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ENHANCE MANAGEMENT PRODUCTION PLANT TO VARIATIONS PLANTING DISTANCES AND ORGANIC FERTILIZER

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ABSTRACT

Management Plant was an activity or system of plant cultivation that involves several production factors such as cultivation management, namely plant spacing, and liquid organic fertilizer to obtain maximum results on an ongoing basis. This study aims to see crop production due to variations in spacing and application of liquid organic fertilizer in human urine. This research was conducted in Sunggal North Sumatra from February to April 2022. This study used a factorial randomized block design (RAK) with 2 factors, namely variations in spacing such as 15 cm x 15 cm, 20 cm x 20 cm, 25 cm x 25cm and 30cm x 30cm. factor 2, namely liquid organic fertilizer human urine, namely 0, 100, 200, 300 ml/l.air/plot. The results showed that the variation in spacing showed a significant effect where the best variation was 15 cm x 15 cm.
Keywords: Human Urine, Planting distance, ShallotsA, liquid organic fertilizer

INTRODUCTION.

Shallots (Allium ascalonicum L) are a horticultural commodity that has high economic value and is widely consumed by humans as a mixture of cooking spices after chili. Shallots are also sold in processed forms such as onion extract, powder, essential oil, fried onions, and even as an ingredient for lowering cholesterol levels, and blood sugar, preventing blood clots, lowering blood pressure, and improving blood flow. As a horticultural commodity that is widely consumed by the public, the potential for the development of shallots is still wide open not only for domestic needs but also abroad (Suriani, 2011).

Indonesia is one of the shallot exporters in the world. The prospect of Indonesian shallot development in the world ranks fourth as a shallot producer after New Zealand, France, and the Netherlands. Indonesia ranks first in ASEAN countries and experienced an increase in harvested area growth of 3.70% in 2010-2014 compared to the previous year (PUSDATIN, 2015).

One of the efforts to increase shallot production is to regulate the number of plants per hectare or spacing which is an important factor to get high yields. As with tillage, the yield of shallots is also influenced by the number of plants per unit area. The use of proper spacing for plant species is intended to avoid competition between plants in water absorption, nutrients, use of sunlight, and competition with nuisance plants. The use of proper spacing is very important in maximizing the utilization of sunlight for the photosynthesis process.

LITERATURE REVIEW.

2.1. An Efficiency Management

Setting variations in spacing is one of the efforts that can be done to increase the production of shallots. Setting the spacing with a certain density aims to provide space for each plant to grow. Plant spacing will affect the density and efficiency of light use, and competition between plants in the use of water and nutrients will affect plant production (Hidayat, 2008 Rahmawati, 2017).

The right spacing will give the plant the possibility to grow well without experiencing competition for nutrients, water, and sunlight. Competition for plants to get sunlight is higher at dense plant densities compared to more tenuous plant densities which can result in plants shading each other so that the appearance of plants becomes higher because plants lack light so that etiolation occurs which causes plant height to be higher (Tien, et al., 2012).

Agriculture in Indonesia began to use inorganic fertilizers en masse and continuously. The use of chemical fertilizers (artificial fertilizers) in Indonesia continues to increase every year. Organic fertilizer in the form of manure has been widely used by farmers, but the number of livestock owned by farmers is limited so the need for fertilizer cannot be met, especially after the development of the organic rice farming system. One source of organic fertilizer that is abundantly available in the farmer's environment is human urine. The volume of normal human urine every day is 900-1200 ml/person, and this volume is influenced by many factors including temperature, and diuretic substances (tea, alcohol, and coffee). . Urine availability is a great opportunity to be used as a liquid organic fertilizer.

To get optimal plant growth and production, several efforts are needed, one of which is fertilization. Fertilization aims to provide nutrients that may be lacking or not available in the soil. One of the fertilizers that can be used is organic fertilizer because, in addition to increasing the availability of nutrients in the soil, organic fertilizers can also improve the physical and biological properties of the soil and support sustainable agriculture.

Human urine is human waste that can be used as liquid organic fertilizer. The utilization of human urine is by the concept of Ecological sanitation or eco-san. The eco-san concept assumes that human waste is a resource that can be reused for agricultural purposes (Dickin, et al. 2018).
The nutrients contained in urine make urine potential to be processed into Liquid Organic Fertilizer (POC) which can support plant growth and production. According to Robinson (2010), urine contains 95% water, 2.5% urea, and 2.5% a mixture of minerals, salts, hormones, and enzymes, while according to Sheneni, et. al., (2018) Human urine contains high concentrations of flavonoids, tannins, saponins, cardiac glycosides, total phenols, and alkaloids.

2.2. POC Human Urine.

Liquid organic fertilizer (POC) is a fertilizer that usually uses basic ingredients from animals, plants, or humans that have been fermented in liquid form. The advantages of liquid organic fertilizer are that it can be applied easily, existing nutrients can be more easily absorbed by plants, liquid organic fertilizer is also equipped with microorganisms, and can be used as a source of bacteria that increase microorganisms in other types of fertilizers (Yulistiawati, 2008).

