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THE EFFECT OF SOME TREATMENTS ON THE FLOWER GROWTH CHARACTERISTICS OF TWO PLANT VARIETIES OF *TULIPA. SSP*

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ABSTRACT

This study was conducted within the wooden canopy of the Department of Horticulture and Landscape Engineering / College of Agriculture and Forestry / University of Mosul, during the period from November 1, 2023 to June 1, 2024, with the aim of studying the effect of soaking bulbs with gibberllic acid (GA3) at different concentrations (0, 100). 200 mg L-1 and spraying with organic fertilizer (Organic Extra plus) at different concentrations (0, 2, 4) ml L-1 and the interaction between the characteristics of vegetative and flowering growth and the yield of bulbs and follicles for two types of Tulip bulbs. Spp (Tulipa. Spp (.The study was carried out using a factorial experiment in a randomized complete block design (R.C.B.D.) in a split plot, with three replicates and 10 plants per- replicate. The results indicated that the Violet Negrita variety was earlier in the time required for the flower to open fully, as the flowers formed after 131,174 days. It also excelled in the length of the flower stand, 33.083 cm. The fresh weight of the flower stand and flower was 11.498 grams. The diameter of the flower stand was 0.827 cm. The duration of the flowers remaining on the plant was 5.583 days. Flower diameter. cm m Flower age 6,037 days.

INTRODUCTION

The Tulipa plant belongs to the Liliacea family and is native to Turkey. People call it the turban flower because it consists of several layers of colored petals, which resemble the turban that men in Turkey wrap around their heads. The tulip flower is shaped like a tea cup or an inverted bell. These flowers moved to Europe 400 years ago

Its cultivation has spread in the Netherlands, which has become a major source of income for it, as it produces a billion flowers annually that are exported to all countries of the world. It is a true bulb, and its original homeland is northeastern Europe to central East Asia, especially the mountains of Iran, Turkey, and Iraq (1). Flowering bulbs constitute 90% of the world's production to produce cut flowers, such as tulips, cladiolus, hyggeus, iris, lilium and daffodils. Tulips can be considered one of the main flowering bulbs around the world, and the Netherlands contributes to the production of 60% of its production (2). Tulip bulbs have become one of the most important ornamental crops due to their wide availability and the fourth major flower in the global

floriculture trade (3).. Gibberllic acid GA3) is known for its role in the elongation of axial organs (stems, petioles, and inflorescences) and flower development (4). Gibberllic acid is involved in many plant development processes and promotes several desirable effects including regular and early flowering, and an increased number of flowers. Gibberellins represent a group of plant hormones that stimulate growth. The physiological effects of gibberellins are attributed to their control of enzymatic activity and their activation of metabolic processes such as increasing carbohydrates, cell division and elongation, and increasing or decreasing fruit setting and ripening (5), which has a role in the flowering process through its combination with Anthesin and the production of the flowering hormone. Florogen, which has a role in stimulating flowering (6).

(7) showed in a study he conducted on two varieties of tulips, the white Lily Flowring and the red Frenged, that they differed significantly in most floral characteristics, as the Frenged variety was superior in terms and time of flower bud emergence by (10.1) days in diameter of the flower bud (4.63). mm vs. (3.88) mm.

In a study conducted by (8) on the tulip plant, Tulip Upstar, to find the effect of different levels of liquid organic fertilizers, as well as the chemical fertilizer NPK, and the effect of this on the characteristics of flowering growth. The factors studied included adding three levels of organic fertilizers and chemical fertilizers, which are 0, 1, and 2 ml. / Liter. It was added by spraying on the leaves. It was noted that spraying the plants with high levels of artificial foliage fertilizer was significantly superior and caused a significant increase in the length of the flower stand (6.32 cm/plant), the diameter of the flower stand (0.810), the diameter of the flower (9.010), and the flowering age (14.633) days and duration. The survival of flowers on a plant (18.566) and the duration required for flowering (84.35).

METHODOLOGY

The experiment was carried out inside the wooden canopy of the Department of Horticulture and Landscape Engineering / College of Agriculture and Forestry / University of Mosul, during the period from November 1, 2023 to June 1, 2024, to study the effect of soaking bulbs with gibberllic acid(GA3) and spray with organic fertilizer (Organic Extra plus). And the interaction between them in the characteristics of vegetative and flowering growth.

Characteristics of flowers:

1. The period required for the flower to fully open (day): The period required for the flower to fully open is calculated as the number of days from the date of planting until the flower is fully bloomed. (It was calculated for all treated plants).

