shallots ~~can~~ make dishes rich in flavor and make dishes more delicious also have important health benefits, including being able to nourish the heart, lower LDL cholesterol, reduce hypertension, treat diabetes mellitus, prevent cancer, overcome impotence (Nugrahini, 2013).

Shallots (*Allium ascalonicum* L.) is a kitchen spice used almost every day by the people of Indonesia, roadside food stalls also need shallots every day, of course, in large quantities. In recent times, many Indonesian people have paid attention to their health, from the lower class, middle class to the upper class, by consuming shallots to prevent disease and treat their illnesses. With the above background, it is certain that the demand for shallots from year to year will increase so that shallot producing centers will certainly be unable to meet market demand which will certainly increase every year (Irfan, 2013).

In 2014, Indonesia still imported 74,903 tons of shallots. In 2015 total imports decreased to 17,429 tons. But in 2016 there were no shallot imports, in fact Indonesia was able to export 735 tonnes and in 2017 Indonesia had managed to export 7,750 tonnes of shallots up 93.5% and in 2018 exported shallots to Thailand as much as 5,600 tonnes. It is hoped that in the following year, Indonesia will again be able to increase shallot exports, which initially became a shallot importing country to meet the demand for shallots from several ASEAN countries (Aldila et al., 2017).

Shallot plants (*Allium ascalonicum* L.) are thought to have originated from the Southeast Asian region, namely around India, Pakistan, to Palestine and even the mountainous regions of Iran, Egypt and Turkey (M. A. Ali et al., 2021). Shallots are plants that can grow well and are developed in areas with tropical climates, one of which is in Indonesia, both in the lowlands to the highlands of approximately 1100 m (ideally 0-800 m) above sea level. The best product is produced in the lowlands with temperatures between 25-32ºC and dry

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climates. To grow and develop properly, shallots need an open place with 70% lighting and 80-90% humidity, and 300-2,500 mm rainfall per year (BPPT, 2007). Apart from the above factors, shallot plants require soil with a loose structure and contain lots of organic matter supported by sandy loam or dusty loam soil. Soil types for shallots are Latosol, Regosol, Grumosol and alluvial soil types with soil acidity (pH) of 5.5-6.5 and good drainage and aeration in the soil so that the shallot bulbs do not rot (Luta et al., 2020).

All types of plants, including shallots, to achieve high production yields, it is not enough to rely on nutrients in the soil alone, so plants need to be given additional fertilizer to increase soil fertility (Hariyadi et al., 2018). Fertilizer itself is divided into 2 types of fertilizer, namely organic fertilizer and inorganic fertilizer. Inorganic fertilizers are fertilizers that are made by factories by mixing chemicals and have a high nutrient content (Sopian, 2021).

Meanwhile, organic fertilizers are fertilizers that are partly or wholly derived from organic materials such as plants or animal manure that have gone through an engineering process that can be in the form of solid or liquid used to provide plant nutrient needs and can improve the physical, chemical and biological properties of soil (Nisak et al., 2017). The advantages of using liquid organic fertilizers are that they work faster, can loosen the surface layer of the soil, increase the population of microorganisms, increase the absorption and storage capacity of water and increase soil fertility (M. Ali & Pratiwi, 2022).

Liquid Fertilizer is also very necessary so that it can boost the productivity of shallot plants to obtain good plants besides paying attention to environmental factors, varieties and technical culture, the availability of nutrients for plants is very decisive (Sulardi, 2020). Soil as a factor of production does not always provide nutrients for plants. An alternative that can be done is to provide growth regulators, for example by providing Petrovita Liquid Fertilizer which is currently circulating in the market. In order to find out the method, time and dosage that are effective (effective) for using growth regulators in shallots, it is necessary to study further the use of the Petrovita Liquid Fertilizer growth regulators.

METHODS

This study used a randomized block design (RBD) consisting of six doses of Petrovita Liquid Fertilizer, with three replications and two sample plants. This research was conducted in 2019 within six months of the year starting from a method using a randomized block design (RBD) consisting of six doses of Petrovita Liquid Fertilizer, with three replications and two sample plants. Use of Liquid Petrovita at doses Z0 = no fertilizer/control, Z1 = 1 ml/l/plant, Z2 = 2 ml/l/plant, Z3 = 3 ml/l/plant, Z4= 4 ml/l/plant, and Z5 = 5 ml/l/plant. Observations consisted of plant length, number of leaves, fresh weight of plants, the weight of plant tubers, and number of plant tubers.

