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THE EFFECT OF THE COMBINATION OF BIOSLURRY AND SPACING ON THE GROWTH AND YIELD OF SHALLOTS (ALLIUM ASCALONICUM L.) VARIETIES OF BIMA BREBES

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Abstract
The study aims to find out: (1) The effect of the combination of bioslurry and spacing of shallots (Allium Ascalonicum L.) (2) The effect of the combination of bioslurry concentration and the best planting distance on the ha sil of onion plants (Allium Ascalonicum L.). (3) Correlation between growth components and yield of onion plants (Allium Ascalonicum L.). The research was conducted in Karangwangun Village, Babakan District, Cirebon Regency - West Java. The research was conducted from August to December 2022. The experimental method used is using the experimental method with Group Random Design (RAK), the treatment consists of two factors that are repeated 3 times. The first factor is bioslurry with concentrate of 5% or 50 ml/lt, 10% or 100 ml/lt, 15% or 150 ml/lt. While the second factor is the planting distance which consists of three levels, namely planting distances of 20 cm x 10 cm, 20 cm x 15 cm, 20 cm x 20 cm. The main observation data were processed using statistical tests, fingerprint analysis, and further test analysis of the Scott-Knott group. To determine the correlation between treatment and the components of rice growth and yield, the correlation used is with the Product Moment correlation coefficient. The experimental results showed: (1) The combination of Bioslurry and planting distance affected the number of saplings, root volume, plant growth rate aged 15 HST-25 HST, tuber diameter, fresh tuber weight per clump, dry tuber weight per clump, and dry tuber weight per plot, (2) The highest dry tuber weight per plot of 3.74 kg per plot or equivalent to 9.972 tons / ha (land efficiency 80%) was obtained in the combination of E treatment (bioslurry 50 ml / liter and planting distance 20cm x 15cm), and (3) There was a marked correlation between the number of leaves at 25 HST and 35 HST and the number of saplings in all observation periods with dry tuber weights per plot.
Keywords: shallots; bioslurry; yield ;plant spacing ; growth

INTRODUCTION

Shallots (Allium ascalonicum L Including horticultural commodities that have many benefits and high commercial value and have attractive market prospects. Among its benefits is as a food flavoring spice and is included in the group of spices that cannot be substituted for its function as a food flavoring seasoning. In the XIX century shallots became one of the cash crops in various countries. Shallot producing countries include Japan, USA, Romania, Italy, Mexico, and Texas. Shallots in Indonesia are still seasonal like agricultural products in general (Fajarika & Fahadha, 2020). This causes the needs of shallots of the Indonesian people outside the harvest season cannot be met so that import actions are carried out. People's need for shallots (Allium ascalonicum L) is quite high, but productivity and prices fluctuate relatively high. This is because the amount of productive land is not fixed and due to crop failure, so it is necessary to expand land (extensification), maximize land (intensification) with various planting manipulation efforts to increase shallot production. One of the intensification efforts is through improving cultivation technology, namely by using organic fertilizers and spacing.

Fertilization is an act of providing additional nutrients to the soil both directly and indirectly so that it can provide nutrients for plants. The growth of plant development is greatly

influenced by the availability of nutrients in the soil. Organic fertilizers come from plants or animals that have undergone an engineering process and contain nutrients needed by plants (Ayub, 2004). The use of Organic fertilizers is applied to increase the growth and yield of shallots.

At this time the increase in onion production is generally very dependent on in-organic fertilizers that provide high yields but it turns out to cause many environmental damage problems. The use of chemical fertilizers initially did provide more yields, so farmers continued to use them. The increasing price of subsidized chemical fertilizers is felt to be a burden for farmers so that other alternatives are needed that can meet the demand for fertilizer needs. Efforts to increase the productivity of shallots can be done in several ways. Among the ways that greatly influence is the cultivation technique, namely through fertilization. The continuous use of chemical fertilizers causes the role of these chemical fertilizers to be ineffective.

