IMPACT OF FOLIAR APPLICATION OF POLYAMINE AND IRON SULPHAT ON GROWTH AND FLOWERING OF SNAPDRAGON (*Antirrhinum majus* L)

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ABSTRACT

This experiment was conducted during 2022-2023 season in private nursery. The aim of the study was to assess the effects of foliar spraying with polyamine and iron sulphate on growth and flowering of the snapdragon plant, *Antirrhinum majus* L. The experiment focused on two factors. The first factor involved foliar spraying with polyamine at concentrations of 0, 5, 10, and 15 mg.L^{-1}, The plants were treated with polyamine through two rounds of spraying, 15 and 25 days after planting. The second factor involved foliar spraying with iron sulphate at concentrations of 0, 0.1, 0.2, and 0.4 g.L^{-1} through two rounds 15 and 25 days after planting. The study followed a factor experiment design (4×4) based on the Randomised Complete Block Design (RCBD). The research commenced by sowing seeds in cork dishes filled with Peat moss. After two weeks of planting, the plants were fertilized with a chemical fertilizer at a concentration of 2 g.L^{-1}. The findings indicated that applying polyamine through foliar spraying at a concentration of 15 mg.L^{-1}, along with iron sulphate at a concentration of 0.4 g.L^{-1}, had a notable impact on the vegetative and flowering growth traits. These included plant height, chlorophyll content in leaves, and carbohydrates percentage in leaves

Key words: Plant height, Peat moss, Chlorophyll content in leaves, carbohydrates percentage in leaves

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تأثير الرش الورقي بالبولي امين وكبريتات الحديد في نمو وإزهار نبات حنك السبع

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المستخلص

نفذت التجربة موسم 2022–2023 في احد المشاتل الاهلية (مشتل غصن)، هدفت الدراسة إلى معرفة تأثيري الرش الورقي بالبولي امين وكبريتات الحديد في نمو وإزهار نبات حنك السبع *Antirrhinum majus* L ، تضمنت التجربة دراسة عاملين إذ مثل العامل الاول الرش الورقي بالحامض الاميني البولي امين وبتراكيز مختلفة هي 0، 5، 10، 15 ملغم.لتر$^{-1}$، رشت النباتات بالحامض الاميني البولي امين مرتين بعد 15 و25 يوماً من الشتل، اما العامل الثاني فتمثل في الرش الورقي بكبريتات الحديد وبتراكيز مختلفة هي 0، 0.1، 0.2، 0.4 غم.لتر$^{-1}$مرتين بعد 15 و25 يوماً من الشتل نفذ البحث كتجربة عاملية (4 × 4) وفق تصميم القطاعات العشوائية الكاملة (RCBD)، بدأت خطوات البحث بزراعة البذور في اطباق فلينية تحتوي على البتموس وتم تسميد النباتات بعد اسبوعين من الشتل بالسماد الكيميائي المركب بالتركيز 2غم لتر$^{-1}$ بينت نتائج التجربة أن الرش الورقي بالبولي امين بالتركيز 15 ملغم لتر$^{-1}$ وكبريتات الحديد بالتركيز 0.4 غم لتر$^{-1}$ اثر معنوياً في صفات النمو الخضري والزهري للنبات, منها ارتفاع النبات, محتوى الكلوروفيل في الاوراق, والنسبة المئوية للكربوهيدرات في الاوراق.

الكلمات المفتاحية: ارتفاع النبات، البتموس، محتوى الكلوروفيل في الاوراق، نسبة الكربوهيدرات في الاوراق.

