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The Effect of Humic and Gibberellin on the Growth and Flowering of The Cat's Eye (*Syzygium Zeylanicum*) Plant

Nada Wahab Ahmed

College of Health and Medical Techniques – Aldour – Northern Technical University

ABSTRACT: Cat's eye *(Syzygium zeylanicum)* is one of the tropical plants that has a fairly high value. *Cat's eye plant* is often used variously. This first-year research was conducted with the aim to study the effect of the interaction of Humic acid and gibberellin on the flowering of Cat's eye plant and to determine the best concentrations of Humic acid (LHA) and gibberellin (GA) to spur the flowering of cat eye plant. The research method used is an experimental method with a factorial RAL treatment pattern. The first factor is the concentration of gibberellins consisting of 4 levels, namely 0 ppm; 100 ppm; 200 ppm; 300 ppm. The second factor is the concentration of Humic acid, which consists of 4 levels consisting of 0 ppm; 100 ppm; 200 ppm and 300 ppm. Each combination of treatments was repeated 10 times so that 120 experimental units were obtained. The results showed that the interaction between Humic acid and GA did not show significantly different results on all parameters tested. The independent use of GA and Humic acid may affect the growth of Cat's eye plant. GA treatment of 200 ppm showed plant height and relative growth rates. The Lion Humic acid treatment concentration of 0 ppm and 200 ppm showed the highest average number of flowers, while for the highest average number of roots shown in the 0 ppm Humic acid treatment. The F test was used to analyses the data, and if they were significantly different.

KEYWORDS: Gibberellin, Cat's eye plant, tropical plant, Humic acid, growth parameters flowering.

INTRODUCTION

Cultivation of tropical plants is currently a very popular activity and is able to improve the economy of the community. Tropical plants can be potted plants, hanging plants, table decorations, garden tropical plants and indoor plants. The economic value of a tropical plant is influenced by architecture, leaf color, and flower size [Ali et al , 2022). The demand for tropical plants from year to year continues to increase along with public awareness of the needs of tropical plants [Yusuf et al , 2023]. One of the flower plant commodities that are often cultured is the Cat's eye plant often known as chicken mole flowers. Cat's eye plant is a plant originating from India and Sri Lanka, South Asia [Flowersofindia.net]. *S. zeylanicum* belongs to the family Myrtaceae with the characteristic of having many erect stem branches, with a plant reaching 12m. *S. zeylanicum*. is a tropical plant that is used as a hedge plant to become a ritual flower used for religious rituals. Cultivation of Cat's eye plant Often carried out in open fields, and very rarely cultivated using pots. this is because the height of the *S. zeylanicum* plant reaches 12 m with many branching, making this plant easily fall off. Therefore, plant growth engineering is needed to make plants shorter so that they can be used as potted tropical plants that have high aesthetic value. One of the ways to get a short crop with a quick flowering time is the application of Lion Humic acid and gibberellin feeding to plants [Hamad , 2017].

Humic substances are defined as naturally occurring, heterogeneous substances that can vary in color from yellow to black, have high molecular weight, and are resistant to degradation. Humic substances are amorphous, partially aromatic and well-defined organic compounds. They are substances that do not have chemical and physical properties. Humic substances are divided into three groups humic acid, fulvic acid, and humin, according to their solubility in acids and bases. Chen and Avnimelech [Chen , 1986] classified humic substances and fulvic acids, starting from humus. Fulvic acid has a smaller molecular structure than humic acid [Grenthe , 1997], is less persistent in the soil, and is more easily subjected to microbial degradation. Humins are humic structures that cannot dissolve in either acidic or alkaline environments. Humic acid, on the other hand, has a large molecular weight and takes longer to break down. For this reason, humic acids are generally used in soil applications [Ghabbour , 2001]. In addition to reducing the evaporation rate of water in the soil, humic substances increase the cation exchange capacity (CAC) of soils and increase soil fertility. The unique feature of humic substances is that they show buffering properties over a wide pH range. All humic substances have the same general functional groups. There are no significant compositional differences between old and new humic materials, and they show the same types of reactions and interactions [Kulikova et al , 2005].