The materials and materials used were planting soil, Petrovita Liquid Fertilizer, polybags with a medium size of 5kg, shallot plant seeds, and the tools used: hoes, rulers, stationery, labels, knives, electric scales and other laboratory equipment. The data obtained were processed using the excel data processing program.

RESULTS AND DISCUSSION

Plant Length

The results of the analysis of variance showed that the treatments with different doses of Petrovita Liquid Fertilizer had a significant effect on the length of the shallot plants, when the plants were 20 days, 40 days and 60 days after planting. This is according to the data in table 1 below.

Table 1 shows that the average plant length growth was obtained in treating of Petrovita Liquid Fertilizer with different doses, the average trend was produced by

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K5 using a dose of Petrovita Liquid Fertilizer 5 ml/1 liter of water at 30.16 cm at the age of 60 days after planting. But not significantly different from K1 using a dose of 1 ml Petrovita Liquid Fertilizer/1 liter of water of 29.00 cm, K2 who use the dosage of Petrovita Liquid Fertilizer 2 ml/1 liter of water is 29.16 cm, K3 using a dose of 3 ml Petrovita Liquid Fertilizer/1 liter of water of 29.33 cm, and K4 using a dose of Petrovita Liquid Fertilizer at a dose of 4 ml/1 liter of water, which is 30 cm. While the average of the shortest shallot plants is indicated by K0 or without the Petrovita Liquid Fertilizer treatment, which is equal to 23.00 cm and this treatment was statistically significantly different from other treatments. With this it can be concluded that by increasing the application of Petrovita Liquid Fertilizer to shallot plants, leaf length will also be followed during the growth of shallot plants.

Table 1. Average plant length (cm) of shallots at various ages observations (days)

Treatment	Age Observation (Days After Planting)		
	20	40	60
K0	21,00 a	22,50 a	23,00 a
K1	21,66 ab	25,00 b	29,00 b
K2	22,00 b	25,16 b	29,16 b
K3	22,00 b	25,50 b	29,33 b
K4	22,16 b	26,33 b	30,00 b
K5	23,05 c	26,66 bc	30,16 b
BNT 5%	0,93	1,31	1,26

Note: Numbers accompanied by the same letter in the same column shows no significant difference

Number of Leaves

The results of the analysis of variance also showed that the dosing of Petrovita Liquid Fertilizer had a significant effect on the observed number of shallot leaves, namely when the plants were 20 days, 40 days and 60 days after planting. This is according to the data in table 2.

Table 2 shows that the average number of leaves obtained in the treatment of Petrovita Liquid Fertilizer with different doses, the highest average tendency was produced by K5 i.e. with a dose of 5 ml/1 liter of water Petrovita Liquid Fertilizer of 46.00 at the age of observation 60 days after planting, but not significantly different from the K treatment1 using the Petrovita Liquid Fertilizer dose of 1 ml/1 liter of water which is 34.83, K2 using a dose of 2 ml Petrovita Liquid Fertilizer/1 liter of water of 37.66, K3 using a dose of 3 ml Petrovita Liquid Fertilizer/1 liter of water of 37.83 and K4 using Petrovita Liquid Fertilizer 4 ml/1 liter of water of 38.83 but significantly different from the K treatment or without using Petrovita Liquid Fertilizer, which is equal to 16.33.

Plant Wet Weight

The results of the analysis of variance showed that the treatment with Petrovita Liquid Fertilizer had a significant effect on the wet weight of the shallot plant observation variable. This is according to the data in table 3.

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Table 2. The average number of shallots at various ages of observation

Treatment	Age Observation (Days After Planting)		
	20	40	60
K0	12,16 a	14,33 a	16,33 a
K1	16,16 b	23,16 b	34,83 b
K2	16,33 b	24,33 b	37,66 b
K3	16,50 b	24,50 b	37,83 b
K4	17,00 b	25,16 b	38,83 b
K5	17,33 b	25,66 b	46,00 b
BNT 5%	2,22	4,26	13,05

Note: Numbers accompanied by the same letter in the column, the same shows no significant difference

Table 3. Average wet weight of shallot plants at 60 days of age

Treatment	60 Day Age Observation (gram)
K0	22,10 a
K1	58,16 b
K2	60,43 b
K3	62,36 b
K4	62,56 b
K5	68,33 b
BNT 5%	21,14

