

## THE EFFECT OF SOME TREATMENTS ON THE GROWTH CHARACTERISTICS PINK FOR TWO TYPES OF PLANTS NARCISSUS TAZETA L.

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### ABSTRACT

*The experiment took place in the timber canopy of the Department of Horticulture and Landscape Engineering within the College of Agriculture and Forestry at the University of Mosul, spanning from 2023 to 2024. The objective of this study is to examine the effects of different concentrations of the organic fertiliser Greener (02, 4) mg L<sup>-1</sup> and salicylic acid at concentrations of (0, 250, 25) mg L<sup>-1</sup> on the growth of flowers and plants, as well as the production of bulbs for two varieties of daffodil bulbs. Semper Avanti and Dutch Master are two cultivars of Narcissus tazeta L., distinguished by their white and yellow petals, respectively. The inquiry was carried out using a factorial experiment established in a split plot design. The experiment had three repetitions, with 10 plants per replicate, and followed a randomised complete block design (RCB D). The results indicated that the white variant The variant that is white in colour Semper Avanti achieved the greatest rates in all of the assessed qualities. The yellow variety plants documented by the Dutch master had a lifespan of 10,296 days, a growth period of 139,051 days, an average of 1,362 flowers per plant, and a length of 20,963 days for the flowers to stay on the plant. The highest recorded rates were seen for the following characteristics: the flower's diameter, which measured 7.563 cm, the combined fresh weight of the flower and its stem, which amounted to 6.710 grammes, the length of the flower's stem, which measured 28.810 cm, and the diameter of the flower's stem, which measured 0.939 cm.*

### INTRODUCTION

The scientific term of the narcissus plant Narcissus tazeta L. is a member of the Amaryllidoideae family, which is comprised of fifteen taxa. The Amaryllidaceae family is home to 80 to 100 wild species of perennial bulbous plants (Hanks, 2002; Barkov et al., 2009). It is prevalent in Iraq and originated in Asia, Europe, and the Mediterranean region. The northern regions of Iraq are the habitat of the wild daffodil, Narcissus tazeta L. (ADAS 1992). Narcissus is regarded as one of the most attractive clustered cut flowers and is classified as an annual winter bulb. It is a plant that is commonly used in the landscaping of natural-style gardens and is commonly found in pots. It is also regarded as one of the most significant medicinal and aromatic plants, as its flowers are commercially extracted to produce essential oils that are employed in the production of fragrances, cosmetics, and other products. Medical. Cinnamyle Alcohol, Eugenol, Benzaldehyde, and Benzoic acid were among the chemical compounds that were isolated by Guenther (1975). Because it

contains the compound Benzaldehyde, which is converted into the substance Laetrile-Like in the human body, it has been discovered to have an effect on certain types of cancer (Morris, (2000). Laetrile-Like is recognised for its ability to inhibit the proliferation of cancer cells. The foliage of narcissus plants emerges prior to the flowering process, and they can grow to a height of over 50 cm. The leaves are ribbon-shaped and thick, measuring approximately the same length as the floral stand. The blossoms are white and feature a yellow cup-shaped crown in the centre. The bulb in wild species is symmetrical or oval in shape, containing dense fleshy leaves that store nutrients, and the bases of the leaves are coleoptile, as reported by Mahmoud et al. (1989). The buds are situated in the axils of the fleshy leaves, where they develop into bulblets. After they reach their ultimate size, they form offsets. The centre of the bulb is occupied by the growing apex, which then unfolds into a flower bloom or leaves (Hartmann et al., 1997). The significance of liquid organic fertilisers has recently been recognised as one of the most critical sources of nutrients that plants require. This is due to the fact that they contain a variety of organic and amino acids, as well as other substances, that are characterised by their affordability, ease of use, lack of environmental pollution, and ability to enhance the physical, chemical, and biological characteristics of the soil, which is reflected in the growth of plants (Alwan and Al-Hamdani, 2012).

