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Growth of red onion plant (*Allium ascalonicum L.*) in an application by phosphate solubilizing microbes and goat dung compost

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Abstract

The research was held in the Experimental Farm of the Faculty of Agriculture, Hasanuddin University, Makassar. The purpose of study is to determine the effect of various types of phosphate solubilizing microbes and the provision various doses of goat dung compost on the growth of red onion. The study was arranged in a Separate Plot Design (RPT) with Main Plot (PU) of various doses of goat dung compost consisting of three levels, namely: goat dung compost with dose of 0 tons ha^{-1} (k0), compost of goat dung 5 tons ha^{-1} (k1), goat dung compost 10 tons ha^{-1} (k3), as sub plots (AP) are various types of phosphate solubilizing microbes consisting of four levels namely: without phosphate solubilizing microbes (0), *Streptomyces* sp. (p1), *Bacillus cereus* (p2), *Pseudomonas aeruginosa* (p3). Each treatment was repeated three times. The results was showed that the application of *Pseudomonas aeruginosa* as phosphate solubilizing microbes produced the highest average of plant height (26.90 cm), the highest number of leaves (25.67 leaves) in experiments using red onion plants. Goat dung compost of 10 tons ha^{-1} produced the highest average plant height (29.20 cm), the highest number of leaves (27.37 leaves) in the experiment used red onion plant.

Keywords: Red Onion, Goat Dung Compost, *Pseudomonas Aeruginosa*, *Bacillus Cereus*, *Streptomyces* sp.

INTRODUCTION

Poorly managed technology in agricultural land gives sub-optimal result in terms of quantity and quality harvest of agricultural products. Commonly agricultural intensification was used chemical fertilizers excessively caused pollution in the waters, reduce fertility and soil productivity which ultimately reduces biodiversity by killing soil microorganisms, insects and wildlife that beneficial and playing important roles as a decomposer in nature.

The conventional of the farming system using input in the form of inorganic fertilizer in higher doses, increasing the yield of red onion. However, these techniques caused problems such as hardening of the soil in the planting area, washing of micronutrients, contamination of groundwater, the development of pests and certain diseases that result in decreased land productivity and yield of red onion. The improvement of agricultural cultivation is pursued through environmentally friendly technologies and increasing the quality of agricultural commodity products.

Red onion (*Allium ascalonicum L.*) family Liliaceae is a famous vegetable and forming tuber plant. The red onion is Indonesia's national flagship vegetable commodity with many benefits and high economic value as a source of spices and medicinal plant. The productivity of red onion plant after 2014 until now has decreased from year to year, which is 9.2947 tons/ha in 2017 [1]. Based the demand of red onion, the production and quality yields of them must be increased through intensification. In general, the decrease in red onion productivity is strongly influenced by the declining quality of land fertilities. It caused excessive of land exploitation and fertilizer used exceed the recommended dose.
The importance of macronutrients such as nitrogen, phosphorus, potassium, sulphur, zinc and boron commonly used for the growth and yield of various crops around the world [2,3]. The one important source of them such as inorganic fertilizer. The

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inorganic fertilizer was used in the long term and caused negative impacts such as harden the soil and reduce the stability of soil aggregates [4]. In terms of the use of inorganic fertilizers in high quantities continuously is a way of making fertilizers that are not environmentally friendly and unsustainable on land used for cultivation crops [5]. Commonly phosphorus is a primary essential nutrient element for all plant growth and development. The deficiency in farmlands is obviated by the phosphate fertilizer application [6].

