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The Effect of Gibberellin (GA₃) Concentration on the Growth and Yield of Several Eggplant Varieties (*Solanum melongena* L.)

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Abstract

Eggplant (*Solanum melongena* L.) is an important horticultural crop with high economic value and is widely cultivated in various regions due to increasing demand. This study aimed to determine the effects of gibberellin (GA₃) concentration and eggplant varieties on the growth and yield of eggplant (*Solanum melongena* L.). The research was conducted in Kolomayan Village, Wonodadi District, Blitar Regency, from February to May 2025. A Completely Randomized Design (CRD) with a factorial arrangement of two factors was used. The first factor was gibberellin concentration at 0 ppm, 100 ppm, 200 ppm, and 300 ppm. The second factor was the eggplant variety, including Hitavi, Mustang, Pulus, and Teho 555. Parameters observed included vegetative and generative growth traits. The results showed a significant interaction between 200 ppm GA₃ concentration and the Hitavi variety on total harvested fruit weight. The 200 ppm GA₃ treatment alone produced the best results across all observed parameters. The Teho 555 variety excelled in plant height and leaf number, while the Hitavi variety outperformed others in flower number, total fruit number per plant, total fruit weight per plant, and fruit set.

Keywords: Fruit Formation, Growth Regulators, Generative Growth, Plant Hormones, Vegetative Growth

1. Introduction

Eggplant (*Solanum melongena* L.) is a shrubby vegetable plant belonging to the Solanaceae family. Increasing vegetable production is a crucial component of efforts to enhance agricultural output, benefiting both public health by providing essential nutrition and improving the income and welfare of farming communities. The prospects for eggplant cultivation are very promising, as demand continues to rise amid population growth and greater awareness of the nutritional benefits of vegetables.

This study used four eggplant varieties: Mustang, Hitavi, Pulus, and Teho 555. Research by Arsy and Barunawati (2018) on variety treatments showed significant effects on several growth parameters. The Mustang variety exhibited greater plant height than the Milano variety, while the Milano variety produced more flowers than Mustang. Additionally, the Mustang variety had a larger leaf area, whereas the Milano variety had a higher number of productive branches. The Milano variety also surpassed

Mustang in both the number of fruits and total fruit weight per plant, although Mustang had the highest average fruit weight. Eggplant production remains relatively low compared to other vegetables, primarily due to challenges in cultivation, including a lack of intensive farming systems. A major obstacle in eggplant cultivation is the frequent dropping of flowers or failure to set fruit. The level of fruit set in eggplant plants is still relatively low, around 30%–40% (Wahyuningsih et al., 2023). One cause of this low fruit set is the low concentration of Gibberellin (GA₃) in the plant, which causes cells in the flower organs to age more quickly and fall before fertilization. Therefore, the addition of exogenous hormones, such as GA₃, is necessary to induce the formation and maintenance of plant reproductive organs, particularly flowers, thereby increasing the likelihood of fertilisation and fruit set. Gibberellin is a hormone that accelerates seed germination, promotes shoot and embryo formation, stimulates stem elongation and leaf growth, stimulates flowering and fruit

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development, and influences root growth and differentiation. (Triani et al. 2020).

GA₃ supplementation in eggplant plants can increase auxin content in plant tissue, thus preventing the separation of plant organs such as flowers, leaves, and stems. Gibberellin can influence genetic traits and physiological processes in plants, including flowering, parthenocarpy, and carbohydrate mobilisation during germination. It is hoped that the addition of gibberellin can reduce flower and fruit loss in eggplant plants (Nurita dan Yuliani, 2023). Gibberellin application during the flowering phase can stimulate the formation of parthenocarpic fruit. Fruit produced by parthenocarpy has fewer or no seeds.