Plant materials and animal materials that contain one or more nutrients are the two categories into which organic fertilisers are divided. In situations where the absorption of nutrients through the soil is challenging, such as the case of heavy metals like iron, zinc, manganese, and copper, plant leaves have the capacity to absorb nutrients. This is due to the fact that these elements are attached to soil particles, which reduces their availability to the plant (Al-Naimi, 2000). Plant growth is significantly influenced by foliar nutrition. It entails the application of dissolved solutions to the plant's stems. The growth and development of plants are significantly influenced by macro- and micronutrients. The presence of these nutrients in concentrations that are lower than the plant's requirements may result in a reduced growth rate. The leaf is regarded as the foundation for the photosynthesis process; therefore, a deficiency of nutrients The leaf is the site of its appearance, and in contrast to fertilisation, the foliage must be uniformly sprayed with nutrients (Hamad and Jumah, 2000; Al-Zurfi, 2009). One of these fertilisers is Greener, a liquid organic fertiliser that contains 19 amino acids in addition to organic carbon and nitrogen. Organic fertilisers are manufactured from a variety of sources. They may consist of industrial, animal, or plant refuse. They are introduced to plants in a variety of methods and in quantities that are estimated based on the type of crop, soil, prevailing environmental conditions, and the ratio of solid materials to liquid materials in the organic fertiliser (Samar et al. 2001, Al-Zurfi, 2009). It is classified as an acid. Salicylic acid (SA) is a phenolic plant growth regulator that regulates numerous functional activities, such as the regulation of ion uptake and flowering induction (Hartmann et al., 2014; Nazar et al., 2017). It is also crucial in the regulation of plant response, hormonal balance, and the mechanism of stomata and photosynthesis processes, as well as in the resistance to environmental stress (Hartmann et al. 2002). Salicylic acid has been observed to delay ageing by preserving the energy required for vital processes in plants and preserving cell membranes (Hayat et al. 2010, Khan et al. 2012, Hamza et al. 2015, Nazar et al. 2017, Muthulakshmi et al. 2017). Salicylic acid plays a critical function in water relations. In addition to its role in the formation of photosynthetic pigments represented by chlorophyll and carotene, which contributes to increasing the efficiency of the plant process, it is involved in plant growth, stomatal movement, transpiration, photosynthesis, and plant growth (Arfan et al., 2007), as well as the absorption of nutrient ions, permeability of cell membranes, and activation of enzymes related to plant growth and development (Arberg, 1981). Photosynthesis (Hayat and Ahmad, 2007) contributes to the increase in total anthocyanins and the impediment of ethylene synthesis (Huang et al., 2004). Furthermore, salicylic acid is involved in the biosynthesis of quinine, which is a critical component of the plant cell wall (Al-Khafaji, 2014). Bin Al-Sharifi (2023). Salicylic acid was applied to two varieties of *Gladiolus grandiflorus* L. bulbs: White Prosperity, which has white flowers, and Plumtart, which

has purple flowers, at three concentrations: 0, 500, and 1000 milligrammes, during the study. The vegetative system was sprayed with L-1 on three separate occasions. A substantial increase in all of the characteristics examined was observed following treatment with salicylic acid at a concentration of 1000 mg/L. The treatment of Iris bulbs with varying concentrations of salicylic acid resulted in positive effects on the majority of the vegetative and flowering characteristics, as explained by Amin and Al-Saad (2020). The treatment with a concentration of 300 mg/L resulted in the longest leaf (131.34 cm), flower diameter (12.20 cm), and vase expectancy (9.55 days), while the longest flower stand (65.01 cm) was achieved at a concentration of 150 mg/L of salicylic acid.

## METHODOLOGY

The experiment was conducted between November 1, 2023 and June 1, 2024, beneath the wooden canopy of the Department of Horticulture and Landscape Engineering/College of Agriculture and Forestry/University of Mosul. The purpose of the experiment was to examine the effects of spraying with three different amounts of organic fertiliser. The study examined how the characteristics of vegetative and reproductive growth in two varieties of *Narcissus tazeta* L. bulbs affected bulb output. The study found that using doses of (0, 4, 2) mg L<sup>-1</sup> of salicylic acid resulted in a greener color.

### **Adjectives Thought:**

### **Duration required for flowers (day):**

The period required for flowering was calculated as the number of days from the date of planting until the flower fully bloomed. (It was calculated for all treated plants).

### **Number of flowers(cm):**

The number of flowers on each plant was counted.

### **Flower diameter(cm):**

The diameter of the flower was measured at the fully opened stage after it opened on the flower stalk by measuring the distance between the corollas and the corollas using the foot (Vernire).

### **Fresh weight of flower stands and flower (g).**

The fresh weight of the flower stands and flower (g) was calculated using a sensitive balance.

