THE EFFECT OF VARIATIONS OF PLANTING DISTANCES AND FERTILIZATION OF HUMAN URINE LIQUID ORGANIC FERTILIZER ON ONION GROWTH

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ABSTRACT

Growth is a process of increasing volume that is irreversible (cannot be reversed), and occurs due to the increase in the number of cells and the variation of each cell. In the process of growth accompanied by changes in shape. Good growth will result in maximum production. 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 25 cm 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: Growth, Human Urine, Planting distance, Shallots

INTRODUCTION

Shallots is one of the horticultural crop commodities that have 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 a medicinal ingredient to lower cholesterol levels, blood sugar, prevent blood clots, lower blood pressure and improve 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).

Good growth will produce maximum production. as for the way to increase growth is to use variations in spacing and the provision of nutrients such as the provision of human urine POC. 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, competition between plants in the use of water and nutrients so that it will affect plant production (Hidayat, 2008 in Rahmawati, 2017). Human urine is human waste that can be used as liquid organic fertilizer. Utilization of human urine is in accordance with 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).

LITERATURE REVIEW

To get optimal growth, it takes several efforts, one of which is setting the spacing and fertilization. The cropping setting is how to adjust the spacing or location of plants with the intention of providing better growth space for each individual plant so that can reduce the magnitude of the negative effects caused by plants other in a crop. Planting arrangements are closely related to interception of solar radiation by plants (Buhaira, 2007). Spacing is one of the basic ingredients to determine the amount or not of a production in plants. Plant spacing will

affect the effectiveness of nutrient absorption by plants. The closer the spacing, the more plant population per unit area, so the competition for nutrients between plants is getting tighter. As a result, plant growth will be disrupted and production per plant will decrease. At a spacing that is too close, cultivated plants will give relatively less than optimal results because of the competition between the plants themselves. Therefore, optimal spacing is needed to obtain maximum yields (Mayadewi, 2007).

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 the result of residual fluid resulting from kidney excretion that is removed from the body through the process of urination. Urinary excretion is needed to get rid of residual molecules in the blood that are filtered by the kidneys and to maintain body fluid homeostasis (Notoatmodjo, 2010). According to Songthanasak (2012), fermented human urine contains 3.74% N, 0.0058% P and 1.105% K.

METHODS

This research activity was conducted in the Sunggal province of Sumatera Utara Indonesia from February to April. The material used is a spacing variation and giving human urine liquid organic fertilizer. The study used the Randomize 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 randomlyThe 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 plant height (cm) and number of leaves (strands).Data is analysed 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).

RESULTS AND DISCUSSION

Plant Height (cm)

Based on the results of observations and statistical analysis, it is known that the variation of plant spacing has a very significant effect on plant height (cm) of shallots at the age of 3, 4 and 5 weeks after planting. Meanwhile, the provision of human urine POC and the interaction of the two showed no significant effect on plant height (cm) at 3, 4 and 5 weeks after planting.

The results of the average plant height (cm) the effect of variations in spacing and application of human urine POC on the growth of shallot plants aged 3, 4 and 5 weeks after planting, after being tested for differences in mean using Duncan's Distance Test can be seen in Table 1 .

Table 1. Average Plant Height (cm) Shallots Due to the Effect of Variations in Planting Distance and Application of POC in Human Urine Age 3, 4 and 5 Weeks After Planting

Treatment	Plant Height (cm)		
	3 MST	4 MST	5 MST
J = Planting Distance			
J1 = 15 x 15 cm	26.07 a	32.46 a	41.55 a
J2 = 20 x 20 cm	22.13 b	28.38 b	37.27 b
J3 = 25 x 25 cm	23.29 b	28.97 b	38.03 b
J4 = 30 x 30 cm	20.68 c	25.26 c	34.47 c
U = Human Urine			
U0 = 0 ml/L air/plot	22.46	28.38	37.22
U1 = 100 ml/L air/plot	23.82	29.38	38.42
U2 = 200 ml/L air/plot	23.22	28.86	38.09
U3 = 300 ml/L air/plot	22.66	28.45	37.59

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 can be explained that the highest plant (cm) was found in the J1 spacing treatment, which was 41.55 cm and the lowest plant was found in the J4 treatment, which was 34.47 cm In the administration of human urine POC, it can be seen where the highest plants were found in U1 treatment, which was 38.42 cm. While the lowest plants were found in the U0 treatment, which was 37.22 cm.