Gibberellin growth regulators are most effective when applied at the right time and at the right concentration relative to the plant's growth rate. The dosage, variety, and stage of plant development all influence how the plant responds to growth regulators. Arsy dan Barunawati, (2018) menyatakan Purple eggplant skin contains flavonoids and alkaloids. Green eggplant contains secondary metabolites, including alkaloids, flavonoids, tannins, and glycosides. White eggplant contains fibre and nutrients such as potassium, magnesium, folate, vitamin B6, and vitamin A. Black eggplant has a higher anthocyanin content in its skin than other varieties and contains phenolics and flavonoids. Eggplant variety selection is based on its characteristics and economic potential. White eggplant is known for its soft, tender flesh and milder flavour. White eggplant has market appeal due to its unique appearance and is often used in certain dishes. Black eggplant has a thicker skin with a distinctive flavor. This variety is generally more resistant to pests and diseases, making it easier to cultivate in various environmental conditions.

Triani et al. (2020) found that on-treatment at 200 ppm significantly reduced fruit weight, seed number, and seed size in green eggplant of the Antaboga variety. Wahyuningsih et al. (2023) showed that a 250 ppm concentration of the plant growth regulator Gibberellin (GA₃) could increase plant height, increase leaf production, and increase the percentage of fruit formation in the Mustang variety of eggplant. In this study, Gibberellin (GA₃) was applied with three different concentrations, namely 100 ppm (low), 200 ppm (medium), and 300 ppm (high), on four varieties of eggplant plants, namely Mustang, Hitavi, Pulus, and Teho 555.

The positive response of plants to growth regulators is influenced by several factors, including plant species, growth stage, type of growth regulator, concentration, and method of application. The concentration of the growth regulator is particularly important, as it must be carefully determined to achieve optimal effects. Based on this, the present study used the plant growth regulator gibberellin (GA₃) to investigate the effect of different gibberellin concentrations on the growth and yield of various eggplant

(*Solanum melongena* L.) varieties. This research aims to identify the optimal gibberellin concentration that maximizes growth and yield across multiple eggplant varieties.

2. Material and Methods

2.1. Place and Time

This research was conducted from February 2025 to May 2025 in Kolomayan Village, Wonodadi District, Blitar Regency. The research site is located at approximately 167 meters above sea level, with coordinates of 8°4'30.6" South Latitude and 112°16'49.2" East Longitude. Average annual rainfall is approximately 1,200 mm, and air temperature is approximately 29–33 °C.

2.2. Tools and materials

The tools used in this study were hoes, watering cans, hand sprayers, a meter or ruler, callipers, pruning shears, stakes, stationery, nameplates, trowels, cameras, scales, seedling trays, buckets, raffia ropes, and measuring cups. The materials used in this study were Mustang F1 purple eggplant varieties (PT East West Seed Indonesia), Hitavi F1 green eggplant (PT East West Seed Indonesia), Pulus F1 white eggplant (PT Benih Citra Asia), Teho 555 F1 black eggplant (CV. Multi Global Agrindo), Gibberellin (GA₃), planting media, soil, goat manure, burnt rice husks, Mutiara 16:16:16 NPK fertilizer, vermicompost, decis, antracol, water, 10 x 12 cm polybags, 40 x 40 cm polybags and labels.

2.3. Research methods

This experiment is a factorial design arranged in a Completely Randomized Design (CRD) and repeated 3 times. The factorial consists of two factors: the first, the concentration of Gibberellin, with 4 levels; and the second, the variety, with 4 levels.

The first factor was Gibberellin concentration, with 4 levels (0, 100, 200, 300 ppm). The second factor was eggplant plant variety, with 4 levels (Mustang, Hitavi, Pulus, Teho 555). The combination of the two factors yielded 16 treatment combinations, each repeated 3 times, for a total of 48 experimental units. Each experimental unit would include 3 sample plants, for a total of 144 eggplant plants whose growth and yield would be observed.

2.4. Observation Parameters

2.4.1. Plant Height (cm)

Plant height was measured from the base of the stem to the highest growing point using a meter (cm). Observations began 7 days after planting, with 7-day intervals (1 week), continuing until 49 days after planting.

2.4.2. Number of Leaves (Sheets)

The number of leaves counted was the number of leaves in each observation. The leaves counted were those that had fully opened. Observations began at 7 days after

planting (DAP) with 7-day (1-week) intervals until 49 DAP.

2.4.3. Number of Flowers (Buds)

The number of flowers is counted every day, from the first flower until 2 weeks before harvest, which occurs at 72 DAP.