PLANT DESCRIPTION

Syzygium zeylanicum begins to flower when it is bush-sized and can reach trees up to 22 m high and with a trunk diameter of up to 50 cm. All the organs of this plant are not covered by hair. Twigs are cylindrical and slender, 1−2 mm in diameter. The leaves are arranged opposite each other and are arranged in such a way in one plane, when young they are reddish, when crushed they are very aromatic, the leaves are oblong or oval-shaped, measuring 6-10 × 3-4 cm, the base is wedge-shaped and asymmetrical, the tip is usually tapered, the veins intramarginal is usually 1−2 mm from the margin. The flowers in series resemble panicles with a length of 2-4 cm, appearing from branches that have shed or rarely have not shed leaves. The number of flowers is large, between 27 to 53, apparently there are often fewer. Flowers have no stalks, the calyx tube is inverted cone-shaped, 2−2.5 mm long and with four ornamental parts, calyx 1 mm long, corolla 1.7−2 mm long, circular in shape and the lobes are free. The fruit is round, green and becomes red and dark when ripe, measuring 0.5 × 1 mm in both length and width. Secondary Metabolites and Bioactivity Various secondary metabolite compounds have been identified from this type, including α-pipene, octanal, linalool, α-cubebene, azulene, valencene, ßpanasisene, δ-cadinene, α-panasinsen, nerolidol, humulene epoxide II, caryophyllene oxide , farnesol, phytol, squalene, ß-tocopherol, γ-tocopherol, α-tocopherol and ß-sitosterol, heptane, ß-linalool, ß-selinene, propylene glycol, α-copaene, Selina 4,11-diene, pyrogallol, methyl palmitate , neophytadiene, palmitic acid, eicosane, methyl oleate, stearic acid, tannin, α-farnesene, ß-caryophyllene and hentriacontane. Some of the important known bioactivities include anticancer, anti-inflammatory, lowering blood pressure, antibacterial and antioxidant. Based on the accounts of people born in the 1970s, this type of fruit is said to be often consumed, which incidentally is also reported in various literature. Other uses are for construction, although it seems less popular, and also for medicine. The leaves are known as bay leaves, which are a well-known cooking spice. Grows naturally in areas with sand-clay soil types in secondary forest habitats. This species tends to live in the lowlands with an altitude generally reaching 400 m, but seems to be able to live at higher elevations [Abd Rahim et al , 2018].

Syzygium are typically grown as tropical plants for their attractive glossy foliage. Some varieties produce edible fruit that are eaten fresh or used in jams and jellies. It has a multitude of uses. It is evergreen, has dense foliage, and grows rapidly to a height of up to 14 m if left unchecked. Syzygiums are sensitive to extreme cold and frost, but will grow almost anywhere. *Syzygium zeylanicum* is excellent for hedges and borders. *Syzygium zeylanicum* has the regional name cat eye plant. This plant can be found in tropical and subtropical areas. The flowers produce nectar, which can attract insects such as bees and butterflies.This plant bears fragrant white flowers that develop into pearly, beautiful albeit inedible berries. Native to the western ghats in Kerala, India, and Evergreen tree. This study aims to determine the effect of Lion Humic acid and gibberellin application on the growth and flowering of *Cat's eye* plant (*Syzygium zeylanicum*)

RESEARCH METHODS

A field experiment was done from June 2020 to March 2022 at the Horticulture Section of the University campus. The purpose of the study was to investigate the impact of lion's humic and gibberellin on the growth and flowering of the cat's eye plant. This study used Complete Randomized Design (CRD) with Factorial Pattern [Dafaallah , 2019]. Cat eye plant seeds came from the department of horticulture. The seeds were sown at a depth of 1-1.5 centimetres, with a distance of 3 metres between rows and 2 to 3 metres inside each row. Four-week-old healthy seedlings with a strong growth pattern were chosen for transplanting. Two times every month, we sprayed the plants with foliar applications of humic acid (LHA) and gibberellic acid (GA).

