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Comparison of the Success of Guava Stem Cuttings (*Psidium guajava*) Using the Chemical Liquinox Start (Vitamin B1), Root Up, and Natural Ingredients of Red Onion (*Allium cepa* L)

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Abstract

Guava (*Psidium guajava* L.) is a tropical plant that holds significant popularity and economic value in Indonesia. Despite its benefits, many Indonesians still face challenges in successfully cultivating guava seeds. Traditionally, guavas are propagated from seeds, which often results in lower-quality fruit. Seed-grown trees may take longer to bear fruit, and the fruit produced may not resemble that of the parent plant. This study aims to evaluate the success rate of guava propagation using stem cuttings treated with two different chemicals—Root Up and Liquinox Start—as well as a natural alternative, shallot extract. The cuttings were treated uniformly across all treatments, and the growth parameters observed included the number of shoots, the number of leaves, and the length of the shoots over two months from April 20 to June 22, 2025. The results indicated a significant difference between the three treatments. Root Up treatment produced the longest shoot growth on average, while Liquinox Start also showed a relatively high rate of shoot development. Shallot extract, a natural alternative, also yielded promising results, offering an environmentally friendly and easily accessible option for guava propagation. While chemical treatments, such as Root Up, led to optimal results in terms of shoot, leaf, and shoot length development, the use of shallots demonstrates that natural ingredients can also provide a sustainable and effective approach to guava propagation. Based on the findings, Root Up is recommended for accelerating guava plant growth, but shallot extract presents a viable, eco-friendly alternative.

Keywords: Chlorine, Content, Quality, Storage, Sweet Potato

1. Introduction

Guava, also known as guava siki and guava klutuk, is a tropical plant native to Brazil and introduced to Indonesia through Thailand. The fruit starts green when unripe and turns yellowish-green when ripe. Its flesh can be white or red, with a sweet flavor that has a slightly sour edge. Known for its high vitamin C content, guava belongs to the genus Psidium and the family Myrtaceae (Flores et al., 2015). It is one of the most widely cultivated tropical fruits in Indonesia, especially in backyard gardens.

Guava plants typically grow to a height of 3-10 meters, thriving below sea level. In the Amazon, however, guava trees can reach up to 20 meters, and the fruit can grow as large as a tennis ball. The tree itself has a relatively small trunk but can expand significantly, bearing fruit throughout the year. Guava was introduced to Indonesia through Thailand (Agustina, 2018). This tropical fruit is highly popular in Indonesia due to its delicious taste and nutritional benefits. It is rich in antioxidants, fiber, and vitamin C, and is often found in fresh fruit shops. Apart from being eaten fresh, guava is commonly used to make juice or as an ingredient in Rujak, a traditional fruit salad.

Guava production in Indonesia shows promising growth, particularly in areas with favorable climate and soil conditions. Several factors influence guava production, including the variety of guava, cultivation techniques,

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fertilization, pest and disease control, and propagation methods. On a commercial scale, using quality seedlings is essential, as they ensure healthy, productive plants that consistently produce high-quality fruit. Recording production data—such as the number of productive trees, average yield per tree, and total production volume—is crucial for evaluating business performance and predicting market potential. This data helps farmers optimize land management, improve efficiency, and develop effective distribution strategies. (Wirawan IWA et al., 2018).

The contribution of seeds and cuttings to the success of guava cultivation is quite significant. Seeds derived from generative propagation (seeds) generally have high genetic diversity, but take longer to bear fruit, and their quality can vary. In contrast, cuttings as a vegetative propagation method can maintain the superior characteristics of the parent plant, accelerate the fruiting period, and ensure uniform fruit quality (Pakpahan, 2015). In several studies, the use of cuttings can contribute up to 60–70% to cultivation success due to their time efficiency and consistent results, while the remainder is determined by factors such as maintenance, environment, and post-planting management. The combination of selecting superior seeds or quality cuttings with appropriate cultivation techniques will provide an optimal contribution to high and sustainable guava production (Susiloadi, 2008).

Therefore, the cutting method used is stem cuttings. Stem cuttings are a vegetative propagation technique that involves cutting the stem of the parent plant (Muslimawati et al., 2015). Stem cuttings are a simple, easy, and fast way to produce new individuals with the same characteristics as the parent plant (Febriani et al., 2015).

Generally, the stem cutting method uses both natural and chemical ZPT. The growth regulator often used as a root growth booster in cuttings is synthetic auxin; however, synthetic auxin is relatively more expensive (Marpaung & Hutabarat, 2015). The natural ZPT used is shallots (*Allium cepa* L.), which contain chemical compounds in the form of auxin to encourage Root and shoot growth. Additionally, the chemical used in this study is Root Up ZPT, which contains IBA (Indole-3-Butyric acid), a compound that can stimulate Root and leaf growth. The chemical or ZPT used next is Liquinox Start, containing vitamin B1, which can stimulate Root and shoot growth and prevent plants from being injured when taking cuttings.