With the right spacing, sunlight is easier to get, where the photosynthesis process can run well. Proper spacing can have a good impact on the process of plant height growth, and is free to get nutrients. In the absence of competition, it is better for plants to develop and roots become better at absorbing nutrients that support plant height (Erawati and Hipi, 2016). A plant is better if a plant has good genetic traits plus environmental conditions that can be beneficial and in accordance with plant growth and development. Then the crop yield is determined by the spacing, because the spacing determines solar radiation, mineral nutrients and the cultivation of the plant itself. This shows that the right spacing can increase the production of shallot bulbs. This is stated by Darma, *et al*, (2015) that the higher the plant population per plot, the higher the yield per plot, so that more production is produced from closer spacing.

Number of Leaves (strands)

Based on the results of observations and statistical analysis, it is known that the variation of plant spacing has a very significant effect on number of leaves (strands) of shallots at the age of 3, 4 and 5 weeks after planting. Meanwhile, the provision of human urine POC and the interaction of the two showed no significant effect on number of leaves (strands) at 3, 4 and 5 weeks after planting.

The results of the average number of leaves (strands) the effect of variations in spacing and application of human urine POC on the growth of shallot plants aged 3, 4 and 5 weeks after planting, after being tested for differences in mean using Duncan's Distance Test can be seen in Table 2 .

Table 2. Average Number of Leaves (strands) Shallots Due to the Effect of Variations in Planting Distance and Application of POC in Human Urine Age 3, 4 and 5 Weeks After Planting

Treatment	Number of Leaves (strands)		
	3 MST	4 MST	5 MST
J = Planting Distance			
J1 = 15 x 15 cm	28.18 a	32.49 a	38.42 a
J2 = 20 x 20 cm	24.13 b	27.31 b	34.25 b
J3 = 25 x 25 cm	25.53 b	28.63 b	34.39 b
J4 = 30 x 30 cm	20.17 c	23.43 c	28.78 c
U = Human Urine			
U0 = 0 ml/L air/plot	23.93	27.68	33.43
U1 = 100 ml/L air/plot	24.83	28.21	34.56
U2 = 200 ml/L air/plot	24.68	28.08	34.26
U3 = 300 ml/L air/plot	24.56	27.88	33.58

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 can be explained that the highest number of leaves (strands) was found in the J1 spacing treatment, which was 38.42 strands and the lowest number of leaves was found in the J4 treatment, which was 28.78 strands. In giving POC human urine, it can be seen where the highest number of leaves is found in treatment U1 which is 34.56 strands while the lowest number of leaves is found in treatment U0 which is 33.43 strands. Wide spacing is less efficient in land use, if it is too narrow it can result in high competition, resulting in productivity. The plant population density can be increased until it reaches the environmental carrying capacity, because environmental limitations eventually become a limiter for plant growth. Each plant has an optimal plant population density to obtain production. The yield of shallots that can be achieved is highly dependent on plant growth, but not all growth with the highest values always give a good response to the yield of shallots. This is because to get good crop yields, plants need optimal growth. Spacing is able to increase crop yields and give a significantly different effect on the observed parameters.

The function of spacing is to reduce the level of competition of a plant with other plants to get optimal sunlight so that photosynthesis in these plants is not hampered by other plants, so that plants are able to grow well. This is in accordance with the opinion of Nora *et al,* (2016) that basically the use of close spacing aims to increase yields, as long as other limiting factors can be avoided. The limiting factor in question is competition between plants in obtaining nutrients, water, sunlight and growing space for plant roots and canopy.

CONCLUSION

The results showed that the optimal spacing is at a spacing of 15 cm x 15 cm which indicates the growth of plant height and number of leaves.

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