The experimental design involved the use of treatments consisting of factor A, which encompassed four distinct concentrations of humic acid, and factor B, which encompassed four distinct concentrations of gibberellic acid. The first factor GA with 5 concentration levels is: 0 ppm (GA1), 100 ppm (GA2), 200 ppm, 300 (GA3) ppm, 400 (GA3) ppm and 500 (GA5) ppm. The second factor is Humic acid with 4 levels of concentration, namely: 0 ppm (LHA1), 100 ppm (LHA2), 200 ppm(LHA3) and 300 ppm(LHA4). All treatments are planted on soil media, husk waste, shrimp fertilizer and compost in a ratio of 1:1:1:1. During the course of this study, we conducted measurements and documented many parameters of the plant, including its height, the quantity of primary and secondary branches, and its girth, which was measured in millimetres. The blooming attributes that were observed and recorded included the number of days until the first flower bud initiation, the number of days until the first flower opening, the number of days until 50% flowering, and the duration of the flowering period. This research used an area of 1 m x 9 m. Gibberellins and LHA were applied three times in a row, namely when the plants were 8 weeks after planting and had entered the generative phase with the bud size being approximately 3-3.5 mm until the plants were 10 weeks after planting. However, at 8 weeks after planting, right before the first spraying, the first victim was observed to see the morphological growth of the cat eye before applying

GA. The data was analyzed by variance analysis, with a confidence level of 95%. The calculated F value obtained is greater than the F table, followed by a further test of honest real difference (LHSD).

RESULTS AND DISCCUSION

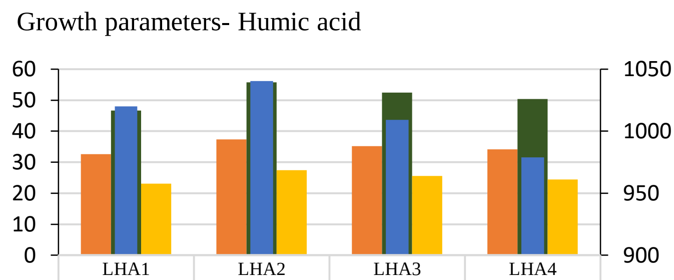
Based on the results of observations made, changes in plants are characterized by changes in size, the formation of new organs, and an increase in the number of plant organs. This is because there are nutrients available in plant media and most of the nutrients needed by plants have been provided by the growing media for further nutrients in the media are absorbed by the roots used for the growth and flowering process. The results of variance analysis of the interaction of Humic acid and GA on the observed parameters showed results that had no real effect. The results of the analysis that had a real effect were shown by the treatment alone, both GA and Humic acids (Figure 1-4).

Effect of Humic acid on plant growth and flowering

The impact of humic acid on the vertical growth of cat eye plants (mm): The greatest plant height ever measured (1040.4 cm) was observed when the humic acid factor HA2 was applied topically. The following treatment, LHA3, resulted in a plant height of 1009.19 cm. The plant's height after receiving the aerial humic acid factor under the LHA4 treatment was 978.91 cm. In contrast, the control treatment (LHA1) had a plant height that was 1020 units lower. This phenomenon could be caused by humic acid's ability to promote plant nitrogen absorption. This is performed by stimulating the transport of micronutrients through the leaf epidermal and into the plant's vascular system.

Humic acid's effect on plant branches: The LHA2 treatment produced the most branches per plant, with 37.36 primary and 55.76 secondary branches. The LHA3 treatment was closely followed by 35.14 primary branches and 52.4 subsidiary branches. Furthermore, the LHA4 treatment resulted in 34.14 primary branches and 50.4 secondary branches when humic acid was applied to foliar. The control treatment (LHA1), on the other hand, had the fewest primary branches per plant. The observed effect could be ascribed to the use of a humic acid-containing foliar spray. This chemical has the ability to stimulate the generation of plant hormones, such as auxins and cytokinins, which have been linked to activities such as cell division, elongation, and differentiation. As a result, the increased presence of these hormones may lead to the expansion of primary branches.

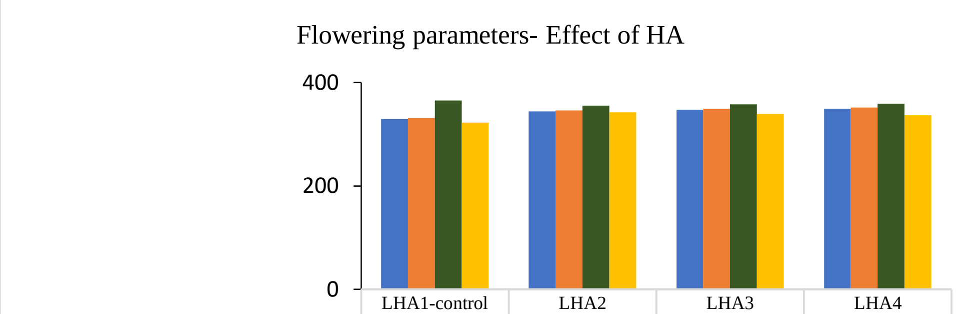
Humic acid's impact on plant stem diameter (in millimeters): In terms of stem girth, it was discovered that the LHA2 treatment had the largest diameter, measuring 27.44 mm. This was followed by LHA3 (diameter: 25.62 mm) and LHA4 (diameter: 24.48 mm). These findings imply that foliar treatment of the humic acid component LHA4 resulted in the smallest stem diameter. The control treatment (LHA1) had a considerably smaller stem girth (23.14 mm). Increased nutritional intake as a result of nutrient chelation or binding has the potential to improve plant growth and development, particularly in terms of stem girth.