2.4.4. Total Number of Fruits per Plant (Fruit)

The total number of fruits per plant is calculated by counting all the fruits in each polybag from the first to the last harvest (10 harvests), then summing them.

2.4.5. Total Fruit Weight per Plant (g)

The total fruit weight per plant was determined by weighing all the fruit in each polybag using a digital scale from the first to the last harvest (10 harvests), then summing the weights to obtain the total fruit weight per plant.

2.4.6. Fruit set (%)

Fruit set is the percentage of flowers that develop into fruit, calculated by dividing the number of fruits formed by the number of flowers. The calculation is performed per plant sample. The formula for fruit set is as follows (Kusumayati et al. 2015): Fruit set = number of fruits formed / Total number of flowers blooming x 100%.

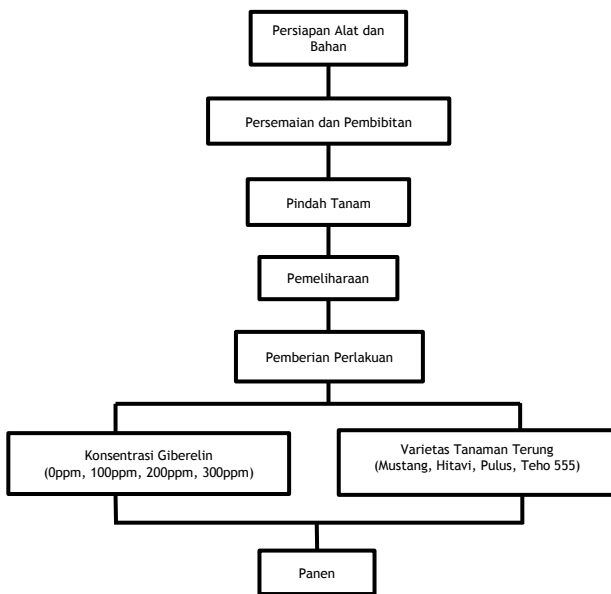


Figure 1. Research flow diagram

3. Results and Discussion

3.1. Plant Height

The results of the analysis of variance showed that there was no interaction between the Gibberellin (GA₃) concentration treatment and eggplant varieties on plant height (*Solanum melongena* L.). The single factor of Gibberellin (GA₃) administration had no significant effect at 7 and 14 DAP, but had a highly significant effect at 21 to 49 DAP. The single factor of eggplant varieties had a very significant effect at all observation ages. The average

results of eggplant plant height by the influence of the single treatment of Gibberellin (GA₃) concentration and several varieties of eggplant plants aged 7 - 49 DAP are presented in Table 1.

Table 1 shows that the single factor of Gibberellin (GA₃) concentration of 200 ppm is significantly different from the treatment of Gibberellin (GA₃) concentration of 0 ppm, but not significantly different from the Gibberellin (GA₃) concentrations of 100 ppm and 300 ppm. The average height of the highest eggplant plant by Gibberellin concentration of 200 ppm is at the age of 21 DAP of 36.22 cm, the age of 28 DAP of 50.55 cm, the age of 35 DAP of 50.55 cm, the age of 42 DAP of 64.34 cm, the age of 49 DAP of 76.55 cm and the age of 49 DAP of 88.85 cm. While the lowest average height of eggplant plants by 0 ppm Gibberellin treatment is at the age of 21 DAP of 30.09 cm, the age of 28 DAP of 42.31 cm, the age of 35 DAP of 55.05 cm, the age of 42 DAP of 68.07 cm and the age of 49 DAP of 79.68 cm. The single factor of the Teho 555 variety treatment is significantly different from the Pulus variety treatment, but not significantly different from the Mustang and Hitavi varieties. The highest average height of eggplant plants by Teho 555 variety treatment is at the age of 7 DAP of 9.70 cm, the age of 14 DAP of 22.34 cm, the age of 21 DAP of 36.66 cm, the age of 28 DAP of 51.13 cm, the age of 35 DAP of 64.91 cm, the age of 42 DAP of 77.74 cm and the age of 49 DAP of 88.99 cm. Meanwhile, the lowest average height by the Pulus variety treatment was at the age of 7 DAP of 9.25 cm, the age of 14 DAP of 16.10 cm, the age of 21 DAP of 31.20 cm, the age of 28 DAP of 40.86 cm, the age of 35 DAP of 52.34 cm, the age of 42 DAP of 65.91 cm and the age of 49 DAP of 78.48 cm.

