

## Test of the Soaking Time of ZPT Moringa Leaf Extract and the Combination of Planting Media on the Growth of Robusta Coffee Seedlings (*Coffea canephora* var. *robusta*)

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**Abstract:** Robusta coffee cultivation can be done in two ways, namely vegetatively and generatively (seeds), cultivation using seeds often experiences obstacles due to the hard nature of coffee beans, the use of ZPT is one way to help the germination process of coffee beans, In addition, the growth of coffee plants can also be influenced by the planting media used to live and obtain nutrients. This study used a Complete Randomized Block Design (RAK) with 2 factors and 3 blocks so that 36 research plots were obtained. Factor 1: duration of soaking of the moringa leaf extract growth regulator (T) consisting of 4 levels, namely: T0: 0 hours, T1: 6 hours, T2: 12 hours, T3: 18 hours. Factor 2: combination of planting media symbolized by (M) consisting of 4 levels, namely: M0: top soil, M1: top soil + rice husk charcoal + goat manure (2: 1: 1), M2: top soil + rice husk charcoal + chicken manure (2: 1: 1). The results showed that the soaking time of the Moringa leaf extract growth regulator did not have a significant effect on all observation parameters. The combination of planting media had a significant effect on the height of the coffee plant but did not have a significant effect on the number of coffee leaves. The interaction of the two treatments did not have a significant effect on all observation parameters.

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### INTRODUCTION

Robusta coffee has advantages in terms of its adaptability to various environmental conditions that are relatively extreme and less than ideal for Arabica coffee. This coffee can grow well at altitudes between 200 and 800 meters above sea level, temperatures between 24-30°C, and rainfall of around 1,500-3,000 mm per year. In addition, Robusta coffee is more resistant to pests and diseases such as leaf rust (*Hemileia vastatrix*), which makes it easier and more economical to cultivate, especially in areas with hot and humid climates.

Economically, Robusta coffee is the main choice in the production of instant coffee and blended coffee because it has a higher caffeine content than Arabica coffee,

as well as taste characteristics that tend to be stronger and more bitter. This provides added value to Robusta coffee as a raw material in the beverage and food industry. In Indonesia, Robusta coffee is widely cultivated in various regions such as Lampung, South Sumatra, and East Java, with a significant contribution to national coffee exports. Based on data from the Center for Agricultural Data and Information Systems in 2019, Indonesia's coffee production was 760.96 thousand tons, 73% or 531.56 thousand tons of which were robusta coffee while the remaining 27% or 29.06 thousand tons were arabica coffee. Robusta coffee with high production results is produced by the provinces of South Sumatra, Lampung, Bengkulu, East Java, and Central Java from the average data of the last five years (Pusat Data dan Sistem Informasi Pertanian, 2020).

Robusta coffee (*Coffea canephora*) seedling is a very important initial stage in coffee production, seedling coffee usually experiences obstacles because the coffee beans experience a resting period, namely a dormant phase or cannot germinate, even though they are in an ideal location, efforts that can be made to accelerate the germination process of robusta coffee beans are by using ZPT. One of the Plant Growth Regulators (ZPT) that can be used is moringa leaves. Research conducted by Indriaty et al, (2022) Soaking moringa leaf extract as organic priming for 12 hours provided the best germination power and seed growth rate at 90.93% and 3.79%/etmal respectively. This is also in accordance with the results of research presented by Iqbal (2015) that priming moringa leaf extract can increase soybean seed germination by up to 86%.

In the generative seedling process, the thing that needs to be considered is the planting medium used. Good planting media has the potential to produce quality seedlings. Good planting media contains the nutrients needed by plants and makes it easier for seedlings to take root properly (Girsang et al., 2019).

Good planting media used are chicken manure, goat manure and rice husk charcoal which function to form a looser soil structure. Manure and rice husk charcoal provide nutrients that can support plant growth. Chicken manure compost contains 2.08% N, 2.211% P and 3.89% K, while rice husk charcoal contains 18.62% C, 43.11% O and 37.43% Si (Armynah et al., 2018).

## RESEARCH METHODS

This research was conducted in Mekar Jaya Village, Wampu District, Langkat Regency, North Sumatra Province. This study used a Factorial Randomized Block Design (RAK) consisting of 2 treatment factors and 3 replications, Factor I. Duration of Moringa leaf extract ZPT soaking (T) consisting of 4 levels, namely: T<sub>0</sub>: 0 Hours, T<sub>1</sub>: 6 Hours, T<sub>2</sub>: 12 Hours T<sub>3</sub>: 18 Hours. Factor II. Combination of planting media with the symbol (M) consisting of 4 levels, namely: M<sub>0</sub>: Top Soil, M<sub>1</sub>: Top soil + Rice Husk Charcoal + Goat Manure (2: 1: 1) M<sub>3</sub>: Top Soil + Rice Husk Charcoal + Chicken Manure (2: 1: 1). Parameters observed in this study: Plant Height (cm) and stem diameter (mm).

