

Does Swallow Droppings and NPK Fertilizer Have a Good Impact on Onion Growth And Results on Peat?

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ABSTRACT

Shallots are one of the horticultural commodities that are very often used to be a flavoring for dishes. Tanah peat as a medium for growing shallots has many obstacles including low nutrient availability, low pH, organic matter that has not been decomposed so that the nutrient content especially macro nutrient such as low N, P and K. Usaha to fix it is to give swallow manure and NPK compound fertilizer. The purpose of this research is to obtain the interaction of doses of swallow manure and NPK fertilizer for the best growth and yield of shallots on peatlands. This research was carried out on March 7, 2020 to May 9 2020 at Jalan Reformasi, Southeast Pontianak District, Kota Pontianak, West Kalimantan. The design used in this study is a Randomized Design of Factorial Group (RAKF) which consists of 2 factors, namely the first factor is the application of swallow feces consisting of 3 levels, and the second factor is the application of NPK fertilizer, whose plot consists of 3 levels with a total of 9 treatments including 20 tons / hectare of swallow manure and 400 kg / hectare of NPK fertilizer, 20 tons of swallow manure and 500 kg/hectare of NPK fertilizer, 20 tons/hectare of swallow manure and 600 kg/hectare of NPK fertilizer, 30 tons/hectare of swallow manure and 400 kg/hectare of NPK fertilizer, 30 tons/hectare of manure swallows and 500 kg/hectare of NPK fertilizer, 30 tons of swallow manure and 600 kg/hectare of NPK fertilizer, 40 tons/hectare of swallow manure and 400 kg/hectare of NPK fertilizer, 40 tons/hectare of swallow manure and 500 kg/hectare NPK fertilizer, 40 tons/hectare of swallow manure and 600 kg/hectare of NPK fertilizer. The treatment was repeated 3 times, and each experimental unit consisted of 15 plant samples. The variables in this study were planting height, number of leaves per clump, number of saplings per clump, root volume, total dry weight per plant, fresh weight of tubers per clump, dry weight wind tubers per clump, yield per plot, The results of the research showed that the application of 30 tons / hectare of swallow manure and 400 kg / hectare of NPK fertilizer on shallots was the best interaction dose to increase the yield of fresh weight of bulbs and wind dry weight of tubers.

Keywords: Shallots; Peat; Swallow Otoran; NPK Fertilizer.

INTRODUCTION

Shallots (*Allium ascalonicum* L) are one of the horticultural commodities that are very often used to be a flavoring for cooking. The content contained in shallots is nutritional and also compounds that are classified as non-nutritional substances and contain enzymes that are beneficial for therapy, improving and maintaining the health of the human body. The chemical composition found in onion plants includes per 100 g of bulbs is water 80-85 g, protein 1.5 %, fat 0.3 %, carbohydrates 9.2 %, carotene 50 IU, thiamin 30 mg, riboflavin 0.04 mg, niacin 20 mg, and phosphorus 40 mg, (Wibowo, 2009).

Shallot production in West Kalimantan in 2015 was 15 tons (Central Statistics Agency of West Kalimantan 2017), while in 2015 shallot consumption was 8,950 tons, and in 2016 there was an increase in consumption of 9,085 tons. Shallots as a horticultural commodity are widely consumed by people in West Kalimantan, while production is still very lacking in West Kalimantan, therefore opportunities for developing shallot cultivation businesses are still very open to the community (Agricultural Technology Assessment Center, 2016).

Onion cultivation in peat soils is still slightly carried out due to the constraints contained in peat soils that can inhibit plant growth, including acidic soil pH which is worth below 5 while onion plants usually grow in soils with a pH of 5.6 - 6.5 (Horticultural Research and Development Agency, 2019). Disruption of the root system and affecting plants to absorb nutrients (Winarso, 2005), in addition to that many compounds are racun for plants, as well as the low decomposition of organic matter by microorganisms because only a few microorganisms are able to live in anaerobic conditions.