Farida and Rohaeni (2019) stated that cell division is stimulated by the active amylase, which hydrolyses starch into reducing sugars, thereby increasing sugar concentration and osmotic pressure. Increased osmotic pressure in the cell causes water to enter the cell, enabling it to carry out all physiological processes and stimulating cell growth, thereby increasing plant height. The advantage of Gibberellin compared to other hormones is that Gibberellin has a special ability to stimulate growth in many species, especially dwarf plants. In Alfiyadana et al. (2024) research, 200 ppm Gibberellin induction gave the best growth of chilli plants. The superiority of vegetative growth in the Teho 555 variety is thought to be related to the plant's genetic potential, which is more adaptive to the environment in which the research was carried out, compared to other varieties. The Black Eggplant variety shows substantial morphological and physiological diversity, including in aspects of early plant growth.

3.2. Number of Leaves

The results of the analysis of variance showed that there was no interaction between the combination of Gibberellin (GA₃) concentration treatments and Eggplant

varieties on the number of leaves of Eggplant (*Solanum melongena* L.) plants. The single factor of Gibberellin (GA₃) administration on the number of leaves aged 7 to 35 DAP, but had a significant effect at 42 and 49 DAP. The single factor of Eggplant varieties had no significant effect at 7 to 28 DAP, but had a highly significant effect at 35 to

49 DAP. The average results of the number of leaves of Eggplant plants by the influence of the single treatment of Gibberellin (GA₃) concentration and Eggplant varieties aged 7 - 49 DAP are presented in Table 2.

Table 1. Average Height of Eggplant Plants Aged 7-49 DAP in Gibberellin Concentration (GA₃) Treatments and Eggplant Varieties

Treatment	Plant Height (cm)						
	Age (DAP)						
	7	14	21	28	35	42	49
Gibberellin GA ₃ Concentration (ppm)							
0	9.43±1.17	19.34±1.34	30.09±1.64 a	42.31±1.83 a	55.05±1.57 a	68.07±0.74 a	79.68±1.57 a
100	9.47±1.24	20.13±1.56	35.99±1.97 b	50.44±0.91 b	63.38±0.82 b	76.42±1.60 b	86.90±1.10 b
200	9.54±1.22	20.29±1.43	36.22±1.46 b	50.55±1.29 b	64.34±1.34 b	76.55±0.89 b	88.85±0.97 b
300	9.45±1.90	19.09±1.04	35.97±0.61 b	50.10±0.75 b	63.73±1.74 b	75.67±1.34 b	86.52±1.22 b
BNJ 5%	tn.	tn.	2.02	2.76	2.88	2.51	3.30
Eggplant Varieties							
Mustang	9.37±1.90b	19.11±1.40b	33.86±1.11 b	50.62±0.79 b	64.60±1.05 b	76.50±0.85 b	86.59±1.32 b
Hitavi	9.57±1.46c	21.30±1.24c	36.54±0.74 c	50.80±1.94 b	64.65±0.93 b	76.55±1.58 b	87.94±1.84 b
Pulus	9.25±0.87a	16.10±1.15a	31.20±1.37 a	40.86±1.02 a	52.34±1.54 a	65.91±1.53 a	78.43±1.17 a
Teho	9.70±0.89d	22.34±1.18c	36.66±1.97 c	51.13±0.81 b	64.91±1.82 b	77.74±0.51 b	88.99±0.77 b
BNJ 5%	0.10	2.14	2.02	2.76	2.88	2.51	3.30

Description: Numbers accompanied by the same letter for each treatment and the same age show no significant difference in the BNJ test at 5% level, tn = no significant difference.

