

## CULTIVATING HIGH-YIELD SHALLOTS: A STUDY ON PLANTING MEDIA AND ECOENZYME APPROACHES

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### Article Info

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### Abstract

The demand for shallots in North Sumatra surpasses local production, primarily reliant on unsustainable inorganic fertilizers, which compromise long-term land productivity. To counter this trend, the integration of organic matter becomes imperative for enhancing and sustaining soil quality. Chicken manure compost, enriched with vital nutrients, emerges as a viable medium to enhance soil fertility and quality while avoiding the detrimental effects of chemical fertilizers. This study delves into the effectiveness of planting media and ecoenzyme treatment on shallot production. Ecoenzymes, generated through the enzymatic breakdown of vegetable and fruit waste in the presence of sugar and water using specific microorganisms, offer a sustainable solution. Infused with bacteria capable of organic matter decomposition, plant growth stimulation, and pest control, ecoenzymes present an eco-friendly strategy to bolster plant production. Enzymes like Trypsin, Lipase, and Amylase within ecoenzymes optimize plant development. The study investigates the combined impact of planting media and ecoenzyme treatment on shallot yield using a factorial randomized block design, with focus on wet tuber weight, dry bulb weight, and tuber diameter as key parameters. Results underscore the efficacy of a planting medium composed of 75% topsoil and 25% compost, which positively influenced shallot production. Conversely, ecoenzyme treatment and its interaction with planting media did not significantly affect shallot yield metrics, encompassing wet tuber weight, dry bulb weight, and tuber diameter. Drawing from prior research, the utilization of organic fertilizers for enhancing soil quality and productivity is well-established. Earlier studies by Tarigan and Sembiring (2017) and Saepuloh et al. (2020) corroborated the yield-improving attributes of organic matter and chicken manure compost. Ecoenzymes, as expounded by Thirumurugan (2016) and Utami et al. (2020), demonstrate potential in stimulating plant growth and controlling disruptive organisms. Notably, the solution's pH of 4 and diverse enzyme composition, including Trypsin, Lipase, and Amylase, facilitate organic matter decomposition in soil, liberating essential nutrients for plant assimilation, as highlighted by Hasanah (2021).

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## INTRODUCTION

The production of shallots in North Sumatra is far from meeting the demand due to the reliance on inorganic fertilizers. Although these fertilizers provide high yields, they reduce agricultural land productivity in the long run. Thus, the provision of organic matter is essential to maintain and improve soil quality. Chicken manure compost is a medium that contains the necessary nutrients for plant growth and can improve soil fertility and quality. It is important to note that a good planting medium should hold water and distribute excess water easily, be porous, and easily breakable.

Ecoenzymes are produced through the decomposition process of vegetable and fruit waste in the presence of sugar and water using selective microorganisms. Ecoenzyme treatment contains bacteria that have the potential to decompose organic matter, stimulate plant growth, and control plant-disturbing organisms. The enzymes present in ecoenzyme, such as Trypsin, Lipase, and Amylase, can optimize plant growth and production. Moreover, ecoenzyme treatment is an environmentally friendly method that helps in the decomposition process of plants.

In this study, we aim to investigate the effect of planting media and ecoenzyme treatment on shallot production. A factorial randomized block design was employed with two treatment factors: planting media and ecoenzyme. We observed wet tuber weight per plot (g), dry bulb weight per plot (g), and tuber diameter (mm). The results showed that the provision of planting media in the form of 75% topsoil + 25% compost responded well to shallot production. However, ecoenzyme treatment and the interaction between ecoenzyme and growing media had no significant effect on shallot production in terms of wet tuber weight per plot, dry bulb weight per plot, and tuber diameter.

