EFFECT OF ENDOMYCORRHIZA DOSAGE ON GROWTH OF SALAK PLANTS (*Salacca edulis* L.)

Dewa Ayu Ari Febriyanti[1)], Dicky Marsadi[2)]
[1)]Agrotechnology Study Program, Faculty of Agriculture and Business
Dwijendra University
dewaayuarifebriyanti@gmail.com
[2)]Agrotechnology Study Program, Faculty of Agriculture and Business
Dwijendra University
dickymarsadi14@gmail.com

ABSTRACT

In efforts to increase salak productivity, inorganic fertilizers are often used. This inorganic fertilizer has a negative impact on soil and environmental conditions, including changing the structure of the soil, making the soil compact, reducing the nutrient content in the soil, and causing environmental pollution. Continuous application of inorganic fertilizers over a long period of time can impact the presence of microorganisms in the soil so that ultimately soil fertility will be disrupted. Efforts to maintain soil fertility and environmental sustainability so that plant productivity remains high require efforts to develop cultivation methods using organic fertilizers or biological fertilizers. One source of biological fertilizer is arbuscular mycorrhizal fungi. The research was carried out from August 2023 to February 2024. This research was conducted in Selat Village, Karangasem Regency. The materials used in this research were soil samples, Johnson's solution, endomycorrhiza, urea fertilizer, digrow leaf fertilizer, manure. This research used a Randomized Group Design (RAK). The results showed that the dose of mycorrhiza had a significant effect on the stem diameter and root infection variables. The highest stem diameter was obtained at the D_1 dose (75 spores), namely 1.60 cm, at four months after planting observations which was significantly different from D_0 (control), namely 1.28 cm. Meanwhile, the highest root infection in the two months after planting observation was obtained at the D_3 dose (225 spores), which was 92.50%, which was significantly different from D_0 (control), which was 36.25% in the four months after planting observation. The highest root infection was obtained at the D_2 dose (150 spores). namely 82.50%, which is significantly different from D_0 (control), which is 10.00%. The volcanic sand carrier medium showed the highest total plant dry weight, namely 3.59 g, which was significantly different from sea sand, namely 2.43 g.

Keywords: *endomycorrhiza, salak productivity, microorganisms soil, endomycorrhiza dosage, biological fertilizers*

1. INTRODUCTION

The salak plant (*Salacca edulis L*.) is a plant belonging to the palmae family that can grow in tropical areas. The distribution of snake fruit plants in tropical areas is very wide, one of which is in Karangasem Regency. Farmers in an effort to increase salak productivity rarely use inorganic fertilizers, because inorganic fertilizers have a negative impact on soil and environmental conditions, namely causing the soil to become compacted, the nutrient content in the soil to decrease, and environmental pollution.

The results of interviews with salak farmers showed that farmers use salak leaf litter for fertilization, so that their land often lacks nutrients as a result of which the productivity of salak plants decreases. Efforts to increase soil fertility and

environmental sustainability so that plant productivity remains high require cultivation techniques through the use of biological fertilizers. One source of biological fertilizer is endomycoryza.

The use of endomycoryza as a biological fertilizer can be used as an alternative to avoid soil damage due to the use of inorganic fertilizers. Endomycorrhiza has great potential as a biofertilizer because it can facilitate nutrient absorption in the soil so that it can increase plant growth.

This research was carried out with the aim of finding out the dose of spores required for the growth of salak plants, so that the growth of salak plants would be better, it is not yet known for certain. Therefore, it is necessary to research how the growth of snake fruit (Salacca edulis L.) responds to the dose of endomycoryza spores.

2. RESEARCH METODOLOGY

The research was carried out from August 2023 to February 2024. This research was conducted in Selat Village, Karangasem Regency.

The tools used in this research are tissue, plastic bags, label paper, tweezers, petri dishes, oven, glass objects, cover glass, microscope, scales, beakers, spoons, centrifuge tubes, centrifuge machines, spray bottles, micro pipettes , dropper pipette, scale, oven, refrigerator, oose needle, polybag, rice filter, stove, pan, stationery, camera and a set of filters with hole diameters of 1 mm, 500 µm, 212 µm, 106 µm and 53 µm.

The materials used in this research were soil samples, Johnson's solution, endomycoryza, urea fertilizer, digrow leaf fertilizer, manure.

This research used a Randomized Group Design (RAK):

The number of spores of the endomycorrhizal genus consists of 4 levels, namely:

D_0 = 0 spores per 500 g of carrier material (control)

D_1 = 75 spores per 500 g of carrier material

D_2 = 150 spores per 500 g of carrier material

D_3 = 225 spores per 500 g of carrier material

3. RELATED RESEARCH/LITERATUR REVIEW

Salak is a type of palm fruit commonly eaten. Also known as salak, in English it is called salak because its skin is similar to snake scales, while its scientific name is Salacca zalacca (Tim Karya Tani Mandiri, 2010).