Swallow manure can be used as an enhancer of nutrient content in the soil and as a substitute for manure. The use of swallow manure has a very important function including being able to increase the ability of the soil to hold water, improve soil chemical properties, namely by increasing the nutrient content and can improve soil biological properties by increasing the number and activity of microorganisms. The nutrient content contained in swallow manure includes C-Organic 57.35%, N / Total 3.95%, and C / N Ratio 14.52 with a pH of 5.64, Phosphorus 2.00%, Potassium 0.13%, Calcium 0.92%, Magnesium 0.24% (Laboratory of Chemistry and Soil Fertility, Faculty of Agriculture, University of Tanjungpura, 2019).

NPK fertilizer contains elements that are needed by plants including nitrogen which is useful for the formation of chlorophyll, protein formation, and can increase plants to absorb other elements such as phosphorus, potassium and others, (Samadi and Cahyono, 1996). Phosphorus plays a role in the energy transfer process to support various other processes in plants such as osmotic work, glycolysis, ion transfer and photosynthesis reactions, (Poerwidodo, 1993). Potassium is an element that is needed for the development of tubers because potassium plays a role in helping the process of photosynthesis, by forming new organic compounds that are transported to the organs where the hoarding is the tubers (Samadi and Cahyono, 1996). Based on the description above, research on the effect of swallow manure and NPK on onion growth and yield on peatlands needs to be carried out.

The use of organic fertilizers for onion plants is very important, until now there are no definite recommendations regarding the recommended dosage of the use of organic fertilizers in peat soils. According to Firmanto (2011), the recommended dose of manure use for shallots on peatlands is around 30 tons per hectare. According to Wibowo (2009), the recommended dose for applying manure to shallot crops on peatlands ranges from 10-15 tons per hectare

According to Lingga and Marsono (2003), the application of organic fertilizers into the soil can add nutrients that can increase growth optimally. Winarso (2005) stated that the addition of organic matter is also very strong in its effect towards improving soil properties, especially to increase nutrients in the soil so that nutrient levels can be used by plants.

The results of research by Nugroho and Firmansyah (2016), showed that the wet weight of shallots in the swallow manure treatment tended to be the highest compared to the application of chicken manure and quail droppings, which was 1.59 tons / ha, while chicken and quail manure was 0.82 tons / ha and 1.41 tons / ha.

The results of Hekhusetya's research (2019), the application of duck manure as much as 2 kg / plot or 13.4 tons / ha on shallot plants in peat soils showed that the average fresh weight of bulbs per plot had the highest value of 4 kg while without manure it was only 3.8 kg.

Npk fertilization recommendations for shallots on peatlands according to BPTP West Kalimantan (2019), are 500 kg/ha with three applications, namely for basic fertilization of 200 kg/ha, second follow-up fertilization at the age of 20 days after planting at a dose of 200 kg/ha and third follow-up fertilization at the age of 40 days after planting at a dose of 100 kg/ha

According to Rukmana (1995), the dose of NPK fertilizer (15:15:15) for a land area of 1 hectare is 300-400 kg. Half the dose of fertilizer is applied at the time of planting, that is, it is mixed evenly with the soil or by means of tugal.

According to Saputra (2016), the best NPK fertilizer dose for biofertilizer application in onion plants in the range of 730-1,300 kg/hectare is indicated by the increase in bulb volume, the wet weight of bulbs per plot, and the dry weight of tuber wind per sample. The purpose of this study was to obtain the interaction of doses of swallow manure and NPK fertilizer for the best growth and yield of shallots on peatlands.

METHOD

The research was conducted on peatlands of Jalan Reformasi, Southeast Pontianak District, Pontianak City, West Kalimantan at an altitude of 1-2 m above sea level for 64 days, from March 7 to May 9, 2020. The design used in this study is a Factorial Group Randomized Design (RAKF) which

consists of 2 factors, namely: The first factor is the p bucket of swallow manure consisting of 3 levels including 20 tons / ha, 30 tons / ha and 40 tons / ha. The second factor is the application of NPK fertilizer which consists of 3 levels, namely 400 kg / ha, 500 kg / ha and 600 kg / ha.