## RESULTS AND DISCUSSION

### **Duration required for flowering (day):**

Table 1 displays the statistical analysis results, which indicate that the white variety *Semper Avanti* is significantly superior to the Dutch master yellow variety in terms of the number of days required for flowering. The flowers were formed after 139,051 days, while the yellow variety's plants took 144,900 days. The application of Greener organic fertiliser at a concentration of 4 ml L<sup>-1</sup> caused a considerable delay in the time it took for blooming to occur. The delay occurred after 138,694 days, whereas the comparative treatment had a delay of 145,933 days. The results also suggest that the use of salicylic acid at a dosage of 500 mg L<sup>-1</sup> caused a significant delay. The plants in the control treatment took 144,161 days to flower, while the blossoming happened after 140,105 days. After 135,811 days of planting, the plants of the white variety showed much earlier growth compared to the control treatment. This was observed through the binary interaction between the variety and the organic fertilizer Greener. This observation was recorded. The white variety plants

displayed the most abbreviated flowering duration of 137,300 days when subjected to a salicylic acid spray at a dosage of 500 mg L<sup>-1</sup>. Conversely, the yellow plants in the comparator treatment took 147,500 days to bloom. As a result, there were significant differences in the values of the different therapies. The findings from the interaction between the organic fertiliser Greener and salicylic acid indicate that the plants experienced a notable delay in flowering, with a total of 135,950 days compared to 146,983 days for the plants in the comparator treatment. The plants were delayed by applying the organic fertiliser Greener at a dosage of 4 ml L<sup>-1</sup> and salicylic acid at a concentration of 500 mg L<sup>-1</sup> through spraying. The white variety Semper Avanti plants treated with 4 ml L<sup>-1</sup> of the organic fertiliser Greener and 500 mg L<sup>-1</sup> of salicylic acid had the shortest flowering time, taking a total of 133,300 days, compared to 150,100 days for the plants in the comparison treatment. There is no expert or authority figure in the field of Dutch.

**Table 1** illustrates the influence of organic fertilisers. The duration required for flowering in two varieties of narcissus plants is influenced by the interactions between greener and salicylic acid. Narcissus tazet L.

Items	Organic fertilizer Greener (mg L <sup>-1</sup> )	Salicylic acid concentrations (mg L <sup>-1</sup> )			Overlapping of items X Organic fertilizer Greener	Item response
		0	250	500		
Semper Avanti the White	0	143.866 E	143.066 EF	142.100 F	143.0111 C	139.051B
	2	139.533 H	138.966 G H	136,500I	138.333E	
	4	139.066 H	135.066 I	133.300 J	135.811F	
Dutch master Yellow	0	150.100 A	148.566 b	147.900 B C	148.855 A	144.900a
	2	146.766 CD	143.800 E	142.233 f	144.266 B	
	4	145.633 D	140.500 g	138.600 H	141,577 D	
Overlapping of items X Salicylic acid	the White	140.822 D	139.033 E	137.300 F	Effect of organic fertilizer Greener	
	Yellow	147.500 A	144.288 b	142.911 C		
Interfering with organic fertilizer Greener X Salicylic acid	0	146.983 A	145.816 b	145,000 B	145.933A	
	2	143.150 C	141.383 D	139.366 E	141.300 B	
	4	142.350 CD	137.783 F	135.950 G	138.697 C	
Effect of salicylic acid		144.161A	141.661B	140.105 C		

\*Values with similar letters for each factor or their interactions individually are not significantly different according to Duncan's multinomial test under probability level 5%.

#### Number Flowers are a plant<sup>-1</sup>:

It is evident from the beginning to the end. The table data (2 indicates that the number of flowers between the white and yellow varieties was significantly different, with a total of 1,362 plants-1. 1.183 plants of the white variety Semper avanti and 1 plant of the Dutch master yellow variety. The application of Greener organic fertilizer at a concentration of 4 ml L<sup>-1</sup> resulted in a substantial increase in the number of blooms, with a value of 1.377 compared to 1.165 for the control treatment. The results also showed that applying acid Salicylate at a concentration of 500 mg. L<sup>-1</sup> led to a significant increase in the number of blooms, with a value of 1.387 compared to 1.143 for the control treatment plants. Regarding the binary interaction treatments between the variety and the organic fertiliser Greene, we noticed significant differences in the number of blooms on