	LHA1	LHA2	LHA3	LHA4
Averge Number of primary branches plant-1	32.59	37.36	35.14	34.13
Averge Number of secondary branches plant-1	46.71	55.76	52.4	50.4
Averge Stem girth	23.14	27.44	25.62	24.48
Plant Height (cm) Averge	1020	1040.4	1009.19	978.91

Figure 1: The effect of aerial LHA treatment on growth indices in the cat eye plant

Effect of humic acid on days to flower bud initiation and flowering: From the results given in figure 3, it was identified that the treatment LHA1 (control), the first flower bud appeared in 329.4 days. For the treatment LHA3, it took 349 days, which was the same as for the treatment LHA2. The application of humic acid, on the other hand, made it take a lot longer for LHA4 to start its first flower bud (349.56 days). Because flower buds need a certain number of days to open, using more humic acid in the areal spray may slow down the process. With the LHA4 treatment, it took the longest (351.66 days) for the first flower to open. This might have happened because the plant in the control treatment didn't get any extra nutrients or stimulants, so the first flower opened faster. The quickest time to 50% blooming was with LHA2 treatment (355.43 days). Plants in the LHA1 (control) group took 365.51 more days to reach 50% blooming than those in the other groups. Using humic acid on plant leaves may have improved photosynthesis, which could explain what happened. The results showed that flowering times changed significantly depending on the amount of humic acid present. Flowering taken 342.23 days with the LHA2 treatments but only 322.70 days with the LHA1 (control) treatments. This is a difference that is statistically significant. This might be because humic acid makes plants stronger and better able to handle harsh conditions. Similar results obtained by Kirn (2010) in Okra plants [Kiren et al , 2010]



	LHA1-control	LHA2	LHA3	LHA4
Averge Days to first flower bud initiation	329.4	344.25	347.4	349.56
Averge Days taken for opening of first flower	331.38	346.32	349.48	351.66
Averge Days to 50 percent flowering	365.51	355.43	357.95	359.24
Averge Duration of flowering	322.7	342.23	339.71	337.12

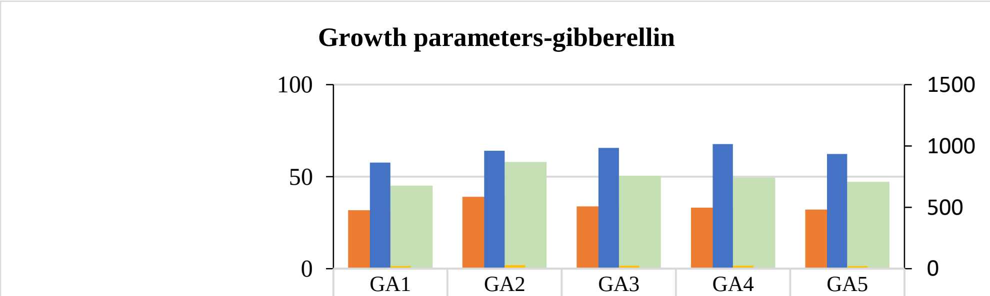
Figure 2: The effect of aerial LHA treatment on flowering parameters in the cat eye plant

The diameter of the blooming flower is one component of the final result in the cat eye plant production process. Flower diameter is measured from the centre line of the flower corolla, carried out when the flower is half open, namely at the time of flower harvest with the criteria that the flower corolla opens 45° to the axis of the flower stalk. Figure 3 shows that in the flower diameter parameters, there was no significant difference between the treatment and the control. Significant differences in all treatments could be due to the same number of florets produced so that the distribution of assimilate was equally distributed to all flowers. In marigold flowering experiments, [Ahmad et al , 2019] observed comparable findings.