Table 2. Average Number of Leaves of Eggplant Plants Aged 7-49 DAP in Gibberellin Concentration (GA₃) Treatment and Eggplant Varieties

Treatment	Number of leaves (blades)						
	Age (DAP)						
	7	14	21	28	35	42	49
Gibberellin GA ₃ Concentration (ppm)							
0	2.8±0.08	3.75 ± 0.10	6.08 ± 0.20	8.22 ± 0.25	11.92 ± 0.30	15.58± 0.45 a	20.19 ± 0.60a
100	2.53±0.07	3.56 ± 0.09	6.22 ± 0.18	8.31 ± 0.22	12.06 ± 0.28	15.83± 0.40 a	20.72 ± 0.55ab
200	2.33 ± 0.06	3.44 ± 0.08	5.58 ± 0.16	8.06 ± 0.20	12.44 ± 0.30	16.39± 0.38 b	21.25 ± 0.50b
300	2.47 ± 0.07	3.47 ± 0.10	5.39 ± 0.15	7.78 ± 0.25	12.06 ± 0.28	16.00 ± 0.45ab	20.94 ± 0.60ab
BNJ 5%	tn.	tn.	tn.	tn.	tn.	0.58	0.85
Eggplant Varieties							
Mustang	2.47± 0.08	3.47± 0.10	5.69± 0.20	8.08±0.25	11.86±0.30ab	15.69 ± 0.45 a	20.81± 0.60bc
Hitavi	2.58± 0.07	3.56± 0.09	6.19± 0.22	8.42±0.22	12.14±0.30b	16.11± 0.40ab	21.14± 0.55 bc
Pulus	2.31± 0.06	3.44± 0.08	5.31± 0.18	7.58 ± 0.24	11.47±0.35a	15.64± 0.38 a	19.92± 0.50 a
Teho 555	2.78±0.09	3.75± 0.10	6.08± 0.20	8.28±0.22	13.00± 0.28 c	16.36 ± 0.43b	21.25± 0.60b
BNJ 5%	tn.	tn.	tn.	tn.	0.5	0.58	0.85

Description: Numbers accompanied by the same letter for each treatment and the same age show no significant difference in the BNJ test at 5% level, tn = no significant difference.

Table 2 shows that the single-factor Gibberellin (GA₃) 200 ppm concentration treatment is significantly different from the Gibberellin (GA₃) 0 ppm concentration treatment but not significantly different from the Gibberellin (GA₃) 100 ppm and 300 ppm concentrations. The average number of leaves of the Eggplant plant is highest at a Gibberellin concentration of 200 ppm, namely 16.39 strands at 42 DAP and 21.25 strands at 49 DAP. The single factor of the Teho 555 variety treatment is

significantly different from the Mustang variety treatment at 42 DAP and Pulus, but not significantly different from the Hitavi variety and the Mustang variety at 35 and 49 DAP. The average number of leaves on the Eggplant plant is highest for the Teho 555 variety at 35 DAP (13.00 strands), 42 DAP (16.36 strands), and 49 DAP (21.25 strands). Meanwhile, the average number of leaves on the eggplant plant was lowest for the Pulus variety, namely at 35 DAP (13.00 leaves), 42 DAP (15.64 leaves), and 49

DAP (19.92 leaves).

Research by Deviyanti *et al.* (2023) indicates that gibberellin availability influences metabolic processes and can increase vegetative growth, including leaf number. The number of leaves and plant height are interrelated. The taller the plant, the more leaves it will produce. The number of leaves in this study increased with plant height. This result aligns with Alfiyadana *et al.* (2024), who found that taller plants produce more internodes, resulting in a greater number of leaves. According to Daunay *et al.* (2019), research indicates that optimal vegetative growth, such as plant height and a large number of leaves, supports overall plant productivity. In addition, a larger number of leaves increases photosynthetic surface area, thereby improving light absorption efficiency and supporting greater biomass accumulation. The results of this study are in line with those of Colak *et al.* (2022), which indicate that the black eggplant variety has a greater ability to adapt to environmental variations and shows better vegetative growth vigour.

3.3. Amount of Interest

The results of the analysis of variance showed that there was no interaction between the Gibberellin concentration treatment and Eggplant varieties on the number of flowers of Eggplant (*Solanum melongena* L.) plants. The single factor of Gibberellin (GA₃) administration for each Eggplant variety had a very significant effect on the number of flowers. The average results of the number of flowers of Eggplant plants by the influence of the single treatment of Gibberellin concentration (GA₃) and eggplant varieties are presented in Table 3.