The phosphorus in the form of phosphate nutrient (P) is a macronutrient playing an important role in plant photosynthesis and root development. Phosphate in the soil is mostly bound by colloidal soils that are not available for the plant. These activities made the phosphate fertilizer inefficient and need to be given in high dosage. The availability of phosphate in the soil always under 0.01% of total phosphate. Most forms of phosphate are bound by soil particles and difficult for plants to use. The presence of phosphate-binding causes the phosphate fertilizer inefficient using the recommended dosage and is repeated many times[7]. The ability of a few soil bacteria to transform unavailable forms of phosphorus (P) and potassium (K) to an available form is an important feature in plant growth-promoting bacteria for increasing crop yields of high P and K demand crops [8]. The use of microbial biofertilizers on red onion has several advantages, such as: reduce the need for inorganic fertilizers and able to increase the growth of onion plants [9]. Microbes in the soil can accelerate the supply nutrients for plants by improving the physical, biological and chemical soil. Increasing plant growth and production [10]. Phosphate solubilizing microbes have the ability to secrete phosphatase enzymes that play a role in the hydrolysis of organic P into inorganic P. Some microbial genes of phosphate solubilizing microbes include *Bacillus, Pseudomonas, Arthrobacter, Micrococcus, Streptomyces* and *Flavobacterium* [11].

Pseudomonas and *Bacillus* usually are the phosphate solubilizing bacteria. They have the ability as good biofertilizers by dissolving phosphate elements that are bound to other elements such as Fe, Al, Ca and Mg. The ability of bacteria changes the P element becomes available and easily used by [12]. Soil-dwelling bacteria such as *Bacillus* and *Pseudomonas* also release organic acids and reduce the pH around them to break phosphate bonds in the soil [13] phosphate solubilizing microbes such as *Bacillus pantotheticus*, *Klebsiella aerogenes*, *Chromobacterium lividum* and *Bacillus megaterium* living on *Brassica caventis* resulted from fresh leaves higher than treatment without microbes. The similar result was showed at the finding of that phosphate solubilizing microbes has a positive impact on the growth and P nutrient uptakes of cacao seedlings [14]. In another research, findings that *Bacillus cereus* is a bacteria that has competent supporting plant growth in saline condition [15]. Besides *Pseudomonas* and *Bacillus*, another genus of phosphate solubilizing microbes, such as *Streptomyces* in the soil has several important roles helping the process of decomposition of complex organic materials, namely: lignin, lignocellulose, chitin, cellulose and other materials containing starch [16].

Compost can be an alternative important in increasing the fertility of agricultural land. Compost is made from a variety of organic materials, including crop residues, vegetable residues and livestock manure [17]. Commonly source of manure coming from poultry and livestock such as cow, goat, sheep, horses, pigs and etc [18]. The addition of goat dung compost can be an option for increasing soil organic matter content and improving nutrients in the soil [19]. Organic matter has an important role as a trigger for soil fertility. The most important role of organic matter improves soil physical properties, biological properties (as an energy source for macro and micro soil fauna) and chemical properties of soil [20]. Increased soil biological activity due to the provision of organic material will encourage improvement in soil fertility.

The use of organic fertilizer in the long term has the potential increasing land productivity, preventing land degradation and improving land quality in a sustainable manner. However, application organic fertilizers on land and crops can vary and has an important function in improving the physical, chemical, biological nature of the soil and the environment [21]. Nutrient compost content of goat manure includes P_2O_5 2.21%, K_2O 1.96%, organic C 15.41%, organic N 0.74%, organic C/N 21 and pH 6.84. The purpose of the research is to determine the effect of goat dung compost and various types of phosphate solubilizing microbes on the growth of red onion.

The results analysis of the findings that the use of phosphate solubilizing microbes and goat dung compost as a solution to land degradation was a problem. This is the negative impact of land degradation as a result of the conventional application to red onion plants in the past. This activity is an effort to returned organic material into the soil by utilizing beneficial soil microbes on the red onion. The application of goat dung compost and phosphate solubilizing microbes will be improving microbial activity in the soil more varied and stabilizes in the soil habitat.

MATERIALS AND METHODS

Site of Research

The experiment was conducted at the Experimental Farm, Faculty of Agriculture, Hasanuddin University, Makassar. The study was conducted from March to July 2019.