In the cultivation of shallots, the act of spacing planting is very important. Spacing aims to provide the possibility for plants to grow well without experiencing competition between plants or competition with weeds. Improper spacing can lead to a decrease in the yield of onion crop production. Planting distances that are too narrow cause plants to compete with each other for nutrients, light, water, minerals, and compete to develop. Population density on a field can cause stunted branch growth. If the growth of branches is inhibited, the crown of the plant is not lush and causes sunlight not to be well received by the plant. Thus the photosynthesis process is inhibited and fruit production is not optimal, even though plants are given sufficient fertilizer and contain lots of phosphorus (Novatriana & Hariyono, 2020).

Plant population by spacing is one of the factors that greatly affect crop production. The results showed that, increasing the planting density of corn unity to a certain extent can increase seed yields, but too many plants will reduce yields due to competition for nutrients, water, solar radiation, and growing space so that it will reduce the number of seeds per plant (Handayani, 2021). Plant spacing affects plant populations and the efficient use of light, also affects competition between plants in using water and nutrients, thereby affecting crop production yields. Increased plant density can cause plant stems to become smaller and often taller (Santoso, 2011).

The purpose of this study was to find out: (1) the effect of the combination of bioslurry concentration and planting distance on shallot yield, (2) the effect of the best combination of bioslurry concentration and planting distance in increasing the growth and yield of shallot plants, and (3) the correlation between growth components and onion yield of Bima Brebes variety (Allium ascalonicum L.)

METHOD RESEARCH

This experiment was carried out in Karangwangun Village, Babakan District, Cirebon Regency, West Java. The time for this experiment is from August to December 2022. The ingredients used in the experiment were onion seeds of Bima variety, Bioslurry, Fungicide, NPK, ZA, KCL, SP-36 and pesticides for pest maintenance and control. The tools used in field trials are scales, measuring cups, calipers, drills, handsprayer, plastic bags, meters, hoes, label paper, stationery, treatment boards, signposts for experimental activity schedules, raffia rope, bamboo, and sickles.

The experimental design used was using the Group Randomized Design (RAK) combination pattern method, the treatment used was a combination of bioslurry concentration and planting spacing, this study consisted of 9 treatment combinations and each treatment was repeated three times so that there were 27 experimental plots.The first factor is the concentration of Bioslurry (B) which consists of 3 levels, (B1: 5%, B2: 10%, and B3: 15%), the second factor is the Planting Distance (JT) consisting of 3 levels, namely: (JT1=20cm x 10cm), (JT2=20cm x 15cm), (JT3=20cm x 10cm).

Key observations include: Plant height, number of leaves, root volume per clump, plant growth rate, number of saplings per clump, number of tubers per plant, diameter of tubers per plant, weight of fresh tubers per clump, weight of fresh tubers per plot, weight of dry tubers per clump and per plot.

The experimental data on the main observation were processed using statistical tests with a linear model proposed by Ali, (2001) as follows: Xij = + □ ri + tj + eij. From the results of data processing or variety analysis, if there is a noticeable difference from the treatment or the F-count value is greater than the F-table at a real level of 5%, then the test is continued using the Scott-Knott Group Test.

Analysis of the correlation between growth components and onion yield was carried out on: (1) plant height (cm) with the yield of dry tuber weight per plot, (2) number of leaves per clump with the yield of dry tuber weight per plot, and (3) number of saplings per clump with the yield of dry tuber weight per plot. To determine the correlation between treatment and the growth component and sesame yield, the correlation used is with the Product Moment correlation coefficient.

RESULT AND DISCUSSIO

Plant Height (cm)

Based on the results of variance analysis using Test F in table 1 below, it shows that the tested treatment has a significant effect on plant height variables in all observation periods.

Table 1. the Effect of Bioslurry and Plant Spacing Combination on Plant Height at 15, 25, and 35 HST.

No.	Treatment	15 HST (cm)	25 HST (cm)	35 HST (cm)
1.	A. B:50ml/liter, JT:20 cm x 10 cm)	20,92 a	30,67 b	37,67 b
2.	B. B:100 ml/liter, JT:20 cm x10 cm)	**22,17 b**	**31,33 b**	**38,33 b**
3.	C. B:150 ml/liter, JT:20 cm x 10cm)	**22,72 b**	**32,53 b**	**39,53 b**
4.	D. B:50 ml/liter, JT:20cm x 15cm)	20,95 a	29,07 a	36,07 a
5.	E. B: 100 ml/liter, JT:20cm x 15cm)	**21,80 b**	29,33 a	36,33 a
6.	F. B:150 ml/liter, JT:20cm x 15cm)	19,70 a	28,53 a	35,53 a
7.	G. B:50 ml/liter, JT:20cm x 20cm)	19,78 a	28,00 a	35,00 a
8.	H. B: 100 ml/liter, JT:20cm x 20cm)	19,73 a	28,00 a	35,00 a
9.	I. B:150 ml/liter, JT:20cm x 20cm)	20,03 a	28,93 a	35,93 a

Remarks: The average number followed by the same letter in the same column shows no real difference based on the Scott-Knott Cluster Test at a real level of 5%.