Several studies have shown the importance of using organic fertilizers to improve soil quality and productivity. For instance, Tarigan and Sembiring (2017) reported that the provision of organic matter could increase the yield of red onion. Similarly, Saepuloh et al. (2020) found that chicken manure compost could improve soil fertility and quality. Ecoenzymes have also been used to optimize plant growth and production. Thirumurugan (2016) explained that ecoenzyme is a solution produced from a simple decomposition process of vegetable and fruit waste in the presence of sugar and water filling using selective microorganisms. Ecoenzymes contain bacteria that have the potential as decomposers of organic matter, development stimulants, and agents of controlling plant-disturbing organisms (Utami et al., 2020). The ecoenzyme solution has a pH in the range of 4 and contains various enzymes such as Trypsin, Lipase, Amylase, which can aid in the decomposition process of organic matter in the soil, leading to the release of essential nutrients that can be taken up by plants (Hasanah, 2021).

In the agricultural sector, shallot cultivation plays a significant role in meeting the demand for food in Indonesia. However, the current production of shallots in North Sumatra, Indonesia, is still insufficient to meet the demand for it. The Department of Agriculture reported that the production of shallots in North Sumatra was 16,337 tons, while the demand for it was 33.96 tons in 2018. One of the reasons for the low productivity of shallots is the overuse of inorganic fertilizers, which can decrease soil productivity and stability (Humberto and Alan, 2013). Therefore, the use of organic fertilizers to improve soil fertility and quality has been recommended (Tarigan and Sembiring, 2017).

In recent years, research has focused on increasing shallot productivity by improving planting media and applying ecoenzyme treatment. Planting media is crucial in determining the growth and development of plants. A good growing medium should be able to retain and distribute water easily, be porous and easy to break. Chicken manure compost has been found to be an effective planting medium for improving soil quality due to its high nutrient content (Saepuloh et al., 2020). The content test at the Socfindo Laboratory revealed that the planting medium contains c-organic 7.2500%, pH 5.7700%, N 2.9810%, P 3.9600%, and K 0.4380%.

Therefore, this study aims to determine the effect of planting media and ecoenzyme treatment on shallot production. The results of this study can contribute to the development of sustainable agricultural practices that can increase the productivity of shallots in Indonesia.

## MATERIALS AND METHODS

The research was carried out in Sunggal, Medan, North Sumatra in February-May 2022. The materials used were shallot bulbs of the bauji variety, ecoenzymes, chicken manure compost, trichozia, top soil, and polybags. The tools used are meter, hoe, gembor, analytical scale, ruler, stationery, and bamboo. This study used a factorial randomized block design (RAK) which had two blocks. Factor I is Planting Media (M) which consists of M0: 100% topsoil, M1: topsoil (75%) + chicken manure compost (25%), M2: topsoil (50%) + chicken manure compost (50%) and M3 : topsoil (25%) + chicken manure compost (75%). Factor II is Ecoenzyme (E) which consists of 0, 10, 20 and 30 ml. Observations of production parameters were observed such as wet tuber weight per plot (g), dry bulb weight per plot (g) and tuber diameter (mm). This study uses analysis of variance and further test for real treatment using Duncan.

## RESULTS AND DISCUSSION

### Wet Bulbs Weight per Plot (g)

The results of the analysis showed that the growing media showed a very significant effect on wet tuber weight per plot (g) while ecoenzymes and the interaction between the two had no significant effect on wet tuber weight per plot (g).

Table 1. Wet Bulbs Weight per Shallot Plot (g) Due to Provision of Several Planting Media and Ecoenzymes

Growing Media	Eco Enzyme				Average
	E0	E1	E2	E3	
Note:					
	..... g.....				
A0	235,50	242,50	239,50	235,50	238,25 c
A1	510,00	545,00	529,50	533,50	529,50 a
A2	431,00	475,00	539,00	492,00	484,25 a
A3	346,50	342,50	373,00	364,50	356,63 b
	380,75	401,25			
Average			420,25	406,38	

Numbers followed by unequal letters indicate a very significant difference according to the Multiple Distance Test (Duncan) at the 5% level.