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INTRODUCTION

The Snapdragon, *Antirrhinum majus* L., is in the Plantaginaceae family and has 36 species and 20,000 cultivars around the world (18). It's called a snapdragon because the flowers are flexible and can open and close like a dragon's mouth when you pinch them on the sides with your thumb. Snapdragon cultivars are grouped by how their growth and flowering change with weather and day length (14). It is becoming more and more famous around the world as a cut flower and bedding plant because of its pretty color and mild smell (19). Following DNA investigations, snapdragon plants have been moved from the Scrophulariaceae family to the Plantaginaceae family (18) Contemporary snapdragon plants are mainly found in the Mediterranean region, specifically in the southern part of France. There are many different varieties of snapdragon plants, but the most important ones are grown specifically for their flower clusters and their ability to withstand rust(13). polyamine play a vital function in physiological processes and significantly contribute to improve of floral quality. polyamine serve fundamental constituents of proteins and contribute to the synthesis of various chemical substances, including proteins, amines, pyrimidine bases, alkaloids, vitamins, terpenes, enzymes, and more. There are roughly 20 essential polyamine that have a role in all plant functioning processes (1 , 25). Polyamines are aliphatic molecules with a low molecular weight that are useful in many important ways for plants to grow and develop. They control the basic physiology of living things, which includes how cells divide and change into different types. They help plants handle both living and nonliving stresses better, fix oxidative damage, keep nucleic acids stable, and connect proteins and phospholipids. The first line of defense in plants is thought to be the control of endogenous plant hormones, cell division, flowering growth, ageing, and the production of secondary metabolites. Polyamines help plants live longer and better in harsh environments like salty soil, lack of water, high carbon dioxide levels, and cuts (11) Polyamine spraying also improves the productivity of fruits such as apricots (3) It also works to increase the flowering life and vegetative characteristics of the rose plant (7, 8) Foliar nutrition refers to the practice of applying nutrient solutions directly onto the plant's foliage, with the aim of supplying essential nutrients for plant growth and addressing any deficiencies in those elements (4). Nutrient solutions consist of both macro and microelements, with iron being a crucial microelement for growth and flowering of plants (2, 24). An element that is abundant in the soil, but frequently has low availability for plants due to its tendency to form insoluble aggregates. Furthermore, it plays a crucial part in numerous physiological and biochemical pathways within the plant, making it indispensable for a diverse array of biological functions. Iron has a role in the production of chlorophyll and enhances the plant's photosynthetic activity by controlling the functioning of stomata. Furthermore preserving the integrity and functionality of chloroplasts is crucial. Iron has a role as a plant antioxidant, enhancing plant resilience against abiotic stress conditions (9, 26). The research focused on enhancing the vegetative growth and flowering quality of The Snapdragon a highly valued cut flower, through the application of polyamine and iron sulphate.

MATERIAIS AND METHODS

The experiment took place at a private nursery throughout the 2022-2023 season, specifically from November 1, 2022, to April 20, 2023. The study was to investigate the impact of foliar application of polyamine and iron sulphate on the growth and blooming of the snapdragon, (*Antirrhinum majus* L). The experiment involved investigating two factors. The first factor involved applying the polyamine through foliar spraying at various concentrations: 0, 5, 10 and 15 mg L^{-1}. These concentrations were denoted as PA0, PA5, PA10, and PA15, respectively. The plants were sprayed with the polyamine twice, once after 15 days and again after 25 days of seeding. The second element involved the application of iron sulphate through foliar spraying at various concentrations: 0, 0.1, 0.2, and 0.4 $g.L^{-1}$, represented by Fe0, Fe0.1, Fe0.2, and Fe0.4, respectively once after 15 days and again after 25 days of seeding The snapdragon plant's seeds were imported from the Swiss seed production business, Syngenta, via an agricultural office in Baghdad. The research commenced by sowing the seeds in cork dishes filled with peat moss. Two weeks after sowing, the plants were fertilized with a chemical compound fertilizer at a concentration of 2g L^{-1}. The experiment followed a factorial design (4 × 4) based on the Randomized Complete Block Design (RCBD). The means were compared using the Duncan test, implemented through the SAS program.(16).

Studied Traits

1. Plant height (cm): The plant's height was determined by measuring from the point where the stem touches the soil surface of the pot to the top of the fully developed apex inflorescence, using a measuring tape.

