


Research Article

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The effect of applying liquid organic fertilizer Bamboo Shoots for Growth of Jackfruit Seedlings (*Artocarpus heterophyllus lamk*)

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Abstract

This study aims to influence the administration of applying applying liquid organic fertilizer Bamboo Shoots on the success of grafting of Jackfruit Seedlings with a certain amount of concentration. This research used Randomized Block Design factorial with 5 treatments and 5 replications to obtain 25 experimental units with the order of treatment, namely N0 = No Bamboo Shoot POC, N1 = Giving POC Bamboo Shoots 20 ml/seed, N2 = Providing POC Bamboo Shoots 30 ml/seed, N3 = Giving Bamboo Shoot POC 40 ml/seedling, and N4 = Giving Bamboo Shoot POC Bamboo 50ml/seed. The parameters observed were: plant height, number of leaves and percentage of live plants. Plant height is measured by measuring from the basestems to the youngest shoots or leaves of growing plants using a ruler. The number of leaves is calculated by counting all the leaves which has developed and opened perfectly on the jackfruit plant which grow. Percentage of live plants was carried out by counting the number of plants survival to the total number of plants planted. Observations were made at the age of 15, 30 and 45 days after plant. The research results show that the application of liquid organic fertilizer bamboo the best treatment obtained in N2 treatment (POC bamboo shoots 30 ml/seed) aged 15 to 45 days after plant.

Keywords: fertilizer, number of leaves, percentage of live plants, plant height, randomized block design

1. Introduction

Jackfruit (*Artocarpus heterophyllus* Lamk) is a popular fruit in tropical areas, especially Indonesia. Jackfruit is included in the Moraceae family, which is a large fruit with a sharp aroma and sweet taste (Widarti *et al.*, 2013). The jackfruit plant is known as a multipurpose plant because of everything parts on the plant can be used for various purposes ranging from food, housing, reforestation, livestock, industry and even health needs such as cancer treatment whose efficacy has been proven (Anggriana, Muhardi and Rostiati, 2017).

Based on the structure of the plant, the jackfruit plant has double fruit where 8-15% of the weight of the fruit is seeds. Ripe fruit has a unique aroma, jackfruit is generally consumed as fresh fruit and as an ingredient in Asian culinary processing (Moelyohadi, 2021).

Jackfruit in Indonesia based on statistic data tends to continue to increase from year to year. This is in line with the increase in population, increasing income, and people's tastes or lifestyles which prioritize consuming quality fruit, as well as the development of the domestic food or beverage processing industry, however, the increase in domestic demand for jackfruit consumption has not been kept pace with. domestic production (Atdwiyani *et al.*, 2017).

The development of jackfruit cultivation so that it can be successful must be done through plant nurseries by preparing planting materials through

nurseries, because nurseries are the initial growth of a plant as a determinant of subsequent growth, maintenance in nurseries must be carried out more intensively. Apart from fertilization, the growth of jackfruit seedlings is also influenced by the composition of the planting media used. (Adelina, M.A.Tiwow and Adrianton, 2015)

Seeding is the initial activity in cultivation which aims to prepare seeds ready for planting. Nurseries must be prepared before processing the land for planting, the seeds planted meet the requirements, both in age and size. Good and quality seeds are one of the conditions that determine success in any plant cultivation business. Seedling growth can be optimized by increasing the availability of needed nutrients in the soil. One way to increase the availability of nutrients in the soil is by fertilizing, especially using organic fertilizer.

2. Materials and Methods

The research was conducted in the experimental garden of the Plantation Management Study Program of the Politeknik Indonesia Venezuela located in Cot Suruy Village, Ingin Jaya Sub-district, Aceh Besar Regency, from May 2024 to June 2024. The tools used in this study are: scissors, roller/ruler, cutter knife, polybag, scales, label paper, gembor, jackfruit seeds (*Artocarpus heterophyllus* lamk), compost, POC bamboo shoots, soil and water.

Liquid organic fertilizer in fertilization has the advantage of being evenly distributed, there will be no accumulation of fertilizer concentration in one place, because liquid organic fertilizer dissolves in water. This liquid organic fertilizer has the advantage of being able to quickly overcome nutrient deficiencies and not having problems in leaching nutrients and also being able to provide nutrients quickly. In jackfruit plants, applying liquid organic fertilizer at a dose of 6 cc POCL-1air to Tulo jackfruit seeds provides an increase in plant height of up to 2.85 mm (Ardan and Nuraeni, 2020)

POC applications have been widely tested on various agricultural commodities. Providing POC can increase plant growth and yield and improve soil health. (Prasetyo *et al.*, 2021). Young shoots of bamboo shoots can be used as a basic ingredient for making liquid organic fertilizer (POC). Bamboo shoot POC solution has a very high content of organic C and gibberellin so it can stimulate plant growth. Apart from that, the POC solution for bamboo shoots also contains organisms that are important for helping plant growth, namely Azotobacter and Azospirillum. If we look at its content, bamboo shoot POC solution can be used as a growth stimulant in plants (Supriyanto *et al.*, 2023).

