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Growth Percentage And Length Of Mucuna Bracteata Tendles With The Provision Of Local Microorganisms (Mol) From Banana Corn

Chelvin Van Roy Ginting[1], Agung Rafiul Naldi Tanjung[2], Yustina Sri Sulastri[3],

Martha Adiwaty Sihaloho[4], Rama Riana Sitinjak[5,] Bayu Pratomo[6*]

[1,2,5,6]Program Studi Agroteknologi, Fakultas Agro Teknologi Universitas Prima Indonesia

[3]Program Studi Agroteknologi, Fakultas Pertanian Universitas Katolik Santo Thomas

[4]Program Studi Agroteknologi, Fakultas Pertanian Universitas Amir Hamzah

[5,6]Agro Sustainable Centre, Universitas Prima Indonesia

**Email: bayupratomo@unprimdn.ac.id*

ABSTRACT

There are two methods to propagate Mucuna bracteata generative and vegetative. Cuttings are used in vegetative propagation, while seeds are used in generative propagation. It was very difficult for M. bracteata to produce flowers, fruits, or seeds in 1999. Much could be achieved through cuttings as it presented a challenge. A non-factorial randomized block design (RBD) with four treatments (P) and six replications (U) was used in this study. Four different irrigation concentration levels were applied: P0 (0 ml), P1 (50 ml), P2 (150 ml), and P3 (250 ml). Four levels of soaking time treatments were used: P0 (0 minutes), P1 (5 minutes), P2 (10 minutes), and P3 (15 minutes). The study results showed that not all parameters were significantly affected by the combination of banana stem MOL irrigation concentration and soaking time. However, different soaking durations and banana stem MOL irrigation concentrations had an impact on the development of M. bracteata. It was clear that various treatment combinations had some effects, although statistically, there were no significant differences. For example, P3 had a growth percentage of 33.33%, along with a tendon length of 22.84 cm. The highest values for irrigation concentration and soaking of banana stem MOL were shown by P3. As a result, this effort can reduce infection and agricultural waste.

Keywords: Mucuna bracteata, soaking time, banana stem, growth, microorganisms

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INTRODUCTION

The ground cover plant Mucuna bracteata was first discovered in the Tri Pura forest in North India. Currently, many plantations use this climbing shrub as a ground cover. The high content of phenolic compounds in this plant makes it unpopular with pests and animals such as sheep and cattle. In addition, Mucuna bracteata is also richer in biomass than other types of ground cover plants (Afandi et al. 2018).

Mucuna bracteate *was* introduced in 1999 as a ground cover plant but never flowered or produced fruit. Therefore, the main vegetative propagation technique for this plant is cuttings. However, this method has a significant drawback as the mortality rate of cuttings reaches 90%. One of the main reasons for this high failure rate is the difficulty in obtaining high-quality cuttings (Sebayang et al. 2004). Mucuna bracteate can be propagated through two methods, namely vegetative and generative. The vegetative method is done by cuttings, while the generative method is done by using seeds.(Harahap and Subronto 2002).

Using organic fertilizer can reduce fertilizer costs significantly. On the other hand, the soil can become hard if inorganic fertilizer is used continuously for a long period and is difficult to process, which can ultimately inhibit plant growth (Pratomo et al. 2021). One type of banana with high development potential is the barangan banana. These bananas are rich in nutrients and Bananas contain various minerals, including calcium, iron, magnesium, phosphorus, and potassium. Apart from that, barangan bananas also contain serotonin, vitamin B complex, vitamin B6, and vitamin C. These nutrients function as neurotransmitters to support brain function (Suhastyo 2011). Banana stems are one of the many useful plant components but are often thrown away as trash rather than used.

During the vegetative development phase of the plant, banana stems are used to make Liquid Organic Fertilizer (POC). In addition, the use of POC makes plants more resistant to disease. The high concentration of phenolic acid in POC helps bind Al, Fe, and Ca ions, which increases the availability of phosphorus (P) in the soil. The flowering process and fruit production are highly dependent on phosphorus (Setianingsih 2009).