Note: Numbers accompanied by the same letter in the column, the same shows no significant difference

Table 3 shows that the average plant wet weight was obtained in the treatment of Petrovita Liquid Fertilizer, the highest average tendency was produced by K5 with a dose of Petrovita Liquid Fertilizer 5 ml/1 liter of water which was 68.33 grams but not significantly different from the K treatment1 using the Petrovita Liquid Fertilizer dose of 1 ml/1 liter of water which is 58.16 grams, K2 who used a dose of 2 ml/1 liter of Petrovita Liquid Fertilizer which was 60.43 grams, K3 using a dose of 3 ml Petrovita Liquid Fertilizer/1 liter of water which is 62.36 grams and K4 who used a dose of Petrovita Liquid Fertilizer which used a dose of 4 ml/1 liter of water which amounted to 62.56 grams but was significantly different from the K treatment or without using Petrovita Liquid Fertilizer of 22.10 grams.

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Tubers Weight per Plant

The results of the analysis of variance showed that the concentration of Petrovita Liquid Fertilizer had a significant effect on tuber weight per plant. This is in accordance with the data in table 4.

Table 4. Average weight of shallot planting bulbs at 60 days of age

Treatment	60 Day Age Observation (gram)
K0	15,45 a
K1	38,56 b
K2	40,10 b
K3	42,56 b
K4	46,36 b
K5	49,00 b
BNT 5%	13,60

Note: Numbers accompanied by the same letter in the column, the same shows no significant difference

Table 4 shows that the average tuber weight per plant was obtained in the treatment of Petrovita Liquid Fertilizer, the highest average tendency was produced by K5 using a dose of Petrovita Liquid Fertilizer 5 ml/1 liter of water which is 49.00 grams but not significantly different from the results of K1 using the Petrovita Liquid Fertilizer dose of 1 ml/1 liter of water which is 38.56 grams, K2 who use a dose of Petrovita Liquid Fertilizer with a dose of 2 ml/1 liter of water of 40.10 grams, K3 using a dose of Petrovita Liquid Fertilizer of 3 ml/1 liter of water of 42.56 grams and K4 using a dose of Petrovita Liquid Fertilizer with a dose of 4 ml/1 liter of water of 46.36 grams but significantly different from K0 or without using Petrovita Liquid Fertilizer of 15.45 grams.

Number of Planted Bulbs

The results of the analysis of variance showed that the concentration of Petrovita Liquid Fertilizer had a significant effect on the number of tubers planted. This is according to the data in table 5 below.

Table 5 shows that the average number of tubers planted was obtained in the treatment of Petrovita Liquid Fertilizer with different doses, the tendency for the highest average was produced by K5 using a dose of Petrovita Liquid Fertilizer 5 ml/1 liter of water of 10.00 but not significantly different from the K treatment1 using the Petrovita Liquid Fertilizer dose of 1 ml/1 liter of water) of 8.16, K2 using the dose of Petrovita Liquid Fertilizer 2 ml/1 liter of water of 8.50, K3 using a dose of 3 ml Petrovita Liquid Fertilizer/1 liter of water of 9.16 and K4 using the dose of Petrovita Liquid Fertilizer 4 ml/1 liter of water of 9.83 but significantly different from K0 or without using Petrovita Liquid Fertilizer of 5.83.

The application of Petrovita Liquid Fertilizer showed that the treatment using Petrovita Liquid Fertilizer had a significant effect on several observation parameters, namely plant length, number of leaves, plant wet weight, number of tubers and tuber weight. The highest average was obtained using a dose of Petrovita Liquid Fertilizer of 5 ml per liter of water with a plant length of 30.16 cm when the shallot plants were 60 days after planting and the number of leaves 46.00. The harvest period

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is carried out at 80 days when shallots experience peak development growth with visible signs of excess 60% of neck stems are soft, plants fall, and leaves turn yellow and many tubers appear on the ground.