Based on table 1 above, the response of bioslurry concentration and planting distance to plant height at the age of 15 HST is highest aimed at a combination of treatments B, C, and E and is significantly different from other treatment combinations. This is thought to be due to the adequacy of nutrients contained in the bioslurry and also the tight planting distance triggers plants to get high quickly. This is in accordance with the opinion of Biswas et al., (2020) who said that the provision of bioslurry combined with planting spacing showed a real difference in plant height.

While at the age of 25 HST and 35 HST the highest average plant height was achieved by a combination of treatments A, B and C and was significantly different from other treatments. It is suspected that spacing treatment has a real effect on plant height. The highest yield is shown in the treatment of planting distance 20 cm x 10 cm (tight planting distance). This is because with the use of tight planting distances and high plant populations, competition for nutrients, water and light is getting higher. In line with Hantari et al., (2020) opinion that appropriate spacing will create environmental factors conditions needed by

plants to be evenly available to each plant and optimize the use of available environmental factors.

2. Number of leaves

The results of variance analysis using Test F showed that the tested treatment did not have a significant effect on the variable number of leaves in each observation period (Table 2).

Table 2. Effect of Bioslurry Combination and Plant Spacing on Plant Leaf Number at Age 15, 25, and 35 HST

No.	Treatment	15 HST (helai)	25 HST (helai)	35 HST (helai)
1.	A. B:50ml/liter, JT:20 cm x 10 cm)	15,60	23,00 a	31,10 a
2.	B. B:100 ml/liter, JT:20 cm x10 cm)	17,17 a	24,60 a	32,37 a
3.	C. B:150 ml/liter, JT:20 cm x 10cm)	16,43 a	22,93 a	29,93 a
4.	D. B:50 ml/liter, JT:20cm x 15cm)	15,77 a	22,50 a	29,50 a
5.	E. B: 100 ml/liter, JT:20cm x 15cm)	16,27 a	27,13 a	33,13 a
6.	F. B:150 ml/liter, JT:20cm x 15cm)	14,67 a	22,13 a	29,13 a
7.	G. B:50 ml/liter, JT:20cm x 20cm)	15,07 a	18,87 a	25,87 a
8.	H. B: 100 ml/liter, JT:20cm x 20cm)	14,90 a	20,03 a	27,03 a
9.	I. B:150 ml/liter, JT:20cm x 20cm)	14,37 a	22,90 a	29,90 a

Remarks: The average number followed by the same letter in the same column shows no real difference based on the Scott-Knott Cluster Test at a real level of 5%.

In table 2 it can be seen that the average number of leaves of onion plants in each treatment did not have a noticeable difference in all observation periods. It is suspected that the increase in population density and bioslurry cannot increase plant growth, so it does not have a real effect on the number of leaves of onion plants. The addition of Bioslurry at various planting distances has not been able to increase the number of leaves due to the results of soil analysis before the experiment, the nutrient content of nitrogen, potassium and C/N ratio in the study land is low so that it can inhibit the growth of onion plants. Nitrogen and potassium are mineral elements that plants need in fairly large quantities. Nitrogen and potassium function in plant vegetative growth, giving color to plants, plant longevity, and carbohydrate use Haring et al., (2019). Lack of one or several nutrients will result in improper plant growth, namely there are abnormalities or deviations and many plants die young which previously looked wilted and dried out (Kafrawi & Zahraeni, 2017).