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MATERIALS AND METHODS

This research was conducted in Mutiara Village, Kota Kisaran Timur District, Asahan Regency, North Sumatra, from June 4 to July 4, 2024. The tools used in this study were a meter, 8 mesh sieve, knife, jerry can, bucket, measuring cup, parent, raffia rope, manual scales, analytical scales, hand sprayer, 60-milliliter syringe, and various stationery. The materials used in this study were 15 cm x 21 cm polybags, water, topsoil, banana stems, molasses, EM4, rice washing water, and coconut dregs.

A non-factorial randomized block design with six replications and four types of treatments was used in this study. Four levels of watering concentration (P0 (0 ml), P1 (50 ml), P2 (150 ml), and P3 (250 ml) and four levels of soaking time (P0 (0 min), P1 (5 min), P2 (10 min), and P3 (15 min)) were the treatments. A total of 24 experimental plots were created by repeating each treatment combination six times. Each plot was 15 cm x 21 cm in size, and there was a distance of 15 cm between plots and 20 cm between replications. Since there were six plants per plot, there were six times as many plants in each replication or a total of 24 plants. The total number of plots in this study was 4 x 6 = 24 plots, with a total plant population of 24 x 6 = 144 plants.

RESULTS AND DISCUSSION

Percentage of Life

The results of the study and analysis of variance in Table 1 show that the duration of soaking and the concentration of local microorganisms (MOL) originating from banana stems have a significant effect on the growth rate and the harvest yield does not significantly affect the percentage of survival in Mucuna bracteata cuttings. After the plants are 3 weeks old after planting, the cover will be opened. In addition, Table 2 describes the survival rate of Mucuna bracteata cuttings three weeks after planting.

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Table 1. Results of Variance Analysis Percentage of Life Mucuna bracteata DC

MST	SK	DB	JK	KT	F HIT	F 5%	F 1%	Notation
3	**Treatment**	3	833.67	277.89	3.15	3.29	5.42	tn
	block	5	648.41	129.68	1.75	2.9	4.56	tn
	Error	15	1111.56	74.1				
	Total	23	2593.63					
4	**Treatment**	3	1793.57	597.86	2.73	3.29	5.42	tn
	block	5	890.82	178.16	1.53	2.9	4.56	tn
	Error	15	1747.34	116.49				
	Total	23	4431.74					
5	**Treatment**	3	1145.25	381.75	2.35	3.29	5.42	tn
	block	5	520.58	104.12	0.74	2.9	4.56	tn
	Error	15	2117.69	141.18				
	Total	23	3783.53					
6	**Treatment**	3	1017.87	339.29	2.19	3.29	5.42	tn
	block	5	416.5	83.3	0.93	2.9	4.56	tn
	Error	15	1342.19	89.48				
	Total	23	2776.56					
7	**Treatment**	3	1017.87	339.29	2.19	3.29	5.42	tn
	block	5	416.5	83.3	0.93	2.9	4.56	tn
	Error	15	1342.19	89.48				

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Total	23	2776.56

Table 2.The Effect of Banana Stem MOL Concentration and Soaking Time on the Percentage of Mucuna bracteata DC Survival

Table 2. Effect of concentration of banana plow MOL andsoaking durationon the percentage of live Mucuna bracteata DC

Treatment	Weeks After Planting (%)				
	3	4	5	6	7
P0	25.00	5.55	5.55	2.78	2.78
P1	33.33	11.11	8.33	5.55	5.55
P2	19.44	8.33	5.56	5.56	5.56
P3	33.33	27.77	22.22	19.44	19.44