The soil used in this study is peat soil. Before the soil is used it is first cleaned of dirt of plant debris and, roots-akar and grass. After that, the soil is loosened using a hoe while making beds with a size of 1 m x 0.6 m as a treatment plot with the distance between plots is 25 cm and the distance between tests is 50 cm, then dolomite lime and swallow manure are applied by mixing evenly on each plot, for dolomite lime is given with doses of 1.1 kg, while for swallow feces, each was given with a dose of each treatment including w1n1 = 1.2 kg / plot, w1n2 = 1.2 kg / plot, w1n3 = 1.2 kg / plot, w2n1 = 1.8 kg / plot, w2n2 = 1.8 kg / plot, w2n3 = 1.8 kg / plot, w3n1 = 2.4 kg / plot, w3n2 = 2.4 kg / plot, w3n3 = 2.4 kg / plot. then incubated for 21 days.

The onion bulbs used in this study were bulbs with blue-labeled Header Varieties (scatter seeds) and were characterized by good, healthy, hard bulb shapes and slippery surfaces and raging. Planted onion bulbs are bulbs weighing 3-4 g and uniformly that come from single and intact bulbs and are not deformed. Before planting the seeds are first cleaned of the remnants of the roots and the outer skin of the tubers that have dried out, after which the tip part is cut off using a knife.

Planting onion bulbs is carried out by immersing onion bulbs in planting holes that have been made on the plot. The top of the cut tuber is also immersed and do not let the tip of the tuber be covered with soil to prevent rotting in 1 planting plot with a plot area of 0.6 m² using a planting distance of 20 x 20 cm, so that in 1 plot there are 15 plants. Planting onion seeds is carried out in the afternoon.

NPK fertilization (15:15:15) is carried out 2 times, namely at the time of planting and 14 days after planting (Rukmana., 1995). The fertilizer applied is a compound NPK with doses of each treatment adalah: w1n1 = 12 g / plot, w1n2 = 15 g / plot, w1n3 = 18 g / plot, w2n1 = 12 g / plot, w2n2 = 15 g / plot, w2n3 = 18 g / plot, w3n1 = 12 g / plot, w3n2 = 15 g / plot, w3n3 = 18 g / plot. Fertilizer application is carried out by watering each plant.

Embroidery do 1 week after planting, in diseased plants it is replaced with a new plant. Watering plants is carried out 2 times a day until the plants form bulbs which are carried out in the morning and evening, after the plants form tubers, watering is carried out only 1 time, namely in the morning. Weeding is carried out by pulling out weeds that are in the treatment plot and around the research site.

Harvesting is carried out after the plant is 64 days old and is characterized by the appearance of onion bulbs, 80% of the leaves have begun to fall down and the color of the leaves turn yellow, the neck of the stem begins to droop, and the bulbs begin to cul the surface of the soil. Harvesting shallots is carried out by pulling out plants so that the bulbs can be pulled out of the soil (West Kalimantan Agricultural Research and Development Agency, 2019).

The variables in this study were plant height, number of leaves per clump, number of saplings per clump, root volume, total dry weight per plant, fresh weight of tubers per clump, dry weight of tuber wind per clump, yield per plot, supporting variables are daily air temperature, daily air humidity and rainfall. The data obtained were analyzed by diversity analysis, then if it had a real effect, it was continued with the BNJ test at a level of 5%

RESULT AND DISCUSSION

The results of the diversity analysis showed that the dose treatment of swallow manure had a significant effect on the variables of fresh weight of tubers per plot and dry weight of tubers per clump, the interaction between the two factors had a significant effect on variable fresh weight of tubers per plot can be seen on Tabel 1 and 2.

Table 1. Honest Real Difference Test The Effect of The Interaction of Swallow Manure and NPK Fertilizer on the Fresh Weight of Tubers per Plot (g)

Swallow Manure (tons/ha)	NPK fertilizer (kg/ha)		
	400	500	600
20	295.29 b	377.51 ab	385.33 ab
30	379.57 ab	417.75 ab	417.55 ab
40	475.58 a	460.23 ab	535.76 a
BNJ 5% = 176.69			

Description: Numbers followed by the same letter in the same column are different from real on the BNJ Test at a level of 5%.

