Jurnal Agrotek UMMAT
p-ISSN 2356-2234 | e-ISSN 2614-6541 | SINTA accredited
Volume 13, issue 1, 2026

The effect of the concentration of jakaba and biosaka liquid organic fertilizers on the growth and yield of purple eggplant (*Solanum melongena* L.) variety F1 mustang

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Received: 07th February, 2026 | accepted: 25th February, 2026

ABSTRACT

Purple eggplant (Solanum melongena L.) is a horticultural commodity with high economic value, whose production in Banten Province fluctuates due to low soil nutrient content. This study aims to analyze the effect of Jakaba Liquid Organic Fertilizer (POC) concentration and Biosaka solution on the growth and yield of purple eggplant. The Research method used a factorial Randomized Block Design (RBD) with two factors. The first factor was the concentration of Jakaba POC (J0: 0, J1: 20, J2: 40, J3: 60 ml/l). The second factor was the concentration of Biosaka (B0: 0%, B1: 25%, B2: 50%, B3: 75%). There were 16 treatment combinations with three replicates. The observation parameters consisted of plant height, number of leaves, number of fruits per plant, and fruit weight per plant. The results showed that a Jakaba concentration of 40 ml/l (J2) had a significant effect on plant height (11.33 cm at 3 WAT and 26.72 cm at 4 WAT), leaf number (9.08 leaves at 4 WAT), and fruit number (average of 2.25 fruits). The concentration of Biosaka 75% (B3) gave the best results in plant height (8.48 cm at 2 WAT and 27.34 at 4 WAT), number of leaves (7.67 leaves at 3 WAT and 8.75 leaves at 4 WAT), and fruit weight (152.86 grams). A significant interaction occurred between Jakaba 40 ml/l and Biosaka 75% (J2B3) on plant height (31.50 cm) and number of leaves (10.33 leaves) at 4 WAT.

Keywords: biosaka; liquid organic fertilizers; jakaba; purple eggplant

INTRODUCTION

Purple eggplant is a horticultural commodity with high economic value, widely cultivated in Banten Province. However, eggplant production has fluctuated over the past three years, partly due to low nutrient availability. According to (Maidila, 2022), low nutrient availability in soil can inhibit plant growth. Eggplant plants require fertile soil, rich in organic matter, with a sandy loam texture, and good aeration and drainage to support optimal growth.

How to cite: Supriana., Fatmawaty, A.A., Roidelindho, K., Firnia, D.(2026). *The effect of the concentration of jakaba and biosaka liquid organic fertilizers on the growth and yield of purple eggplant (Solanum melongena L.)* variety F1 mustang. *Jurnal Agrotek Ummat*, 13(1), 24-32

The availability of nitrogen, phosphorus, and potassium is an important factor in determining optimal vegetative growth, root formation, and fruit development. Appropriate fertilization can increase photosynthetic efficiency, strengthen the root system, and accelerate flowering and fruiting (Habibi et al., 2024). Jakaba POC contains organic N, P, and K at 0.01%, 0.01%, and 0.02%, respectively, which can improve the properties and activity of soil organisms. Although the nutrient content is below the quality standard, using the appropriate concentration allows these nutrients to be optimally absorbed by plants.

In addition, the growth and yield of purple eggplant can be increased by applying biosaka extract derived from elisitor plants (Elfrida, 2024). Elisitor plants contain active compounds that can stimulate physiological and morphological responses. Biosaka contains organic N, P, and K at 0.52%, 0.03%, and 0.06%, Biosaka stimulates plant metabolism and defense mechanisms against pests and diseases through its content of growth hormones and macro- and micronutrients (Azhimah et al., 2023).

The purpose of this study was to analyze the effect of jakaba and biosaka concentrations on the growth and yield of purple eggplant (*Solanum melongena* L.).

METHODOLOGY

This study used a factorial randomized block design (RBD) with two factors. The first factor is the concentration of Jakaba POC (J0: 0, J1: 20, J2: 40, J3: 60 ml/l). The second factor is the concentration of Biosaka (B0: 0%, B1: 25%, B2: 50%, B3: 75%). There were 16 treatment combinations with three replicates.

