



**THE ROLE OF GROWTH REGULATORY SUBSTANCES OF TOGE
TOWARDS THE SUCCESSFUL GRAFTING OF
GUAVA PLANT (*Psidium guajava*)**

**PERAN ZAT PENGATUR TUMBUH TOGE TERHADAP
KEBERHASILAN GRAFTING TANAMAN JAMBU BIJI (*Psidium guajava*)**

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Abstract

Not much is known about the development of crystal guava plants in Indonesia. Therefore, it is necessary to study the ways and techniques for cultivating crystal guava plants starting from the seeding process so that you get plants that have fast growth and can produce quality crystal guava fruit with high yields. This research aims to see the effect of soaking scions in sprout solution on the success of grafting guava plants. This research was carried out at the experimental garden of the Politeknik Indonesia Venezuela, Cot Suruy Village, Ingin Jaya Subdistrict, Aceh Besar District from May to June 2023. This research used a non-factorial Randomized Block Design (RBD) of 4 treatments and 4 replications, resulting in 16 experimental units. The parameters observed were branch length, number of leaves, number of branches, and percentage of grafting success. The results of the research showed that the immersion treatment of scion in sprout solution did not have a real effect on the grafting of guava plants for the parameters of branch length, number of leaves, and number of branches as well as the percentage of grafting success.

Keywords : *Growth Regulators, Grafting, Guava Plants, Sprouts*

Abstrak

Pengembangan tanaman jambu biji kristal di Indonesia belum banyak diketahui. Oleh karena itu perlu dipelajari cara-cara serta teknik budidaya tanaman Jambu biji kristal yang dimulai dari proses pembibitan sehingga mendapatkan tanaman yang memiliki pertumbuhan cepat dan dapat menghasilkan buah Jambu biji kristal yang berkualitas dengan hasil produksi tinggi. Penelitian ini bertujuan untuk melihat pengaruh perendaman entres dalam larutan toge terhadap keberhasilan grafting tanaman jambu biji. Penelitian ini dilaksanakan di kebun percobaan Politeknik Indonesia Venezuela Desa Cot Suruy Kecamatan Ingin Jaya Kabupaten Aceh Besar pada bulan Mei sampai Juni 2023. Penelitian ini menggunakan Rancangan Acak Kelompok (RAK) non faktorial dari 4 perlakuan dan 4 ulangan sehingga menghasilkan 16 satuan percobaan. Parameter yang diamati adalah panjang cabang, jumlah daun, jumlah cabang dan persentase keberhasilan penyambungan. Hasil penelitian menunjukkan bahwa perlakuan perendaman entres dalam larutan toge tidak memberikan pengaruh nyata terhadap grafting tanaman jambu biji untuk parameter panjang cabang, jumlah daun dan jumlah cabang serta persentase keberhasilan penyambungan.



Kata Kunci : Zat Pengatur Tumbuh, Grafting, Tanaman Jambu Biji, Toge

INTRODUCTION

Indonesian people are now more aware of the importance of health by starting to live a back-to-nature lifestyle. One way to maintain health is by consuming fresh fruit, although fruit is needed in relatively small quantities, it is an important nutrient for health. This has an impact on increasing fruit consumption in society. 'Crystal' guava (*Psidium guajava* L.) is one of the fresh fruits that is widely consumed because it contains high levels of vitamin C. According to Pratama *et al.*, (2022), 100 g of ripe 'Kristal' guava fruit contains 87 mg of vitamin C, and 'Crystal' guava also contains a lot of fiber so it can maintain the digestive system.

Not much is known about the development of the 'Crystal' guava plant in Indonesia. Therefore, it is necessary to learn ways and techniques for cultivating 'Crystal' guava plants starting from the seeding process so that you get plants that grow quickly and can produce quality 'Crystal' guava fruit with high production results. Good seed growth is the main factor in obtaining high-yielding plants, for this, we need a growing medium with chemical, physical, and biological properties that are suitable for the growth of 'Crystal' guava seeds.