the plants of the white variety, which was 1.505, compared to 1.093 on the plants of the yellow variety in the comparison treatment. The number of flowers observed in the white variety plants exhibited significant variation among the different interactions. The yellow variety showed a notable disparity in growth when treated with salicylic acid at a dosage of 500 mg L<sup>-1</sup>, with a value of 1.511 compared to 1.087 in the control treatment. The findings from the interaction between the organic fertiliser Greener and salicylic acid suggest that the plants were treated with Greener at a concentration of 4 ml L<sup>-1</sup>, which coincided with the application of the acid. The concentration of salicylate at 500 mg L<sup>-1</sup> resulted in a substantial increase in the number of blooms, reaching 1.533 compared to the control treatment plants which recorded 1.073. The Semper Avanti white variety plants were subjected to a treatment of Greener organic fertiliser at a concentration of 4 ml L<sup>-1</sup>, along with intermittent spraying of salicylic acid at a concentration of 500 mg L<sup>-1</sup>. This treatment was carried out as part of the inquiry into the triple interaction of the components. As a consequence, the white variety plants exhibited the greatest significant values in the number of blooms, totaling 1,700. During the comparative treatment, the yellow variety Dutch master plants exhibited a decline in this value to 1,000, which represented the minimum level.

**Table (2):** Effect of organic fertilizer Greener and salicylic acid and their interactions in the number of flowers of two types of narcissus plants. *Narcissus tazeta* L.

Items	Organic fertilizer Greener (mg L <sup>-1</sup> )	Salicylic acid concentrations (mg L <sup>-1</sup> )			Overlapping of items X Organic fertilizer Greener	Item response
		0	250	500		
Semper Avanti the White	0	1.146 f g	1.233ef	1.3333 c d	1.237b c	1.362a
	2	1.146f g	1.366c	1.500b	1.344b	
	4	1.283c d e	1.533b	1.700a	1.505a	
Dutch master Yellow	0	1.000h	1.123g	1.156 f g	1.093d	1.183B
	2	1.146f g	1.2066e f g	1.270d e	1.207 c	
	4	1.116g	1.266d e	1.366C	1.250b c	
Overlapping of items X Salicylic acid	the White	1.198d	1.377b	1.511a	Effect of organic fertili Greenerzer	
	Yellow	1.087e	1.198d	1.264c		
Interfering with organic fertilizer Greener X Salicylic acid	0	1.073f	1.178e	1.2450 c d	1.165C	
	2	1.156f	1.286e	1.385b	∪ 1.276b	
	4	1.200 de	1.400b	1.533a	1.377a	
Effect of salicylic acid		1.143C	b	1.387a		

\*Values with similar letters for each factor or their interactions individually are not significantly different according to Duncan's multinomial test under probability level 5. %

#### Flower diameter:

The statistical analysis results in Table (12) suggest that the yellow variety has a flower diameter (cm) of 7.563, which is significantly larger than that of the white variety. Dutch master and 6.986 (cm) in the white variety Semper Avanti. Significant differences in flower diameter were observed



in the treatment with Greener organic fertiliser at a concentration of 4 ml L<sup>-1</sup>. Specifically, the plants in the comparison treatment had a flower diameter of 6.315 (cm), while the treatment with Greener organic fertiliser had a flower diameter of 8.326 (cm). This data is manifest. The same table suggests that a 500 mg concentration of salicylic acid should be sprayed. The flower diameter of the plants in the control treatment was 6.342 (cm), While L-1 led to a notable disparity of 8.094 centimeters. The outcomes of the binary interaction between the variety and the Greener organic fertiliser, at a concentration of 4 ml L<sup>-1</sup>, suggest significant variations in the diameter attribute. In the comparison treatment, the flower diameter of the yellow variety was 8.822 cm, whereas the blossom diameter of the white type was 6.055 cm. The flower's diameter exhibited significant variation due to the intervention of different varieties and the application of salicylic acid. The plants of the yellow variety displayed notable variations when treated with salicylic acid at a dosage of 500 mg L<sup>-1</sup>. The plants of the white variety in the control treatment had a length of 6.038 cm, while the length of the plants in comparison was 8.524 cm. The experimental findings indicate that the plants were treated with the organic fertiliser Greener at a concentration of 4 ml L<sup>-1</sup>, alternating with salicylic acid at a concentration of 500 mg L<sup>-1</sup>. The experiment led to significant variations in blossom diameter, with a measurement of 9.556 cm compared to 5.490 cm for the control group plants. Overall, the findings from the triple interaction analysis suggest that the Dutch master yellow cultivar plants displayed the greatest and statistically significant flower diameter values, measuring 10.733 cm. This occurred when the plants were treated with Greener organic fertiliser at a concentration of 4 ml L<sup>-1</sup> and salicylic acid at a concentration of 500 mg L<sup>-1</sup>. In contrast, the Semper Avanti plants of the white variety had a minimum flower diameter of 4.930 cm in the comparison treatment.