2. Number of leaves (leaf.plant^{-1}): The average number of leaves for plant in the experimental unit was calculated.

3. Chlorophyll levels in leaves using the SPAD : The relative chlorophyll content of leaves was estimated using a SPAD-502 device manufactured by Minolta (23).

4. Percentage of carbohydrates in leaves (%): It was determined according to (10).

5. Inflorescence length (cm): It was determined by measuring from its base to its apex using a measuring tape, and subsequently calculating its average.

6. Floral stem length (cm): It were measured using a tape measure, starting from the point where the vegetative stem branches out to the lower base of the inflorescence.

7. Floral stem diameter (mm): The diameter of the floral stems were measured from the thickness of the area on the floral stems by (Vernier) and calculated for each treatment.**8 . Vase life (day):** It was measured by picking three inflorescences with stems of equal length from each experimental unit. They were picked in the early morning (17), and then placed in containers with distilled water only after making an oblique cut at the bases of the floral stems. The containers were placed at room temperature and the water in the containers was replaced daily the number of days in the water until the inflorescences lost their freshness and flowering value was calculated (21).

Table 1. analysis of the physical and chemical traits of the soil

Unit	value	Adjective
Decisimens.m^{-1}	2.45	EC (1:1)
-	7.12	P^H (1:1)
%	2.778	organic matter
gm.kgm^{-1}	156.15	$CaCO_3$
	prefabricated items	
mlg.kgm^{-1}	29.90	Nitrogen
mlg.kgm^{-1}	10.60	phosphorous
mlg.kgm^{-1}	210.7	potassium
	Soil articulations	
gm.kgm^{-1}	111.0	clay
gm.kgm^{-1}	129.0	Silt
gm.kgm^{-1}	760.0	Sand

RESUITS AND DISCUSSION

Plant height (cm): The data presented in Table (2) encompass the complete range of polyamine concentrations. The application of a spraying treatment with a concentration of PA15 mgL^{-1} resulted in the highest plant height of 104.89 cm, while the comparison treatment yielded the lowest plant height of 88.28 cm. The application of iron sulphate to plants through spraying resulted in a significant increase in plant height compared to the control treatment. The concentrations of Fe0.2 gL^{-1} and Fe0.4 gL^{-1} were found to be the most effective in promoting the highest plant heights, measuring 99.23 cm, 98.59 cm, and 105.09 cm, respectively. In contrast, the control treatment resulted in the lowest plant height of 87.26 cm. The result of the interaction between the factors exhibits a significant influence on plant growth. The PA15×Fe0.4 treatment achieved the highest plant height of 117.32 cm, while the lowest plant height of 66.53 cm was observed in the PA0×Fe0 treatment.

Number of leaves (leaf.plant-1)

The data in Table (3) indicate that all polyamine concentrations led to a significant increase in the number of leaves compared to the control treatment, and the spraying treatment with a concentration of PA15 mg L^{-1} excelled in giving it the highest number of leaves, reaching 303.19 $leaf.Plant^{-1}$, while the control treatment recorded the lowest number of leaves, reaching 155.80 $leaf.Plant^{-1}$. The spraying of iron sulfate to plants resulted in a noteworthy augmentation in the leaf count as compared to the control treatment. The spraying treatment with a concentration of Fe0.4 g L^{-1} resulted in the highest number of leaves, with each plant having an average of 244.83 $leaf.plant^{-1}$ However, there was no significant difference between this treatment and the two spraying treatments with concentrations of Fe0.2 and Fe0.1 gL^{-1}, which had average leaf counts of 223.14 and 222.84 $leaf.plant^{-1}$, respectively. The comparison treatment had the lowest number of leaves, with an average of 177.48 $leaf.plant^{-1}$. The interaction between the two factors had a significant effect on the number of leaves, and the treatment PA15 × Fe0.4 excelled in giving it the highest number of leaves, which amounted to 374.55 $leaf.Plant^{-1}$, while the treatment PA0 × Fe0 recorded the least number of leaves, which amounted to 136.31 $leaf.plant^{-1}$.