The increasing demand for jackfruit requires an increase in production, one of the efforts to increase production is to increase the jackfruit nursery. A good nursery will produce quality seeds starting from the initial growth phase. One way to increase nursery yield is by applying fertiliser. Good organic fertiliser is highly recommended because it provides nutrients and is environmentally friendly. The natural POC content of bamboo shoots can help meet nutritional needs and stimulate growth, strengthen roots and stems and maintain leaf health. Bamboo shoot liquid organic fertiliser has a high C-Organic and Gibberellin content so that it can stimulate plant growth. The types of microbes identified in bamboo shoot POC are Azotobacter and Azospirillum, these microbes function in decomposing organic matter. Azotobacter in biofertilisers has the potential to manage soil and plant health(Sumbul *et al.*, 2020). This study will show how much success the application of POC rebung on jackfruit seedlings.

The process for making bamboo shoot POC is as follows:

Prepare the tools and materials used, including 1,500 g bamboo shoots, 3 liters of rice washing water. 250 g brown sugar, bucket, stirrer, knife and blender.

Bamboo shoots that have previously been prepared, cut into small pieces measuring 1 cm x 1 cm, blended and put into a bucket containing rice washing water. Slice the brown sugar, then put it in a bucket containing water left over from washing rice and

bamboo shoots that have been blended. The brown sugar is stirred until it dissolves and is evenly distributed. Once mixed evenly, the bucket is closed tightly. The fermentation process is carried out for 15 days or until it smells of tapai with physical characteristics of a brownish yellow color. When it is 15 days old or smells of tapai, the MOL bamboo shoots can be filtered and stored in a 5 L jerry can.

Jackfruit seeds (seeds) are obtained from ripe jackfruit from Cot Suruy village, Want Jaya sub-district, Aceh Besar Regency. Jackfruit seeds (seeds) are planted directly in polybags that have been filled with planting media (soil, manure and husks), planted in the middle of the polybag to a depth of 5 cm. The number of seeds used is 50 seeds, including reserves Bamboo shoot POC was given 3 times, namely the first time after planting the jackfruit seeds in polybags, the second 10 days after planting (DAT) and the third 30 days after planting (DAT). Given by watering in a circle in the direction of the polybag. The dose of POC for bamboo shoots given is according to each treatment.

Jackfruit seeds that have been planted are maintained by watering twice a day if it does not rain and adjusting to the humidity conditions of the planting medium. Then control or protect jackfruit seeds and/or jackfruit seedlings from pest and disease attacks. The parameters observed were: plant height, number of leaves and percentage of live plants. Plant height is measured by measuring from the basestems to the youngest shoots or leaves of growing plants using a ruler. The number of leaves is calculated by counting all the leaves which has developed and

opened perfectly on the jackfruit plant which grow. Percentage of live plants was carried out by counting the number of plants survival to the total number of plants planted. Observations were made at the age of 15, 30 and 45 days after plant.

$$\text{Percentage of live plants (\%)} = \frac{\sum \text{living plants}}{\sum \text{planted seeds}} \times 100\%$$

This research used a non-factorial Randomized Group Design (RAK) with 5 treatments and 5 replications to obtain 25 experimental units, with the order of treatment, namely:

N0 = Without POC Bamboo Shoots

N1 = Giving Bamboo Shoot POC 20 ml/seedling

N2 = Giving Bamboo Shoot POC 30 ml/seedling

N3 = Giving Bamboo Shoot POC 40 ml/seedling

N4 = Giving Bamboo Shoot POC 50 ml/seedling

The research data was analyzed of variance and if it showed significant differences, it was continued with the BNT test. The statistical model of the Randomized Block Design (RAK) is as follows:

$$X_{ij} = \mu + \beta_i + \tau_j + \varepsilon_{ij}$$

Description:

Y_{ij} = The dependent variable score for the subject in block-i that receives treatment - j

μ = The population mean

β_i = The effect of Block i

τ_j = The effect of Treatment j

ε_{ij} = The experimental error

3. Results and Discussion

Average Height of Jackfruit Seed Plants (Table 1) shows that the average growth of jackfruit seedlings after application of POC bamboo shoots at different doses did not have a significant effect and was not significantly different from the control and between treatments on plant height at the age of 15 to 45 HST. Based on the results of direct observation of the application of POC bamboo shoots Bamboo with different doses had an effect on jackfruit seedlings both between replications between treatments and with controls.