Materials

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Materials was used at research in the laboratory and land is red onion seeds (variety Super Philip), microbes medium (such as NB/*Nutrient Broth* and NA/*Nutrient Agar*), alcohol 70%, bunsen, aquades, aluminum foil, cotton, masks, tissues, rubber gloves, plastic wrap, label paper, plastic ropes, goat dung compost, urea fertilizer, fertilizer namely NPK Mutiara 16-16-16, clear plastic bags, isolates of phosphate solubilizing microbes (*Streptomyces sp*, *Bacillus cereus* and *Pseudomonas aeruginosa*).

The tools were used in research as laboratory equipment: analytical scales, autoclaves, 1000 ml measuring cups, 1000 mL Erlenmeyer, Laminar Air Flow Cabinets (LAF), hot plates, incubators/shakers, oven, petri dishes, UV-Vis spectrophotometers (LAF Spectronic 20D), spatula, needle, test tube and dropper. The field equipment in the experimental farm of the Faculty of Agriculture, Hasanuddin University Makassar, such as: ruler, lawnmower, tractor, hoe, sprayer, jar, bucket, knife, scissors, stakes, digital camera/mobile phone, ballpoint, pencil, notebook and watering can.

Propagation of Phosphate Solubilizing Microbes

The isolates of phosphate solubilizing microbes (*Streptomyces sp., Bacillus cereus* and *Pseudomonas aeruginosa*) were cultured into 1 litre of *Nutrient Broth* solution, respectively. Then the solution was stored inside the incubator for one week. After the solution turns into concentrated, the next step is to determine the density of bacterial colonies with diluted the isolate into obtain a density of $1x10^{-6}$ cfu. Application in the field about one week after planting with dose 2 cc/plant and 5 weeks after planting with dose 10 cc/plant.

The Research Design

The study was arranged in a Separate Plot Design (SPD) with the main plot (PU) various doses of goat dung compost divided into 3 levels: goat dung compost with dose 0 tons ha^{-1} (k0), goat dung compost dose of 5 tons ha^{-1} (k1), goat dung compost 10 tons ha^{-1} (k3), as subplots (AP) various types of phosphate solubilizing microbes divided into 4 levels: without phosphate solubilizing microbes (p0), *Streptomyces* sp. (p1), *Bacillus cereus* (p2) and *Pseudomonas aeruginosa* (p3). Each treatment was repeated in 3 times, with a total 36 units of the experimental plot.

Research Implementation

The research activities such as: preparation of goat dung compost, preparation of phosphate solubilizing microbes, land preparation, selection of red onion seedling, planting the red onion, phosphate solubilizing microbes application, maintenance of plant (watering in the morning and evening, weed control by manual, pest and disease control, harvest.

Parameter of Observation

The parameters were observed in research: measure the increase in the number of red onion leaves, a measure of plant height, tissue analysis N and P from red onion leaves.

RESULTS AND DISCUSSION

The Plant Height (cm)

The results observations of average plant height and their variance was showed that goat dung compost treatment had a significant effect. In a similar parameter, the treatment used various types of phosphate solubilizing microbes, giving a very significant effect on plant height at 9 WAP (the week after planting).

Table 1: The average height of red onion plant with treatment goat dung compost and various types of phosphate solubilizing microbes at 9 WAP

Goat Dung Compost (K)	Phosphate Solubilizing Microbes (P)				Average	LSD 0.05
	Control (p0)	*Streptomyces* (p1)	*Bacillus cereus* (p2)	*Pseudomonas aeruginosa* (p3)		
Control (k0)	17.01	18.97	20.06	22.79	19.7 b	4.70
5 ton.ha^{-1} (k1)	22.96	26.15	27.49	26.99	25.9 a	
10 ton ha-1(k2)	26.70	29.76	29.53	30.93	29.2 a	
Average	22.22 r	24.96 q	25.69 pq	26.90 p		
LSD 0.05			1.87			