2. Length of the flower stand (cm): The length of the flower stand was calculated using a tape measure.

3. Fresh weight of the flower stand and flower (cm): The fresh weight of the flower stand and flower was measured using a sensitive electronic balance.

4. Diameter of the flower stand (cm): The diameter of the flower stand was calculated using the Vernier foot.

5. Duration of the flower remaining on the plant (day): The number of days that the flower remained on the plant was calculated for the period from blooming until the appearance of wilting symptoms on the flower, for all plants.

6. Flower diameter (cm): Flower diameter was calculated using Vernier’s foot.

7. Flowering age (days): Flowers were picked with a sharp blade in the early morning at the beginning of flower opening (11). The flowers were transferred to the refrigerated room, which was at a temperature ranging between (23-25) degrees Celsius, and were placed in glass bottles of a size of (1 liter). These bottles were filled with distilled water as a preservative solution up to (300) ml of distilled water. The flowers were placed in the bottles after consolidating the length of the flower stand is 75 cm. Make sure to change the water every (3) days, while cutting (1) cm from the bottom of the flower diagonally. We continue this process until symptoms of wilting appear on the flowers.

RESULTS AND DISCUSSION

The time required for the flower to fully open (day)

The results of the statistical analysis in Table (1) indicated that the Violet variety Negrita was significantly earlier in the period required for the flower to fully open than the plants of the white variety White Prince, as the flowers formed after 131.174 days, compared to 134.68 days for the plants of the white species The soaking treatment with Gibberllic acid at a concentration of 200 mg resulted. L-1 significantly earlier in the time required for the flower to fully open, which occurred after 129.311 days compared to 136.077 days when not treated. The results also showed that spraying with Organic Extra Plus at a concentration of 4 ml L-1 led to a significant earlier time required for the flower to fully open, which occurred after 130,183 days, compared to 135,605 days for the control treatment plants. From reviewing the results of the binary interaction between the variety and Gibberellic acid, it is noted that the plants of the Violet variety are significantly earlier, 127,556 days after planting, compared to 138,178 days for the plants of the control treatment. Significant differences were recorded between the values of the different interventions, while the plants of the Violet variety recorded the shortest time required for the flower to fully open when sprayed with the organic fertilizer at a concentration of 4 ml L-1, which amounted to 127.966 days, compared to 137.211 days for the plants of the comparison treatment of the white species The results of the interaction between the treatment of soaking with gibberllic acidand spraying with the organic fertilizer Organic Extra plus show that the treatment of soaking with gibberllic acid a concentration of 200 mg L-1 overlapping with spraying with the organic fertilizer Organic Extra Plus at a concentration of 4 ml L-1 led to a significant delay in the time required for the flower to fully open. It reached 125,500 days, compared to 139,916 days for the comparison treatment plants. Finally, it can be said that the plants of the Violet Negrita variety were treated by soaking with Gibberellic acid a concentration of 200 mg. L-1 with treatment by spraying with Organic Extra Plus at a concentration of 4 ml L-1. The shortest time required for the flower to fully open was recorded after 122,333 days, compared to 143,333 days for plants in the comparison treatment of the White Prince species.

Table 1. The effect of soaking with Gibberllic acidand spraying with organic fertilizer with their interactions on the time required for the flower to open for two varieties of tulip plants fully, Tulipa spp

Species	Concentration of Gibberllic acid (mg l^{-1})	Organic Extra plus (mL^{-1})			Interaction of species X Gibberellic Acid	Response of species
		0	2	4		
Negrita Violet	0	136.500 b c	134.067 cde	131.367fg	133.978 bc	131.174 B
	100	133.233 def	132.533 egh	130.200 gh	131.989 c	
	200	132.267efg	128.067 c	122.333 i	127.556e	
White Prince	0	143.333a	136.833b	134.367 b e	138.178 a	134.68A
	100	135.200 bcd	135.100 bcd	134.167cde	134.822 b	
	200	133.100 def	131.433fg	128.667g	131.067 d	
Integration species X Organic fertilizer	Violet	134.000 b	131.555 c	127.966c	Impact of Gibberlic Acid	
	White	137.211a	134.455b	132.400c		
Interaction of Gibberlic Acid X Organic fertilizer	0	139.916 a	135.450 b	132.866 cd	136.077 a	
	100	134.216 bc	133.816 bcd	132.183d	133.405 b	
	200	132.683cd	129.750 e	125.500 f	129.311 c	
Impact of Organic Fertilizer		135.605a	133.005b	130.183 c		