3. Number of saplings (fruits)

The results of variety analysis using the F Test showed that the tested treatment had a significant influence on the variable number of saplings in each observation period (Table 3). Based on table 3 at the age of 15, 25, and 35 HST, the average observation of the number of tillers combined with treatment E (concentration of 100 ml / liter and planting distance of 20 cm x 15 cm) showed the best results and was significantly different from other treatments. This is suspected because the concentration of 100 ml / liter and planting distance of 20 cm x 15 cm is the optimal combination of treatments that suit the needs of onion plants of the Bima Brebes variety.

Table 3. The Effect Of The Combination Of Bioslurry And Spacing On The Number Of Saplings At The Age of 15, 25, and 35 HST

No	Treatment	15 HST (buah)	25 HST (buah)	35 HST (buah)
1.	A. B:50ml/liter, JT:20 cm x 10 cm)	2,77 a	3,63 a	6,63 a
2.	B. B:100 ml/liter, JT:20 cm x10 cm)	2,80 a	3,80 a	6,67 a
3.	C. B:150 ml/liter, JT:20 cm x 10cm)	2,73 a	3,77 a	6,70 a

4.	D. B:50 ml/liter, JT:20cm x 15cm)	2,73 a	3,73 a	6,80 a
5.	E. B: 100 ml/liter, JT:20cm x 15cm)	**3,10 b**	**4,13 b**	**7,13 b**
6.	F. B:150 ml/liter, JT:20cm x 15cm)	2,63 a	3,73 a	6,63 a
7.	G. B:50 ml/liter, JT:20cm x 20cm)	2,70 a	3,77 a	6,77 a
8.	H. B: 100 ml/liter, JT:20cm x 20cm)	2,87 a	3,87 a	6,87 a
9.	I. B:150 ml/liter, JT:20cm x 20cm)	2,60 a	3,57 a	6,60 a

Remarks: The average number followed by the same letter in the same column shows no real difference based on the Scott-Knott Cluster Test at a real level of 5%.

Proper spacing will provide the maximum number of saplings. According to Purba et al., (2018) optimal planting distance will provide good growth for the number of saplings because it can take advantage of more sunlight and good root growth so that it can utilize more nutrients. Conversely, planting distances that are too tight will result in competition between plants that are very great in terms of sunlight, water, and nutrients. As a result, plant growth is stunted and crop yields are low. This is in accordance with the results of research by Purba et al., (2019), fertilizing 100 ml / liter of biological fertilizer at a planting distance of 20 cm x 15 cm shows the best results on the number of saplings of onion plants.

4. Root Volume (ml)

The results of variance analysis using Test F showed that the tested treatment had a significant influence on the root volume variable in each observation period (Table 4).

Table 4. Effect of Bioslurry and Plant Spacing Combination on Root Volume at Age 15, 25, and 35, HST

No	Treatment	15 HST (ml)	25 HST (ml)	35 HST (ml)
1.	A. B:50ml/liter, JT:20 cm x 10 cm	0,58 a	1,83 a	2,33 a
2.	B. B:100 ml/liter, JT:20 cm x10 cm	0,92 a	1,92 a	2,42 a
3.	C. B:150 ml/liter, JT:20 cm x 10cm	0,92 a	1,83 a	2,33 a
4.	D. B:50 ml/liter, JT:20cm x 15cm	0,92 a	1,92 a	2,42 a
5.	E. B: 100 ml/liter, JT:20cm x 15cm	1,50 b	2,50 b	2,92 b
6.	F. B:150 ml/liter, JT:20cm x 15cm	1,17 b	2,17 b	2,67 b
7.	G. B:50 ml/liter, JT:20cm x 20cm	1,08 b	2,08 a	2,58 b
8.	H. B: 100 ml/liter, JT:20cm x 20cm	1,17 b	2,08 a	2,58 b
9.	I. B:150 ml/liter, JT:20cm x 20cm	1,25 b	2,25 b	2,75 b

Remarks: The average number followed by the same letter in the same column shows no real difference based on the Scott-Knott Cluster Test at a real level of 5%.

In table 4 it can be seen that the concentration of bioslurry and planting spacing exerted an intangible influence on the average root volume of onion plants in all observation periods. In the observation of 15 HST and 35 HST, the highest average plant root volume was obtained in the combination of treatment E (bioslurry 100 ml / liter and planting distance 20cm x 15cm) and the combination of treatments F, G, H, and I, but significantly different from other treatment combinations. It is suspected that medium and wide planting distances at various bioslurry concentrations are optimal plant spacing that can improve the growing environment of onion plants, so that onion plants provide the highest root volume. According to Roessali et al., (2019), optimal planting distance will provide good plant top growth so that it can utilize more sunlight and good root growth so that it can utilize more nutrients.