Note: The numbers followed by the same letters in columns (a, b) and rows (p, q, r) are not significantly different in the LSD test with $\alpha = 0.05$

Based LSD test in α 0.05 at Table 1 was showed the treatment of 10 ton ha^{-1} goat dung compost (k2) application on red onion plant has the highest average plant in 29.2 cm and significantly different from the control treatment (k0), but not significantly different with the treatment of goat dung compost 5 ton ha^{-1} (k1) at 9 WAP. The treatment using phosphate solubilizing microbe *Pseudomonas aeruginosa* (p3) was showed the highest average plant in number 26.90 cm and significantly different from other treatments. However, the result not significantly different from the treatment of *Bacillus cereus* (p2) at 9 WAP of red onion.

The results analysis of plant height increased with the treatment used phosphate solubilizing microbe in observations of 1 to 11 WAP presented in Figure 1.

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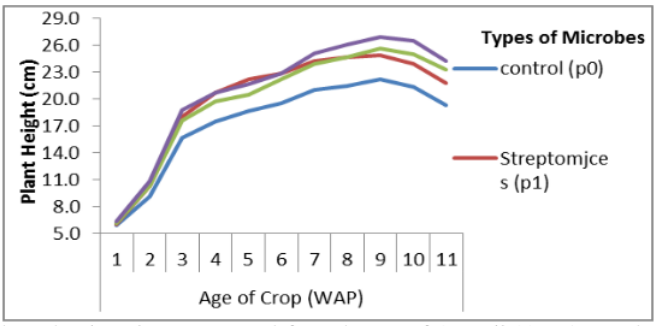

Figure 1: The height of the red onion plant was started from the age of 1 until 11 WAP used various types of phosphate solubilizing microbes.

Figure 1 was showed a condition of red onion height increased from 1 to 11 WAP. The peak point of plant height increase in the treatment of various types of phosphate solubilizing microbes occurred at 9 WAP. When 10 and 11 WAP, unfortunately, there was a decrease in plant height. The treatment using a microbe of *Pseudomonas aeruginosa* (p3) produced the highest rate increased in plant height while the lowest value was indicated by the treatment without used phosphate solubilizing microbes (p0).

The Number of Red Onion Leaves (leaves)

The results of observations of the average number of red onion leaves and their variance showed that the goat dung compost treatment had a significant effect. On the other side, the treatment of various types of phosphate solubilizing microbes had a very significant effect on the average number of red onion leaves at the age 6 WAP.

Table 2: The average number of red onion leaves with treatment used goat dung compost and various types of phosphate solubilizing microbes at the age 6 WAP.

Goat Dung Compost (K)	Phosphate Solubilizing Microbes (P)				Average	LSD 0.05
	Control (p0)	*Streptomyces* (p1)	*Bacillus cereus* (p2)	*Pseudomonas aeruginosa* (p3)		
Control (k0)	14.47	16.60	18.60	20.87	17.63 b	3.26
5 ton.ha $^{-1}$ (k1)	22.13	23.47	26.47	27.27	24.83 a	
10 ton ha-1(k2)	22.00	30.87	27.73	28.87	27.37 a	
Average	19.53 q	23.64 p	24.27 p	25.67 p		
LSD 0.05	2.52					

Note: The numbers followed by the same letters in columns (a, b) and rows (p, q) are not significantly different in the LSD test with $\alpha = 0.05$

The LSD results $\alpha = 0.05$ in Table 2 was shown that the treatment of 10 tons ha^{-1} goat dung compost (k2) on red onion plants produced an average of the highest number of about 27.37 leaves. There are significantly different from the control treatment (k0) but was not significantly different from the treatment of goat dung compost 5 tons ha^{-1} (k1) at 6 WAP. *Pseudomonas aeruginosa* (p3) as one of phosphate solubilizing microbes treatment produced the highest average number, about 25.67 leaves and significantly different from the control treatment (p0), but not significantly different from the phosphate solubilizing microbes treatment of *Bacillus cereus* (p2). Another phosphate solubilizing microbes treatment used *Streptomyces sp*. (p1) not significant on the average number of leaves when 6 WAP. Increasing the number of leaves by treating various types of phosphate solubilizing microbes (p) in observation of 1 to 11 WAP was presented in Figure 2.