Based on the results of the analysis of variance in Table 1. the soaking time and concentration of MOL of banana corms at 3 MST - 7 MST produced statistically insignificant results at any treatment level. The findings of the analysis in Table 2 indicate that the proportion growth of Mucuna bracteata in treatments P1 (50 ml, 5 minutes) and P3 (250 ml, 15 minutes) reached the highest value at 3 MST with an average of 33.33%. In contrast, at 7 MST, treatment P0 (0 ml, 0 minutes) recorded the lowest results with an average of 2.78%. The low percentage of plant growth in rehabilitation initiatives can be caused by several things. Transportation of seedlings from nurseries, seedlings attacked by pests before planting, inappropriate planting dates, poor plant maintenance and care, and incompatibility of plant varieties are some of the causes. With the environmental conditions where they grow (Pramono et al., 2016).

Plant growth regulators and bacteria can be found in banana stumps. According to Cahyono (2016), banana stumps are home to seven types of microorganisms that are beneficial to plants, as well as plant growth regulators including cytokinins and gibberellins. These microorganisms, all of which can be used as liquid fertilizers, include cellulolytic bacteria, phosphate-solubilizing microbes, Bacillus, Aeromonas, Aspergillus, and Azospirillium.

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The plant growth regulator auxin is applied to Mucuna bracteata DC cuttings to accelerate and improve root development. Auxin is a plant growth regulator that encourages root, shoot, and leaf growth in oil palm seedlings and helps cell elongation (Pratomo et al 2019). The use of plant growth regulators (PGRs) in various doses has a significant impact on each type of plant, producing varying results. The effectiveness of the concentration of PGRs applied to plants is highly dependent on the dose used because variations in concentration will affect plant activity in different ways (Pratomo 2018). At certain doses, the use of plant growth regulators such as Growtone can have a major impact on plants. However, excessive cell division and callus development, which ultimately inhibits root and leaf growth, can damage plant cuttings if given in too high a concentration. Conversely, if the concentration of growth regulators is too low, they will not provide the expected effect. (Prameswari & Pratomo 2021).

According to Husniati (2010), auxin plays a role in stimulating cell division which is crucial for the root formation process. However, auxin can also be toxic to plants under certain conditions. This is because, if auxin levels are regulated properly, the chances of good root formation will increase. Conversely, if the auxin dose is too little or too much, as a result, plant development can be inhibited (Mufarihin et al., 2012). This follows the statement of Sitinjak and Pratomo (2019) that auxin and cytokinin hormones regulate plant growth and development by influencing the processes that occur in cells, tissues, and organs even in small amounts. These two hormones influence each other's production, indicating the existence of a feedback mechanism that interacts with each other to balance hormone levels in the meristem that develops from roots and shoots. In addition, auxin and cytokinin are also involved in regulating apical meristems, root patterns, and organ formation (Sitinjak and Pratomo 2019). In addition, cytokinins are also involved in regulating early shoot growth and nutrient distribution. These two hormones work together to regulate the cell cycle, where auxin regulates the process that triggers DNA replication, while cytokinin regulates the process that initiates mitosis (Sitinjak and Pratomo 2019).

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Tendril Length

The study and analysis of variance in Table 3 showed that the length of the tendrils on Mucuna bracteata cuttings was not substantially affected by the concentration of local microorganisms (MOL) originating from banana stems or the length of immersion time. The cover was opened 21 Days After Planting (DAP) later. Table 4 shows the length of the tendrils on Mucuna bracteata cuttings at 21 DAP.