Propagation of guava seeds can be done vegetatively and generatively. Generative propagation means using seeds, which have advantages such as stronger roots, easier to reproduce, and longer plant life span. Vegetative propagation, such as grafting, grafting, grafting, and stem cuttings. The advantages of vegetative propagation are that the fruit produced will be the same as the parent, the plant will bear fruit more quickly and the plant will grow bigger faster (Cahyono and Bambang, 2010).

Superiority multiplication plant in a way grafting is repaired quality and quantity results plants, produced combined plant new ones have it superiority from rooting and production, also possible speed up time flowering and fruiting (plants aged early maturity) as well produce nature of plants its fruition The same with its parent. The stem bottom (rootstock/understem) is functioning plants as the stem part bottom is still be-equipped with a system functioning roots take food from in land for the stem on or the title (Wirawan *et al.*, 2018). Condition stem below that already Ready For jointed 3-5 mm in diameter, aged around 3-4 months. Ihsan, (2011), also believes rod sizes as big as pencils become benchmark base stem lower Ready connected, even if the diameter is larger small give the same result, even with method grafting certain, growth more fast according to Ruhnayat and Syakir, (2015).

Growth regulator (GR) can shared into natural PGR and chemical PGR. Generally, PGR is naturally directly available in nature and derived from material organic, for example, the material naturally utilized as GR, among others extracts bean sprouts. Bean sprouts contain lots of very compound very efficacious phytochemicals (Pamungkas and Nopiyanto, 2020). When inside form bean sprouts, sprouts own more vitamin content Lots from the content of the seeds. Compared to the rate in seeds, vitamin B and E levels increase the amount, from 2.5 to 3 times more big. Meanwhile, there is very little vitamin C in grains dry, deep-form bean sprouts increase to 20 mg/100g. Content gibberellin in species *Phaseolus* sp reached 18 mg/kg. According to the



Directorate of Nutrition, Department of Health, Obstetrics nutrition in 100 g of bean sprouts consists of, calories 23 cal of, protein 2.9 g of, fat 0.2 grams of, calcium 29 mg of, phosphorus 69 mg of, iron 0.8 mg, vitamin A 10 IU, vitamin B1 0.07 mg, vitamin C 15 mg, and water 92.4 g. Sprouts Peanut green (bean sprouts) is a type of common vegetable consumed, easy to obtain, economical, and does not produce compounds with toxic effects. Extract sprouts peanut green own concentration compound substance regulator grow auxin 1.68 ppm, gibberellin 39.94 ppm, and cytokinin 96.26 ppm (Ulfa, 2014). According to Fadhilah (2015), the addition extract bean sprouts as much as 20 g/L shows results best based on the number parameter root plantlets potato (*Solanum tuberosum* L.). Based on the description on so done study about The role of GR Toge to in the success of Plant Grafting Guava Seed (*Psidium guajava*).

RESEARCH METHODS

Place and time of research

Study This was carried out in the garden test Politeknik Indonesia Venezuela, Cot Suruy Village, Subdistrict Ingin Jaya Aceh Besar District from May to June 2023.

Tools and materials

Tools used are meter, glass measuring, scales, grafting carter, scissors, container plastic, and tools write, meanwhile materials used are seeds guava seeds, bean sprouts, scions guava crystal, plastic hood, plastic ice lolly, and plastic tie.