In general, the scientific classification of salak is as follows:

Kingdom : Plantae

Division : Magnoliophyta

Order : Liliopsida

Family : Arecaceae

Genus : Salacca

Species : *S. zalacca*

The word mycorrhiza comes from the Greek words myces (fungi) and rhiza (root). Mycorrhiza is a form of mutualistic symbiotic relationship between fungi and the roots of higher plants. This symbiosis is mutually beneficial, the fungus obtains

carbohydrates from the host plant, on the other hand the fungus provides benefits to the host plant, by helping the plant absorb nutrients, especially P elements. Mycorrhizal fungal hyphae can increase P uptake by expanding the absorption area of the plant root system. The effect of endomycorrhiza on growth, P uptake and plant yield is influenced by plant type and variety, soil type, type of endomycorrhiza, type of fertilizer, and environmental factors. (INVAM. 2017)

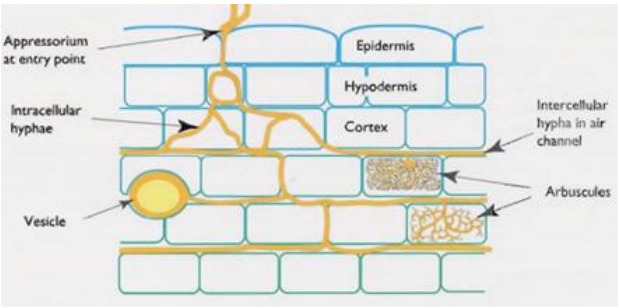

Figure 1. Endomycorrhiza structure in plant roots

Source: Brundrett *et al*., 1996

The development of endomycorrhiza is influenced by factors such as light, soil pH, temperature, soil moisture, availability of nutrients, heavy metals, fungicides, root residues, organic matter, and host plants. The reciprocal relationship between endomycorrhiza and its host plant is a form of mutually beneficial relationship, with this symbiosis the host plant obtains many benefits for its growth, both directly, namely by increasing the absorption of water and nutrients, protecting the plant from root pathogens and toxic elements, or indirectly, namely playing a role in improving soil structure and increasing the solubility of nutrients.

4. RESULTS AND DISCUSSION

This research shows that the dose of mycorrhiza has a real effect on the observed variables of stem diameter and root infection, almost all of the observed variables show unreal results. The highest root infection was found at D_3 dose (225 spores) at two months after planting observations (92.50%) but was not significant with D_1 (86.25%), and D_2 (91.25%) but was significantly different from D_0 (36.25%). %), while in root infection 2 BST the highest root infection was obtained in D_2 (150 spores), namely 82.50%, not significantly different from D_1 (78.75%) and D_3 (80.00%) but significantly different from D_0 (10.00) the occurrence of root infection in treatment D_0 (control) was caused by a lack of sterilization time in the soil and the occurrence of air splashes in polybags of snake fruit plants so that the mycorrhiza experienced symbiosis in treatment D_0 (control).

Observations of the stem diameter variable showed that the highest value was obtained at 4 BST observations on D_1 (75 spores), namely 1.60 cm, which was not significantly different from D_2 (1.57 cm) but significantly different from D_0 (1.28 cm) and D_3 (1 .44 cm). Yudhistira (2012) reported that giving mycorrhiza to jabon seedlings resulting from generative culture experienced an increase in stem diameter of only 113.95%. It is suspected that endomycorrhizal inoculation has a better effect and response on the growth of stem diameter of snake fruit plants. Diameter increase is secondary growth that thickens the stem and roots in areas of the plant that are younger in stem diameter. This can be seen from the total dry

weight which tends to be higher in the four months after planting observations, namely D_2 (3.42 g) which is not significantly different from other treatments.

Table 1. Effect of Endomycorrhiza Dosage on Salak Plant Growth Two Months After Planting and Four Months After Planting

Variabel	Two Months After Planting	Four Months After Planting
Plant Height (cm)	ns	ns
Stem Circumference (cm)	ns	**
Leaf Area (cm2)	ns	ns
Number of Leaves (pieces)	ns	ns
Leaf Chlorophyll (spad unit)	ns	ns
Root Length (cm)	ns	ns
Head Fresh Weight (g)	ns	ns
Root Fresh Weight (g)	ns	ns
Header Dry Weight (g)	ns	ns
Root Dry Weight (g)	ns	ns
Total Fresh Weight (g)	ns	ns
Total Dry Weight (g)	ns	ns
Root Infection (%)	**	**
Number of Roots	**	**
Plant P Tissue	**	**

Source: Obtained from primary data, 2024

5. CONCLUSION

Mycorrhizal dosage had a significant effect on stem diameter and root infection variables. The highest stem diameter was obtained at the D_1 dose (75 spores), namely 1.60 cm, at four months after planting observations which was significantly different from D_0 (control), namely 1.28 cm. Meanwhile, the highest root infection in the two months after planting observation was obtained at the D_3 dose (225 spores), which was 92.50%, which was significantly different from D_0 (control), which was 36.25% in the four months after planting observation. The highest root infection was obtained at the D_2 dose (150 spores), namely 82.50% significantly different from D_0 (control), namely 10.00%.

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