At the observation of 25 HST, the average volume of plant roots was obtained in the combination of treatment E (bioslurry 100 ml / liter and planting distance 20 cm x 15cm) and the combination of treatments F and I, but significantly different from other treatment combinations. This is thought to be due to the population at planting distances of 20 cm x 15 cm and 20 cm x 20 cm less so that onion plants are more optimal in obtaining nutrients,

sunlight for the process of photosynthesis and space to grow can affect the growth of the number of leaves and root volume, because leaves are the main organs that function for photosynthesis which produces photosynthetes for plant vegetative growth such as root volume.

Irregular planting spacing will allow competition for sunlight, nutrients, water and between individual plants, so that appropriate spacing can reduce competition for plant growth factors (Sumarni & Rosliani, 2012). Furthermore, Sudewi et al., (2020)stated that regulating planting spacing aims to minimize the occurrence of intra-species and inter-species competition and is an act of manipulation so that the canopy and plant roots can utilize the environment optimally.

5. Plant Growth Rate (g/m2/hr)

The results of variance analysis using Test F showed that the tested treatment had a significant effect on the variable plant growth rate in the observation period of 15 HST - 25 HST, but not significantly in the observation period of 25 HST - 35 HST (Table 5).

Table 5. The Effect of the Combination of Bioslurry and Plant Spacing on Plant Growth Rate at the Age of 15 HST - 25 and 25 HST - 35 HST and Tuber Diameter

No	Treatment	15–25 HST (g/m2/hr)	25–35 HST (g/m2/hr)	Tuber Diameter (cm)
1.	A. B:50ml/liter, JT:20 cm x 10 cm)	**72.58 b**	53.33 a	2.51 a
2.	B. B:100 ml/liter, JT:20 cm x10 cm)	**73.08 b**	52.50 a	2.40 A
3.	C. B:150 ml/liter, JT:20 cm x 10cm)	**74.08 b**	50.83 a	2.54 a
4.	D. B:50 ml/liter, JT:20cm x 15cm)	51.00 A	36.11 a	2.62 a
5.	E. B: 100 ml/liter, JT:20cm x 15cm)	**69.78 b**	35.00 A	**2.74 b**
6.	F. B:150 ml/liter, JT:20cm x 15cm)	48.94 a	46.67 a	2.65 a
7.	G. B:50 ml/liter, JT:20cm x 20cm)	38.50 a	29.17 a	**2.92 b**
8.	H. B: 100 ml/liter, JT:20cm x 20cm)	38.96 a	33.33 a	**2.77 b**
9.	I. B:150 ml/liter, JT:20cm x 20cm)	45.04 a	25.83 a	**2.81 b**

Remarks: The average number followed by the same letter in the same column shows no real difference based on the Scott-Knott Cluster Test at a real level of 5%.

In table 5 it can be seen that the concentration of bioslurry and planting distance have a significant influence on the growth rate of shallots in the observation period of 15 HST – 25 HST. In the observation of 15 HST and 25 HST, the highest average plant growth rate was obtained in the combination of treatment C (bioslurry 150 ml / liter and planting distance 20cm x 10cm) sebssar 74.08 g / m^2 / hr and a combination of treatments A, B, and E, but significantly different from other treatment combinations. It is suspected that pthere is a certain concentration of bioslurry fertilizer application will encourage growth, while at higher levels it will inhibit growth, and poison plants (Hudaib et al., 2019). As stated by Wati, (2019), applying organic fertilizer to a certain extent can increase plant growth and yield quality.

In the observation of plant growth rate aged 25 HST – 35 HST bioslurry concentration and planting distance did not have a significant effect on the average plant growth rate, where the combination of treatment A (bioslurry 50 ml / liter and planting distance 20 cm x 10 cm) achieved the highest plant growth rate of 53.33 g / m^2 / hr which was not significantly different from other treatments. It is suspected that the nutrients contained in bioslurry are not responded well by onion plants at various planting distances, so it does not affect the growth rate of onion plants. This is in accordance with the results of previous research conducted by Ardebili et al., (2011) on fertilization efficiency in onion plants which showed that excessive doses of bioslurry fertilizer did not provide benefits in terms of their effect on the growth rate of onion plants.