The results of the BNJ Test in Table 1 show that the fresh weight of tubers per plot at the application of NPK fertilizer doses of 400 kg / hectare, the addition of swallow manure at a dose of 40 tons / hectare is significantly different when compared to the dose of swallow manure of 20 tons / hectare but is not real when compared to the dose of swallow manure 30 tons / hectare, while in the application of NPK fertilizer doses of 500 kg / hectare and 600 kg / hectare of swallow manure application at a dose of 20 tons / hectare, 30 tons/hectare and 40 tons/hectare are differently unreal.

Table 2. Test the Real Difference Honestly The Effect of Swallow Manure on the Dry Weight of Tubers per Clump (g)

Swallow Manure (tons/ha)	Average
20	33.47 b
30	49.98 a
40	47.81 ab
BNJ 5% = 14.50	

Description: Numbers followed by the same letter in the same column are different from real on the BNJ Test at a level of 5%.

Table 2 shows that the dry weight of tubers per clump with the application of swallow manure at a dose of 30 tons / ha is significantly different from the dry weight of tubers per clump by the application of swallow manure dose 20 tons/ha but the difference is not real when compared to the administration of swallow manure at a dose of 40 tons/ha.

Discussion

The results showed that in the variable average value of plant height at the observation of 5 MST was 40.92 cm when compared to the description, which ranged from 26.4-40 cm, the variable number of leaves the average value at the observation of 5 MST was 27.29 strands when compared to the description was 15-45, and the variable number of saplings had an average value at 5 MST was 6.26 saplings and in the description range from 6-12 saplings. From the data, it shows that the average value in the variables of plant height, number of leaves and number of saplings have met the criteria when compared to the description, this proves that the availability of nutrients needed by plants for plant height growth, the number of leaves and the number of onion saplings have been met.

The application of NPK fertilizer is very useful for plants, including nitrogen which is useful for chlorophyll formation, protein formation, and can increase plants to absorb other elements such as Fosfor, Potassium (Samadi and Cahyono, 1996), while phosphorus has a role in the energy transfer process to support various other processes in plants such as osmotic work, glycolysis, ion transfer and photosynthesis reactions, (Poerwidodo, 1993), and the use of potassium for plants is an element that is needed for the development of tubers because Potassium plays a role in helping the process of photosynthesis, by forming new organic compounds that are transported to the organs where the hoarding is tubers (Samadi and Cahyono, 1996).

The provision of kotoran swallow gives souvenirsngan to increase thepH of the soil to increase the pH of the peat soil. The increase in soil pH when incubated along with the administration of swallow manure and dolomite lime in each treatment undergoes almost the same changes. In treatment with a dose of swallow manure of 20 tons / hectare is 5.26, while in treatment with a dose of 30 tons / hectare is 5.49, and in the treatment of 40 tons / hectare is 5.60 one of the conditions for growing shallots is that it must have a soil pH between 5.6 - 6.5 (Horticultural Research and Development Agency., 2018), soil pH is very influential on plant growth, such as the availability of nutrients for plants, one of which is the availability of nitrogen, phosphorus and potassium elements (Lubis, et al., 2015).

Various kinds of dosing of swallow manure and NPK fertilizer are thought to be equally good in providing nutrients needed by onions and in increasing the pH of peat soils so that they are in accordance with the requirements for onion growing, and causing an unreal influence on the variables of plant height, number of leaves, number of saplings and root volume.

The results of the diversity analysis showed that the treatment of various kinds of swallow manure and NPK fertilizer and their interactions had an intangible effect on the variable fresh weight of tubers perclump and dry weight of wind per clump. A very important element in the development of bulbs is the element K (potassium), it is suspected that the K content given to onions through swallow manure and NPK fertilizer is equally good in the process of bulb development. The results showed that the average value of the fresh weight of shallot bulbs per rumpun was 89.88 g and when compared to the description was 32.5-68.4 g, from the data showed that the fresh weight of onion bulbs had met the criteria according

to the description Potassium elements have an important role as catalysts in the change of proteins into amino acids, constituents of carbohydrates, regulates the accumulation and translocation of carbohydrates formed, element K also has a role in enzyme activators in the process of photosynthesis, therefore element K is needed more than other elements, especially in root crops (Sumiati and Gunawan., 2007).