Table 2. Impact of foliar spraying with polyamine and iron sulphate, as well as their interaction, on the plant height (cm). The snapdragon *Antirrhinum majus* L

Polyamine concentrations (mgL^{-1})	Iron concentrations (gL^{-1})				Polyamine mean
	Fe0	Fe0.1	Fe0.2	Fe0.4	
PA0	66.53 d	91.53 c	96.09 bc	98 bc	88.28 c
PA5	93.64 c	96 bc	99.31 bc	102.64 bc	0.3997 b
PA10	92.31 c	108.42 ab	95.2 bc	102.42 bc	99.59 ab
PA15	95.53 bc	103 Bc	103.76 bc	117.32 a	104.89 a
Iron mean	87.26 b	99.23 a	98.59 a	105.09 a	

The Duncan polynomial test indicates that there is no significant difference (P≤ 0.05) between the averages that share the same letters for each factor or the interference between them

Table 3. Impact of foliar polyamine and iron sulphate, as well as their interaction, on the leaf count ($leaf.plant^{-1}$) of the snapdragon *Antirrhinum majus* L

Polyamine concentrations (mgL^{-1})	Iron concentrations (gL^{-1})				Polyamine mean
	Fe0	Fe0.1	Fe0.2	Fe0.4	
PA0	136.31 g	156.53 fg	160.77 fg	169.55 efg	155.8 d
PA5	179 efg	180.42 efg	178.66 Efg	204.89 def	185.75 c
PA10	186.2 efg	260.87 cd	216.89 def	230.33 de	222.58 b
PA15	208.42 def	293.53 bc	336.22 ab	374.55 a	303.19 a
Iron mean	177.48 b	222.84 a	223.14 a	244.83 a	

The Duncan polynomial test indicates that there is no significant difference (P≤ 0.05) between the averages that share the same letters for each factor or the interference between them

Relative chlorophyll content in leaves (SPAD): The findings from Table 4 demonstrate a noteworthy rise in the relative chlorophyll levels for all polyamine spraying treatments. Among these treatments, the one with a concentration of PA15 mg L^{-1} exhibited the highest relative chlorophyll content in the leaves, measuring 54.71 SPAD. The control treatment exhibited the lowest relative chlorophyll content in the leaves, measuring at 46.68 SPAD. The application of a spraying treatment with a concentration of Fe0.4 g L^{-1} resulted in the highest relative chlorophyll content in the leaves, measuring 54.58 SPAD. In contrast, the control treatment exhibited the lowest relative chlorophyll content in the leaves, measuring 44.68 SPAD. The application of polyamine and iron sulphate sprays had a notable impact on the chlorophyll content in the leaves. The treatment PA15×Fe0.4 demonstrated the highest chlorophyll content, measuring 59.58 SPAD. Conversely, the treatment PA0×Fe0 exhibited the lowest chlorophyll content, measuring 35.76 SPAD.

Percentage of carbohydrates in leaves (%)

The results of Table (5) indicate that all polyamine concentrations lead to a significant increase in the percentage of carbohydrates in the leaves compared to the control treatment. The spraying treatment with a concentration of PA15 mg L^{-1} excelled in giving it the highest percentage of carbohydrates in the leaves, which amounted to 25.69%, while it was the lowest percentage of carbohydrates in the leaves when the control treatment reached 21.32%. All treatments of spraying plants with iron sulfate led to a significant increase in the percentage of carbohydrates in the leaves compared to the comparison treatment, and the spraying treatment with a concentration of Fe0.4 g L^{-1} excelled in giving it the highest percentage of carbohydrates in the leaves, amounting to 24.50%, while the lowest percentage of carbohydrates in the leaves when compared to the comparison treatment, (21.82%) The result of the interaction between the factors shows a significant effect on the percentage of carbohydrates in the leaves, and the treatment PA15×Fe0.4 excelled in recording the highest percentage of carbohydrates in the leaves amounting to 30.35%, while the lowest value when the treatment PA0×Fe0 reached 19.18%.