6. Tuber diameter

The results of variance analysis using Test F showed that the tested treatment had a significant influence on the variable diameter of tubers (Table 5). The results of this study are in accordance with the results of research by Jigme et al. (2019) which states that less frequent planting distances provide opportunities for plants to absorb more water so as to increase the diameter of tubers. Plant density affects the yield of onion bulbs, both the number and size of bulbs produced (Khalafalla, 2001). Spacing or plant population regulation is closely related to the level of competition between plants for growth factors. Close planting distances result in higher levels of competition so that there will be plants whose growth is hampered, either because they are shaded by surrounding plants or because of plant competition in obtaining water, nutrients, and oxygen (Lehar et al., 2016).

7. Fresh Tuber Weight and Dry Tuber Weight Per Clump (grams)

The results of variety analysis using Test F showed that the tested treatment had a significant influence on the variables of fresh weight per clump and dry weight per clump (Table 6).

In Table 6 it can be seen that the treatment of bioslurry concentration and planting distance has a significant effect on the weight of fresh bulbs per clump of shallots, the highest average weight of fresh bulbs of 117.17 grams was obtained in the combination of treatment E (bioslurry 100 ml / liter and planting distance 20cm x 15cm) and was significantly different from other treatment combinations. This is thought to be because the application of bioslurry fertilizer of 100 ml / liter and planting distance of 20 cm x 15 cm is an optimal combination of treatments. In accordance with the opinion of Maghfoer et al., (2022), the use of planting spacing and the right dose of bioslurry can increase plant growth and yield, including the weight of fresh bulbs of onion plants. Furthermore, the results of Lende et al., (2020), said bioslurry is an organic fertilizer that contains macro and micro nutrients that are needed by plants for growth and development, if given with the right dose will increase plant generative yields such as the weight of fresh plant tubers

Table 6. The Effect of Bioslurry Combination and Plant Spacing on Fresh Tuber Weight Per Clump, Dry Tuber Weight Per Clump, and Dry Weight Per Plot

No	Treatment	Weight of Fresh Tubers Per Clump (g)	Weight of Dry Tubers Per Clump (g)	Weight of Dry Tubers Per Plot (kg)
1.	A. B:50ml/liter, JT:20 cm x 10 cm)	83.67 a	61.47 a	2.13 b
2.	B. B:100 ml/liter, JT:20 cm x10 cm)	76.00 a	53.70 a	2.15 b
3.	C. B:150 ml/liter, JT:20 cm x 10cm)	84.00 A	58.37 a	2.38 b
4.	D. B:50 ml/liter, JT:20cm x 15cm)	82.00 A	57.67 a	3.01 c
5.	E. B: 100 ml/liter, JT:20cm x 15cm)	**117.17 C**	**85.90 b**	**3.74 s**
6.	F. B:150 ml/liter, JT:20cm x 15cm)	93.83 b	66.83 a	2.90 C
7.	G. B:50 ml/liter, JT:20cm x 20cm)	99.90 b	**72.57 b**	1.36 A
8.	H. B: 100 ml/liter, JT:20cm x 20cm)	92.33 b	65.37 a	1.77 a
9.	I. B:150 ml/liter, JT:20cm x 20cm)	97.83 b	**71.10 b**	1.93 b

Remarks : The average number followed by the same letter in the same column shows no real difference based on the Scott-Knott Cluster Test at a real level of 5%.

In the observation of dry tuber weight per clump, the concentration of bioslurry and planting distance had a significant effect, where the combination of treatments with the highest average dry weight per clump of 85.90 grams was obtained in the combination of treatment E (bioslurry 100 ml / liter and planting distance 20cm x 15cm) and was not significantly different from the combination of G and I treatments, but significantly different from other treatments. It is suspected that medium planting distance is the optimum planting distance desired by onion plants. According to Rosyidah et al., (2014), in general, the higher the density of plants to a certain extent, the higher the productivity, but planting distances that are too tight will increase humidity, affect the use of sunlight, nutrient use, land use efficiency, plants grow thin and less productive. The ideal planting spacing pattern is if plant needs for environmental conditions (light, humidity, air aeration and rooting) can be fulfilled (Gebretsadik & Dechassa, 2018).