Based on the above problems, researchers will conduct research on the Comparative Effect of Guava Stem Cuttings (*Psidium guajava*) Using Chemicals Liquinox Start (Vitamin B1), Root Up, and Natural Ingredients of Shallots (*Allium cepa* L.). This research aims to determine the effect of Root Up, Liquinox Start, and natural ingredients derived from shallots on the growth of guava stem cuttings and to compare the effectiveness of these natural and chemical ingredients.

2. Material and Methods

2.1. Place and Time of Research

This research will be conducted over approximately 2 months, from April 20 to June 22, 2025. The research location is in Berangir Village, Na IX-X District, North Labuhan Batu Regency, North Sumatra, at coordinates 2° 12′ 54″ N and 99° 43′ 58.8″ E, with an elevation of approximately 38 meters above sea level.

2.2. Materials and tools.

The materials and tools used in this research are, for the tools: cutter knife, as a tool for cutting stem samples that will be used as cuttings, camera, measuring tool, and the materials needed for cuttings are sand as a planting medium, stem cuttings, chemicals ZPT Root Up and Liquinox Start (Vitamin B1) and natural ingredients ZPT shallots, polybags, 3 kg sugar plastic as a cover.

2.3. Research methods

The research method used in this study was to use a Randomized Block Design (RAK) with four levels of treatment with five repetitions so that 20 plant sample units were obtained, namely: Without treatment (P0), Using Root Up chemicals with a dose of 7 grams / 10 ml of water (P1), Using Liquinox Start with a dosage of 10 ml / 1 liter of water (P2), Shallot Extract 10 ml / 1 liter of water (P3).

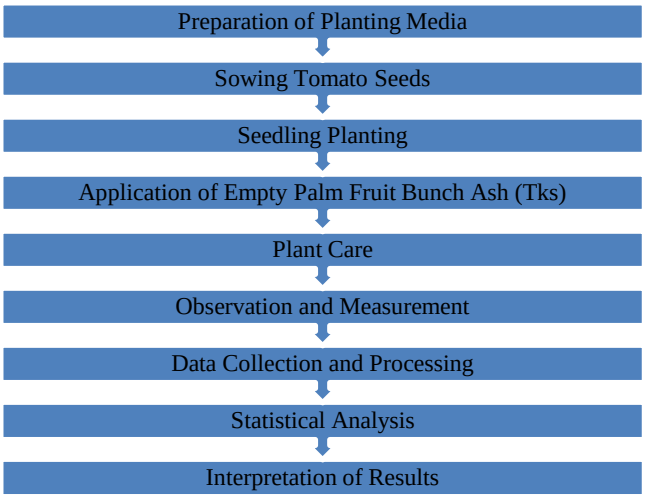

Figure 1. Research Flow Diagram

2.4. Observation Parameters

a. The number of shoots is observed once a week for 2 months after planting.
b. The number of fully opened leaves was observed every two weeks after planting for a period of 2 months.
c. The shoot length was observed every 2 weeks for 2 months.

2.5. Comparative Analysis

The comparative analysis employed a mean analysis, where all samples were compared with each other in terms

of the number of shoots, leaves, and shoot length. The analysis was conducted using Microsoft Excel 2016 software.

3. Results and Discussion

3.1. Number of shoots

The number of shoots on guava stem cuttings in each treatment was calculated weekly for two months by counting all shoots emerging from the plant stem. The following table shows the number of shoots.

Table 1. Number of shoots

Treatment	Average number of shoots (fruit)							
	1 MST	2 MST	3 MST	4 MST	5 MST	6 MST	7 MST	8 MST
Control	0	0	0	0	0	0	0	0
Root Up 7 grams / 10 ml water	2	2	2	2	2.8	3.2	3.4	3.8
Liquinox Start 10 ml / 1 liter of water	1.6	1.6	1.6	1.6	2.6	2.6	2.6	2.6
Shallot Extract 10 ml / 1 liter of water	1.8	1.8	1	1	1.4	1.4	1.6	1.6

Description: The data consist of 4 treatments and five replications, with data analysis comparing the average of each treatment.

Based on the average number of shoots in various treatments, it can be seen that the Root Up treatment of 7 grams/10 ml of water provided the highest and most consistent results in stimulating shoot growth from week to week, with a significant increase from 2 shoots at the beginning of the observation to 3.8 shoots in the eighth week. The Liquinox Start treatment, administered at 10 ml/1 liter of water, yielded moderate results, with a relatively stable number of shoots at 1.6 at the beginning, which then increased to 2.6 starting from the fifth week. Meanwhile, the shallot extract of 10 ml/1 liter of water showed lower and fluctuating shoot growth, with an average of shoots ranging from 1 to 1.8. The control treatment showed no shoot growth throughout the observation, indicating that the administration of root stimulants plays a crucial role in promoting shoot formation in plants.