The highest plant height data after control was the average plant height in the N2 treatment (30 ml bamboo shoot POC) from 15 to 45 HST, namely 33.74 cm, 46.74 cm and 55.98, while the lowest was obtained in the N4 treatment at the age of 15 HST, which was 28.12 cm, and at the age of 30 and 45 HST, it was obtained in the N1 treatment (POC of bamboo shoots 20 ml/seedling) which was 38.98 and 51.72.

Supported by the opinion of (Nugraheni, Muhammad and Ulumuddin, 2021), that soaking treatment with bamboo shoot fertilizer in a ratio of 4:1 is able to produce the highest plant height in sugar cane seedlings. The results above are in line with the

research results of (Achmad Nizar, 2018), that soaking in fertilizer from bamboo shoots effectively affects plant height growth in shallots.

The effect of bamboo shoot fertilizer can increase plant height due to cell division, cell growth and increase in cell walls. Sudarso (Sudarso, Nelvia, 2015), stated that applying bamboo shoot fertilizer can produce better plant height for oil palm seedlings than other fertilizers. Bamboo shoots are used as a source of organic fertilizer and natural growth regulators because of their gibberellin content. (Pipit *et al.*, 2014), stated in the results of their research that the height of soybean plants given gibberellin increased and was taller than those not given gibberellin, this is thought to have increased cell division and elongation so that the height of plants given gibberellin increased.

Average Number of Leaves for Jackfruit Seedlings after application of POC bamboo shoots at different doses (Table 2) did not have a significant effect and was not significantly different from the control and between treatments regarding the number of leaves at the age of 15 to 45 HST. This is because at the age of 15 days after planting the jackfruit plants have not yet shown the growth of fully opened leaves.

At the beginning of plant growth, plants are still unable to produce carbohydrates normally. Meanwhile, at the age of 30 and 45 HST, there were leaves that had opened completely but were not sufficient for this produces carbohydrates (Rahmatika and Setyawan, 2019) (Nine Wahyuni Maulani, Lusiana *et al.*, 2024), stated that giving concentrations of 4.5 ml and 9 ml of bamboo shoot extract have a real effect on increasing the number of okra plant leaves. This is due to the

gibberellin content contained in the POC of bamboo shoots. So it is necessary to increase certain intakes to increase the number of leaves.

On average, the highest number of leaves was obtained in the N2 treatment (POC bamboo shoots 30 ml/seedling) from 15 to 30 HST, namely 4.40 pieces. 6.20 strands and 11.20 strands. Percentage of Live Plants The results of observations on the percentage of growth can be seen in Appendix 10

Table 1. Average Height of Jackfruit Seed Plants

Treatment	Plant Height (cm)		
	15 DAP	30 DAP	45 DAP
N0	34.70	48.42	56.72
N1	29.46	38.98	51.72
N2	33.74	46.74	55.98
N3	33.66	44.82	52.20
N4	28.12	40.36	52.92

Table 2. Average Number of Leaves for Jackfruit Seedlings

Treatment	Number of leaves (leaf blade)		
	15 DAP	30 DAP	45 DAP
N0	4.00	5.60	9.00
N1	4.20	5.60	8.60
N2	4.40	6.20	11.20
N3	4.20	6.00	8.00
N4	4.00	5.60	9.00

The calculation results show that the success percentage is proven that all live plants, 100% of the research samples, grew, although there were some plants that had crooked growth and sparse leaves. Successful propagation of plants through seeds (generative) is characterized by a strong root system, longer productive period, easier to reproduce, resistance to soil-borne diseases and high genetic diversity (Dewi, Handayani and Rosnina, 2016).

Plants' ability to survive and adapt is influenced by several factors ranging from environmental, biotic and abiotic factors. When the

system in plant tissue (genes) is good and the activity in absorbing food into the leaves for assimilation and processing is also good, plant growth can be optimal. Plant growth can be influenced by climate such as weather, some plants are susceptible to humidity and temperature.

Plants adapt differently, some can withstand high humidity, moderate humidity and low humidity. Furthermore, plants cannot adapt well when their growth and development are disturbed by the activities of other organisms.

4. Conclusions

Based on the research results, it can be concluded that the treatment for the growth of jackfruit seedlings with the best dose of liquid organic fertilizer for

bamboo shoots was obtained in the N2 treatment (POC bamboo shoots 30 ml/seedlings) aged 15 to 45 HST. The application of POC bamboo shoots on the

growth of jackfruit seedlings did not have a real effect and was not significantly different from the control and between treatments on plant height and number of leaves, and had an effect on the percentage of live plants, namely 100%.

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