8. Weight of dry tubers per plot

The results of variety analysis using Test F showed that the tested treatment had a significant effect on the variable weight of dry tubers per plot (Table 6). In Table 6 it can be seen that the treatment of bioslurry concentration and planting distance has a significant influence on the weight of dried onion bulbs per plot, the highest average weight of dry bulbs per plot of 3.74 kg per plot or equivalent to 9,972 tons / ha (land efficiency 80%) obtained in the combination of treatment E (bioslurry 50 ml / liter and planting distance 20cm x 20cm) is significantly different from other treatment combinations. This is thought to be because the application of bioslurry fertilizer of 100 ml / liter and planting distance of 20 cm x 15 cm is an optimal combination of treatments, so that maximum plant yields (dry tuber weight per plot) are obtained. Pthere is a combination of nutrients needed by onion plants available and can be absorbed by plants for vegetative growth and plants can absorb the nutrients contained in the fertilizer to carry out metabolic processes properly. The optimum planting distance will affect plant growth, because there is competition in the use of nutrients, but if nutrients are available sufficiently, plants do not lack nutrients even though there is competition because each plant gets adequate nutrient intake for its growth. As stated by Oktaviani et al., (2020), that plants that grow in optimum populations will be able to grow well as long as nutrients are available sufficiently. Furthermore, Khrisnamoorthy, (1981), suggests that crop production will increase at a certain population increase.

Correlation Analysis of Growth Components and Yield of Shallot Plants

1. Correlation of plant height with dry tuber weight per plot

Based on the calculation of the Pearson product moment correlation test (Table. 7) shows that the correlation between plant height and dry tuber weight per plot there is an intangible correlation in all observation periods (age 15 HST, 25 HST, and 35 HST) with categories successively weak, very weak and weak because after testing the correlation $t_{count} < t_{table}$, This means that the relationship between plant height at the age of 15 HST, 25 HST and 35 HST with dry tuber weights per plot is not real. Thus, the number of leaves at the observed age of 15 HST, 25 HST, and 35 HST which are growth components does not affect the yield of dry tuber weight per plot because based on the calculation of the Coefficient of Determination (R Square) of 0.210, 0.179 and 0.290 respectively, it means that the yield of seed weight per plot is influenced by the number of leaves at the age of 15 HST 21.0% (weak category) , at age 25 HST 17.9% with very weak category, and at age 35 HST 29.0% with weak category.

This is thought to be caused by the insufficiency of macro element needs, especially N, P, and K by onion plants during the formation of bulbs. In accordance with Rai's opinion, G.S. (2018), who said that nitrogen, potassium and phosphorus play a role in perfecting the formation of onion bulbs. Nitrogen deficiency or the presence of impaired

nitrogen metabolism in a certain time range will limit the number and size of tubers. The results of Rosyidah et al., (2014) to obtain maximum production in onion plants nitrogen, phosphorus and potassium nutrients must be available adequately during the vegetates and generative growth phases.

Table 7. Correlation Between Plant Height and Number of Leaves with Dry Tuber Weight Per Plot

No	Correlation Coefficient	Plant Height			Number of leaves			Number of saplings		
		15 HST	25 HST	35 HST	15 HST	25 HST	35 HST	15 HST	25 HST	35 HST
1	R	0.210	0,179	0,290	0,214	0,413	0,354	0,427	0,582	0,471
2	Category	Weak	Very weak	Weak	Weak	Keep	Weak	Keep	Keep	Keep
3	R2	0,044	0,032	0,084	0,046	0,170	0,125	0,182	0,170	0,222
4	t-count	1.07	0.91	1,52	1,1	2.27	1.89	2.36	3.58	2.67
5	t-table $_{0.05\ (25)}$	2,060	2,060	2,060	2,060	2,060	2,060	2,060	2,060	2,060
6	Conclusion	MR	MR	MR	MR	N	MR	N	N	N

