



Study of Growth Regulating Substances and Concentration of Coconut Water on the Growth and Results of *Garlic Shallots* (*Allium Ascalonicum* L.)

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ABSTRACT

A study of Atonic Growth Regulatory Substances and coconut water immersion on the growth and yield of shallots was carried out from 3 March to 9 May 2023 in Tawangrejo Village, Ngrambe, Ngawi. This study aims to examine the dose of ZPT Atonik and coconut water on the growth and yield of shallots (*Allium ascalonicum* L). The experimental design used in this study was a Completely Randomized Block Design (RAKL) which consisted of two factorials, namely the first factor was the concentration of coconut water immersion (K) which consisted of 4 levels, namely K0 = 0%, K1 = 80%, K2 = 90%, K3 = 100%. The second factor is Atonik (A) which consists of 4 levels namely, A1 = 0 ml/l, A1 = 1.5 ml/l, A2 = 3.0 ml/l, A3 = 4.5 ml/l. Each experiment will be applied to three (3) repetitions and consists of four treatment levels so that there are 16 treatment combinations in this study. Data were analyzed using Analysis of Variance and followed by the Honest Significant Difference Test (BNJ) at the 5% level.

The results of this study showed that the Atonik treatment and coconut water immersion had no significant effect on the observed parameters of the number of leaves (40.30 leaves), number of tubers (17.87 pieces), tuber diameter (2.45 cm), fresh weight (130.63 g), dry weight (109.22 g), but significant effect on the observed parameters of plant height (41.33 cm)

Keywords: *Shallots, Coconut Water and Atonik*

INTRODUCTION

Garlic shallots (*Allium ascalonicum* L) is one of the basic needs of the Indonesian people, where shallots are needed as a staple spice, traditional medicine, and a complement to cooking spices. In the last decades it has shown that the presence of shallots in the country has increased every year for use as seeds and for consumption. In addition, shallots are a source of income and employment opportunities that contribute to the domestic community. Increased industrial growth, especially in Indonesia, tends to increase the need for shallots (Firmansyah dan Sumarmi, 2013).

The need for shallots in the country is very high, but Indonesia has not been able to meet this need. There are many things that reduce shallot production. These factors include pests, weather and fertilizer factors. One example that causes the need for shallots to be not met is that the number and weight of the bulbs produced are not optimal. In addition, extreme weather with a tendency to rain and fog makes shallots vulnerable to fungal/bacterial diseases, if the weather is too hot, caterpillars will attack the plants (Refti, 2021)

One of the efforts to increase shallot production is through the use of plant stimulating hormones. Generally there are three hormones that can support plant growth, namely gibberellins, auxins, and cytokinins. Each of these hormones has a different use. Giving ZPT can stimulate cell division in plant tissue. ZPT is a non-nutrient organic compound that can support, prevent, and change the physiological processes of plants in certain concentrations.

One of the most commonly used ZPT is Atonik. Plants require the addition of atonic substances to activate enzymes (Azwar, 2018). Meanwhile, Hidayanto (2014) said that nitroaromatic compounds in Atonik can encourage root development and stimulate shoot growth. Aton's dinitrophenol compounds can increase nutrient uptake and stimulate shoot release. The direction of plant growth and development is determined by the selection of a particular ZPT. The active ingredients contained in Atonik are sodium ortho-nitrophenol, sodium paranitrophenol, sodium dinitrophenol and sodium nitroguaiacol.

In addition to the use of synthetic ZPT, this study also used concentrations of immersing coconut water. During the germination process of shallot seeds, it is necessary to soak natural ZPT using coconut water immersion. Coconut water contains growth regulators such as cytokinins (5.8 mg/l), auxin (0.07 mg/l), and very small gibberellins, as well as other compounds that can stimulate germination and plant growth (Deni, 2020).

RESEARCH METHODS

This research was conducted on March 3 - May 9 2023 in Ngrambe District, Ngawi Regency, East Java Province. The condition of the land is at an altitude of 600 meters above sea level and has a temperature of 25-35°C. The type of soil in this area is Andosol.

The experimental design used in this study was a Completely Randomized Block Design (RAKL) which consisted of two factorials, namely the first factor was the concentration of coconut water immersion (K) which consisted of 4 levels, namely K0 = 0%, K1 = 80%, K2 = 90%, K3 = 100%. The second factor is Atonik (A) which consists of 4 levels namely, A0 = 0 ml/l, A1 = 1.5 ml/l, A2 = 3.0 ml/l, A3 = 4.5 ml/l. Each experiment will be applied to three (3) repetitions and consists of four treatment levels so that there are 16 treatment combinations in this study. Data were analyzed using Analysis of Variety and followed by the Honest Significant Difference Test (BNJ) at the 5% level.

The research procedure applied in this study was to make beds with a length of 1 m and a width of 1 m. The height of the beds is 30 cm with the aim that during the rainy season, water can flow smoothly and not stagnate. Basic fertilizer application using cow bokashi fertilizer at a dose of 15 tons/ha. The shallot seeds were obtained from the Nganjuk area and have been sorted in order to get superior seeds. The spacing used was 20 x 20 cm, so that 25 plant populations were obtained per plot and there were 5 sample plants. The application of coconut water immersion is done when the seeds are to be planted by soaking the shallot seeds for 24 hours with a predetermined concentration. Atonik application is done when the plants are 15 and 36 HST. How to apply this Atonik using tools sprayer with the concentration determined by each treatment. Follow-up fertilization was carried out during the vegetative period of 14 HST and the generative period of 36 HST. Control of pests and diseases using fungicides and insecticides that work both systemically and contact. Harvesting of shallots has been carried out at the age of 67 HST which is marked by the leaves starting to fall and turn yellow and giving off a pungent aroma.

