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Response of Growth and Production of Shallots (Allum cepa L.) to Planting and Watering Time Eco Enzyme

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ABSTRACT

This research was conducted on the land of UPT Tanjung Selamat Main Seed Center, Deli Serdang, North Sumatra Province, with an elevation of ±25 meters above sea level. This research was conducted from February to May 2022. The purpose of this study was to determine the exact spacing and timing of Eco Enzyme watering on the growth and production of shallots (Allium cepa L.). This study used a factorial randomized block design (RBD). Factor 1 is the spacing consisting of: J1=15cm x 15cm, J2=20cm x 15cm, J3=25cm x 15cm. Factor 2 namely: Eco Enzyme Watering Time consisting of: W1=1x1 day, W2=1x2 days, W3=1x3 days. The results of the study showed that the spacing treatment had a significant effect on shoot age, root length, tuber/sample diameter, and tuber/sample dry weight. From the results of the study it was also found that J2 and J3 had the fastest germination age (2.37 days) when compared to treatment J1 (2.67 days), the highest root length was in treatment J3 (14.92 cm) and the lowest was in treatment J1 (13.22 cm), diameter The largest tuber/sample was in treatment J3 (20.38 mm) and the lowest was in treatment J1 (18.11 mm) and the highest tuber/sample dry weight was in treatment J3 (66.68 g) and the smallest was in treatment J1 (52.06 g).

Keywords: *planting spacing, eco enzyme, shallots*

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INTRODUCTION

Shallots (Allium cepa L.) are a type of tuber plant that has high economic value (Setiawan et al., 2021). The prospect of shallots in Indonesia is quite good, this is shown by the high demand for this commodity (Panataria et al., 2021). In 2016 North Sumatra shallot production was 13,368 tons, productivity 8.69 tons/ha with a harvest of 1,538 ha. In 2017 the production of North Sumatra shallots was 16,103 tons, in 2018 it was 16,337 and in 2019 it was 18,072 with an average growth of 10.62%. In 2019 there was an increase in the harvested area of 1,238 ha with a production of 9,971 tons and a productivity of 8.54 tons/ha . (Badan Pusat Statistik, 2019). Data on the need for shallots from the Central Bureau of Statistics in 2020 reached 43,754.3 tons per year. Meanwhile, shallot production in 2020 is 26,000 tons. This means that the province of North Sumatra experienced a deficit of 17,754.3 tons (Badan Pusat Statistik, 2020).. The data shows that the production of shallots in North Sumatra is not sufficient for the people's needs. To meet the demand for red onions in North Sumatra, the government imports from abroad and some must be supplied from outside Java. Various efforts have been made to increase shallot production, one of which is by looking at the eco enzyme application time and the planting distance. Eco-enzymes are solutions of complex organic

substances which are the product of fermented organic residues, sugar and brownish water with a strong sour/fresh aroma. This fermentation creates a liquid-like acid with natural proteins, mineral salts and enzymes so that it can be used in several aspects, including in agriculture (liquid organic fertilizers and vegetable pesticides), health (bio sanitizers), and households (floor cleaners) (Hasanah et al, 2021). The benefits of eco enzymes in agriculture are increasing the growth of chili plants which are characterized by height, stem diameter, wider leaf width and greener leaf color than chili plants without eco enzyme applied (Ramadani et al., 2019).The timing of the application of eco enzyme watering on onions can also affect the growth of shallot plants. Based on the results of eco-enzyme analysis of different organic materials, the nutrient content obtained was 0.29% K2O, 0.22% P2O5 content (Panataria et al., 2022). These nutrients affect the growth and formation of shallot bulbs. Apart from the application of eco enzyme, setting the spacing is also a treatment that can increase shallot production. Spacing with different levels of density can provide good growing space. Plant spacing will also affect the density of plant populations thereby affecting the efficiency of using light, absorbing water and nutrients in plants (Rahmawati, 2017). Setting the spacing with a certain density aims to provide space for each plant to grow. 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 crop production. The highest dry tuber weight per plant (grams) was obtained in the JT5 treatment (20cm x 30cm) of 35.73 grams, while the lowest yield was in the JT2 treatment (20cm x 10cm) of 22.95 grams (Beja, 2020).

RESEARCH METHODOLOGY

This research was conducted on the land of UPT Tanjung Selamat Main Seed Center, Deli Serdang, with an altitude of ± 25 meters above sea level. This research was conducted from February to May 2022. The materials used in this research were the shallot seeds of the Tajuk variety, eco enzyme and water solutions, the tools were hoes, machetes, tape measure, analytical scales, sample stakes, bamboo, and other tools. This study used a factorial Randomized Block Design (RBD), Factor 1 namely: Planting distance (J), namely: J_1 = 15cm x 15cm; J_2 = 20cm x 15cm; and J_3 = 25cm x 15cm, Factor 2 namely: Eco enzyme watering time (W), namely: W_1 = 1x1 day; W_2 = 1x2 days; W_3 = 1x3 days. Observational data were analyzed by means of variance, if the variance was significant then it was continued with further analysis using Duncan's level of 5%. All treatment combinations were 9 combinations and each treatment combination was repeated 3 times. If the results of the analysis of variance show a significantly different effect, it will be further tested using Duncan's test. Observations made in this study were: age of sprouting (days), root length (cm), tuber diameter/sample (mm), tuber dry weight/sample (gr).