1. JAKABA Production

Jakaba is made from bran and the first rice wash water, which contains carbohydrates, proteins, minerals, and vitamins that can serve as nutrients for microbial growth (Mohidem et al., 2022).

The process begins by mixing bran with warm water and adding rice washing water, then covering the container with a cloth and fermenting it for 14-21 days.

2. Biosaka Production

The biosaka production process begins by selecting leaves from 5 plant types that are healthy, fertile, and free of pests or diseases. Next, all the leaves are placed in a container filled with 1 liter of clean water and then gently squeezed by hand for 15 minutes until the water turns green. Once finished, the leaf juice solution is filtered using gauze to separate the pulp. The liquid is poured into a tightly sealed bottle and placed in a cool place away from direct sunlight. The resulting liquid can be used immediately as a natural elicitor.

3. Planting

The sowing process involves soaking the seeds in a jakaba solution, then planting them in seedling trays. The planting medium is made from a 1:1 combination of soil and compost. After the seeds are planted in the medium, they are covered to maintain moisture and allow the germination process to proceed optimally.

The purple eggplant seedlings are transplanted when the plants are 21 days old after sowing.

4. **Application of jakaba and biosaka**

   Jakaba is applied by applying the solution onto the planting medium, while biosaka is applied by spraying the solution onto the leaves. Eringing is done periodically at 7-day intervals. Pruning is done in the morning to avoid plant stress due to high ambient temperatures.

5. **Data analysis**

   Data processing was performed using Analysis of Variance (ANOVA) in Microsoft Excel. If the ANOVA results showed a significant to very significant effect on at least one treatment, a Duncan Multiple Range Test (DMRT) was performed at a 5% level.

RESULTS AND DISCUSSION

1. Plant Height

The results in Table 1 show a significant interaction between Jakaba POC and biosaka on the height of purple eggplant plants at 4 WAT. The combination of 40 ml/L Jakaba with 75% biosaka (J2B3) produced the tallest plants with an average height of 31.50 cm. Individually, Jakaba 40 ml/L had a significant effect on plant height at 3 and 4 WAT, by 11.33 cm and 26.72 cm, respectively. The biosaka factor had a significant effect at 2 and 4 WAT, with a concentration of 75% producing average plant heights of 8.48 cm and 27.34 cm, but did not show a significant effect at 3 WAT.

The strong growth response to the J2B3 combination indicates synergy between Jakaba's increased nutrient availability through soil microorganism activity and Biosaka's role as an elicitor that stimulates plant physiological activity. According to (Rafik et al., 2025), Jakaba supports cell division and elongation during the vegetative phase by increasing the availability of essential nutrients. Meanwhile, according to (Andriansyah et al., 2024), biosaka increases photosynthetic efficiency, enzyme activity, and the production of growth hormones that are rapidly absorbed through leaf stomata. The insignificant effect of biosaka at 3 WAT is thought to be due to environmental conditions, particularly high light intensity, which triggers stomatal closure, thereby reducing photosynthetic rate and the effectiveness of bioactive compound absorption through the leaves. This finding is consistent with Harahap et al. (2025), who stated that light stress can inhibit plant vegetative growth.

Table 1.
Average plant height

Plant Age (WAT)	Jakaba (ml/L)	Biosaka (%) B0 0%	B1 25%	B2 50%	B3 75%	Average (Cm)
2	J0 0 ml/l	7,47	7,17	7,00	9,07	7,68
	J1 20 ml/l	7,77	6,03	8,07	8,83	7,68
	J2 40 ml/l	7,37	7,33	7,70	7,83	7,56
	J3 60 ml/l	7,47	8,03	8,13	8,17	7,95
Average (Cm)		7,52b	7,14b	7,73ab	8,48a	
3 WAT	J0 0 ml/l	9,40	8,27	10,77	10,50	9,73b
	J1 20 ml/l	9,03	9,17	9,70	10,17	9,52b
	J2 40 ml/l	12,17	10,73	11,70	10,70	11,33a
	J3 60 ml/l	8,97	9,43	10,20	9,00	9,40b
Average (Cm)		9,89	9,40	10,59	10,09	
4 WAT	J0 0 ml/l	20,23fg	18,13g	21,60defg	27,90ab	21,97c
	J1 20 ml/l	25,57bcde	22,67cdefg	22,93bcdefg	26,30bcd	24,37b
	J2 40 ml/l	27,07abc	22,57cdefg	25,73bcde	31,50a	26,72a
	J3 60 ml/l	21,20efg	23,40bcdef	27,63abc	23,67bcdef	23,98bc
Average (Cm)		23,52bc	21,69c	24,48b	27,34a	

Note: Numbers followed by the same letter in the same column or row indicate significant differences based on the 5% DMRT test.