Table 3 shows that the treatment of Gibberellin (GA₃) concentration of 200 ppm is significantly different from the treatment of Gibberellin (GA₃) concentration of 0 ppm and 100 ppm, but not significantly different from the treatment of Gibberellin (GA₃) concentration of 300 ppm. The average highest yield is 31.11 flowers, while the average smallest yield is 27.36 flowers. The single-factor eggplant variety treatment, Hitavi, is significantly different from the Pulus and Teho 555 treatments but not significantly different from the Mustang treatment. The average highest yield is 30.06 flowers, while the average smallest is 28.64 flowers. According to the research by Tsiakaras *et al.* (2014), it is necessary to avoid applying Gibberellin at too high a concentration, as it causes a significant decrease in fruit yield and quality.

Yasmin *et al.* (2014) stated that GA₃ applied at the beginning of flowering plays a role in the process of stimulating flowering and reducing flower and fruit abscission until an increase in the number of fruits formed along with the addition of GA₃ concentration applied at the beginning of flowering because the application of GA₃ at the beginning of flower formation can increase the need for

GA₃ to meet fruit growth with the provision of exogenous GA₃. The higher the concentration of Gibberellin, the fewer the number of normal fruits. The number of flowers in the Hitavi variety is relatively high, at 30.06. The number of flowers formed is closely related to nutrient intake and photosynthetic activity, which, in this variety, is supported by the large leaf size discussed above in the vegetative section. Hariyono dan Nathanie (2023) stated that the high number of flowers reflects a high production capacity, although the efficiency of fruit formation is still determined by fruit set.

3.4. Total Number of Fruits

The results of the analysis of variance showed that the combination of Gibberellin concentration treatment and Eggplant varieties had no significant effect on the total number of harvested fruits of eggplant plants (*Solanum melongena* L.). The single factor of Gibberellin (GA₃) PGR treatment with each eggplant variety treatment had a very significant effect on the total number of harvested fruits of eggplant plants (*Solanum melongena* L.). The average results of the total number of harvested fruits of eggplant plants due to the single treatment of Gibberellin concentration (GA₃) and Eggplant plant varieties are presented in Table 4.

Table 4 shows that the single factor of concentration treatment (GA₃) showed a significant difference in the total number of harvested eggplant fruits across 5 harvest periods. The average result of the highest number of eggplant harvested fruits was obtained in the 200 ppm Gibberellin (GA₃) treatment, which was 16.92 fruits, while the average number of eggplant harvested fruits was the least obtained in the 0 ppm Gibberellin (GA₃) treatment, which was 12.81 fruits. For the single-factor eggplant variety treatment, the average number of harvested eggplant fruits was highest for the Hitavi variety, at 16.42 fruits. The lowest number of harvested eggplant fruits was obtained in the Pulus variety treatment, with 14.58 fruits.

In line with the research by Tsiakaras *et al.* (2014), it is necessary to avoid applying Gibberellin at too high a concentration, as this results in a significant decrease in yield and fruit quality. Yasmin *et al.* (2014) stated that GA₃ applied at the beginning of flowering plays a role in the process of activating flowering and reducing flower and fruit abscission until an increase in the number of fruits formed along with the addition of GA₃ concentration so that it can increase the need for GA₃ to meet fruit growth with the provision of exogenous GA₃. The higher the concentration of Gibberellin, the fewer the number of normal fruits.

The high fruit yield in the Hitavi variety can be attributed to favourable plant morphological traits, such as a wide crown and a large number of flowers (Dewi *et al.* 2023). One of the main factors influencing fruit set on eggplant plants is the number of flowers produced and the ability of these flowers to mature into fruit. The Hitavi

variety reflects the plant's physiological ability to retain flowers and support fruit development.