The results of the diversity analysis showed that there was an interaction in the variable fresh weight of tubers per plot so that it was continued with the BNJ Test with a tare of f 5%. The results of the BNJ Test in Table 1 show that the fresh weight of tubers per plot on the application of NPK fertilizer doses of 400 kg / hectare, the addition of swallow manure at a dose of 40 tons / hectare is significantly different when compared to the dose of swallow manure of 20 tons / hectare but is not real when compared to the dose of swallow manure 30 tons / hectare, while in the application of NPK fertilizer doses of 500 kg / hectare and 600 kg / hectare of swallow manure with a dose 20 tons/hectare, 30 tons/hectare and 40 tons/hectare are differently not real.

The increase in the fresh weight of tubers per plot indicates an indication of a positive relationship with the availability of nutrients given through swallow manure and NPK fertilizer. The use of swallow manure has a very important function including being able to increase the ability of the soil to retain water where fresh weight is greatly influenced by the absorption of roots in absorbing water and nutrients which are also available through the application of NPK fertilizer, nutrient absorption can be better when the soil is in good condition that supports root growth, improvement in soil conditions causes the growth of plant roots better so that plants can absorb nutrients and in the end, it will be able to improve the growth and development of plants, improve soil chemical properties by increasing the nutrient content and can improve soil biological properties by increasing the number and activity of microorganisms.

The results of the diversity analysis also showed that the treatment of swallow manure administration had a noticeable effect on the variable dry weight of tubers per plot so that it was continued with the BNJ test. The results of the BNJ Test in Table 2 show that the highest dry weight of bulbs per clump is produced by onion plants fed with swallow manure at a dose of 30 tons / hectare, from this data it proves that giving swallow manure at a dose of 30 tons / hectare is the best dose for the photosynthesis process so as to increase the dry weight of onion bulbs.

Swallow feces have a K content of 0.13%. Bassiony (2006) stated that the K element is very influential on increasing the dry weight of shallots, besides that swallow manure also affects the goodness of the tillage process so that peat soils become in accordance with the requirements for growing shallots as evidenced by an increase in soil pH, and making the soil loose, Sudjijo (1994) stated that good tillage causes nutrients in the soil, such as manure or other nutrients will mix in such a way as to fill the entire soil, so that it will affect the development of tubers. During the research process, there were several onion plants that experienced wilting caused by the pathogen *Fusarium oxysporum f. sp* when the plant was 2 MST to 7 MST plants, this is suspected to be caused by the high intensity of rain when onions are 2 MST old to 7 MST plants which cause onions to be exposed to fusarium wilt, so the control measures taken are replacing onion plants that have withered when the plant is 2 MST old and then control is carried out using organic pesticides.

Shallots prefer to grow in arid climates and onion plants are sensitive to high rainfall as well as high rain intensity onions need a minimum of 70% sunlight with an air temperature of 25°C-35°C, and a humidity of 50-70% (Sutarya, *et al.*, 1995). In this study, the average air temperature of harian ranged from 28.1°C-31.8°C so that the daily air temperature was qualified to grow from shallots. The humidity of the nisbi at the time of the study ranged from 59.5-84.8%, the humidity of the air that was not in accordance with the terms of growing onions caused the growth of shallots to be disturbed. High air humidity will cause a low transpiration rate and low absorption of nutrient substances, this will reduce the availability of nutrients for onion growth so that its growth will also be hampered (Hartono, 2019).

CONCLUSION

Based on the results of the research conducted, it can be concluded that the application of 30 tons / hectare of swallow manure and 400 kg / hectare of NPK fertilizer on peatlands is the best interaction dose to increase the yield of fresh weight of bulbs and dry weight of onion bulbs.

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