2. Number of leaves

The results in Table 2 show that the interaction between Jakaba POC and biosaka significantly affected the number of leaves on purple eggplant plants at 4 WAT. The combination of 40 ml/L Jakaba and 75% biosaka (J2B3) produced the highest number of leaves, averaging 10.33. Individually, the Jakaba POC had no significant effect during most of the observation period, although treatment J2 (40 ml/L) showed a tendency toward more leaves at 4 WAT (9.08 leaves). The biosaka factor began to have a significant effect at 3–4 WAT, with a concentration of 75% producing the highest number of leaves, 7.67 and 8.75 leaves, respectively.

The significant effect of interaction at 4 WAT indicates the existence of complementary working mechanisms. According to (Azrial, 2024), Jakaba increases the availability and absorption of nutrients through the activity of soil microorganisms, while according to (Sario et al., 2025), biosaka functions as an elicitor that stimulates plant physiological activities, such as cell division and elongation. The combination of these two treatments optimizes leaf formation, which is not achieved when applied individually. The insignificant effect of Jakaba in the early phase indicates that leaf formation is determined not only by nutrient availability but also by genetic and environmental factors. Meanwhile, the application of biosaka through the leaves allows for rapid absorption of growth hormones, thereby accelerating the formation of new shoots and leaves.

The results of this study are consistent with those of (Ramadita et al., 2024), who reported that Jakaba POC increases soil nutrient availability but requires physiological triggers to optimize vegetative growth. These findings are also consistent with (Minangsih et al., 2025), who stated that biosaka and leaf-based liquid fertilizers are effective in increasing leaf number. Furthermore, (Wahyudi et al., 2022) confirmed that leaf number is influenced by the interaction between nutrient availability and environmental factors rather than by a single factor.

Table 2.
Average number of leaves

Plant Age (WAT)	Jakaba (ml/L)	Biosaka (%)				Average (Cm)
		B0 0%	B1 25%	B2 50%	B3 75%	
3 WAT	J0 0 ml/l	6,67	5,67	6,33	8,00	6,67
	J1 20 ml/l	7,33	6,33	8,00	7,33	7,25
	J2 40 ml/l	8,00	6,33	7,00	7,33	7,17
	J3 60 ml/l	6,33	6,33	8,00	8,00	7,17
Average (Cm)		7,08ab	6,17b	7,33a	7,67a	
4 WAT	J0 0 ml/l	7,67e	7,00f	7,6e	8,67d	7,75c
	J1 20 ml/l	9,33bc	7,6e	9,00cd	8,00e	8,50ab
	J2 40 ml/l	9,67b	7,67e	8,67d	10,33a	9,08a
	J3 60 ml/l	6,33g	8,67d	9,00cd	8,00e	8,00b
Average (Cm)		8,25ab	7,75b	8,58a	8,75a	

Note: Numbers followed by the same letter in the same column or row indicate significant differences based on the 5% DMRT test.

3. Number of fruits

The results of the Table 3 analysis show that Jakaba POC concentration significantly affects the number of purple eggplant fruits, with the Jakaba 40 ml/L (J2) treatment producing the highest number of fruits, averaging 1.09 per plant. These results indicate that applying Jakaba at the optimal concentration supports flowering and fruit formation, according to (Raghuwanshi et al., 2025), who state that increased nutrient availability and soil microorganism activity play a role in nutrient absorption and plant physiological balance during the generative phase. This aligns with (Nababan et al., 2025), who found that fruit formation is significantly influenced by the balance of macronutrients, particularly phosphorus and potassium, which are involved in flowering and fruit filling.