Table 5. Average number of shallot planting bulbs at 60 days of age

Treatment	Observation of 60 Days of Age
K0	5,83 a
K1	8,16 b
K2	8,50 b
K3	9,16 b
K4	9,83 b
K5	10,00 b
BNT 5%	1,93

Note: Numbers accompanied by the same letter in the column, the same shows no significant difference

In a previous study, shallots were harvested with a yield of 68.33 gram fresh plant weight, 10.00 tubers and 49.00 gram tuber weight (Dafrita & Sari, 2020). However, statistically the use of Petrovita Liquid Fertilizer at a dose of 5 ml per liter of water was not significantly different from the treatment of the Petrovita Liquid Fertilizer dose of 1 ml per liter of water with a plant length of 29.00 cm, number of leaves 34.83, plant wet weight 58, 16 grams, the number of bulbs was 8.16 and the weight of the bulb was 38.56 grams and was significantly different from the shallot plants without using Petrovita Liquid Fertilizer which had a plant length of 23.00 cm, number of leaves 16.33, fresh weight of plants 22.10 grams, weight tubers 15.45 grams, the number of tubers 5.83.

Giving different doses of Petrovita Liquid Fertilizer is thought to cause different growth of shallot plants and giving certain doses also affects the productivity of shallot plants. This is because Petrovita Liquid Fertilizer is an organic compound made from natural plant extracts whose main ingredient contains hormones that can promote plant growth and development such as Gibberellic Acid. 0.210 g/l, Indole Acetic Acid 0.130 g/l, kinetin 0.105 g/l and Zeatin 0.100 g/l. Other ingredients besides containing growth hormone Petrovita Liquid Fertilizer also contain 17 amino acids and vitamins A, D, E and vitamin K, so that plants have good growth power (Anonymous, 2009). The recommended dose on the product packaging for root crops is 2 ml/l water, but in this study for shallots for the best results it is recommended to use 1 ml/l water.

The results showed that the dosage of Petrovita Liquid Fertilizer had a significant effect on plant length, number of leaves, fresh weight of plants, number of tubers and tuber weight. This can be caused by the content of gibberellin in the form of gibberellic acid, auxin in the form of indole acetic acid and the content of cytokinins in the form of zeatin in Petrovita Liquid Fertilizer which promotes the growth and development of shallot plants.

Previous research reported that lettuce fed with Petrovita Liquid Fertilizer gave the best growth for all observed parameters, namely germination time, germination speed, seedling height, and seedling transfer

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time (Nababan et al., 2018). This is because Petrovita Liquid Fertilizer does not only contain macro and micronutrients, but also contains gibberellic acid, auxins, cytokinins and zeatins, which play an important role in the processes of cell division, cell elongation, and various anabolisms in the plant body.

The advantage of using Petrovita Liquid Fertilizer is that besides being environmentally friendly because it is made from natural plant starch and does not contain ammonia, alcohol, does not contain other toxic substances so it will not damage the soil, the contents in it are also needed for the development and growth of all types of plants (Rhyme, 2021). The use of liquid fertilizer can be applied and can fertilize all types of plants in efforts such as spurring growth while maintaining the balance of development from leaves, flowers, roots, and stems, to the soil (Pranata, 2010). From the leaves, namely accelerating the growth of leaves, they become dense, dense, hard, thick, filled and shiny. From the stem, accelerating the development of the stem in carrying out cell division so that it grows quickly. From flowers, namely accelerating the release of flowers and not easily falling out. From fruit, namely accelerating flower pistils into fruit, fruit is denser, bigger and fuller, more delicious and flavorful. From the roots accelerate the growth of new and sturdy roots. Meanwhile, from the soil to improve soil structure.

CONCLUSION

The treatment of Petrovita Liquid Fertilizer doses had a very significant effect, this means that the treatment of Petrovita Liquid Fertilizer dose has a 100% effect on success in this study effect on all observation variables, namely plant length, number of leaves, number of tubers, fresh weight of plants and fresh weight of shallot (*Allium ascalonicum* L.) bulbs. Petrovita Liquid Fertilizer dose treatment of 5 ml per liter of water showed the highest growth and yield with plant length 30.16 cm, number of leaves 46, wet weight 68.33 gram, number of tubers 10, tuber weight 49 gram, although statistically not significantly different from Petrovita Liquid Fertilizer fertilizer treatment using a dose of 1 ml per liter of water with a plant length of 29 cm, number of leaves 34.83, plant wet weight 58.16 grams, number of tubers 8.16 and tuber weight 38.56 grams.

To obtain better information about Petrovita Liquid Fertilizer, it is necessary to carry out further research regarding the application of Petrovita Liquid Fertilizer to other commodities in different climatic conditions and locations. It is recommended if you want to cultivate shallots, then the recommended dose of Petrovita Liquid Fertilizer is to use a dose of 1 ml per liter of water.

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