Research methods

Study this is done using Non-factorial Randomized Block Design (RBD), if there are results different real will continue with different tests. Study this consists of 4 treatments. Each treatment was repeated 4 times so 16 units test. Order treatment as follows:

T0 = Without immersion

T1 = Immersion scion with solution Tauge for 30 minutes

T2 = Immersion scion with solution Tauge for 60 minutes

T3 = Soaking scion with solution Tauge for 90 minutes

Procedure Implementation Study

Land used moreover formerly cleaned from weed by the area required for arranging place the polybag. Seedlings of guava seed red are obtained from the results of nursery seed guava seed red usually in the Green House laboratory of the Plantation Management Study Program which is 8 months old. Shade made of from net with a pole from iron and a paranet as a roof. Entries used for grafting plant guava seed red is the scion originates from plant guava crystals already cultivated in the garden Test Politeknik Indonesia Venezuela. Cutting scion done with size 15 cm, next scion soaked use extract Touge by time already soaking determined. Extract bean sprouts made with the method smooth 200 grams with a blender then add 2,000 ml of water.



Then scion was soaked with soaking times of 30 minutes, 60 minutes, and 90 minutes or by treatment of their respective entres.

Data analysis

Analysis variety with ANOVA done to observational data from variable growth in level significance 95%. If there is a different real between treatments different tests were carried out real smallest (BNT).

Variable Observation

Observed variables are long branch, number leaves, quantity branch, and percentage success connection.

RESULTS AND DISCUSSION

Branch Length

Results of treatment data analysis immersion scion in solution toge no give real influence to long branch plant guava seeds at the age of 15 to 45 days after grafting. The average branch length of the grafting response of guava plants from the results of the scion soaking treatment in sprout solution can be seen in Table 1 below:

Table 1. Average Branch Length in Response to Plant Grafting Guava Seeds From Treatment Results Soaking Entres in Solution Toge.

Treatment	Average Branch Length		
	15 HSGs	30 HSGs	45 HSGs
T0	0.00	2.50	5.0
T1	0.00	5.00	0.0
T2	0.00	0.00	0.0
T3	0.00	0.00	0.0

From Table 1 it can be explained that the response of grafting guava plants after immersing the scion in sprout solution for different times did not have a real effect on guava growth from 15 to 45 days of age. At the age of 15 HSG did not show any signs of branch growth so the average branch length obtained was zero (0.0). Ages 30 and 45 days after grafting showed branch growth, but not all treatments showed branch growth. Visually, grafting guava plants after soaking the scion in sprouts and using water hyacinth compost as a planting medium affects guava plants. This is because the scion used has buds that will grow into future leaves and branches and still contains cambium which functions to hold the plant together or as an adhesive for the buds. Then it is also supported by the presence of growth regulators contained in sprout extracts such as auxin, gibberellin, and cytokinin (Ulfa, 2014), as well as the macro and micro nutrient content contained in water hyacinth compost. By the opinion of Djamal (2012) and Helena (2013), plant



growth is determined by fertilizer, while the direction and quality of growth and development are largely determined by growth regulators.

Providing the right GR and the right concentration can produce plants with better growth and development. Supported by the statement of Rauzana *et al.*, (2017), giving bean sprout extract affects on shoot length and root length, on the growth of pepper seedlings with a concentration of 300ml/liter. Likewise, water hyacinth compost as a planting medium can encourage successful grafting of guava plants. This is because it contains macronutrients that are needed by plants, namely N of 1.86%, P of 1.2%, K of 0.7%, organic C of 19.61%, and organic matter of 25.16% (Istiqomah *et al.*, 2018).

Number of Leaves

Research results show that treatment immersion scion in solution toge gives no influence real to the number of results of plant grating guava seed. However, visually 10 plants of guava seeds give a good response after treatment immersion scion. That matter can happen because eye shoots are found on scions as prospective shoots or leaves. Then no regardless of role extract toge as a natural PGR that stimulates the growth of shoots and leaf new. In line with the results of research by Harli and Rasma (2017), Immersion with extracted bean sprouts for 30 minutes (T2) provides more influence on the time emergence of shoots. Growth leaf is part of growth vegetative. In phase This the nutrients that play the most role is nitrogen nutrients. This thing by opinion Sutedjo (2010) stated that Nitrogen is the main nutrient for growth plants for the formation or growth parts of plants like leaves. The unsuccessful results of grafting guava plants are because the scion used does not have buds. The average amount of leaf results of plant grafting guava seed can seen in Tabel 2 below this.