Effect of Gibberellic acid (GA)

The impact of GA on the vertical growth of cat eye plants (mm): The findings of the study revealed that there were statistically significant variations in plant height across different amounts of gibberellic acid. The application of GA4 led to the highest plant height seen in the study, measuring 1016.18 cm. GA3 followed this with a height of 984.5 cm, GA2 with a height of 961.18 cm, and GA5 with a height of 935 cm. The control treatment (GA1) exhibited a minimum plant height of 864.82cm as measured. The observed increase in maximum plant height could be related to the administration of GA, which is known to enhance intermodal length and subsequently stimulate cell elongation and protein synthesis.

GA effect on plant branches (Primary & secondary): According to the findings of this study, there were statistically significant differences in the number of branches between GA concentrations. GA2 had the most principal (39.12) and secondary (58.04) branches per plant, followed by GA3 (33.86), GA4 (33.17), GA5 (32.13), and GA5. The control treatment (GA1) had the lowest average number of primary branches per plant in both observations (31.77 and 45.50). This phenomenon is caused by a rise in the number of nodes along the principal axis, which is caused by internode elongation.



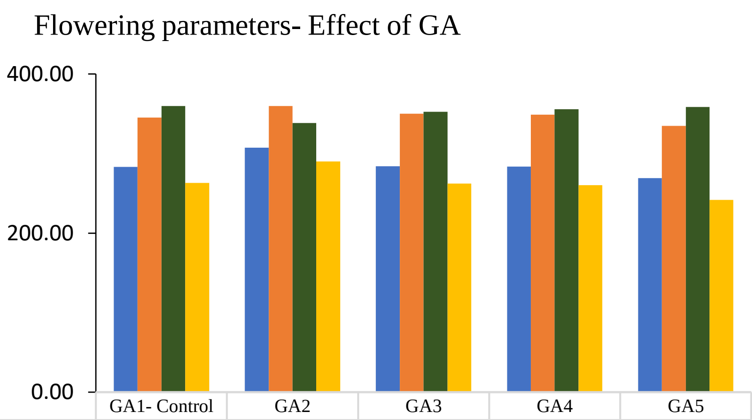
	GA1	GA2	GA3	GA4	GA5
Averge Number of primary branches plant-1	31.77	39.12	33.86	33.17	32.13
Averge Number of secondary branches plant-1	45.28	58.04	50.6	49.5	47.28
Plant Height (cm) Averge	864.82	961.18	984.5	1016.18	935
Averge Stem girth	22.25	28.59	25.48	24.16	22.47

Figure 3: The effect of aerial GA treatment on growth indices in the cat eye plant

GA impact on plant stem diameter (in millimeters): The average outcome indicated that there were statistically significant variations in the stem diameter across varying concentrations of GA. GA2 therapy produced the greatest stem girth measurement of 28.59 mm, whereas GA3 therapy produced a somewhat lower measurement of 25.48 mm. For the GA4 and GA5 regimens, the stem girth measurements were 24.16 mm and 22.47 mm, respectively. The GA1 control therapy resulted in a statistically significant reduction of 22.25 mm in stem girth. A plausible hypothesis postulates that as plant height increases, so does stem diameter. An increase in GA3 concentration stimulates the cambium and its immediate progenitors, resulting in an increase in stem diameter.

GA effect on Leaf area : Leaf area is the main parameter because the photosynthesis rate of a plant is determined to a large extent by leaf area. According to [Sarwar et al , 2017], nutrients, water and light are necessary for plant growth, which are allocated in the form of dry matter during the growth phase, then at the end of the vegetative phase, photosynthesis results will be deposited in plant organs such as fruit stems and seeds. If there is a lack of nutrients, water and sunlight, it will prevent plant growth and development from being less than optimal. Leaf area observations were carried out 3 times, namely when the plants were 8 WAP (before spraying), 11 WAP (a week after the third spraying), and at harvest. From the three observations made, the results showed that there were no significant differences between treatments. This is because gibberellin affects cell elongation but not leaf growth. This is in accordance with the research results of [Bultynck et al, 2004] where gibberellin treatment showed no significant effect on leaf area.[Al-Rawi et al , 2016] stated that leaf development and increase in leaf size are influenced by the availability of water and nutrients in the medium.