RESULTS AND DISCUSSION

Age of Sprout (days). Data on shoot age due to spacing and eco enzyme watering time are presented in Figure 1. The list of variance shows that there is a significant effect of spacing on shoot age. Eco enzyme watering time and the interaction between plant spacing and watering time had no significant effect on shoot age.

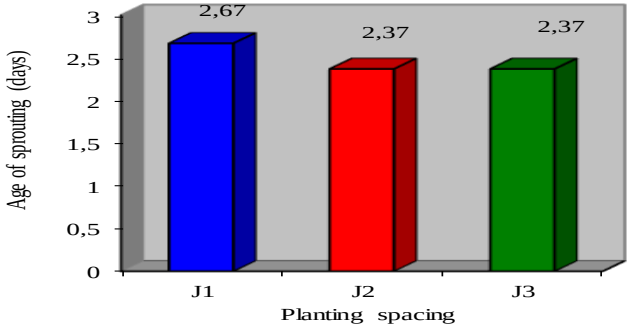

Figure 1. Effect of planting spacing on shallot sprout age (days)

The results showed that a spacing of 25x15 cm gave the best results for the fastest emergence of shoots (2.37 days). This is due to the spacing of the plants that are far apart causing the plant population to be smaller than the spacing that is denser so that competition between plants can be minimized. Spacing that is more tenuous causes gas exchange between rows of plants more freely so that the oxygen needed for germination is easily absorbed into the tubers thereby accelerating the growth of shoots. In addition, a larger spacing can limit competition between plants in utilizing light, nutrients and water (Beja, 2020). In line with the opinion of Setiawan & Suparno, (2018) which states that spacing can provide space for plants to grow so that growth is better. Plant spacing will also affect plant population density, light usage efficiency, competition in water and nutrient absorption so that it can affect crop production.

Root Length (cm). Data on root length due to plant spacing and eco enzyme watering time are presented in Figure 2. The list of variances shows that there is a significant effect on plant spacing on root length. Eco enzyme watering time and the interaction between plant spacing and watering time had no significant effect on root length.

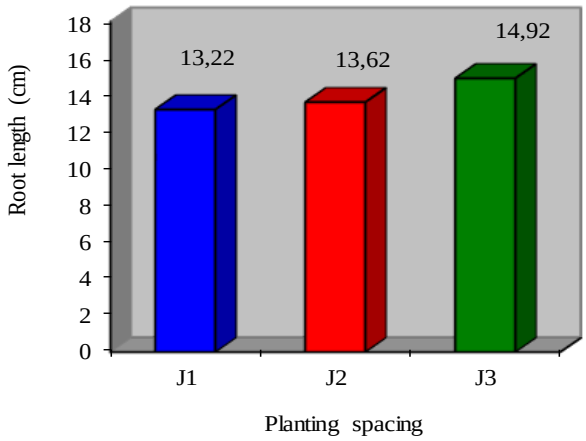

Figure 2. The effect of planting spacing on shallot root length (cm)

A wider spacing (25x15 cm) results in longer roots (14.92 cm). This could be due to a more tenuous spacing that can reduce competition between plants. Nutrients and water available in the soil during the root growth period, which will cause the roots to continue to grow and absorb the nutrients in the soil. According to Sopha *et al.*, (2017) which states that the rate of root elongation is influenced by internal factors and external (environmental) factors. The internal factor that influences it is the supply of photosynthates (generally in the form of sucrose) from the leaves. Environmental factors that influence are soil temperature and soil water content.

Tuber/Sample Diameter (mm). Data on tuber diameter per sample due to spacing and eco enzyme watering time are presented in Figure 3. The list of variance shows that there is a significant effect of spacing on tuber diameter per sample. Eco enzyme watering time and the interaction between plant spacing and watering time had no significant effect on tuber/sample diameter. This is because the spacing is less frequent so that the absorption of water and nutrients is not disturbed. Adequate nutrient absorption will increase the size of the tubers. The results of the tuber diameter parameter (Table 3) show that a spacing of 25x15 cm results in a larger tuber diameter of 20.38 mm.