Table 3. Results of Variance Analysis of Tendrils of Mucuna bracteata DC

HST	SK	DB	JK	KT	F HIT	F 5%	F 1%	Notation
21	**Group**	5	15.39	3.08	0.9	2.9	4.56	tn
	Treatment	3	2.56	0.85	0.25	3.29	5.42	tn
	Error	15	51.1	3.41				
	Total	23	69.05					
24	**Group**	5	9.96	1.99	0.43	2.9	4.56	tn
	Treatment	3	10.96	3.65	0.78	3.29	5.42	tn
	Error	15	70.14	4.68				
	Total	23	91.06					
27	**Group**	5	14.49	2.9	0.56	2.9	4.56	tn
	Treatment	3	16.64	5.55	1.07	3.29	5.42	tn
	Error	15	77.98	5.2				
	Total	23	109.1					
30	**Group**	5	20.14	4.03	0.49	2.9	4.56	tn
	Treatment	3	46.76	15.59	1.9	3.29	5.42	tn

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	Error	15	123.33	8.22				
	Total	23	190.22					
33	**Group**	5	21.17	4.23	0.49	2.9	4.56	tn
	Treatment	3	52.04	17.35	2.01	3.29	5.42	tn
	Error	15	129.5	8.63				
	Total	23	202.72					
36	**Group**	5	53.9	10.78	0.56	2.9	4.56	tn
	Treatment	3	102.71	34.24	1.79	3.29	5.42	tn
	Error	15	286.39	19.09				
	Total	23	442.99					
39	**Group**	5	132.66	26.53	0.68	2.9	4.56	tn
	Treatment	3	190.56	63.52	1.62	3.29	5.42	tn
	Error	15	588.05	39.2				
	Total	23	911.27					
42	**Group**	5	877.18	175.44	0.85	2.9	4.56	tn
	Treatment	3	815.54	271.85	1.32	3.29	5.42	tn
	Error	15	3090.45	206.03				
	Total	23	4783.17					
45	**Group**	5	1575.34	315.07	0.88	2.9	4.56	tn
	Treatment	3	1380.08	460.03	1.28	3.29	5.42	tn
	Error	15	5371.92	358.13				

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	Total	23	8327.34					
48	**Group**	5	2475.1	495.02	0.9	2.9	4.56	tn
	Treatment	3	2109.69	703.23	1.27	3.29	5.42	tn
	Error	15	8288.77	552.58				
	Total	23	12873.56					

Table 4. The effect of MOL concentration of banana stem on the length of Mucuna bracteata DC tendrils

Treatment	Days After Planting (cm)									
	21	24	27	30	33	36	39	42	45	48
P0	1.54	1.06	0.88	1.08	1.17	0.80	0.83	0.88	0.95	1.02
P1	1.52	1.35	1.39	1.25	1.32	1.65	1.75	1.87	1.98	2.13
P2	2.27	1.03	0.93	0.28	0.30	0.34	0.39	0.43	0.47	0.54
P3	2.07	2.68	2.93	3.98	4.21	5.58	7.40	14.47	18.60	22.84

Based on Table 3, the soaking time and concentration of MOL for banana stems in observations of 21 - 48 HST gave results that did not have a significant effect on all treatment levels. Based on the analysis of variance presented in Table 4, it was found that the highest tendril length was recorded in the 10th observation with treatment P3 (250 ml, 15 minutes), reaching an average of 22.84 cm. In contrast, the lowest tendril length was found in treatment P2 (150 ml, 10 minutes), with an average of only 0.54 cm. Auxin, a hormone found in stems, affects root formation, while cytokinin, a hormone found in liquid

organic fertilizers, affects shoot growth (Hadisuwito, 2012). These hormones can be found in organic materials such as banana stems and bean sprouts, which go through a fermentation process to become liquid organic fertilizers. Liquid fertilizers can provide the nutrients needed by plants more quickly and efficiently and are easier for plants to use and absorb than solid fertilizers. In addition, liquid fertilizers can also be mixed with other organic materials or additional nutrients to increase their effectiveness.(Sitinjak and Pratomo 2019). This is in line with the increase in nitrogen (N) levels from organic matter will affect the total amount of nitrogen (N) and support the activity of plant cells. This will also facilitate the process of photosynthesis, which ultimately supports overall plant growth (Anhar et al. 2021). The rate of cell division, elongation, and elongation can be accelerated in plants if sufficient and balanced nutrients are available for growth. As a result, some plant organs can develop faster (Afrianti et al. 2019).