Table 2. Average Number of Leaves Results from Plant Grafting Guava Seed

Treatment	Average Branch Length		
	15 HSGs	30 HSGs	45 HSGs
T0	0.00	3.0	4.50
T1	0.00	2.0	3.00
T2	0.00	0.0	0.00
T3	0.00	1.0	2.00

Number of Branches

The immersion treatment of the scion at different times did not have a significant effect on the grafting results of guava plants. The average results of measuring the number of branches from the scion-soaking treatment for grafting guava plants can be seen in Table 3 below.



Table 3. Average Measurement Results Number of Treatment Branches Entres Soaking Against Plant Grafting Guava Seed

Treatment	Average Branch Length		
	15 HSGs	30 HSGs	45 HSGs
T0	0.00	0.5	1.00
T1	0.00	1.0	1.00
T2	0.00	0.0	0.00
T3	0.00	0.5	1.00

Table 3 above shows that there were 10 guava plants resulting from grafting after the scion-soaking treatment. Visually, the immersion treatment of the scion affects on the grafting of guava plants and the success of branch growth. This success cannot be separated from the presence of scion's eyes that match the base stem, the scion's eye has potential buds or buds, and the presence of PGR sprouts which stimulate the growth of shoots or branches. Bean sprout extract can influence the success of grafting guava plants because bean sprout extract contains the hormone auxin 1.68 ppm, gibberellin 39.94 ppm and cytokinin 96.26 ppm (Jariah, 2022). If the concentration of sprout extract is to the plant's needs and the application is not excessive, the hormone will work optimally, but if excessive use of GR can inhibit the growth of rose cuttings, this is confirmed (Leovici, 2014) who says that excessive use of GR will inhibit plant growth and is toxic which can cause poisoning of all parts of the plant resulting in the cuttings failing to grow.

For guava plants that are unsuccessful or fail to graft, likely, the scion used does not have buds and the maturity level of the scion's eye tissue is not good so it does not support being used as a scion for shoot grafting. Then the juvenile level of the rootstock also influences guava grafting, namely the age of the rootstock is still young. Meanwhile, the rootstock used for this research was not young but old because it was 8 months old. By the statement of Hadi *et al.*, (2010), the use of younger rootstock is thought to have a better effect on improving juvenility. Apart from the juvenility factor of plant tissue, the growth of rootstocks and plant maintenance also influence the growth of shoots and branches.

Percentage Success Connect Shoot

Based on observations of the success rate of grafting at the research location, shows that guava seedlings have a significantly lower success rate, namely around 31.25%. The low success rate of grafting is because the grafts or scions used do not have buds and the rootstock used is old (not young stems). By the statement of Gisbert *et al.*, (2011), the success rate of grafting shows that the upper and lower stems used can live and grow together into one complete plant.

Besides that low percentage success achieved in guava grafting seed caused size and condition physiological (mass cell as well as content compound biochemistry like carbohydrates, proteins, and phytohormones) parts linked plants (scion and stem bottom) in a condition less than optimal. When the stem top and stem lower guava seed are cut in the grafting process, several cells are parenchym damaged and dead. Damaged cells or dead form network necrotic, which



acts as layer isolation (isolation layer) and is reaction network plant For avoid entry source contaminants or infection microorganisms. Grafting failure due to large gaps in the cortex stems top and bottom (Mahunu *et al.*, 2012).

CONCLUSION

Based on the research results, it can be concluded that the immersion treatment of scion in sprout solution did not have a significant effect on the grafting of guava plants for the parameters of branch length, number of leaves, and number of branches as well as the percentage of grafting success. The percentage of connection success was 31.25%. Of all the guava plants that were grafted, 10 guava plants that successfully grew after grafting.

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