Table 4. Impact of foliar spraying with polyamine and iron sulfate, as well as their interaction, on the chlorophyll content in the leaves (SPAD) of the snapdragon *Antirrhinum majus* L.

Polyamine concentrations (mgL^{-1})	Iron concentrations (gL^{-1})				Polyamine mean
	Fe0	Fe0.1	Fe0.2	Fe0.4	
PA0	35.76 f	49.35 cde	52.9 bcd	49.53 cde	46.68 b
PA5	49.42 cde	50.11 bcde	55.8 abcd	52.21 bcd	51.95 a
PA10	44.67 e	55.55 abcd	55 abcd	57 ab	53.05 a
PA15	48.86 de	56.23 abc	54.15 abcd	59.58 a	54.71 a
Iron mean	44.68 b	53.06 a	54.8 a	54.58 a	

The Duncan polynomial test indicates that there is no significant difference ($P \leq 0.05$) between the averages that share the same letters for each factor or the interference between them

Table 5. Impact of foliar spraying with polyamine and iron sulfate , as well as their interaction, on the percentage of carbohydrates in the leaves (%) of The snapdragon *Antirrhinum majus* L

Polyamine concentrations (mgL^{-1})	Iron concentrations (gL^{-1})				Polyamine mean
	Fe0	Fe0.1	Fe0.2	Fe0.4	
PA0	19.18 e	22.06 d	22.39 d	21.66 d	21.32 d
PA5	21.54 d	22.36 d	22.28 d	21.82 d	22 c
PA10	22.68 d	26.18 b	24.6 c	24.16 c	24.41 b
PA15	23.87 c	24.47 c	24.06 c	30.35 a	25.69 a
Iron mean	21.82 c	23.77 b	23.33 b	24.5 a	

The Duncan polynomial test indicates that there is no significant difference (P≤ 0.05) between the averages that share the same letters for each factor or the interference between them

Inflorescence length (cm): Table 6 data shows that applying a PA15 mg L^{-1} concentration of polyamine resulted in a significantly longer inflorescence length of 36.14 cm compared to the control treatment, which had a length of 24.81 cm. An iron sulphate spray with a concentration of Fe0.4 g L^{-1} resulted in an inflorescence length of 36.26 cm, which was the longest compared to the control treatment. (27.34 cm) . There was a notable increase in inflorescence length when the two factors interacted, The treatment PA15×Fe0.4 had the longest inflorescence length at 42.42 cm, while treatment PA0×Fe0 had the shortest at 19.00 cm.

Table 6. Impact of foliar spraying with polyamine and iron sulfate , as well as their interaction, on the length of the inflorescence (cm) of The snapdragon *Antirrhinum majus* L

Polyamine Concentrations (mgL^{-1})	Iron concentrations (gL^{-1})				Polyamine mean
	Fe0	Fe0.1	Fe0.2	Fe0.4	
PA0	19 d	27.42 bcd	21.42 cd	31.42 abc	24.81 b
PA5	30 bc	33 ab	31.42 abc	33.64 ab	32.01 a
PA10	28.87 bcd	31.31 abc	31.76 abc	37.53 ab	32.37 a
PA15	31.53 abc	34.87 ab	35.75 ab	42.42 a	36.14 a
Iron mean	27.34 b	31.64 ab	30.9 b	36.26 a	

The Duncan polynomial test indicates that there is no significant difference (P≤ 0.05) between the averages that share the same letters for each factor or the interference between them

Floral stem length (cm)

Table (7) results indicate that all polyamine concentrations resulted in a notable increase in floral stem length compared to the control treatment. The spraying treatment with a concentration of PA15 mg L^{-1} yielded the highest floral stem length of 53.15 cm, while the control treatment had the lowest floral stem length at 41.64 cm. Spraying plants with iron sulfate resulted in a notable increase in floral stem length compared to the control treatment. The treatment with a concentration of Fe0.4 g L^{-1} produced the longest floral stem length of 50.15 cm, while the control treatment had the shortest length at 41.65 cm. The interaction between polyamine spraying and iron sulfate significantly affected the length of the floral stem. The treatment with PA15×Fe0.4 resulted in the longest floral stem at 56.87 cm, while the PA15×Fe0 treatment had the shortest floral stem at 38.90 cm.