Cytokinin and gibberellin growth regulators are found in liquid organic fertilizer made from banana stumps, according to Sari et al. (2012). The interaction of auxin and cytokinin plays an important role in the development of shoots, stems, leaves, and roots which includes various aspects such as synthesis, inactivation, transportation, perception, and hormonal signals. Cytokinin stimulates cell division by increasing the rate of protein synthesis, while auxin plays a role in the cell elongation process. In addition, cytokinin is also involved in regulating early shoot growth and nutrient distribution. These two hormones work together in regulating the cell cycle, where auxin regulates the process that triggers DNA replication, while cytokinin regulates the process that initiates mitosis (Sitinjak and Pratomo 2019). Auxin has an important function in regulating the elongation and enlargement of segments and young leaves. In addition, auxin also stimulates tissue and organ growth and inhibits the development of lateral shoots. Therefore, it can be concluded that nutrients, auxin hormones, and cytokinins in goat urine have the potential to control the growth of Mucuna bracteata tendrils so that the tendrils can reach their maximum length at certain concentrations (Sitinjak and Pratomo 2019). Auxin given to plants can accelerate the root growth process. Plants with better root systems can grow and adapt to their environment faster. Conversely, plants with slow root systems tend to

experience less than optimal growth and difficulty in adapting, which can lead to plant death (Sembiring et al. 2021).

The part of the plant, species, and age used all affect the amount of auxin present in the cells. While high levels of auxin can inhibit root formation, they can also increase the total number of roots. Gibberellins aid in xylem development, cambium activity, cell elongation, RNA synthesis, and new protein synthesis. Gibberellin supplementation can also increase the synthesis of proteolytic enzymes, which convert tryptophan to auxin, thereby increasing auxin levels in the plant (Sitinjak et al. 2018). Climbing plants play an important role in natural ecosystems and agricultural systems. Their ability to utilize natural and artificial supports allows them to dominate vertical space and maximize photosynthesis. The supports used by climbing plants can vary widely, from natural structures such as trees and shrubs to artificial supports such as bamboo poles, wire, and netting (Anderson and Clark 2016).

CONCLUSION

From the results of the research conducted, the observation parameters of the percentage of life and length of mucuna tendrils were not affected by the Concentration and Soaking Time of local microorganisms from banana stumps based on statistical results. However, a real increase in the length of the tendrils can be observed.

BIBLIOGRAPHY

Afrianti, S., Pratomo, B. & Daulay, DM (2019). Application of Boiler Chicken Egg Shells and Mycorrhizal Fertilizer on the Growth of Oil Palm Seedlings (Elaeis guineensis Jacq) on Acid Sulfate Soil in Pre Nursery. Faculty of Agro Technology: Universitas Prima Indonesia. Medan.

Anderson, H., & Clark, P. (2016). "Comparative Study on the Growth of Climbing Plants with Different Types of Supports." Botanical Studies, 58(1), 99-110.

Anhar, TMS, Sitinjak, RR, Fachrial, E., & Pratomo, B. (2021). Growth Response of Coconut Seedlings Oil Palm in Pre-Nursery Stage with Application of Liquid

Organic Fertilizer from Kepok Banana Peel.*AGRIUM: Journal of Agricultural Sciences*, 24(1), 34-39

Afandi. A., Parwati, WDU, Titiaryani, NM 2018. Effect of Dormancy Breaking and Watering Frequency on the Growth of Mucuna bracteata. Agromast Journal. Vol 3, No2.

Cahyono, Ragil., N. (2016). Utilization of Moringa Leaves and Banana Stems as Liquid Organic Fertilizer for Spinach Plant Growth (Amaranthus sp.). Scientific Publication.

Hadisuwito, S, 2012, Making Liquid Organic Fertilizer, Agromedia Pustaka, Jakarta.