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

Flower stand length (cm):

The results in Table (2) showed that there were significant differences in the length of the flower stand (cm) between the plants of the Violet and white varieties, as it reached 33.083 (cm) in the plants of the Violet variety Negrita compared to 18.158 (cm) in the plants of the white variety White Prince. The acid treatment resulted in Gibberllic acid at a concentration of 200 mg L-1 showed significant differences in the length of the flower stand, amounting to 28.536 (cm) compared to 911.22 (cm) for the control plants. The results also indicated that spraying with

Organic Extra Plus at a concentration of 4 ml L-1 led to significant differences in the length of the flower stand, reaching 834.27 (cm) compared to 173.23 (cm) for the control plants. It was also noted from the results of the binary interaction between the variety and gibberllic acid at a concentration of 200 mg L-1 that there were significant differences in the length of the flower stand in the plants of the Violet variety, amounting to 767.36 (cm) compared to 568.15 (cm) for the plants of the comparison treatment of the white species Significant differences were recorded in the length of The flower stand between the interaction values of two factors, as the plants of the Violet variety recorded significant differences in the length of the flower stand when they were sprayed with the organic fertilizer at a concentration of 4 ml L-1, reaching 461.35 (cm) compared to 875.15 (cm) for the plants of the comparison treatment of the white species The results of the

double interaction indicate Gibberllic acid and the organic fertilizer Organic Extra plus until soaking with gibberllic acid at a concentration of 200 mg. L-1 interspersed with spraying with Organic Extra Plus at a concentration of 200 mg L-1 led to significant differences in flower stand length reaching 30.883(cm) compared to 033.21 (cm) for control treatment plants. It can be said that the results of the triple interaction of the factors under study showed that soaking treatment of the Violet Negrita cultivar with Gibberllic acid at a concentration of 200 mg L-1, interspersed with spraying with the organic fertilizer Organic Extra Plus at a concentration of 4 ml L-1, led to recording the largest significant values in flower stand length in plants. The violet variety reached 833.39 (cm), while this value decreased to a minimum of 333.13 (cm) for the comparison treatment plants of the White Prince species.

Table 2. The effect of soaking with Gibberllic acidand spraying with organic fertilizer and their interactions on the length of the flower stand (cm) of two varieties of tulip plants Tulipa spp L.

Species	*Concentration of gibberllic acid (mg l^{-1})*	*Organic Extra plus (mL^{-1})*			*Interaction of species X Gibberellic Acid*	*Response of species*
		0	2	4		
Negrita Violet	0	28.733 g	31.540 f	31.540 e f	30.253 b	33.083 a
	100	29.216 g	32.463 d e	35.010 c	32.230 b	
	200	33.466 d	37.003 b	39.833 a	36.767 a	
White Prince	0	13.333 k	15.560j	17.813 i	15.568 d	b 18.158
	100	16.300 j	18.623i	20.876h	18.600 c	
	200	17.993 i	20.990h	21.933h	20.305 c	
Integration species X Organic fertilizer	Violet	30.472c	33.317b	35.461a	Impact of Gibberlic Acid	
	White	15.875 f	18.391 e	20.207d		
Interaction of Gibberlic Acid X Organic fertilizer	0	21.033 g	23.023 f	24.676 e	22.911 c	
	100	22.758 f	25.543 d	27.943 c	25.415 b	
	200	25.730 d	28.996 b	30.883a	28.536 a	
Impact of Organic Fertilizer		23.173 c	25.854b	27.834 a		

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

Fresh weight of flower holder and flower (g):

The results in Table (3) showed that there were significant differences in the fresh weight of the flower pod and flower (g) between the plants of the Violet and white varieties, as it reached 11.498 (g) in the Violet variety Negrita and 10.209 (g) in the white variety White Prince. Treatment with Gibberllic acid at a concentration of 200 mg L-1 led to significant differences in the violet variety amounting to 12.057 (g) compared to 9.703 (g) for the control treatment plants. The results of spraying with Organic Extra Plus at a concentration of 4 ml L-1 led to a significant difference in the fresh weight of the flower stand and flower, reaching 11.756 (g) compared to 9.752 (g) for the control plants. From reviewing the results of the binary interaction between the variety and Gibberllic acidat a concentration of 200 mg L-1, it was noted that there were significant differences in the fresh weight of the flower stand and flower in the plants of the purple variety, which

