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Ecoenzyme Potential as Biostimulant against Germination of Shallots of Seed Origin (TSS) (*Allium ascalonicum* L.)

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ABSTRACT

Ecoenzymes are the result of fermentation of organic matter waste such as vegetable waste or abundant fruits such as citrus fruit peels, pineapple peels and banana peels. Some of the functions of ecoenzymes are as a solution for floor cleaning, disinfectants, vegetable and fruit cleaners, pest control, plant pathogen control, and plant fertilizers. True shallot Seed (TSS) is an alternative onion plant material in the form of seeds. The use of onion botanical seeds is one of the potential technology alternatives developed to obtain quality onion seeds. The purpose of the study was to determine the effect of ecoenzyme application as a seed germination booster through seed soaking method using 3 (three) types of ecoenzyme liquid with a solution concentration of 5.0 ml / L water. The results showed that the application of ecoenzymes was able to increase the germination of TSS seeds compared to controls. Ecoenzymes from orange peels produce the highest percentage of germination compared to ecoenzymes from banana peels and pineapple peels.

Keywords: *biostimulant, germination, ecoenzyme, TSS, aplication*

1. INTRODUCTION

Shallots (*Allium ascalonicum* L.) is one of the important horticultural crops that is the highest producer of vegetable production in Indonesia (BPS, 2020). National shallot production data in 2020 shows production of 1,815,445 tons. One of the factors that affect the productivity of shallots is the use of planting material. The source of shallot planting material can come from bulbs or seeds (True Shallot Seed). The use of shallot tss as plant material still experiences problems because it takes between 4-6 weeks for germination (Sopha et al., 2016). So efforts need to be made to accelerate the growth of raw onions in the nursery in order to shorten the time for transferring seeds for planting to the field. Efforts What can be done is to use an ecoenzyme solution which is an enzyme or liquid organic fertilizer which plays a role in accelerating germination and stem elongation. leaf growth and stimulates faster flowering Transportation and storage of TSS is easier and cheaper and produces better quality tubers. The use of TSS as planting material for shallot production has been promoted by the Indonesian government because it has the potential to increase productivity and minimize disease transmission through bulbs, shallot TSS seeds are able to increase crop yields compared to bulb consumption up to two times (Basuki, 2009).

The use of TSS seeds has several advantages compared to the use of tuber planting material, including a lower volume requirement of 3-4 kg / ha, much smaller than the need for planting material for seed tubers which is 1-1.5 tons / ha, as well as in the management of TSS such as easier and cheaper transportation and storage, producing healthier plants because TSS is more free of disease pathogens so that the tubers will be of higher quality (Sumarni et al., 2012). (Atman, 2021), explained that the cultivation technology of shallots from seeds can save seed purchase costs up to 66.7% and increase yields to 30 – 40 tons / Ha.

The use of TSS planting material has several problems, including the growth power and resistance of seedlings that tend to be low to the environment, it takes a long time between 5-7 weeks for germination, so efforts are needed to accelerate the growth of shallots in the nursery, in order to accelerate the growth of shallots in the nursery and can shorten the time of transferring seedlings to move planting, So there is a need for technology to overcome these problems so that it can be used as a source of the main onion planting material that has good potential in the future, namely through the technology of using ecoenzymes from fruit skin waste as seed growth boosters or biostimulants. Ecoenzymes are products of fermentation of fruit and vegetable skins, molasses and water (Hemalatha & Visantini, 2020).

Ecoenzymes contain active microorganisms capable of producing enzymes (Win, 2011), contains complex organic substances from protein chains (enzymes), organic acids and mineral salts (Tang & Tong, 2011), It also contains bacteria that have the potential to remodel organic matter, stimulate development and as controlling agents of plant disturbing organisms. The use of ecoenzymes in agriculture can be categorized as plant fertilizers, namely liquid organic fertilizers that are easy to apply and widely used to improve the structure and fertilize the soil and increase crop production.

Research by (Lubis et al., 2022), Giving ecoenzymes with a concentration of 1% in onion plants has no real effect on the number of leaves, plant height, number of saplings, wet weight of bulbs, dry weight of bulbs. The results of further research on lettuce plants using ecoenzymes from pineapple peel waste, bananas, papaya, soursop and their combinations affect fresh weight and root weight and are effective on the growth of

lettuce plants with an ecoenzyme concentration of 3%. Based on this background, the purpose of this study is to obtain potential information from ecoenzymes as biostimulants against TSS as a source of shallot planting material, namely for germination, and spur the growth of seedlings in nurseries.