**Table (3):** Effect of organic fertilizer Greener and salicylic acid and their interactions on flower diameter of narcissus plants. *Narcissus tazeta* L.

Items	Organic fertilizer Greener mg L <sup>-1</sup> )(	Salicylic acid concentrations (mg L <sup>-1</sup> )(			Overlapping of items X Organic fertilizer Greener	Item response
		0	250	500		
Semper Avanti the White	0	4.930j	6.486g <sub>hi</sub>	6.750 f i	6.055d	6.986b
	2	6.406hi	6.953f <sub>g h</sub>	7.860c d	7.073b c	
	4	6.780f <sub>g h</sub>	8.330b <sub>c</sub>	8.380b c	7.830b	
Dutch master Yellow	0	6.050i	6.654f i	7.023 f <sub>g h</sub>	6.575c d	7.563a
	2	6.720fi	7.336 ed f	7.817c <sub>d e</sub>	7.291 b c	
	4	7.166e <sub>gf</sub>	8.567b	10.733a	8.822a	
Overlapping of items X Salicylic acid	the White	6.038e	7.256c	7.663b	Effect of organic fertilizer Greener	
	Yellow	6.645d	7.519b <sub>c</sub>	8.524a		
Interfering with organic fertilizer Greener X Salicylic acid	0	5.490f	6.570e	6.886de	6.315c	
	2	6.563f	7.144d	7.838c	7.182b	
	4	6.973j e	8.448b	9.556a	8.326a	
Effect of salicylic acid		6.342c	7.388b	8.094a		

\*Values with similar letters for each factor or their interactions individually are not significantly different according to Duncan's multinomial test under probability level 5%.

### **The weight Tender for pregnant women Syphilis and the flower (Gloom):**

The results in schedule (4) suggest that there are moral distinctions between the two categories, which is why the excellence item is present. Yellow Dutch master had a fresh weight of 6.710 (g) in comparison to the white variety Semper Avanti, which had a low value of 6.163 (g). Plants that received Greener organic fertiliser at a concentration of 4 ml L<sup>-1</sup> showed a clear and substantial advantage, with a weight of 7.512 g. Inside The application of salicylic acid at a dosage of 500 mg L<sup>-1</sup> resulted in a significant difference in the fresh weight characteristic. The plants in the treatment group had a total fresh weight of 7.533 g, whereas the plants in the control group had a total fresh weight of 5.120 g. The fresh weight of the yellow variety plants differed significantly from that of the white variety plants in the comparison treatment. The difference in weight was 7.847 g for the yellow variety plants compared to 5.011 g for the white variety plants. This difference was observed due to the interaction between the variety of plants and the organic fertiliser Greener, which was applied at a concentration of 4 ml L<sup>-1</sup>. Concerning the level of interaction between the acid and the specific compound Salicylic acid: The yellow cultivar plants displayed significant variations when treated with salicylic acid at a dosage of 500 mg/L. The change in amount was 7.897 grams for the plants in the white variety comparison treatment, compared to 4.785 grams. An investigation was conducted to study the interaction between Greener organic fertiliser and salicylic acid. The plants were sprayed with Greener organic fertiliser at a concentration of 4 ml L<sup>-1</sup>, followed by the application of salicylic acid at a concentration of 500 mg L<sup>-1</sup>. As a result, there were significant differences in the fresh weight, with a measurement of 8.835 (g) compared to 3.920 (g) for the control treatment plants. The Dutch master yellow variety had the highest values, reaching 9.356 grams, when treated with Greener organic fertilizer at a concentration of 4 milliliters per liter. This result was consistent with the treatment of salicylic acid at a concentration of 500 milligrams per liter. The triple interaction of the factors being studied revealed this relationship. Nevertheless, it underwent a deterioration. The plants in the comparative treatment of the white variety Semper Avanti had a value of 3.340 grams.