amounted to 12.798 (g) compared to 9.051 (g) for the plants of the comparison treatment of the white species Significant differences were recorded in the fresh weight of the flower stand and the flower between the different intervention values, as the plants of the purple variety recorded significant differences when sprayed with the organic fertilizer at a concentration of 4 ml l-1. They reached 12.398 (g) compared to 9.062 (g) for the plants of the comparison treatment of the white species The results of the interaction between gibberllic acid and the organic fertilizer indicate that soaking treatment with Gibberllic acid at a concentration of 200 mg L-1, interspersed with spraying with the organic fertilizer at a concentration of 4 ml L-1, led to significant differences in the fresh weight of the flower stand and flower, reaching 13.550 (g) versus 9.040 (g). gm) for

comparison treated plants. In general, it can be said that the results of the triple interaction of the factors subject of the study showed that soaking the plants of the violet Negrita variety with Gibberllic acid at a concentration of 200 mg L-1, interspersed with spraying with the organic fertilizer Organic Extra Plus at a concentration of 4 ml L-1, recorded the highest significant values in the fresh weight of the flower stand. The flower in Plants of the violet variety amounted to 14.520 (g), while this value decreased to a minimum of 8.050 (g) for plants of the comparison treatment of the white variety White Prince.

Table 3. The effect of organic fertilizer, Gibberellic acid, and their interactions on the fresh weight of the flower stand and flower (g) of two varieties of tulip plants, Tulipa spp L

Species	*Concentration of gibberllic acid (mg l^{-1})*	*Organic Extra plus (mL^{-1})*			*Interaction of species X Gibberellic Acid*	*Response of species*
		0	*2*	*4*		
Negrita Violet	0	10.030 h i j	10.360 g h i	10.676 f g h	10.355 c	*11.498 a*
	100	10.556g h	11.463 d e f	12.000 c d	11.340 b	
	200	10.740 f g h	13.136 b	14.520 a	12.798 a	
White Prince	0	8.050k	9.446j	9.656 i j	9.051 d	*10.209 b*
	100	9.486 j	10.196hig	11.103efg	10.262 c	
	200	9.650 i j	11.716ed	12.580cd	11.315 b	
Integration species X Organic fertilizer	Violet	10.442 d	11.653 b	12.398a	*Impact of Gibberlic Acid*	
	White	9.062 e	10.453 d	11.113c		
Interaction of Gibberlic Acid X Organic fertilizer	0	9.040 f	9.903 e	10.166 e	*9.703 c*	
	100	10.021 e	10.830 d	11.551 c	*10.801 b*	
	200	10.195 e	12.426 b	13.550 a	*12.057 a*	
Impact of Organic Fertilizer		9.752 c	11.053b	*11.756 a*		

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

Diameter of flower stand (cm)

The results of the statistical analysis in Table (4) indicated that there was a significant difference in the diameter of the flower stand, where the purple Negrita variety recorded the highest significant values, reaching 0.827 (cm) compared to 0.758 (cm) for the plants of the White Prince species It was also clear from the results of the table that the treatment By soaking with a concentration of 200 mg L-1 of Gibberellic acid, the highest values were recorded, reaching 0.899 (cm) compared to 0.670 (cm) for plants in the comparison treatment, while the results of the table

showed that spraying with a concentration of 4 ml L-1 of the organic fertilizer Organic Extra Plus recorded The highest values reached 0.906 (cm) compared to 0.653 (cm) for the comparison treatment plants. From reviewing the data of the bilateral interaction between the variety and Gibberellic acid, it is noted that there is a significant difference between the two varieties, as it was found that when soaking at a concentration of 200 mg L-1 of Gibberellic acid led to giving the highest value, reaching 0.968 (cm) for the plants of the violet species. Compared to 0.665 (cm) for the comparison treatment plants of the same variety, the bilateral interaction data between the variety and the organic fertilizer Organic Extra Plus indicated that there was a significant difference between the two varieties when spraying with a concentration of 4 ml l-1 of the organic fertilizer Organic Extra Plus, where the highest significant values were recorded and reached 0.994 (cm) for plants of the violet variety versus 0.618(cm) for comparison treatment plants of the same species

While the results of the binary interaction between Gibberllic acid and the organic fertilizer Organic Extra plus were shown, it was found that when soaking at a concentration of 200 mg L-1 of Gibberllic acid interacting with spraying at a concentration of 4 ml L-1 with the organic fertilizer Organic Extra plus led to recording the highest significant values, amounting to 1.038 (cm) compared to 0.551 (cm) for the control-treated plants. It can be said that the results of the triple interaction of the factors subject of the study. It is noted that there is a significant difference between the two varieties in the diameter of the flower stand. It was found that treatment by soaking with Gibberllic acid at a concentration of 200 mg L-1 combined with spraying at a concentration of 4 ml L-1 with the organic fertilizer Organic Extra Plus led to a higher recording of... The significant values reached 1.171 (cm) for the plants of the purple variety, compared to 0.466 (cm) for the plants of the comparison treatment of the same species.