GA Effect on Flower buds: Flower buds will form as the length of the flower stalk increases due to starch hydrolysis which can increase the sugar concentration. The increase in sugar concentration that occurs will also increase the osmotic pressure in the cells and cause the cells to grow [Taufique et al, 2013] added that the increase in the number of flower buds is in line with the increase in the length of the leaf stalks. Figure 4 shows that there was significant difference in the number of cat eye plant flower florets from the start of observation to harvest. The average result in figure 5 revealed that the efficacy of different doses of GA to stimulate the growth of the first flower bud varies significantly. The GA5 treatment had the lowest time to initiate the first flower bud (269.18 days), while the GA3 treatment took the longest (284.18 days). The immature period of the treated plants was likely shortened as a result of the tropical application of GA, which promoted and enhanced vegetative development, increased photosynthesis and respiration, and improved CO_2 fixation. Treatment GA5 significantly shortened the time to the first flower opening (335.1 days), whereas treatment GA2 lengthened the time to the first flower opening (359.85 days). The number of days between the emergence of the first flower bud and its eventual opening in GA3-treated plants may have been reduced, which is responsible for the early emergence of flower buds in cat eye plants. The GA2 treatment required the fewest days (338.58 days) to achieve 50% flowering, while the GA1-control treatment required the most (359.76 days). Treatment GA2 had the longest flowering duration (290.29 days) while treatment GA3 had the lowest (241.78 days).



	GA1- Control	GA2	GA3	GA4	GA5
Averge Days to first flower bud initiation	283.13	307.35	284.18	283.80	269.18
Averge Days taken for opening of first flower	345.23	359.85	350.10	348.83	335.10
Averge Days to 50 percent flowering	359.76	338.58	352.66	355.85	358.77
Averge Duration of flowering	263.18	290.29	262.24	260.32	241.78

Figure 4: The effect of aerial GA treatment on flowering parameters in the cat eye plant

Figure 5 depicts Cat eye plant plantation, flowering, and fruiting at various intervals after aerial application of lion humic acid and gibberellic acid.

Figure 5: (a) Maintenance of Cat eye plant; (b) Observation 330 days; (c) 410 observations; (d) 460 days observations; (e) 480 days observations.

Combined effect of LHA and GA on growth and flowering of Cat eye plant

The current study found significant differences in the average outcomes for the combined impact of LHA (Humic Acid) and GA (Gibberellic Acid) on the initiation of the first flower bud across humic acid and gibberellic acid concentrations. The combination of treatments (LHA1:GA5) and (LHA4:GA2) resulted in a significantly shorter length of 332.4 days for the emergence of the first flower bud. The identical treatment combination, on the other hand, observed a significantly longer time of 411.1 days for the start of the first flower bud. This study investigates the significant differences in first flower opening noticed when comparing different amounts of humic acid and gibberellic acid. With a reported value of 342.8 days, the treatment combination of LHA2:GA5 resulted in a considerably reduced number of days necessary for the first flower opening. With an average of 390.4 days, the combination of LHA2:GA2 therapy resulted in a significantly longer period for the first flower opening. When evaluating different humic acid concentrations, there are significant differences in flowering time. The LHA1:GA1 treatment had a considerably longer blooming period of 528.2 days, while the LHA2:GA2 treatment had a significantly shorter flowering time of 461.3 days. The flowering duration varies significantly between humic acid and gibberellic acid concentrations. The LHA2:GA2 treatment combination resulted in a much longer maximum length of blooming (437 days) in marigold. In contrast, the LHA1:GA5 treatment combination was associated with a significantly reduced minimum blooming duration (333.8 days) in the Cat eye plant.

Treatment combinations	Average Days to first flower bud initiation	Average Days taken for opening of first flower	Average Days to 50 percent flowering	Average Duration of flowering
LHA1:GA1	350.4	360.4	528.2	357.2
LHA1:GA2	349.1	354.7	509.6	371.5
LHA1:GA3	361.0	358.4	497.6	372.1
LHA1:GA4	345.6	356.6	504.4	363.2
LHA1:GA5	332.4	346.2	505.7	333.8
LHA2:GA1	358.4	353.1	494.8	380.9
LHA2:GA2	394.6	390.4	461.3	437
LHA2:GA3	358.4	361.4	502.9	378.5
LHA2:GA4	362	364.5	504.3	363.7
LHA2:GA5	343.6	342.8	512.2	346.3
LHA3:GA1	364.1	361.4	511.7	380.6
LHA3:GA2	402.5	372.3	475.3	420.4
LHA3:GA3	359.1	369.5	500.8	372.8
LHA3:GA4	362.2	363.3	497.6	381.4
LHA3:GA5	345.5	356.3	507.5	337.5
LHA4:GA1	361.7	361.4	506.2	374.2
LHA4:GA2	411.1	379.6	474.5	417.8
LHA4:GA3	361.3	367.2	499.2	364.1
LHA4:GA4	368.3	366.8	512.2	368.2