2. MATERIAL AND METHODS

Time and Place

This research was conducted from June to August 2022 at the Laboratory and Experimental Land of the Faculty of Agriculture, Medan Area University (Coordinate point: 3°36'08.5"N 98°43'11.2"E). This study used a Complete Randomized Design (RAL) with a concentration of 5.0 ml/L The treatment was repeated 8 times.

Tools and Materials

The tools used are buckets, scales, knives, tweezers, rulers, blenders, 5 L jars, test tubes, measuring cups with a size of 1 L, filter paper, label paper, fabric filters, funnels, plastic bottles where ecoenzyme products, pH meters, petridishes and stationery while the materials used consist of 30 L clean water, TSS onion seeds, pineapple peels, orange peel and banana peel and molasses 3 L. paper labels, *wrapping*, plastic, *tissue*, polybags and sterile soil.

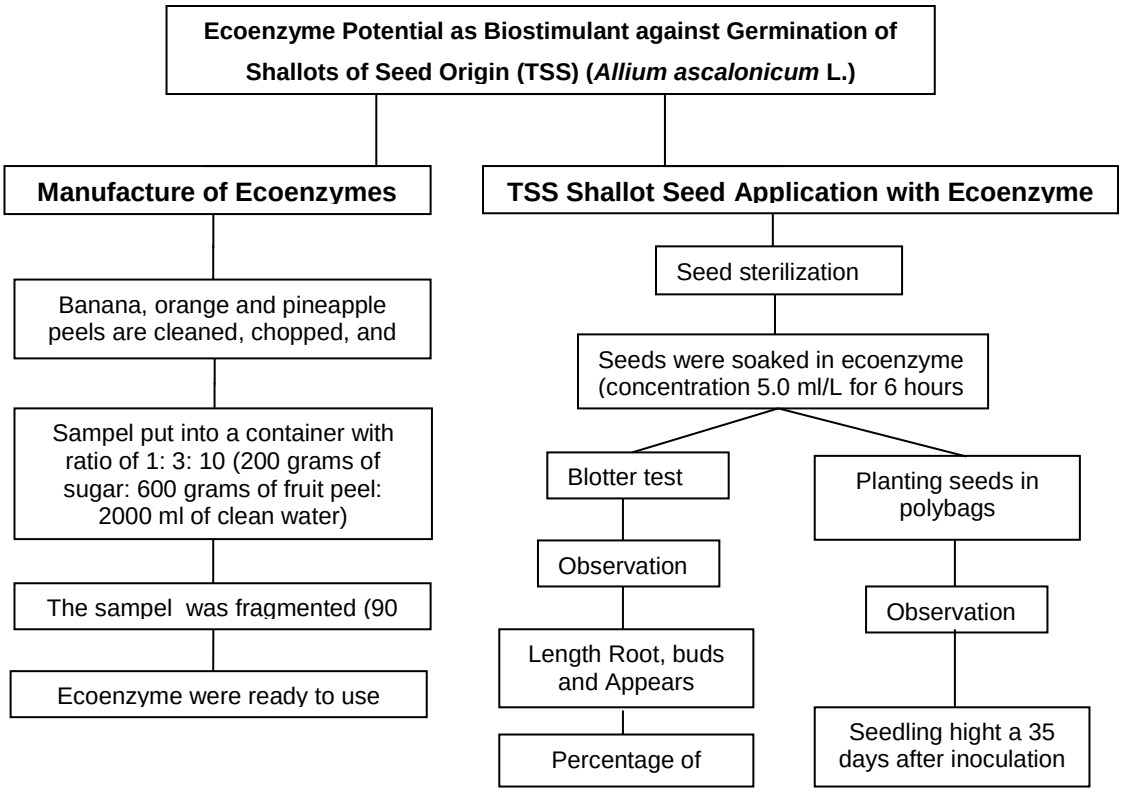

Figure 1. Flow diagram of research implementation

Manufacture of Ecoenzymes

Banana, orange and pineapple peels are cleaned with water, then chopped, weighed and blended then each fruit peel is put into a container that already contains clean water, sugar, molasses and fruit skin according to the dose with a ratio of 1: 3: 10 (200 grams of sugar: 600 grams of fruit peel: 2000 ml of clean water), then all ingredients are stirred evenly and the container is tightly closed and labeled with the date of manufacture and harvest date, namely with a fermentation period of 90 days and disiman in a place that is not exposed to direct sunlight. During the first 1 week, the lid is loosened to remove gas, then stirred every 30 and 60 days. The filtered ecoenzyme is put into a bottle container until the ecoenzyme is ready for use after

reaching a fermentation life of 90 days (Figure 1).