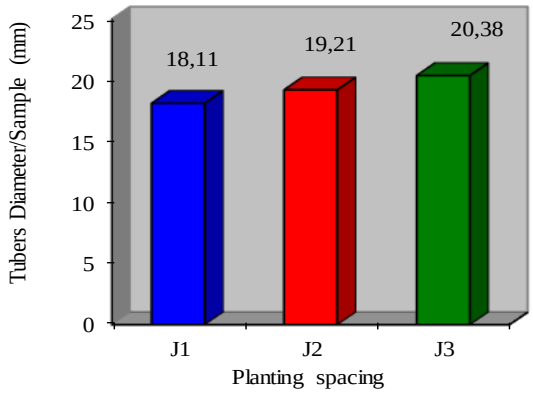

Figure 3. Effect of planting spacing on shallot diameter per sample (mm)

Loose spacing can affect the diameter of the tubers so that the tubers are bigger. Azmi *et al*., (2016) stated that the tuber diameter can be enlarged from the tuber size. This can be done by adjusting the spacing or reducing the total plant population so that competition between plants for nutrients can be avoided. In general, the purpose of spacing treatment is to increase crop production, by minimizing competition between plants. One of the results of this photosynthesis is fructans, where fructans are needed for the formation of tubers (Yetty dan Elita, 2008). Planting in the field with tight spacing can lead to higher competition which will result in stunted plant growth. Loose spacing will tend to produce a larger tuber diameter.

Dry Weight of Tuber per Sample (g). Data on tuber dry weight per sample due to plant spacing and eco enzyme watering time are presented in Figure 4. The list of variance shows that there is a significant effect of plant spacing on tuber/sample dry weight. Eco enzyme watering time and the interaction between plant spacing and watering time had no significant effect on tuber/sample dry weight. The more frequent watering is done, the tuber weight increases. This is because eco enzyme contains elements of phosphorus and potassium. Both of these elements play an important role in producing plant biomass. Nutrients are needed by plants for photosynthesis and can increase tuber weight. The tubers that are formed come from layers of leaf bases that are neatly arranged and layered. The nutrient element potassium (K) functions as a regulator of plant physiological processes including photosynthesis, accumulation of photosynthetic process results, carbohydrate transportation, the process of opening and closing stomas, as well as regulating the distribution of water in tissues and in plant cells. With the availability of the element potassium during the plant growth period, facilitating photosynthesis will also spur to strengthen yields (Aryati dan Nirwanto, 2020).

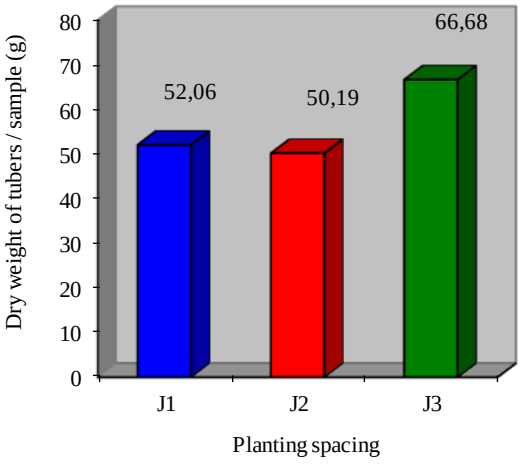

Figure 4. The effect of planting spacing treatment on the dry weight of bulbs/sample (g) of shallots

The treatment with a spacing of 25x15 cm gave a dry weight of 66.68 g which was higher than the spacing of 20x15 cm and 15x15 cm. These results occur because the greater the spacing causes a reduction in the need for light, water and nutrients between plants so that the growth in plant height will be higher and can form more leaves which in turn will produce higher tuber weight. Plant competition at dense spacing is greater so that the resources obtained by each plant will be less. At a closer planting distance, the shallot plants will shade each other so that the sunlight that is needed in the photosynthesis process is not obtained properly. According to (Saidah *et al*, 2019) states that spacing treatment can reduce the plant population so that it can provide greater growth space for plants which can affect the growth of plants. The distance between these plants can affect the total density of plant populations, the efficiency of using light in the photosynthesis process, as well as competition in obtaining water and nutrients in plants so that this of course will also affect the production of plants. The increase in dry weight after the application of eco enzyme shows that there is an increase in plant weight because enzyme molecules which are catalysts of a biomolecular reaction produce products with substrates, where these products greatly affect the formation of new cells and cell division. With the content of various types of acids in eco enzymes which are the result of a fermentation process which is useful in stimulating plant growth and can make plant leaves healthy and plants will grow naturally (Panataria *et al.*, 2022).

CONCLUSION

From the results of the above study it was found that the spacing treatment had a significant effect on the observation of shoot age, root length, tuber diameter/sample, and dry weight/sample. From the figure it can also be seen that treatments J_2 and J_3 had the fastest germination age (2.37 days) when compared to treatment J_1 (2.67 days), the longest root length was in treatment J_3 (14.92 cm) and the shortest was in treatment J_1 (13.22 cm), diameter The largest tuber/sample was in treatment J_3 (20.38 mm) and the lowest was in treatment J_1 (18.11 mm) and the highest tuber/sample dry weight was in treatment J_3 (66.68 g) and the lowest was in treatment J_1 (52.06 g). Plant arrangement in shallots is one of the factors that determine the diversity of growth in plants. The spacing of J_3 (25cm x 15cm) is the widest spacing when compared to the treatments J_1 (15cm x 15cm) and J_2 (20cm x 15cm), causing less competition between plants.

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