Table 3. Average Number of Flowers of Eggplant Plants in Gibberellin (GA₃) Concentration Treatments and Eggplant Varieties

Treatment	Number of Flowers (flowers)
Gibberellin GA ₃ Concentration (ppm)	
0	27.36 ± 0.45 a
100	29.22 ± 0.33 b
200	31.11 ± 0.41 c
300	29.58 ± 0.39 c
BNJ 5%	0.59
Eggplant Varieties	
Mustang	29.33 ± 0.27 cd
Hitavi	30.06 ± 0.35 d
Pulus	28.64 ± 0.48 a
Teho 555	29.25 ± 0.44 b
BNJ 5%	0.59

Description: The average figures followed by the same letter in each treatment show no significant difference in the 5% BNJ test.

Table 4. Average Number of Total Fruit Harvests of Eggplant Plants in Gibberellin Concentration (GA₃) Treatments and Eggplant Varieties

Treatment	Total Number of Harvested Fruits (Fruits)
Gibberellin GA ₃ Concentration (ppm)	
0	12.81 ± 0.35 a
100	15.17 ± 0.41 b
200	16.92 ± 0.44 c
300	15.94 ± 0.39 c
BNJ 5%	0.68
Eggplant Varieties	
Mustang	15.22 ± 0.38 b
Hitavi	16.42 ± 0.36 c
Pulus	14.58 ± 0.40 a
Teho 555	14.61 ± 0.34 a
BNJ 5%	0.68

Description: The average figures followed by the same letter in each treatment show no significant difference in the 5% BNJ test.

3.5. Total Fruit Weight

The results of the analysis of variance showed that the combination of Gibberellin (GA₃) concentration and Eggplant plant varieties had a very significant interaction on the total harvested fruit weight of Eggplant (*Solanum melongena* L.) plants. The single factor of Gibberellin concentration and Eggplant varieties also had a very significant effect on the total harvested fruit weight of Eggplant plants. The average results of the total harvested fruit weight of Eggplant plants due to each treatment are presented in Table 5.

Table 5 shows that the combination of Gibberellin (GA₃) concentration treatment and Terun variety significantly affected the total harvested fruit weight of eggplant plants during 5 harvest periods. The highest average total harvested fruit weight was obtained in the combination treatment of a Gibberellin (GA₃) concentration of 200 ppm and the Hitavi eggplant variety, at 2.11 kilograms. The lowest average total harvested fruit weight was obtained in

the combination treatment of Gibberellin (GA₃) at 0 ppm and Teho 555 eggplant variety at 1.89 kilograms. According to Alvitasari and Sopand (2019), gibberellin affects fruit morphology, including fruit size and weight. Gibberellin significantly reduces fruit size and affects fruit weight. Gibberellin in plants affects cell enlargement and cell division. Cell enlargement results in a larger new cell size. The increase in cell size results in larger tissues and organs, and increases the size and weight of the plant.

In line with research by Rolisty et al. (2014), an optimal GA₃ concentration will promote fruit enlargement because, after fertilization, Gibberellin synthesis occurs in the endosperm and embryo until it is needed for fruit growth. Increased fresh weight at the optimal GA₃ concentration compared to the control can increase fruit weight by an average of 27%. In addition, the presence of the Hitavi variety treatment increases total fruit weight. According to research by Fitriani et al. (2024), fruit weight is influenced by the distribution of assimilates from leaves

to fruit and by the ability of plants to absorb water and nutrients. Large fruit size results in optimal weight accumulation.

The superior fruit weight of the Hitavi variety is attributed to its genetic traits, which promote the formation of larger, denser fruit. Furthermore, plant morphology, such as leaf area and a well-developed root system, also contributes to efficient water and nutrient absorption, thereby supporting optimal fruit growth and development (Hardy Purba et al., 2021). The combination of high fruit number and large fruit size results in optimal weight accumulation. This finding is an important indicator of the

variety's overall production success.

3.6. Fruit set

The results of the analysis of variance showed that the combination treatment of Gibberellin (GA₃) concentration with Eggplant varieties had no significant effect on the fruit set of eggplant (*Solanum melongena* L.) plants. The single factor of Gibberellin (GA₃) treatment and Eggplant varieties had a very significant effect on the fruit set of eggplant plants. The average results of the fruit set of Eggplant plants due to each treatment are presented in Table 6.