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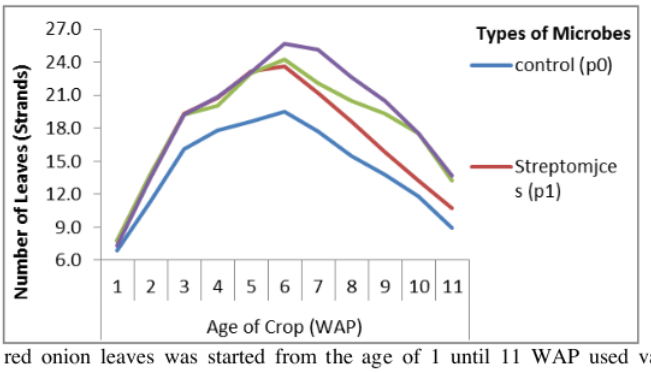

Figure 2: The number of red onion leaves was started from the age of 1 until 11 WAP used various types of phosphate solubilizing microbes.

Figure 2 was showed an increased in the plant height from 1 to 11 WAP. The peak point of the increased number of red onion leaves in the type of phosphate solubilizing microbial treatment occurred on 6 WAP. However, the number of leaves decreased from 7 to 11 WAP. The treatment used microbe *Pseudomonas aeruginosa* (p3) produced the highest rate of leaves growth while the lowest was shown by the treatment without phosphate solubilizing microbes (p0).

N Analysis Content of Red Onion Leaves (%).

The results observation average content of N leaves and their variance showed that there was a very significant interaction between goat dung compost compare various types of phosphate solubilizing microbes to the average of N leaves at 11 weeks after planting (Table 3).

Table 3: Average levels of N at red onion leaves with treatment goat dung compost and various types of phosphate solubilizing microbes on 11 WAP.

Goat Dung Compost (K)	Phosphate Solubilizing Microbes (P)				LSD *a*0.05
	Control (p0)	*Streptomyces* (p1)	*Bacillus cereus* (p2)	*Pseudomonas aeruginosa* (p3)	
Control (k0)	1.07_{ab}^{r}	1.26_{c}^{q}	1.28_{b}^{q}	1.51_{ab}^{p}	
5 ton.ha^{-1} (k1)	1.01_{b}^{q}	1.42_{b}^{p}	1.40_{b}^{p}	1.44_{b}^{p}	0.13
10 ton ha-1(k2)	1.17_{a}^{q}	1.57_{a}^{p}	1.60_{a}^{p}	1.57_{a}^{p}	
LSD *a* 0.05	0.12				

Note: The numbers followed by the same letters in columns (a, b) and rows (p, q) are not significantly different in the LSD test with $\alpha = 0.05$

LSD test results α 0.05 in Table 3 was showed that the treatment of goat dung compost and various types of microbes have an effect increased the average levels of N content of red onion plant. The treatment used 10 tons of ha^{-1} goat dung compost and the bacterium *Pseudomonas aeruginosa* (k2p3) was produced the highest average content of N leaves about 1.57% and significantly different from the control treatment (k0p0).

Currently, many efforts were made to reduce the use of inorganic fertilizers continuously because their final result contributes to the decrease of soil fertility and field hardened. This condition caused the red onion production and productivity decrease in harvest. The use of goat dung compost and various types of phosphate solubilizing microbes can be combined and positive impact reduced the use of inorganic fertilizers. Another benefit improves soil fertility that connects increasing the production and productivity of high value of agricultural crops, especially red onion.