LHA4:GA5	342.5	348.8	509.7	353.9
SD	19.53±1.26	10.81±1.01	14.79±1.61	25.47±0.93

The HSD test results show that all treatments tested did show significant results. This is shown by the absence of differences between the tested treatment and the control treatment. The low number of flowers and the high height of plants produced in this study may be caused by: the concentration of growth regulators used, the physiology of the parent plant, plant genetics and environmental factors (temperature, bulk rain, humidity, etc.). The concentration of Lion Humic acid sprayed on Cat's eye plant is thought to have not been able to have a large effect on the growth inhibition of *S. zeylanicum*. The use of Humic acid with large concentrations can have a better influence on the Myrtaceae family.

The research results showed that the effect of a gibberellin concentration of 200 ppm could increase the germination and growth of cat eye plant which included germination speed, plant height, number of leaves per plant, leaf area per plant, stem diameter, plant wet weight, plant dry weight, longest root length, and root wet weight. However, at gibberellin concentrations of more than 200 ppm, it becomes toxic, inhibiting germination and growth of cat eye plants. According to [Kasim, et al, 2020] that giving fertilizers at a low concentration will not show significant changes in plants, while giving it at a concentration that is too high will actually have an impact on reducing growth.

The role of gibberellin with a concentration of 200 ppm is able to increase plant growth and development because gibberellin influences the absorption of nutrients and water by plant roots to increase, as a result the photosynthesis process can take place smoothly and is accumulated throughout all parts of the plant to support increased plant growth and development. such as the number of leaves, leaf area, plant height, root length, so it will also have an effect on increasing the wet weight of the plant. The results of the research show that the interaction between the effects of gibberellin (GA) concentrations up to 200 ppm can increase germination and growth of cat eye plant which include germination speed, plant height, number of leaves per plant, leaf area per plant, stem diameter, plant wet weight, dry weight: plant and longest root length. The results of the research show that there is a very real interaction between the gibberellin concentration of 200 ppm and LHA. This interaction occurs because there is mutual support between the function and role of gibberellin at a concentration of 200 ppm optimally so that it can hydrolyse proteins and encourage cell division, with the LHA. LHA has the advantage of a high level of adaptation to the environment and response to nutrient absorption so that it can increase germination and better plant growth. [Richards et al, 2001] stated that gibberellin will stimulate cell elongation, namely in the meristem or root tips, because the hydrolysis of starch produced from gibberellin will support the formation of alpha-amylase. As a result, the osmotic pressure in the cells increases so that there is a tendency for the cells to develop with LHA, which has a very good influence on the plants being able to grow well, so the best interaction is achieved in the treatment with a gibberellin concentration (GA) of 200 ppm which is the best interaction that occurs because there is mutual support for each other.

CONCLUSION

Based on the findings and discussions, the inhibition of *Syzygium zeylanicum* growth through the use of plant growth regulators is impacted by the type of plant growth regulators used, the planting material used, and environmental conditions. Several conclusions can be drawn based on the findings of the research and discussion, as follows:

1. The effect of different Gibberellin (GA) concentrations was very significant on all variables observed, only the percentage of germination was not significantly different. The best germination and growth of cat eye plants was achieved at a concentration of 200 ppm.

2. The influence of different concentrations of LHA is very significant for most of the variables observed, but the difference in germination percentage variable is not significant—the best germination and growth of cat eye plant.

3. There is a very significant interaction between the concentration of Gibberellin (GA) and LHA on the variables of germination speed, plant height, number of leaves, leaf area, plant wet weight, plant dry weight, significantly different on stem diameter and longest root length and other variables are not significantly different. The best interaction was at a Gibberellin (GA) concentration of 200 ppm with LHA.

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