Harahap, IY, and Subroto. 2002. "Use of ground cover legume Mucuna bracteata in oil palm plantations". News of the Palm Oil Research Center. 10(1): 1-6.

Husniati, K. (2010). Effect of Planting Media and Auxin Concentration on the Growth of Pineapple (Ananas comosus L. Merr) Crown Leaf Basal Cuttings cv. Queen. Sripsi. Plant Breeding and Seed Technology Study Program. Faculty of Agriculture. Bogor Agricultural University.

Mufarihin, A., Lukiwati, DR, & Sutarno, S. (2012). Growth and dry matter weight of elephant grass and king grass in different auxin level treatments. Animal Agriculture Journal, 1(2), 1-15.

Pramono, AA, Sudrajat, DJ, Nurhasubi., and Danu. (2016). Smart principles of forest plant nursery business. Jakarta: Swadaya Publisher.

Pratomo, B. (2018). The Effect of Giving Sugarcane Bagasse Compost and Bamboo Shoot Extract on the Growth of Oil Palm Seedlings (Elaeis guineensis Jacq.) in Pre Nursery. Agroprimatech, 2(1), 72-90.

Pratomo, B., Sitinjak, RR, Fachrial, E., & Anhar, TMS (2021). Growth Response of Oil Palm Seedlings in the Pre-Nursery Stage with Application of Liquid Organic Fertilizer from Kepok Banana Peels. AGRIUM: Journal of Agricultural Sciences, 24(1), 34-39.

Pratomo, B., Aji, S., & Agustina, LT (2019). Response of sweet potato extract (Ipomoea batatas) and banana pulp as biological PGR on the growth of oil palm seedlings (Elaeis guineensis Jacq) in pre-nursery. Agroprimatech, 3(1), 37-45.

Prameswari, S., & Pratomo, B. (2021). The Effect of Red Onion Extract and Plant Growth Regulators Auxin on Cutting Growth*Mucuna bracteata*DC. Agrinula Journal of Agrotechnology *and Plantation*, 4(2), 130-138.

Sari, DN, Kurniasih, S, & Rostikawati, RT, 2012, The Effect of Providing Local Microorganisms (MOL) Jackfruit Banana Stem on Rosella (Hibiscus sabdariffa) Production Program Biology Education Study, Thesis (Journal) Faculty of Teacher Training.

Sebayang, SY, ES Sutarta, and IY Harahap. (2004). The Use of Mucuna bracteata on Oil Palm Experience in Tinjowan Sawit II Plantation, PT. Perkebunan Nusantara IV. Warta Palm Oil Research Center. 12 (2-3): 5-12.

Sembiring, ESG, Irni, J., Sitinjak, RR, & Pratomo, B.(2021). Growth Response of Mucuna Cuttings to Concentration and Soaking Time of Shallot Extract. Agrinula, 4(2), 122-129.

Setianingsih, R. 2009. Study of the Utilization of Local Microorganism Liquid Organic Fertilizer (MOL) in Priming, Seedling Age and Increasing Rice Plant Yield (*Oryza sativa*L.): Test Try implementing the System of Rice Intensification (SRI). BPSB DIY Province. Yogyakarta.

Suhastyo, AA, 2011. Microbiological Study and Chemical Properties of Local Microorganisms Used On Rice Cultivation Using the SRI (System of Rice Intensification) Method. Thesis. Agricultural Institute Bogor. Bogor.

Sitinjak, RR, & Pratomo, B. (2019). Potential of goat urine and soaking time on the growth of Mucuna bracteata DC cuttings. International Journal of Agricultural Innovations and Research, 8(1), 2319-1473

Sitinjak, RR, Wirani, A., & Pratomo, B. (2018). Growth response of palm oil seedlings after giving shallot extract and different soaking times. Asian Journal of Natural & Applied Sciences Vol, 7, 4.