Microorganisms given during the fermentation process function to maintain the balance of carbon (C) and nitrogen (N). Carbon and nitrogen are one of the determining factors for the success of the fermentation process. The phosphorus content contained in fermented liquid fertilizer is related to the N content in the substrate, the greater the nitrogen contained, the more multiplication of microorganisms that remodel phosphorus so that the phosphorus content in liquid fertilizer will increase (Wijaya, 2008).

According to Yulianto (2010), potassium cannot be found in protein, potassium is not a direct element in the process of forming organic matter, and potassium functions in helping the formation of proteins and carbohydrates. Potassium will be used by microorganisms as a substrate material in a catalyst, in the presence of bacteria and their activities will affect the binding of potassium content. Potassium will be bound and stored in cells by microorganisms. According to Songthanasak (2012), fermented human urine has a N content of 3.74% and; P content of 0.058%; while the K content is 1.105%. When compared with livestock manure which is usually processed into liquid organic fertilizer, human urine has better quality than other fertilizers.

Pesticides are chemical substances and other materials used to control various pests. For farmers, there are several types of pests, namely mites, nuisance plants, plant diseases caused by fungi (fungi), bacteria, and viruses, nematodes (worms that damage roots), and snails, rats, birds, and other animals that are considered harmful. From an environmental point of view, chemical pesticides can cause water pollution with a wide impact, for example, poisoning drinking water sources, poisoning animal food, imbalances in river and lake ecosystems, forest destruction due to acid rain, and so on (Djojosumarto, 2008). One type of plant that can be used as a vegetable insecticide is soursop and papaya. Soursop (Annona muricata L.) contains chemical compounds such as flavonoids, saponins, tannins, glycosides, annonains, and other compounds that are known to act as antifeedants, contact poisons, and stomach poisons for several plant pests. The sap of the papaya plant (Carica papaya L.) contains groups of protease enzymes such as papain and kimopapain and can produce alkaloids, terpenoids, flavonoids, and amino acids which are highly toxic to some insects (Fathanah, 2013).

2.3. Vegetable Pesticide

Pesticides are chemical substances and other substances used to control various pests. For farmers, there are several types of pests, namely mites, nuisance plants, plant diseases caused by fungi (fungi), bacteria, and viruses, nematodes (worms that damage roots), and snails, rats, birds, and other animals that are considered harmful. From an environmental point of view, chemical pesticides can cause water pollution with a wide impact, for example, poisoning drinking water sources, poisoning animal food, imbalances in river and lake ecosystems, forest destruction due to acid rain, and so on (Djojosumarto, 2008). One type of plant that can be used as a vegetable insecticide is soursop and papaya. Soursop (Annona muricata L.) contains chemical compounds such as flavonoids, saponins, tannins, glycosides, annonains, and other compounds that are known to act as antifeedants, contact poisons, and stomach poisons for several plant pests. The sap of the papaya plant (Carica papaya L.) contains groups of protease enzymes such as papain and kimopapain, and can produce alkaloids, terpenoids, flavonoids, and amino acids which are highly toxic to some insects (Fathanah, 2013).

METHOD OF RESEARCH

This research activity was conducted in the Sunggal province of North Sumatra Indonesia from February to April. The material used is a spacing variation and gives human urine liquid organic fertilizer. The study used the randomized group factorial design with 2 treatment factors and 2 blocks. First factor spacing variation (15 x 15, 20 x 20, 25 x 25 and 30 x 30). Second factor is Compost city garbage (0, 100, 200, 300 and 400 ml). Plot size 1x1 m2. The sample plants are taken randomly implementation of the research includes land preparation, preparation of shallots, planting with variations in spacing, determination of plant samples per m2 (plot), application of liquid organic fertilizer of human urine with various doses, and maintenance such as watering, fertilization, weed control, insertion and management of plant-disturbing organisms. Parameters observed were tuber wet weight per sample (g) and tuber wet weight per plot (g). Data is analyzed using various print analyses. If there is a significant influence of the treatment factor then the data analysis is followed by a double distance test Duncan (Duncan Multiple Range Test

ANALYZED RESULT

4.1. Wet Weight Bulbs Per Sample (g)

The results of the statistical variance test showed that the treatment of plant spacing variations showed a significant effect, while human urine liquid organic fertilizer and the interaction of the two gave no significant difference to the wet weight of tubers per sample. Wet weight of bulbs on variations in spacing and liquid organic fertilizer of human urine is shown in Table 1.