Table 1 shows that the weight of wet tubers per plot was significantly different to the growing medium, while the ecoenzyme was not significantly different to the weight of wet tubers per plot. The treatment of M1 growing media was significantly different to M3 and M0 while M1 was not significantly different from M2. The availability of nutrients in appropriate and comparable quantities in the soil to be able to grow and produce optimally is needed by shallot plants. This happens because by giving doses in a balanced and appropriate amount in the soil, the plants can produce optimally. Elements contained in compost Chicken manure includes elements of Nitrogen (N) and Potassium (K) and has an important role in tuber formation. The high content of nitrogen (N) elements makes plants more fertile green so that the photosynthesis process can run perfectly which affects the quality and the quantity of the final harvest with a higher N content, it will Stimulates the growth of tillers so that yields will be obtained with the amount of tuber weight more (Elisabeth et al, 2013).

### Dried Bulbs Weight per Plot (g)

The results of the analysis showed that the planting medium had a very significant effect on the dry tuber weight per plot (g) while the ecoenzyme and the interaction between the two had no significant effect on the dry tuber weight per plot (g) as shown in Table 2.

Table 2. Dried Bulbs Weight per Shallot Plot (g) Due to Provision of Several Planting Media and Ecoenzymes

Growing Media	Eco Enzyme				Average
	E0	E1	E2	E3	
Note: .....					
A0	135,00	142,50	139,50	135,50	138,13 c
A1	407,50	444,00	428,50	433,00	428,25 a
A2	330,00	372,50	435,50	391,00	382,25 a
A3	244,00	242,00	272,00	264,00	255,50 b
	305,88				
Average	279,13	300,25	318,88		

Numbers followed by unequal letters indicate a very significant difference according to the Multiple Distance Test (Duncan) at the 5% level

Table 2 shows that the dry tuber weight per plot was significantly different to the growing media, while the ecoenzyme was not significantly different to the dry tuber weight per plot. The treatment of M1 growing media was significantly different to M3 and M0 while M1 was not significantly different from M2. Shallot tubers that experience weight loss are related to the water content which will affect the quality of the bulbs, especially the freshness of the bulbs. based on Azmi, et al, (2018) that shrinkage occurs because the water content is still high and the respiration rate is still high.

#### Bulb Diameter (mm)

The results of the analysis showed that the planting medium had a very significant effect on tuber diameter (mm) while ecoenzyme and the interaction between the two had no significant effect on tuber diameter (mm) as shown in Table 3.

Table 3. Diameter of Shallot Bulbs (mm) Due to Provision of Several Planting Media and Ecoenzymes

Growing Media	Eco Enzyme				Average
	E0	E1	E2	E3	
..... mm.....					
A0	11,39	11,47	10,81	12,72	11,60 c
A1	18,63	20,97	20,13	17,72	19,36 a
A2	20,19	19,16	18,59	18,37	19,08 a
	13,09		17,72	17,19	
A3					13,19 15,30 b
Rataan	15,83		16,81	16,50	16,20

Note: Numbers followed by unequal letters indicate a very significant difference according to the Multiple Distance Test (Duncan) at the 5% level

Table 3 shows that the tuber diameter was significantly different to the growing medium while the ecoenzyme was not significantly different to the tuber diameter. The treatment of M1 growing media was significantly

different to M3 and M0 while M1 was not significantly different from M2. This is because the nutrient content in the growing media meets the needs needed in the formation of tubers and the nature of the growing media that contains water. According to Wiraatmaja (2017), metabolism is also called enzymatic because it always uses enzyme-catalyzed reactions. This reaction is the basis of life that allows cells to grow and develop to form fruit / tubers.

## CONCLUSION

1. Provision of planting media in the form of topsoil (75%) + chicken manure compost (25%), able to give a real effect on the production of shallots 2. The administration of ecoenzymes and their interaction did not show an insignificant effect on the production of shallots.

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