TSS Shallot Seed Application with Ecoenzyme

TSS onion seeds are first disinfected by soaking the seeds in a 2% NaOCl solution for three minutes and then the seeds are washed three times with sterile aquades. Then the seeds are dried in a *laminar air flow cabinet*. Next, the seeds were soaked in an ecoenzyme solution with a concentration of 5.0 ml/L of water for 6 hours, then the seeds were dried for 15 minutes before the seeds were planted and the seeds for control were soaked in sterile aquades containing 0.05% triton X (Muvea *et al.*, 2018).

To determine the effect of ecoenzymes as biostimulants is to observe the germination of onion seeds through blotter tests in petridish that has been lined with filter paper that has been moistened with sterile aquades. Each petridish contains as many as 25 TSS onion seeds, then the seeds are incubated for 7 days at room temperature, each treatment is repeated 8 times. A total of 200 seeds are used for each treatment. Observation of the percentage of germination is recorded on day 7 after application.

To determine and observe the effect of soaking TSS onion seeds with ecoenzymes on the power of field emergence observed at 15 days after application. To determine the effect of seed soaking on the height of onion seedlings, seeds are planted in polybags of sterile soil mixture, manure and cocopeat (1:1:1). The height of the seedling is measured from the base of the stem to the growing point at the age of the plant 35 days after application. The experimental method used Complete Randomized Design (RAL).

3. RESULTS AND DISCUSSION

A. Effect of Ecoenzyme Application on Germination of Shallot Seeds

The results of ecoenzyme application to onion seed germination through TSS seed soaking for 6 hours can accelerate and increase onion seed germination compared to control. Germination of onion seeds of various concentrations can be seen in Table 1.

Table 1. The effect of soaking TSS seeds with ecoenzymes on onion seed germination

Types of ecoenzymes	Percentage of sprouts (%)
EK. Jeruk	99.600 a
EK. Pisang	96.000 ab
EK. Nenas	94.400 b
Kontrol	79.200 c

Numbers followed by the same lowercase letter on the same column are unmarkedly different according to LSD at the level of 5%

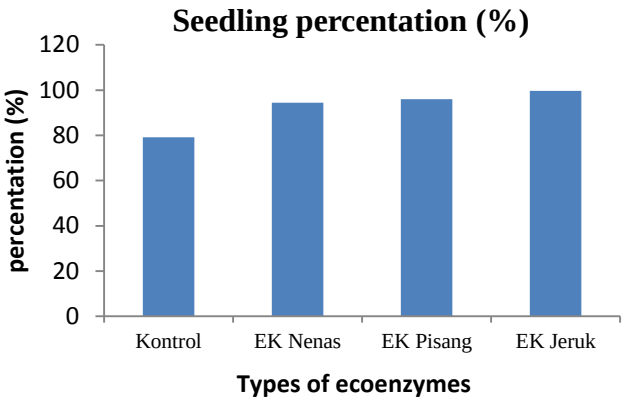

Figure 2. Graph of the effect of ecoenzymes on the percentage of sprouts of TSS onion seeds

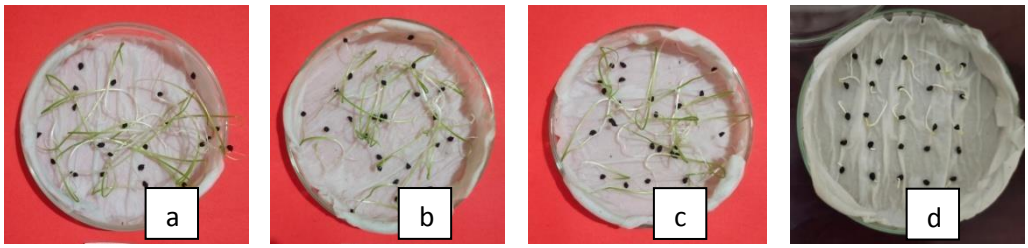

Figure 3. TSS seed germination, a) EK orange, b) EK banana, c) EK pineapple, d) TSS 7 HSI sprouts (Control)

The data in Table 1 show that the application of ecoenzymes through seed soaking was able to increase onion seed germination compared to controls. The average germination of seeds from ecoenzyme application shows a percentage above 90%. The results of statistical analysis, the use of ecoenzymes showed a real difference between ecoenzymes and controls. The best ecoenzymes are ecoenzymes from orange peels. Ecoenzymes from orange peels and from banana peels show unreal differences and ecoenzymes from banana peels and pineapples show unreal differences. The increase in seed germination after ecoenzyme application is due to the ability of these ecoenzymes to produce phytohormones that are able to stimulate seed germination and are not pathogenic in plants.