Table 5. Average Total Harvest Fruit Weight (kg) in the Combination Treatment of Gibberellin Concentration (GA₃) and Eggplant Varieties

Gibberellin Frequency (ppm)	Eggplant Varieties			
	Mustang	Hitavi	Pulus	Teho 555
0	1.93 ± 0.05 b	2.02 ± 0.06 e	1.92 ± 0.05 b	1.89 ± 0.05 a
100	2.00 ± 0.04 de	2.07 ± 0.05 fg	1.96 ± 0.06 cd	1.96 ± 0.04 cd
200	2.05 ± 0.06 f	2.11 ± 0.05 g	2.00 ± 0.05 de	2.00 ± 0.06 de
300	2.03 ± 0.05 ef	2.09 ± 0.06 g	1.98 ± 0.05 d	1.97 ± 0.04 cd
BNJ 5%	0.02			

Description: The average number followed by the same letter in the treatment shows no significant difference in the 5% BNJ test.

Table 6. Average Fruit Set of Eggplant Plants in Gibberellin (GA₃) Concentration Treatments and Eggplant Varieties

Treatment	Fruit set (%)
Gibberellin GA ₃ Concentration (ppm)	
0	47.48 ± 1.20 a
100	55.96 ± 1.45 b
200	61.04 ± 1.68 d
300	57.46 ± 1.53 c
BNJ 5%	2.52
Eggplant Varieties	
Mustang	55.23 ± 1.41 b
Hitavi	60.59 ± 1.62 c
Pulus	52.77 ± 1.36 a
Teho 555	53.34 ± 1.38 a
BNJ 5%	2.52

Description: The average figures followed by the same letter in each treatment show no significant difference in the 5% BNJ test.

Table 6 shows that the single factor of Gibberellin (GA₃) concentration treatment showed a significant difference in the fruit set of eggplant plants. The highest average fruit set results were obtained in the Gibberellin (GA₃) concentration treatment of 200 ppm, namely 61.04%, while the lowest average fruit set results were in the Gibberellin (GA₃) concentration treatment of 0 ppm, namely 47.48%. The highest single factor of eggplant plant variety concentration treatment was obtained in the Hitavi eggplant plant variety treatment, namely 60.59%, while the lowest average fruit set results were in the Pulus eggplant plant variety treatment, 52.77%.

The increase in fruit set is in line with research by Muhyidin et al. (2018) on GA₃ administration, which increased by 49.70% compared to the treatment without GA₃. Fruit set is positively correlated with the number of

fruits and fruit bunches. The higher the concentration of GA₃, the higher the number of fruits and the number of fruit bunches, so automatically the percentage of flowers and the number of fruit that fall will be less. This finding is consistent with research by Yasmin et al. (2014): a greater number of flowers can produce more fruits. The Hitavi variety treatment produced a fruit set percentage of 60.59%, indicating successful pollination and fertilization and was influenced by the balance of plant hormones and environmental conditions.

Wahyuningsih et al. (2023) stated that varieties that can maintain high fruit set consistency indicate physiological stability of the plant during the reproductive period. Varietal differences in the morphology of Eggplant flowers can cause this. Arsy and Barunawat (2018) stated that the pistil location in Eggplant flowers varies: some are

shorter than the anther, the same height as the anther, or taller than the anther. This finding can be a factor in pollination success or failure, thereby affecting the percentage of fruit set in Eggplant plants. This result aligns with Rolistyo et al. (2014), who found that the percentage of fruit set in Solanaceae plants varies by variety. Fruit set is considered high compared to research by Arsy dan Barunawati (2018), which ranged from 45.11% in the Milano variety of eggplant, and below the fruit set results of research by Triani et al. (2020), which reached 81.26% in the Antaboga variety of eggplant.

4. Conclusion

This study demonstrates that the application of Gibberellin (GA_3) at 200 ppm, either alone or in combination with the Hitavi eggplant variety, significantly enhances the growth and yield of eggplant plants. Notably, improvements were observed in total harvested fruit weight, plant height, number of leaves, flowers, fruits, and fruit set. Additionally, the Teho 555 variety exhibited superior vegetative growth, while the Hitavi variety excelled in reproductive traits. Therefore, GA_3 at 200 ppm, in combination with the Hitavi variety, is recommended for eggplant cultivation.

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