2. Correlation of the number of leaves with the weight of dry tubers per plot

Based on the calculation of the Pearson product moment correlation test (Table. 7) shows that the correlation between the number of leaves and the weight of dry tubers per plot there is an unreal correlation in the observation period of 15 HST and 35 HST with weak categories because after testing the correlation tcount<ttable, this means that the relationship between the number of leaves at the age of 15 HST and 35 HST with the weight of dry tubers per plot is not real. Thus, the number of leaves at the observed age of 15 HST and 35 HST which is a growth component does not affect the yield of dry tuber weight per plot because based on the calculation of the Coefficient of Determination (R Square) of 0.214 and 0.354, it means that the yield of tuber weight per plot is influenced by the number of leaves at the age of 15 HST and 35 HST by 21.4% and 35.4% with weak categories.

This is thought to be caused by insufficient nutrient needs by onion plants during the formation of bulbs. In accordance with the opinion of Tandi et al., (2022), who said that macronutrients (nitrogen, phosphorus and potassium) play a role in improving the formation of plant tubers. Deficiency of N, P and K or the presence of metabolic disorders in a certain time range will limit the number and size of tubers. The results of Shinde et al., (2019) research, to obtain bulb production in shallots that are high in nutrients N, P and K must be available adequately during the growth phase.

Meanwhile, at the observation of the age of 25 HST there was a real correlation between the number of leaves and the yield of dry tuber weight per plot with the medium category, because after being tested the correlation tcalc>$_{ttable}$, meaning that the relationship between the number of leaves at the age of 25 HST with the weight of dry tubers per plot was real. Based on the calculation of the Coefficient of Determination (R Square) of 0.413, it means that the yield of keinrg seed weight per plot is influenced by plant height at the age of 25 HST of 41.3%. Thus, it can be concluded that the number of leaves at the age of 25 HST indicates an increased effect on the yield of dry tuber weight per plot.

It is suspected that the number of leaves that are a growth component affects the yield of dry tuber weight per plot when leaves before flowering (reduced growth of vegetative components) affects the yield of keirng seed weight per plot. This suggests that the number of leaves formed at the end of vegetative growth or before flowering

results in a high number of bulbs. If the number of leaves formed is increasing and supported by the availability of nutrients and getting enough sunlight on all the leaves, then many leaves are able to produce high tubers, then the yield increases. According to Khalafalla, (2001), the number of red onion leaves formed will produce bulbs, and affect plant yields. Thehigher the number of leaves, the more the yield of onion plant production

3. Correlation of the number of saplings with the weight of dry tubers per plot

Based on the calculation of the Pearson product moment correlation test (Table. 7) shows that the correlation between the number of saplings and the weight of dry tubers per plot there is a real correlation in all observation periods both at the age of 15 HST, 25 HST and 35 HST with medium categories, because after testing the correlation tcount>ttable, That is, that the relationship between the number of saplings in all observation periods with the weight of dry tubers per plot is real. Based on the calculation of the Coefficient of Determination (R Square) respectively: 0.427, 0.582 and 0.471 means that the weight of dry tubers per plot is influenced by the number of saplings by 42.7% and at the age of 15 HST, at the age of 25 HST by 58.2%, and at the age of 35 HST by 47.1%.

It is suspected that the number of saplings that are a component of growth affects the yield of dry tuber weights per plot. If the number of leaves formed is increasing and supported by the availability of nutrients and getting enough sunlight on all the leaves, then many leaves are able to produce high tubers, then the yield increases. According to Lende et al., (2020), the number of onion saplings formed will produce bulbs, and affect plant yields. Thehigher the number of saplings, the more the yield of onion crop production.

CONCLUSION

Based on the results and discussion above, the following conclusions can be proposed The combination of Bioslurry and planting spacing affects the number of tillers, root volume at, and growth rate of plants aged 15 HST-25 HST, tuber diameter, fresh weight of tubers per clump and weight of dry tubers per clump, and weight of dry tubers per plot. The highest dry tuber weight per plot of 3.74 kg per plot or equivalent to 9.972 tons / ha (land efficiency 80%) was obtained in a combination of treatment E (bioslurry 50 ml / liter and planting distance 20cm x 15cm). There was a marked correlation between the number of leaves at the age of 25 HST and 35 HST and the number of saplings in all observation periods with the weight of dry tubers per plot.

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