Application of ecoenzyme on shallots influenced the growth and production og onion crops on concentrayion of 225 ml/of water/plot (Yudi, 2023). The other reseach of (Dondo et al., 2023) sated the use of ecoenzymes from several kinds of fruit used was 30 ml/ l water effective for the growth of lettuca plants. Ecoenzyme solutions contain various enzymes and plant nutrient minerals such as N, P, K (Susilowati et al., 2021). Ecoenzyme solutions also contain bacteria that have functions for the remodeling of organic matter, growth stimulants and as agents in the control of plant disturbing organisms. Organic raw materials derived from fermented fruit peels and decomposed by microoranism containing carbohydrates, proteins, mineral salts and organic acids that are beneficial for plant metabolic processes (Nazim and Meera, 2021).

B. Effect of Ecoenzyme Application on the Growth of Shallot Seedlings

The results of ecoenzyme application by soaking TSS onion seeds for 6 hours can increase the growth of onion seedlings. All ecoenzyme treatments tested had an effect on

seedling growth compared to controls (Table 2).

Table 2. Effect of Ecoenzyme Application on TSS Shallot Seed Growth

Types of ecoenzymes	Average Length root (cm)	Average Length buds (cm)	Power Appears Spacious
EK. Jeruk	3.292 a	4.665 a	24.625 a
EK. Pisang	2.546 b	4.429 a	23.375 b
EK. Nenas	2.306 b	3.760 ab	22.575 b
Kontrol	1.851 c	2.858 b	20.250 c

Numbers followed by the same lowercase letter on the same column are unmarkedly different according to LSD at the level of 5%

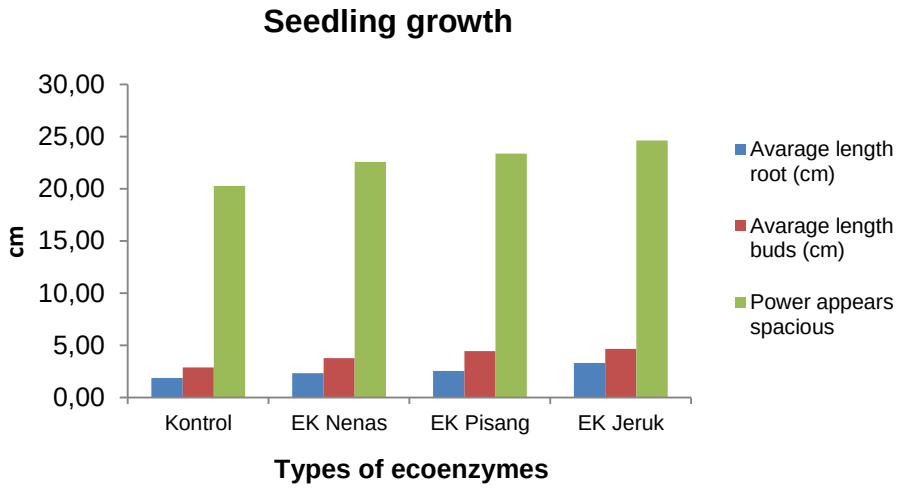

Figure 4. Graph of the effect of ecoenzymes on the growth of TSS onion seedlings

In Table 2 it can be seen that the application of ecoenzymes through seed soaking is able to increase the growth of onion plant seeds. The increase in root length in onion seedlings on average shoot length and field emergence power was significantly different from controls, the best ecoenzyme was found in orange peel ecoenzymes. The application of ecoenzymes in agriculture, in addition to remodeling organic matter and as a pest and disease control agrn, can also stimulate plant growth (Salsabila & Winarsih, 2023). (Rasit & Mohammad, 2018) explained that the use of fruit peels that contain natural organic acids is used as a source of ecoenzyme raw materials so that they can turn into enzyme solutions that can turn into enzyme solutions that can increase the nutrient content of solutions with ecoenzymes significantly increasing the emergence of seedlings, plant height, number of leaves, and weight of fresh roots.