Diameter floral stem (mm)

Table (8) results indicate notable variations in flower stem diameter based on polyamine spraying treatments. The flower stem diameter significantly increased to 8.89 mm after being treated with a spray containing PA15 mg L^{-1}. On the other hand, the comparison treatment had the smallest flower stem diameter, measuring 6.42 mm. The results show that applying iron sulfate to the plants significantly increased the diameter of the flowering stem. moreover, the treatment involving spraying a 0.4 mg L^{-1} concentration of iron sulfate showed better results than the other treatments. The maximum floral stem diameter measured was 8.70 mm, while the control treatment had the lowest diameter (6.64 mm). The floral stem's diameter was notably influenced by the interactions between polyamine and iron sulfate treatments. Treatment PA15xFe0.4 had the largest flowering stem diameter of 10.31 mm, while treatment PA0xFe0 had a minor diameter of 5.00 mm.

Table 7. Impact of foliar spraying with polyamine and iron sulfate , as well as their interaction, on the floral stem length (cm) of The snapdragon *Antirrhinum majus* L

Polyamine Concentrations (mgL^{-1})	Iron concentrations (gL^{-1})				Polyamine mean
	Fe0	Fe0.1	Fe0.2	Fe0.4	
PA0	39.87 ef	42.2 def	43.31 cdef	41.2 ef	41.64 c
PA5	41.65 ef	45.65 bcdef	49.2 abcd	50.31 abc	46.7 b
PA10	38.9 f	51.76 ab	51.42 ab	56.2 a	49.37 b
PA15	47 bcde	56.9 a	52.65 ab	56.87 a	53.15 a
Iron mean	41.65 b	48.92 a	49.14 a	50.15 a	

The Duncan polynomial test indicates that there is no significant difference (P≤ 0.05) between the averages that share the same letters for each factor or the interference between them

Table 8. The impact of foliar spraying with polyamine and iron sulfate , as well as their interaction, on the floral stem diameter (mm) of The snapdragon *Antirrhinum majus* L

Polyamine Concentrations (mgL^{-1})	Iron concentrations (gL^{-1})				Polyamine averages
	Fe0	Fe0.1	Fe0.2	Fe0.4	
PA0	5 h	7 fg	6.31 g	7.42 efg	6.42 c
PA5	7.53 efg	8.9 def	8.53 cde	8.42 de	8.14 b
PA10	7.53 efg	8.87 bcd	9.75 abc	8.64 bcde	8.7 a
PA15	6.53 g	8.86 bcd	9.86 ab	10.31 a	8.89 a
Iron averages	6.64 b	8.2 a	8.61 a	8.7 a	

The Duncan polynomial test indicates that there is no significant difference (P≤ 0.05) between the averages that share the same letters for each factor or the interference between them

Flowering age (day): The results in Table 9 showed that applying polyamine to the plants significantly impacted the flowering age of the cut inflorescences. The spraying treatment with a concentration of PA15 mgL^{-1} significantly extended the flowering life of the inflorescences to 11.17 days, showed superior results compared to other treatments. Applying a treatment with a concentration of PA15 mg.L^{-1} resulted in a flowering age 10.67 days, which was longer than the control treatment where the flowering age was 8.75 days. Spraying plants with iron sulfate significantly affected the flowering age of the inflorescences. The treatment with a concentration of Fe0.4 g L^{-1} resulted in the longest flowering life of 11.42 days, while the control treatment had the shortest flowering life of 8.42 days. The interaction of factors had a significant impact on the flowering age of the inflorescences. Treatment PA15×Fe0.4 resulted in the longest flowering life of 12.67 days, while treatment PA0×Fe0 had the shortest flowering life 7.00 days.