Table 4. The effect of soaking with gibberllic acid and spraying with organic fertilizer and their interactions on the diameter of the flower stand (cm) of two varieties of tulip plants Tulipa spp L.

Species	*Concentration of gibberllic acid (mg l^{-1})*	*Organic Extra plus (mL^{-1})*			*Interaction of species X Gibberellic Acid*	*Response of species*
		0	*2*	*4*		
Negrita Violet	0	0.733 e - h	0.795 c f	0.665 c	10.355 c	0.827 a
	100	0.874 c d	1.018 b	0.847 b	11.340 b	
	200	0.995 b	1.171 a	0.968 a	12.798 a	
White Prince	0	0.678 f g h	0.713eh	0.675 c	9.051 d	0.758b
	100	0.778 d - g	0.837cde	0.768b	10.262 c	
	200	0.842 c d e	0.906bc	0.829b	11.315 b	
Integration species X Organic fertilizer	Violet	0.618 e	0.867 b	0.994 a	Impact of Gibberlic Acid	
	White	0.689 d	0.766 c	0.818 b c		
Interaction of Gibberlic Acid X Organic fertilizer	0	0.551 e	0.705 d	0.754 c d	0.670 c	
	100	0.670 d	0.826 c	0.927 b	0.808 b	
	200	0.739 d	0.918 b	1.038 a	0.899 a	
Impact of Organic Fertilizer		0.653 c	0.817b	0.906 a		

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

Period of the flowers remain on the plant (day):

The results in Table (5) show that there are significant differences in the duration of flowers remaining on the plant (days) between the plants of the purple and white varieties, as it reached 19,414 (days) in the purple variety Negrita and 18,022 (days) in the white variety White Prince. Soaking treatment with Gibberllic acidat a concentration of 200 mg l-1 indicated that there were significant differences in the duration of flowers remaining on the plant, which amounted to 250 (20) days, compared to 17,122 days (for plants in the control treatment. The results showed that spraying with the organic fertilizer Organic Extra Plus at a concentration of 4 mlL-1 led to a significant difference in the duration of flowers remaining on the plant, which amounted to 19.783 (days) compared to 17.522 (days) for the comparison plants.

From a study of the results of the binary interaction between the variety and Gibberllic acid at a concentration of 200 mg. L^{-1}. Significant differences were observed in the duration of flowers remaining on the plant in the plants of the purple variety, amounting to 20.988 (days) compared to 16.388 (days) for the plants of the comparison treatment of the white variety. Significant differences were recorded in the duration of flowers remaining on the plant, as the plants of the purple variety recorded significant differences when sprayed with the organic fertilizer at a concentration of 4 ml L^{-1}, reaching 20.633 (days) compared to 16.933 (days) for the plants of the comparison treatment of the white variety.

The results of the interaction between Gibberllic acid and the organic fertilizer Organic Extra plus showed that soaking with Gibberllic acid at a concentration of 200 mg L^{-1}, interspersed with spraying with the organic fertilizer Organic Extra Plus at a concentration of 4 ml L^{-1}, led to significant differences in the duration of flowers remaining on the plant, reaching 21.716 (days) versus 16.216 (days). For comparison treated plants. A summary of the results of the triple interaction of the factors subject of the study showed that soaking treatment of the violet variety Negrita with Gibberllic acid at a concentration of 200 mg L^{-1}, interspersed with spraying with an organic fertilizer at a concentration of 4 ml L^{-1}, led to recording the highest significant values in the duration of flowers remaining on the plant for plants of the violet variety, amounting to 22.966. (Days), while this value decreased to a minimum and reached 15.500 (days) for plants in the comparison treatment of the White Prince variety.

Table 5. The effect of soaking with gibberllic acid and spraying with organic fertilizer and their interactions on the duration of flowers remaining on the plant for two varieties of tulip plants *Tulipa spp* L.