**Table (4):** Effect of fertilizer Organic Greener and salicylic acid and their interactions in the fresh weight of two varieties of narcissus plants. *Narcissus tazeta* L.

Items	Organic fertilizer Greener (mg L <sup>-1</sup> )	Salicylic acid concentrations (mg L <sup>-1</sup> )			Overlapping of items X Organic fertilizer Greener	Item response
		0	250	500		
Semper Avanti the White	0	3.340 h	5.840 ef	5.853 ef	5.011 c	6.163 b
	2	5.166 e g	6.400 de	7.340 b c	6.302 b	
	4	5.850 e g	7.370 b c	8.313 b	7.177a b	
Dutch master Yellow	0	4.500 g	5.080 f g	6.050 ef	5.210 c	6.710 a
	2	5.670 ef	7.266 cd	8.286 b	7.074a b	
	4	6.196 e	7.990b c	9.356 a	7.847a	
Overlapping of items X Salicylic acid	the White	4.785 e	6.536 c	7.168 b	Effect of organic fertilizer Greener	
	Yellow	5.455 d	6.778 b c	7.897 a		
Interfering with organic fertilizer Greener X Salicylic acid	0	3.920 e	5.460 d	5.951d	5.110c	
	2	5.418 d	6.833 c	7.813 b	6.688 b	
	4	6.023 d	7.680 b	8.835 a	7.512 a	
Effect of salicylic acid		5.120 c	6.657 b	7.533 a		

\*Duncan's multinomial test at probability level 5% indicates that values with similar letters for each factor or their interactions individually are not significantly different.

It is considered an organic fertilizer Greener One of the liquid organic fertilizers, consisting of organic nitrogen, organic carbon, and organic materials in addition to free plant acids, including aspartic, proline, glutamic, threonine, methionine, valine, cysteine, alanine, glycine, lysine, phenylalanine, triosine, leucine, isoleucine, histidine, Arginine, tryptophan, hydroxyproline, serine. The organic fertilizer helps the plant absorb nutrients, acts as a chelating agent and reduces the accumulation of salts in the soil and it works on Activating microorganisms in the soil is a vital stimulant for plant cells to form protein more efficiently. Fertilizers that contain amino acids improve the process of photosynthesis through the role of these elements in building chlorophyll and activating some important enzymes in this process (Alwan and Al-Hamdani, 2012). Many studies also indicate that treating plants with growth regulators improves the plant structure and the quality of the yield. Khalaf and Al-Rajbo (2006), including salicylic acid, which is a plant growth regulator that contributes to increasing systemic resistance to plant diseases (Al-Khafaji, 2014), and the plant is the living organism. What we know is the result of the integration of metabolic functions that are regulated by many factors, including hormones. The results also show the positive role of salicylic acid in increasing the characteristics of vegetative growth in line with the increase in concentration. The reason for this may be due to the role played by the acid. Salicylate in cell division and elongation as a result of the interaction between auxin and phenol Padmapriya Chezhiyan 2002). In addition to the role of salicylic acid in increasing some plant hormones such as auxins and cytokinins, which lead to a rapid and significant increase in cell division in meristematic tissues, in addition to the role of auxin in expanding the cell wall by



breaking the bonds that bind the wall components together, thus increasing the leaf area. Salicylic acid has the ability to increase the plant's ability to improve biological functions by increasing the efficiency and effectiveness of photosynthesis in the plant, which is reflected in the growth and development of the plant and increases the efficiency of water use and the resulting increased absorption of nutrients, whose effect is reflected in increased root growth. Najafabadi et al. Salicylates stimulate the plant to produce plant hormones, such as auxin and cytokinin, and prevent their oxidation (Sardoei et al., 2014, Ram et al., 2014), increasing the efficiency of water use and resulting in increased absorption of nutrients, the effect of which is reflected in increased root growth. Najafabadi et al., (2013) And increasing the number of root hairs and thus improving the characteristics of the root system, which reflects positively on increasing vegetative growth rates and thus increasing the wet weight of bulbs and bulbs, the size of bulbs and bulbs, the diameter of bulbs and bulbs, and the number of bulbs (Sardoei et al., 2014, Ram et al., 2014).