## RESULTS AND DISCUSSION

### Plant Height (cm)

The results of statistical analysis of variance showed that the duration of soaking of Moringa leaf extract ZPT on the observation of the height of Robusta coffee plants showed no significant effect, while the combination of planting media treatments showed a significant effect. The results of the average plant height (cm) duration of soaking of Moringa leaf extract ZPT and combination of planting media on the growth rate of Robusta coffee seedlings aged 4, 8 and 12 weeks after planting (MST), after being tested for different means using the Duncan test, are shown in Table 1 below:

Table 1. Average Plant Height (cm) of Robusta Coffee Seedlings Due to Soaking Time in Moringa Leaf Extract ZPT and Combination of Planting Media at Ages 4, 8 and 12 MST

Treatment	Plant Height (cm)		
	4 MST	8 MST	12 MST
<b>Soaking Time for Moringa Leaf Extract ZPT (T)</b>			
T <sub>0</sub> : 0 hour	5,42	8,45	11,74 aA
T <sub>1</sub> : 6 hour	6,25	9,30	12,51 aA
T <sub>2</sub> : 12 hour	6,41	9,47	12,85 aA
T <sub>3</sub> : 18 hour	6,89	9,85	13,20 aA
<b>Planting Media Combination (M)</b>			
M <sub>0</sub> : top soil	5,68	8,65	11.66 bB
M <sub>2</sub> : top soil + rice husk charcoal + goat manure	6,32	9,38	12.86 aA
M <sub>3</sub> : topsoil +rice husk charcoal +chicken manure	6,73	9,77	13.26 aA

Description: Numbers followed by the same letter in the same column indicate no significant difference at the 5% (lowercase) and 1% (uppercase) levels based on the Duncan Range Test (DMRT).

### Number of leaves

The results of statistical analysis of variance showed that the treatment of the duration of soaking of Moringa leaf extract ZPT and the combination of planting media showed no significant effect on the number of leaves (strands). The results of the average number of leaves (strands) of the duration of soaking of Moringa leaf extract ZPT and the combination of planting media on the growth rate of Robusta coffee seedlings aged 4, 8 and 12 weeks after planting (MST), after being tested for different means using the Duncan test, are shown in Table 2 below.

Table 2. Average Number of Leaves (strands) of Robusta Coffee Seedlings Due to Soaking Time in Moringa Leaf Extract ZPT and Combination of Planting Media at Ages 4, 8 and 12 MST.

Treatment	Number of leaves		
	4MST	8MST	12 MST
<b>Soaking Time for Moringa Leaf Extract ZPT (T)</b>			
T <sub>0</sub> : 0 hour	4,22	5,22	7,33 aA
T <sub>1</sub> : 6 hour	4,28	5,33	7,39 aA
T <sub>2</sub> : 12 hour	4,39	5,39	7,44 aA
T <sub>3</sub> : 18 hour	4,44	5,50	7,50 aA
<b>Planting Media Combination (M)</b>			
M <sub>0</sub> : top soil	4,21	7,33	7,33 aA
M <sub>2</sub> : top soil + rice husk charcoal + goat manure	4,33	7,38	7,38 aA
M <sub>3</sub> : top soil + rice husk charcoal + chicken manure	4,46	7,54	7,54 aA

Description: Numbers followed by the same letter in the same column indicate no significant difference at the 5% (lowercase) and 1% (uppercase) levels based on the Duncan Range Test (DMRT).

It can be seen from the research results that the treatment of the length of soaking the Moringa leaf extract growth regulator showed no significant effect on plant height and number of leaves, this is because the concentration of the growth regulator given in this study was not right so that the effect was not significant. Similar research on the administration of bamboo shoot extract as a ZPT on the growth of Robusta coffee seedlings (*Coffearobusta* L.) showed that bamboo shoot extract had no effect on plant height, number of leaves, stem diameter, plant wet weight, and plant dry weight (Harahap and Siagian 2022).

The combination of planting media has a significant effect on plant height but does not affect the number of leaves. This is because the growth of the number of leaves is not only influenced by the nutrients available in the planting media but also

environmental factors such as light, humidity, and temperature. While the availability of nutrients in the early growth phase will affect plant height. This can be determined in soil with good air and water management, has stable aggregates, good water retention capacity and sufficient space for roots (Luta et al. 2022).

According to research by Nora et al (2015) Comparison of planting media composition 2:1:1 (Soil: Chicken manure: Husks) resulted in an increase in plant height, root wet weight, root dry weight, wet stalk weight and the best dry stalk weight in cocoa seedlings.

The treatment of coffee compost planting media + cow manure on increasing the growth of Arabica coffee seedlings (*Coffea arabica* L.) experienced a significant increase and influence and produced the highest plant height, number of leaves, and stem diameter (Refnizuida et al, 2022).

Meanwhile, according to research (Zamriyeti et al, 2021), the provision of chicken manure fertilizer provides increased growth in plant height, number of productive branches and increases production in seed weight per sample, seed weight per plot and weight of 100 seeds. This is in line with the opinion of Bachtiar et al (2013), which states that the addition of manure to the soil will stimulate microorganisms in the soil to increase their activity, this is because the amount of energy sources needed by microorganisms to be active increases so that it has an impact on increasing the absorption of nitrogen and phosphorus elements by plants.

## **CONCLUSIONS**

In this study, the effect of the soaking time of the Moringa leaf extract growth regulator did not have a significant effect on the height of the plant and the number of leaves of the Robusta coffee plant, but the combination of planting media had a significant effect on the height of the Robusta coffee plant. The interaction of the two treatments did not have a significant effect.

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