Table 1. Average Wet Weight of Bulbs Per Sample (g) due to spacing variations distance and human urine liquid organic fertilizer

Planting distance	Human Urine Liquid Organic Fertilizer				Average
	U0	U	U2	U3	
J1	183.67	201.89	191.78	193.44	96.35 a
J2	144.67	142.11	166.89	133.67	73.42 b
J3	170.56	149.56	134.22	171.11	78.18 b
J4	109.67	145.11	128.11	120.44	62.92 c
Average	76.07	79.83	77.63	77.33	

Description: The numbers followed by the letters that are not the same show differ very real according to the double Distance Test (Duncan) at 5% level

In Table 1 It is known that the varieties of planting distance 15 cm x 15 cm (J1) are the most superior varieties compared to the treatment of 25 cm x 25 cm (J3), 20 cm x 20 cm (J2) and 30 x 30 cm (J4) for the parameters of wet weight of bulbs per plot. The wet weight of the highest bulbs in 15 cm x 15 cm treatment (J1) is 96.35 g and the lowest on the 30 cm x 30 cm (J4) is 62.92 g. Increase in onion production can be done by extensification or with agricultural intensification. Effort intensification is an effort to increase yield per unit area of land with the addition of factors of production such as processing soil, fertilization, spacing and good maintenance.

Spacing setting aims to give plants the possibility to grow well without experiencing competition. Next set the distance planting aims to minimize the occurrence of intra-species competition as well as inter-species and is an act manipulation so that the canopy and plant roots can utilize the environment optimally. There is a significant effect of treatment combination of spacing and type of fertilizer on growth and yield of maize (Tadjudin, et al., 2016).

At sparse planting distances occurs loss of nutrients due to evaporation making it less available to plants. Meanwhile, at medium spacing, it is the appropriate distance where it is not too close and not too tenuous so that nutrients, water and sunlight becomes available. Setting plant density per unit area with spacing settings can be affecting the high and low production plants. Plant density must be adjusted with the spacing so that it doesn't happen competition between plants and easy maintenance. In general the higher plant density to a certain extent the higher the production. nevertheless, Planting distances that are too close can increase humidity, can stimulate development of pathogens, affect the use of sunlight, use of nutrients, land use

efficiency, plants grow thin and less productive. The use of spacing is basically provide a good place to grow with hope to increase growth and crop yields caused by competition, both in the use of nutrients, oxygen, carbon dioxide and sunlight. These factors are not mutually standalone (Harijadi, 2002).

4.2. Wet Weight Bulbs Per Plot (g)

The results of the statistical variance test showed that the treatment of plant spacing variations showed a significant effect, while human urine liquid organic fertilizer and the interaction of the two gave no significant difference to the wet weight of tubers per plot. Wet weight of bulbs on variations in spacing and liquid organic fertilizer of human urine is shown in Table 2.

Table 2. Average Wet Weight of Bulbs Per Plot (g) due to spacing variations distance and human urine liquid organic fertilizer

Planting distance	**Human Urine Liquid Organic Fertilizer**				**Average**
	U0	**U**	**U2**	**U3**	
J1	2654	2944	2289	2438	1290.63 a
J2	1265	1663	1823	1175	740.75 b
J3	1750	1653	1799	2066	908.50 b
J4	1123	1165	1271	1312	608.88 c
Average	13584	14850	14364	13982	

Description: The numbers followed by the letters that are not the same show differ very real according to the double Distance Test (Duncan) at 5% level

In Table 2 It is known that the varieties of planting distance 15 cm x 15 cm (J1) are the most superior varieties compared to the treatment of 25 cm x 25 cm (J3), 20 cm x 20 cm (J2) and 30 x 30 cm (J4) for the parameters of wet weight of bulbs per plot. The wet weight of the highest bulbs in 15 cm x 15 cm treatment (J1) is 1290, 63 g and the lowest on the 30 cm x 30 cm (J4) is 608.88 g. Planting distance is one of the important technological components that have a major contribution in increasing farm production and income. Setting the spacing to be wrong one effort that can be made to increase onion production rainy season. Plant spacing with a certain density aims to give room to grow in each Plants Planting distance will affect density and efficiency of use light, the competition between plants inside use of water and nutrients so that will affect crop production (Hidayat, 2008 in Rahmawati, 2017). Spacing that is too infrequent

will reduce population per unit area. Therefore, a land management strategy is needed. among others, by creating suitable conditions growing environment to achieve maximum results (Rambitan, 2005).

Plant spacing affects population plants and efficient use of light, also affects the competition between plants in using water and nutrients, with thus will affect the results. Density Plants affect appearance and crop production, mainly due to efficiency use of light. Production in general each unit area of height is reached by population is high, because the achievement of maximum use of light at the beginning growth. But in the end, the appearance of each plant individually individuals decline due to light competition and other growth factors (Harijadi, 2002).

Liu, et al (2004), stated that if a population increase is still below an increase in competition then an increase in production will be achieved in a population that is denser. Competition (competition) arises from plant reactions on physical factors and their effects modified factor on its competitors. Two plants even though they grow close together, will not compete with each other if the amount of material contested excessive.

CONCLUSION

Optimal spacing to get maximum results. This matter related to crop competition to get nutrients, water and efficiency in the use of sunlight. The results show that the spacing that has the highest production is at a spacing of 15 cm x 15 cm which shows the yield of wet tubers per sample and plot.

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