Banana peel waste contains chemical elements such as magnesium, sodium, phosphorus and sulfur which can be used as organic fertilizer, pineapple peel contains carbohydrates and sugars that are quite high and can be used as raw materials for making nutrients, while orange peel waste contains minerals and vitamins such as vitamin C, amino acids, proteins, N, Ca, Mg, K, S (Agustin & Wahyuningrum, 2019).

C. Effect of Ecoenzyme Application on Shallot Seedling Height

Ecoenzyme application by soaking onion seeds for 6 hours can increase the height of onion seedlings. All ecoenzymes tested had an effect on

seedling height compared to controls (Table 3).

Table 3. Effect of Ecoenzyme Application on Shallot Seedling Height at 35 days after inoculation

Types of ecoenzymes	Seedling height (cm)
EK jeruk	12.130 a
EK pisang	10.592 b
EK nenas	10.070 b
Kontrol	6.504 c

Numbers followed by the same lowercase letter on the same column are unmarkedly different according to LSD at the level of 5%

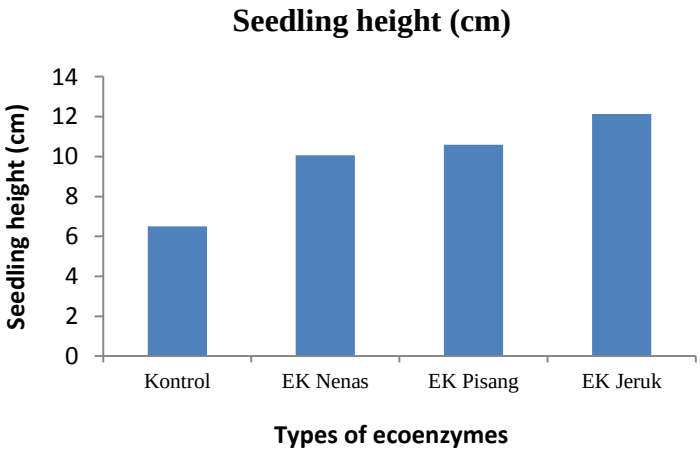

Figure 4. Graph of the effect of ecoenzymes on the height of TSS onion seedlings

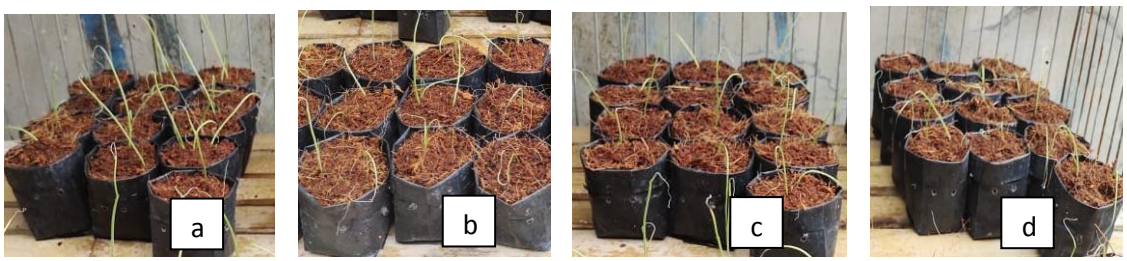

Figure 5. High TSS seedlings in each ecoenzyme treatment, a) EK orange, b) EK banana, c) EK pineapple, d) Control

The increase in growth of onion plants can be influenced by phytohormones produced by enzymes contained in ecoenzymes. Ecoenzymes have active enzymes that can increase the total nitrogen content and organic matter in the soil (Tong and Liu, 2020.). The ability of ecoenzymes to increase plant height, it is suspected that ecoenzymes from fruit skins contain nutrients that can increase the absorption of nutrients and nutrients from the soil. The ability of ecoenzymes to increase plant height is thought to be due to the production of growth regulator compounds or the availability of enzymes and the nutritional content of ecoenzymes in the form of nutrients for plant growth.

This result is in line with the results of research by Fauziatul (2022), soaking chili seeds with ecoenzymes with a soaking of 12 hours and a concentration of 20 ml / L, can increase the germination and growth of chili plants. This research is a preliminary research that will be continued with field tests to test the potential of ecoenzymes on onion production factors from TSS seeds.

4. CONCLUSION

Based on the results of the application of soaking TSS onion seeds with ecoenzyme solution, it was concluded that ecoenzymes from orange peels, banana peel ecoenzymes, pineapple peel ecoenzymes have the potential as biostimulants for germination and growth of onion seedlings. The best ecoenzymes are ecoenzymes from orange peels.

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