Conversely, biosaka alone did not have a significant effect on fruit yield, indicating that it does not play a direct role in increasing it, despite a numerical increase. According to (Andriansyah et al., 2024), flower and fruit formation require sufficient macronutrients, especially nitrogen and phosphorus. The low nutrient content in biosaka, namely 0.52% nitrogen, 0.03% phosphorus, and 0.06% potassium, is thought to be the cause of the suboptimal generative response of plants. This finding aligns with (Ramadhan & Sabli, 2024), who stated that fruit formation is better supported by the continuous availability of phosphorus and potassium in the soil than by application through the leaves.

Table 3.
Average number of fruits

Plant Age (WAT)	Jakaba (ml/L)	Biosaka (%)				Average (Cm)
		B0 0%	B1 25%	B2 50%	B3 75%	
8-12 WAT	J0 0 ml/l	1,04	1,05	1,05	1,08	1,05b
	J1 20 ml/l	1,08	1,05	1,08	1,05	1,06b
	J2 40 ml/l	1,09	1,09	1,09	1,10	1,09a
	J3 60 ml/l	1,09	1,08	1,09	1,05	1,07ab
Average (Cm)		1,08	1,08	1,07	1,08	

Note: Numbers followed by the same letter in the same column or row indicate significant differences based on the 5% DMRT test.

4. **Fruit weight per plant (g)**

The Jakaba treatment did not have a significant effect on all parameters, but at a concentration of 20 ml/l, it produced the highest weight with an average of 133.25 grams. According to (Silaban, 2025), increased fruit weight is influenced by potassium, which promotes the enlargement and filling of fruit tissue. Meanwhile, based on laboratory test results, the potassium content in the jakaba used was quite low. According to (Gulo & Lase, 2025), the activity of microorganisms and bioactive compounds in jakaba can increase nutrient absorption efficiency, especially macro-nutrients such as N, P, and K, which play a role in fruit filling and enlargement.

The application of Biosaka had a significant effect on fruit weight per plant, with a B3 concentration (75%) producing the highest average weight of 152.86 grams. According to (Ndruru et al., 2024), biosaka, as an elicitor and biostimulant, significantly increased the efficiency of plant physiological processes, especially during the fruit-filling phase. (Nabila et al., 2025) explain that the increase in fruit weight is the result of the accumulation of all plant metabolic processes that occur continuously, such as photosynthesis, respiration, and the synthesis and translocation of assimilation products in the form of carbohydrates, proteins, and fats, which are then distributed to generative organs, especially seeds as organs that store food reserves. During seed filling, these metabolic compounds accumulate in seed tissue as starch and other reserves, increasing seed size and weight and ultimately contributing directly to increased overall fruit weight.

Table 4.
Average fruit weight per plant

Plant Age (WAT)	Jakaba (ml/L)	Biosaka (%)				Average (Cm)
		B0 0%	B1 25%	B2 50%	B3 75%	
8-12 WAT	J0 0 ml/l	79,67	95,11	79,67	150,67	101,28
	J1 20 ml/l	92,33	136,67	145,67	158,33	133,25
	J2 40 ml/l	149,78	92,44	59,33	180,22	120,44
	J3 60 ml/l	70,22	120,00	101,44	122,22	103,47
Average (Cm)		98,00b	111,06b	96,53b	152,86a	

Note: Numbers followed by the same letter in the same column or row indicate significant differences based on the 5% DMRT test.

CONCLUSION

The application of POC Jakaba at a concentration of 40 ml/L (J2) had a significant effect on plant height at 3 WAT (11.33 cm) and 4 WAT (26.72 cm), the number of leaves at 4 WAT (9.08 leaves), and the number of fruits per plant with an average of 1.09 fruits.

The application of Biosaka 75% (B3) concentration yielded the best results on several growth and yield parameters, namely plant height at 2 WAT (8.48 cm) and 4 WAT (27.34 cm), number of leaves at 3 WAT (7.67 leaves) and 4 WAT (8.75 leaves), and fruit weight per plant of 152.86 grams.

There was a significant interaction between the POC Jakaba 40 ml/L and Biosaka 75% (J2B3) treatments on the parameters of plant height (31.50 cm) and number of leaves (10.33 leaves) at 4 WAT.

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