Interaction of Goat Dung Compost with Various Types of Phosphate Solubilizing Microbes

Treatment using goat dung compost can bind and store nutrients, also improving soil fertility. The treatment of various types of phosphate solubilizing microbes were giving more help dissolving phosphate in the soil, which acts as a binder as well as adding nutrients to the soil needed red onion for growth. The amount of nutrients lost due to soil washing can be replaced by giving a combination of goat dung compost and various types of phosphate solubilizing microbes.

The result of tissue analysis about nutrient level from red onion leaves was showed a very significant interaction between goat dung compost and various types of phosphate solubilizing microbes to nutrient content in leaves such as N (Table 3) and P (Table 4) as important material for plant growth. The results of observing leaves nutrient levels were carried out at the end of the study. Leaf analysis was used to determine whether differences in nutrient content will explain the abnormal appearance of certain parts of the plant. Contain level of N and P as an essential material in the red onion leaves indicated that good activity of goat dung compost and various types of phosphate solubilizing microbes increasing the number of nutrients in plant growth.

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The aims giving treatment used goat dung compost and phosphate solubilizing microbes in improving and increasing the fertility of soil nutrient content, especially P in the form available in the soil as well as an energy source for the development of phosphate solubilizing microbes. Increasing the number of nutrients in the soil has a positive impact on nutrient uptake and plant growth. The nutrient uptake by plants reflecting by soil and plant nutrient conditions. If soil conditions (in physical, chemical and biological characteristics) supporting plants grow well, plant roots will produce absorbing nutrients more effectively.

Effects of Different Types of Phosphate Solubilizing Microbes

The treatment used various types of phosphate solubilizing microbes giving a very significant influence on the growth of red onion plant. There was shown in the parameters of plant height (Table 1) and the number of leaves (Table 2). The data was showed that plant height and the number of red onion leaves increased from 1 to 11 WAP used various types of phosphate solubilizing microbes treatment on a weekly as presented in Figure 1 and Figure 2.

The treatment used *Pseudomonas aeruginosa* as phosphate-solubilizing microbes at parameters plant height and leaves number, giving better results compared to another type of phosphate solubilizing microbes. The result of *Pseudomonas aeruginosa* was significantly different from the control treatments. It is suspected that the bacteria *Pseudomonas aeruginosa* can be adapted well and increasing the dissolution of the bound phosphate into an available form. This is indicated they increase the availability of phosphate in the soil that is absorbed by plants and affected into plant growth. Also, phosphorus in the soil and plant tissue playing an important role in plant growth and development.

In the plant physiological processes, phosphate playing an important role in the process of photosynthesis on plants in the phase of energy formation in the form of ATP. The provision of phosphate solubilizing bacteria increasing the P content in the soil, thereby increasing the rate of photosynthetic assimilation due to sufficient energy needs. The phosphorus was playing an important role in plants as energy-carrying compounds to carry out various metabolic processes, both as a constituent of ATP derivatives and as a constituent of NADP.

They were giving treatment with *Pseudomonas aeruginosa* as a phosphate solubilizing microbes increasing the availability of phosphate present in the soil. This condition because *Pseudomonas aeruginosa* as a rhizosphere bacteria, has ability to dissolving phosphates and symbiosis with roots. The ability of bacteria supporting storage of phosphate in the soil needed by the plant. Another interesting fact, *Pseudomonas aeruginosa* avoid losing of the P nutrient content reduced and the fertilizing process more efficient. The rhizosphere bacteria *Pseudomonas aeruginosa* has the capacity as a phosphate solubilize. Another advantage if they are applied around the crops, the bacteria more capable producing phytohormones and antagonistic (produce some toxin) to control soil-borne pathogens. This fact was showed that the application of the *Pseudomonas aeruginosa* provide more benefits to plant, especially red onion which is a commodity for trials in this study. Another species of *Pseudomonas* such as *Pseudomonas plecoglossicida* (PSB-5) playing an important role in plant growth promotion and improvement of soil fertility for maize and wheat in different agroclimatic regions.