## CONCLUSION

The study presented a comprehensive evaluation of the effects of Greener organic fertilizer and salicylic acid on the growth characteristics of two varieties of *Narcissus tazeta* L.: *Semper Avanti* (white) and *Dutch Master* (yellow). The results indicate that the white variety, *Semper Avanti*, consistently demonstrated superior growth characteristics across various measures, including shorter flowering times and increased flower diameter and number. Specifically, the combination of Greener organic fertilizer at a concentration of 4 ml L<sup>-1</sup> and salicylic acid at 500 mg L<sup>-1</sup> was found to significantly enhance the growth parameters compared to the control group. These findings underscore the potential benefits of using targeted organic and chemical treatments to optimize ornamental plant growth and productivity.

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## Conflict of Interest

The authors declare no conflict of interest.

## REFERENCES

- Al Nuaimi, Saadallah Najm Abdullah (2000). Principles of plant nutrition. Second edition translated, Ministry of Higher Education and Scientific Research, College of Agriculture, University of Mosul, Iraq.
- Al-Khafaji, Makki Alwan (2014). Plant growth regulators, their horticultural applications and uses. Al-Madar University Press/College of Agriculture, University of Baghdad - Iraq.
- Al-Sharifi, Omar Abdul Karim Muhammad (2023). Response of two varieties of cladiolus plants *Gladiolus grandiflorus* L. For spraying with Nutri Crane organic fertilizer (Nutrigreen) and salicylic acid, Master's thesis, College of Agriculture, University of Mosul.
- Alwan, Jassim Mohammed and Raida Ismail Abdullah Al-Hamdani (2012). Organic agriculture and environment. Dar Ibn Al-Atheer for Printing and Publishing, University of Mosul, Iraq.

- Al-Zarfi, Mushtaq Talib Hammadi (2009). The effect of spraying with zinc and licorice root extract on the growth and flowering of Spanish Iris bulbs *Iris xiphium* L. Master's thesis, College of Agriculture, University of Kufa.
- Amin, Imam Abdel Fattah Rahim and Al-Saad, Kifaya Ghazi Saeed. 2020. The effect of salicylic acid and gibberellin on the growth and flowering of Dutch Iris *Hollandica*. Kirkuk University Journal of Agricultural Sciences Vol. 11, p. 4, p. p. 36-4.
- Hamad, Muhammad Shahab and Farouk Faraj Juma (2000). The effect of foliar fertilization on the mineral content and knot percentage of local orange trees. Iraqi Agricultural Sciences Journal. 31 (2).
- Hamza, Ali Mansour, Darwish Muhammad Ibrahim, and Muhammad Nasraddin Hilali (2015). Economical ornamental plants between preparation and storage. First edition, Modern Library for Publishing and Distribution, Mansoura, Egypt.
- Khalaf, Ahmed Saleh and Abdel Sattar Asmir Al Rajabo (2006). Seed technology. Dar Ibn Atheer for Printing and Publishing, University of Mosul. Iraq.
- Mahmoud, Mohsen Khalaf and Sami Karim Muhammad Amin (1989) Ornamentation and garden architecture. Ministry of Higher Education and Scientific Research. Authority of technical institutes. Technical House. Iraq
- Muhammad, Abdul Azim Kazem (1985). Practical experiments in plant physiology. Dar Al-Kutub for Printing and Publishing. University of Mosul - Ministry of Higher Education and Scientific Research - Iraq.
- Foreign sources
- ADAS, 1992. Areas and Values and allied crops. England and Wales. Agricultural Development and Advisory Services Bulb Crop Notes (CF Hanks, GR 1993. PP. 472)
- Altaee, AHY and Saeed, Kafaia. Ghazi (2020). Effect of spraying organic fertilizer, untrigrin and alkaren algae extract on vegetable floral and chemical growth of two types of tulip plants. E.M. International ISSN 0971-765X.
- Arberg, B. (1981). Plant growth regulators. Monosubstituted benzoic acid. Swed. Agric. Res., 11: 93-105.
- Arfan, M.; HR Athar and M. Ashraf. (2007). Does exogenous application of salicylic acid through the rooting medium modulate growth and photosynthetic capacity in two differently adapted spring wheat cultivars under salt stress. J. Plant. Physiol., 6(4): 685-694
- Berkov S, Georgieva L, Kondakova V, Atanassov A, Viladomat F, Bastida J, Codina C (2009) Plant sources of galanthamine: phytochemical and biotechnological aspects. Biotech Biotechnol Equip 23(2):1170–1176
- Guenther, E. 1975. The essential oil. Vol. VRE Krieger publishing Company, Huntington, New York. PP. 350. USA
- Hanks GR (2002) Narcissus and daffodil: the genus *Narcissus*. CRC Press, Boca Raton
- Hanks, G. (2018). The National Cut Flower Centre. A review of Production Statistics for the Cut Flower and Foliage Sector, Part of AHDB horticulture Project Po Bof. 002a.
- Hartmann, H.T.; DE Kester; F. T. Davies and R. L. Geneva (2002). plant propagation principles and practices 3rd ed, prentice hall, upper saddle river, new jersey, usa.
- Hartmann, H.T.; DE Kester; FT Davies and RI Geneve (2014). Hartmann & Kester's Plant propagation principles and practices. 8th Edition, Pearson Education, Inc., Published by Pearson Prentice Hall, USA.