Table 9.Impact of foliar spraying with polyamine and iron sulfate , as well as their interaction, on the flowering age (day) of The snapdragon *Antirrhinum majus* L

Concentrations Polyamine (mgL^{-1})	Iron concentrations (gL^{-1})				Polyamine averages
	Fe0	Fe0.1	Fe0.2	Fe0.4	
PA0	7 h	8.67 fg	9.33 efg	10 cdef	8.75 c
PA5	8.33 gh	9.67 defg	10.33 cde	12 ab	10.08 b
PA10	8.33 gh	12.66 a	10.67 bcde	11 bcd	10.67 ab
PA15	10 cdef	10.67 bcd	11.33 abc	12.67 a	11.17 a
Iron averages	8.42 c	10.42 b	10.42 b	11.42 a	

The Duncan polynomial test indicates that there is no significant difference (P≤ 0.05) between the averages that share the same letters for each factor or the interference between them

The experiment demonstrated that applying polyamine through foliar spraying at a concentration of PA15 mg L^{-1} significantly impacted various characteristics of the plant's vegetative and flowering growth, including plant height, leaf number, chlorophyll content, leaf carbohydrate percentage, floral stem length, flower stem diameter, inflorescence length, flowering age. The significant effect can be attributed to the ability of amino acids to serve as carbon and energy sources, and their role in the production of various chemical compounds such as proteins, amines, purines, alkaloids, vitamins, enzymes, terrenes, and other molecules (12 , 22) stated that the improvement in vegetative and flowering growth seen after polyamine treatment is due to specific compounds called plant growth regulators, These regulators act as hormones, controlling nutrient use to support the coordinated and balanced growth of the plant. Plant growth regulators are natural compounds applied directly to plants to alter their physiological processes or morphology, enhancing plant quality and yield The growth enhancement in plant height, leaf number, main stem diameter, and leaf area observed after polyamine treatment is likely a result of the biological impact of these acids in promoting cell division and elongation. In this regard, it can be said that stimulating plant growth when treated with Amino acids may contribute to the construction of large molecules. amino acids were found to enhance DNA synthesis (20). The study showed that applying iron sulfate through foliar spraying at a concentration of 0.4 gL^{-1} significantly affected the plant's vegetative and flowering growth attributes. the attributes included plant height, number of leaves , chlorophyll content, carbohydrate percentage in leaves, flower stem length, flower stem diameter, inflorescence length and flowering age. The phenomenon of blossoming and the developmental stage marked by flower production the reason for these increase can be attributed to: Iron is a component of ferredoxin, a protein that acts as an electron carrier in photosynthesis. The presence of iron in ferredoxin stimulates branching, leading to a net increase in the number of branches. Foliage. iron is an essential element in the nitrogen-fixing enzyme present in plants capable of nitrogen fixation. Iron acts as an electron donor for the energy complex NADPI in Photosystem I. iron deficiency has been shown to impact the size of flowers and the timing of flowering (5). The results are consistent with the conclusions made by (15) in their research on applying iron spray to orchid plants. The study's results suggest that applying polyamine through foliar spraying at a concentration of 15 mg L^{-1},along with iron sulfate at a concentration of 0.4 g L^{-1}, significantly improved the plant's vegetative and flowering growth characteristics. These improvements were observed in various aspects, including plant height, number of leaves , chlorophyll content, carbohydrate percentage in the leaves, stem length, flowering occurrence, flowering stem diameter, inflorescence length, and flowering age. We suggest spraying the plant's leaves with polyamine (15 mg L^{-1}) and iron sulfate (0.4 g L^{-1}) to get the best results in this experiment and improve its ability to grow leaves and flowers

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