This result is because the treatment using the active ingredient Root Up contains auxin, which is useful in the process of new shoot growth, as evidenced by the presence of NAA (Naphthalenacetic Acid), which is useful in the formation of roots, cells, and shoot stems (Debitama et al., 2022). According to Setyowati et al. (2015), the availability of auxin, which is absorbed directly, increases the amylase hydrolysis process. The faster the process of cell elongation and division, the greater the increase in new shoot growth will be. In addition, Root Up also has a ZPT in the form of auxin, which functions to influence the process of growth and development through cell division (Fatana et al., 2024). When cell division occurs, the number of shoots increases.

3.2. Number of Leaves

Leaf counts were carried out every two weeks for two months by counting all fully opened leaves that emerged from the shoot stem. The following table shows the number of leaves. The results of observations of the average number of shoots in various treatments showed that Root Up 7 grams/10 ml of water and Liquinox Start 10 ml/1 liter of water provided high and relatively stable results in stimulating shoot growth until the sixth week, with the highest value reaching 14.8 shoots in the fourth week for both. However, in the sixth and eighth weeks, there was a slight decrease in the number of shoots, especially in the Liquinox Start treatment, which decreased sharply to 8 shoots in the sixth week before increasing again to 12 shoots in the eighth week. Meanwhile, the shallot extract showed a moderate increase until the sixth week, but experienced a drastic decrease, reaching only 0.8 shoots by the eighth week. The control treatment still did not show any shoot formation throughout the observation, confirming that the administration of stimulants had a significant influence on the growth of plant shoots.

Table 2. Number of leaves

Treatment	Average Number of Shoots			
	2 MST	4 MST	6 MST	8 MST
Control	0	0	0	0
Root Up 7 grams / 10 ml water	12.2	14.8	14	13.6
Liquinox Start 10 ml / 1 liter of water	13.2	14.8	8	12
Shallot Extract 10 ml / 1 liter of water	3.2	9.2	8.6	0.8

Description: The data consist of 4 treatments and five replications, with data analysis comparing the average of each treatment.

From the table above, it can be seen that among the three ingredients, Root Up and Liquinox are better in increasing the number of leaves compared to natural onion extract ingredients. This result is due to the presence of synthetic auxin compounds, specifically IAA, in Root Up, which, as stated in the study (Masli et al., 2019), plays a role in increasing the number of leaves. At the same time, Liquinox Start contains synthetic thiamine, which helps increase the number of leaves. This result was revealed in a study by Rahayu et al. (2023), which found that administering thiamine to plants can increase the number of leaves.

3.3. Shoot Length

Length measurements were taken every two weeks for

two months, measuring from the base of the shoot to the tip. The table below shows the results:

Table 3. Shoot length

Treatment	Average Shoot Length			
	2 MST	4 MST	6 MST	8 MST
Control	0	0	0	0
Root Up 7 grams / 10 ml water	3.7	4.08	3.9	0.18
Liquinox Start 10 ml / 1 liter of water	5.4	7.9	4.5	5.6
Shallot Extract 10 ml / 1 liter of water	11.8	6.1	6.1	6.5

Description: The data consist of 4 treatments and five replications, with data analysis comparing the average of each treatment.

Based on the average shoot length data, the 10 ml/1 liter of water Shallot Extract treatment showed the most prominent results in the second week, with a shoot length reaching 11.8 cm. However, it then decreased and stabilized in the range of 6.1–6.5 cm until the eighth week. Liquinox Start, when added to 10 ml/1 liter of water, also yielded promising results, especially in the fourth week, with a shoot length of 7.9 cm. It continued to show fairly consistent growth until the eighth week. In contrast, Root Up, which contained 7 grams of water per 10 ml, showed a maximum shoot length of 4.08 cm in the fourth week but dropped drastically to 0.18 cm in the eighth week, indicating growth inhibition in the final phase. Meanwhile, the control treatment produced no shoots at all during the observation period, emphasizing the importance of stimulant treatment in stimulating shoot length growth.

Root Up supports the growth of shoot length on cuttings, which is sufficient to accelerate shoot elongation. This result aligns with the statement by Monica et al. (2017) that auxin can increase shoot length. In research (Ulfa & Isda, 2020), it plays a role in the cell elongation process, which can affect the elongation of guava cutting shoots.

Figure 2. Research Documentation

4. Conclusion

Research has shown that using the active ingredients in Root Up leads to a higher quantity of shoots, more leaves, and longer shoot lengths compared to treatments like Liquinox Start and shallots.

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