- Hartmann, HT; DF Kester; FT Davies and RL Geneve. 1997. Plant propagation: principles and practices. 6th Ed. Prentice-Hall; Inc. pp. 522- 523 USA
- Hayat, Q.; S. Hayat; M. Irfan and A. Ahmad (2010). Effect of exogenous salicylic acid under changing environment: a review. *Environ. Exp. Bot.*, 68:14–25.
- Hayat, S. and A. Ahmad (2007). *Salicylic Acid: A Plant Hormone*. Published by Springer, The Netherlands
- Huang, DJ; CD Lin, HJ Chen, and YH Lin, (2004). Antioxidant and ant proliferative activities of sweet potato (*Ipomoea patats* L. Lam ‘Tainong 57’) constituents. *Bot.Bull.Acad.*, 45: 179-186
- Khan, N.A.; R. Nazar; N. Iqbal and N. A. Anjum (2012). *Phytohormones and Abiotic Stress Tolerance in Plants, Signal Transduction of Phytohormones Under Abiotic Stresses, Salicylic Acid*, Springer-Verlag Berlin Heidelberg.
- Morris, K., SAH Mackerness, T. Page et al 2000 Salicylic acid has a role in regulating gene expression during leaf senescence. *Plant J.*23:677-685.
- Muthulakshmi, S. and Lingakumar (2017). Role of salicylic acid (SA) in plants review, *International. Journal of A applied research*
- Najafabadi, A.; R. Amirnia and H. Hadi. (2013). Effect of different treatments of salicylic acid on some morphological traits and yield of white bean in salinity condition. *J. of Appl. Biol. Sci.*, 7(1): 56-60.
- Nazar, R.; N. Iqbal and N. A. Khan (2017). *Salicylic Acid: A Multifaceted Hormone*. Springer Nature Singapore Pte Ltd.
- Padmapriya, S. and N. Chezhiyan (2002). Influence of Gibberellic acid and certain other chemicals on flowering character of chrysanthemum (*Dendranthema grandiflora* Tzvelev.) cultivars. *South Indian Hort.*, 50(4-6): 437-443.
- Ram, A.; P. Verma and A. Gadi (2014). Effect of foliar of salicylic acid on seedling growth and biochemical and parameters of watermelon (*Citrullus lantanus*). *Res. Report. Fluoride*, 47(1): 49-55.
- Reid, M. S. and C. Z. Jiang (2012). *Postharvest Biology and Technology of Cut Flowers and Potted Plants*. Horticultural Reviews, Volume 40, 1st Edition. Published Wiley-Blackwell. Inc.
- Samar, M.; MJ Malakouti, H. Siadat, A. Sadjadi and H. Ghafourian (2001). Root partial contact with localized organic matter increased Fe<sup>59</sup> uptake and alleviated lime-induced chlorosis of young apple trees. WJ Horst et al., *Plant Nutrition-Food Security and sustainability of Agro-Ecosystem*, 860-861
- Sardoei, A.; S. Fahraji and H. Ghasemi (2014). Effect of salicylic acid on rooting of poinsettia (*Euphorbia pulcherrima* L.). *Inter. J. Advan. Bio. Biomed. Res.*, 2(6):1883-1886. *Sci. Ain Shams Univ. Cairo*. 9(2): 803-824.