RESULTS AND DISCUSSION

Table 1. The average results of the treatment of various concentrations ZPT Atonik.

Treatment	Plant height	Number of Leaves	Tuber Diameter	Dry Weight of Tubers
A0	35,32 A	33,83 A	2,03 A	101,11 A
A1	36,68 B	35,01 A	2,07 A	102,68 A
A2	37,98 C	36,45 B	2,24 B	104,76 B
A3	37,68 BC	37,29 B	2,30 B	106,41 C

Note: Numbers followed by the same letter in the same column show no significant difference in the BNJ test at the 5% level.

Plant height when seen from table 1 shows the control treatment is different from all other treatments. This is because the administration of Atonik growth regulators can help increase plant height due to the presence of auxin in Atonik which stimulates cell elongation. Atonik's role in plant growth is as a growth stimulant, as a building block for organismal cells, as an organic catalyst to accelerate reactions, stimulate the formation and elongation of shoot cells.

Furthermore, the parameter for the number of shallot leaves also showed a significant difference in each treatment, and the highest number of leaves was A3 (37.29 strands). Atonik is a type of auxin with compounds that have a positive effect on root formation and together with cytokinins can control the growth of shoots, stems and roots. The presence of leaves on plants gives a good influence on root formation, because leaves produce carbohydrates through photosynthesis, and shoots serve as a source of auxin.

The tuber diameter parameter showed significantly different results for each treatment, the highest yield was in A3 (2.30 cm). This shows that the right Atonik concentration has a significant effect when the spraying interval is continuous. Auxin regulates growth and other physiological functions in the plant body outside of the tissues where it is produced, and in very small amounts, auxin is the active ingredient. Auxin also affects the osmotic pressure of plants, so that auxin has the effect of increasing/enlarging cell size. The simple explanation is that auxin softens cell walls, which increases cell water absorption and causes cell elongation.

The last yield parameter was the dry weight of shallots which showed a significant difference for each treatment. Atonic substances absorbed by plants accelerate the flow of protoplasm in cells and activate metabolism. At the same time, dry weight can increase when photosynthesis is greater than respiration. It is believed that the administration of Atonik increases the permeability of the cell wall, which increases the absorption of chlorophyll-forming nutrients, which is very important for enhancing photosynthesis. With increasing photosynthesis, the dry tuber weight also increases.

Table 1. The average results of the treatment of various concentrations of coconut water.

Treatment	Plant height	Number of Leaves	Tuber Diameter	Dry Weight of Tubers
K0	35,86 A	34,71 A	1,99 A	99,95 A
K1	36,39 A	35,20 A	2,08 A	103,94 B
K2	38,27 C	36,98 A	2,29 B	105,35 B
K3	37,14 B	35,69 A	2,28 B	105,72 B

Note: Numbers followed by the same letter in the same column show no significant difference in the BNJ test at the 5% level

In the plant height parameter for giving coconut water it can be read that each treatment is significantly different, for the highest value is found in K2 (38.27 cm). Utilization of coconut water as an organic material is one way to replace the use of synthetic materials. The advantages of coconut water are comparable to synthetic ingredients that contain cytokinins or are a substitute for cytokinin hormones. In shallot plants with vegetative propagation, if shoots have appeared, the growth will be fast, after the onion bulbs sprout, the plants grow faster because of the high value of the ratio of leaves and roots, so plant growth becomes faster so that it is also faster to form new plant organs.

The number of leaves parameter did not show significantly different results for each treatment. In this study, the results of coconut water analysis showed that the N content was still below the quality standards for liquid organic fertilizer, namely 0.14 and 0.04%, which were not effective in encouraging the growth of shallots. External factors such as the availability of N nutrients play an important role. This nitrogen plays an important role in plant vegetative growth and also in growth rate, which can increase protein synthesis, which is then used to form plant cells, so that when N levels are optimal it can encourage growth rate.

The next parameter is fresh which shows a significant difference for each treatment. Tubers increase in number and diameter due to the increase in available food reserves. The large tuber diameter indicates a lot of food reserves in the form of carbohydrates which are the raw materials that support the growth and development of seed tubers in the coming season. more carbohydrates are used for growth, development, food storage and cell development.

For the last parameter, namely dry weight of shallot bulbs which showed significantly different results in each treatment, the highest value was found in K3 (105.72 g). Another factor is the length of immersion in young coconut water which produces the best plant height, which affects the process of photosynthesis which results in photosynthesis to increase crop production. Where the concentration of coconut water affects plant growth. This is evident from Kristina (2012) which states that there are three types of sugar in young coconut water, namely glucose with a composition of 34-45%, sucrose with a composition of 53-18% and fructose with a composition of 12-36%.

CONCLUSION

Based on the research results from the treatment of ZPT Atonik and coconut water, it can be concluded that :

1. The treatment of giving Atonik with a concentration of 3 ml/l (A2) gave the highest results on plant height parameters. Treatment with a concentration of 4.5 ml/l (A3) gave the highest results on the parameters of observation of the number of leaves, tuber diameter, and tuber dry weight.
2. The treatment of coconut water with a concentration of 90% (K2) gave the highest results on plant height, number of leaves and tuber diameter, while the treatment with a concentration of 100% (K3) showed the highest results on the parameter dry weight of shallot bulbs.
3. The treatment of ZPT Atonik and coconut water on the yield and growth of shallots showed results that did not significantly affect the number of leaves (40.30) strands, tuber diameter (2.45) cm, dry weight (109.22) grams. The interaction between the combined treatments between ZPT Atonik and coconut water showed that it had an effect on the combined interaction of plant height (41.33) cm.

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