As we know, phosphorus is an essential nutrient needed by plants in stimulating the growth of plant roots and another part of them. The presence of phosphorus solubilizing bacteria were giving more help in the absorption of nutrients in the soil. The ability of bacteria that solubilizing phosphate in the soil playing an important role in providing nutrient requirements for crops such as red onion plants. This is guarantee the availability of P in the soil will more increase. In general, phosphorus plays an important role and responsibility in all metabolic processes that occur at plant tissue. The phosphorus metabolism is closely related to photosynthetic phosphorylation in photosynthesis and phosphorylation processes. Phosphates that have undergone a metabolic process into ATP are quickly absorbed by subsequent metabolic reactions into phosphorylated plant parts by producing large amounts of sugar-phosphate, phospholipid and nucleotides.

Effect Different Dose of Goat Dung Compost

The treatment used several dose levels of goat dung compost also had a significant effect on the growth parameters of plant height (Table 1) and the number of red onion leaves (Table 2). The results of the average plant height and the highest number of leaves obtained in the dose of goat dung compost were 10 tons ha^{-1}. This proves that the applied of goat dung compost has a significant to a very significant effect on the growth of plant height and the amount forming of red onion leaves.

The results of previous studies were showed that the dose of 10 tons of ha^{-1} the nutrients provided was available in an optimal, balanced amount and were able to supply nutrients to increase the height of bean plants. The provision of poration is beneficial for plants in providing elements of N, P, K, enlarging the soil exchange cation capacity and increasing soil P solubility, which is essential for plant growth.

The nutrient such as phosphorus (P) has the function to transfer energy to all parts of the plant, useful for stimulating the growth and development of roots, especially the roots of young plants. However, the main component of various important substances in the formation of plant leaves. The plant showed a very high response to the treatment of nitrogen because nitrogen is the main nutritional element in the preparation of amino acids and protein.

The treatment of several levels dose of goat dung compost had a significant effect on plant height parameters (Table 1) and had a very significant effect on the number of leaves parameters (Table 2). The results of the experiment showed the highest result in

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the parameter of plant height about 29.2 cm and the number about 27.37 leaves in the provision dose of goat dung compost as much as 10 tons ha^{-1}.

This proves that the applied of goat dung compost has a significant effect on the growth parameters of red onion. Giving goat dung compost has a positive impact by helping improving physical, chemical and biological soil properties. Improvement of soil physical properties due to the presence of organic material is a loose-grain adhesive or aggregate-stabilizing agent. Improvement of soil chemical properties due to organic matter also helps plant roots penetrate the soil deeper. The plant more able to absorb nutrients and water in large quantities; improve the rhizosphere that maintains the nutrient cycle, improves the exclusion by plant roots which increasing the degradation of soil organic matter and N mineralization contained in the soil. Improvement the soil biological properties due to the presence of organic material which is the energy source of most soil-dwelling organisms, especially microbes.

The research has been done can be an illustration of the benefits of giving goat dung compost mixed with phosphate solubilizing microbe. This combination can increase the vegetative growth of the red onion. The findings of the research as a recommendation increasing regional productivity is the centre of red onion planting in Indonesia.

CONCLUSION

The conclusions of this study is:

1. There is a very significant interaction between phosphate solubilizing microbes and goat dung compost. The use of 10 tons ha-1 of goat dung compost and rhizosphere bacteria *Pseudomonas aeruginosa* produced the highest N content in leaves analysis (1.57%) and P content in the similar analysis (2.35%).
2. *Pseudomonas aeruginosa* as phosphate-solubilizing microbe was produced the highest average of plant height (26.90 cm) and the highest number of leaves (25.67 leaves) in the experiments used red onion.
3. The dose of 10 tons ha-1 of goat dung compost was produced the highest average of plant height (29.20 cm) and the highest number of leaves (27.37 leaves) in the experiment used red onion.

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