Species	*Concentration of gibberllic acid (mg l^{-1})*	*Organic Extra plus (mL^{-1})*			*Interaction of species X Gibberellic Acid*	*Response of species*
		0	2	4		
Negrita Violet	0	16.933 g h	17.833 f g	18.800 d e	17.855 c	19.414 a
	100	18.466 e f	19.600 c d	20.133 c	19.400 b	
	200	18.933 d e	21.066 b	22.966 a	20.988 a	
White Prince	0	15.500 i	16.433h	17.233 g h	16.388 d	18.022 b
	100	16.966 g h	18.433ef	19.100de	18.166 c	
	200	18.333 e f	19.733cd	20.466bc	19.511 b	
Integration species X Organic fertilizer	Violet	18.111 d	19.500 b	20.633 a	Impact of Gibberlic Acid	
	White	16.933 e	18.200 d	18.933 c		
Interaction of Gibberlic Acid X Organic fertilizer	0	16.216 g	17.133 f	18.016e	17.122 c	
	100	17.716 e f	19.016 c d	19.616 c	18.783 b	
	200	18.633 d	20.400 b	21.716 a	20.250 a	
Impact of Organic Fertilizer		17.522 c	18.850b	19.783 a		

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

Flower diameter (cm):

The results of the statistical analysis in Table (6) indicate that there are significant differences in flower diameter between the plants of the violet and white varieties, reaching 5.583 (cm) for the violet species Negrita compared to 4.911 (cm) for the white species (White Prince). The soaking treatment with Gibberllic acidat a concentration of 200 mg L-1 led to significant differences in flower diameter in the purple variety, which amounted to 6.103 (cm) compared to 4.202 (cm) for the control treatment. Spraying with Organic Extra Plus at a concentration of 4 ml L-1 also led to There was a significant difference in flower diameter, reaching 6.061 (cm) compared to 4.304 (cm) for the control treatment plants. From a review of the results of the binary interaction between the variety and Gibberellic acid. At a concentration of 200 mg L-1, it was noted that there were significant differences in the flower diameter in the plants of the purple variety, amounting to 6.672 (cm) compared to 4.200 (cm) for the comparison treatment plants of the same variety. Significant differences were recorded in flower diameter between the different intervention.

values, as the plants of the purple variety recorded significant differences when sprayed with the organic fertilizer Organic Extra Plus at a concentration of 4 ml L-1, reaching 6.526 (cm) compared to 4.516 (cm) for the plants of the comparison treatment of the purple variety. The results of the interaction between gibberllic acidand the organic fertilizer Organic Extra plus indicate that soaking with Gibberllic acidat a concentration of 200 mg. L-1 interspersed with spraying with Organic Extra Plus at a concentration of 4 ml L-1 led to significant differences in flower diameter reaching 6.868 (cm) compared to 3.459 (cm) for the control treatment plants. Through studying the results of the triple interaction of the factors under study, it was found that soaking treatment of the purple Negrita variety with Gibberllic acidat a concentration of 200 mg L-1, interspersed with spraying with the organic fertilizer Organic Extra Plus at a concentration of 4 ml L-1, led to recording the largest significant values, which amounted to 7.468 (cm). This value decreased to a minimum of 3.751 (cm) for the comparison treatment plants of the White Prince species.

Table 6. Effect of soaking with gibberllic acidand spraying with organic fertilizer and their interactions on flower diameter (cm) for two varieties of tulip plants. Tulipa spp L.

Species	*Concentration of gibberllic acid (mg l^{-1})*	*Organic Extra plus (mL^{-1})*			*Interaction of species X Gibberellic Acid*	*Response of species*
		0	*2*	*4*		
Negrita Violet	0	16.933 g h	17.833 f g	18.800 d e	17.855 c	19.414 a
	100	18.466 e f	19.600 c d	20.133 c	19.400 b	
	200	18.933 d e	21.066 b	22.966 a	20.988 a	
White Prince	0	15.500 i	16.433h	17.233 g h	16.388 d	18.022 b
	100	16.966 g h	18.433ef	19.100de	18.166 c	
	200	18.333 e f	19.733cd	20.466bc	19.511 b	
Integration species X Organic fertilizer	Violet	18.111 d	19.500 b	20.633 a	Impact of Gibberlic Acid	
	White	16.933 e	18.200 d	18.933 c		
Interaction of Gibberlic Acid X Organic fertilizer	0	16.216 g	17.133 f	18.016e	17.122 c	
	100	17.716 e f	19.016 c d	19.616 c	18.783 b	
	200	18.633 d	20.400 b	21.716 a	20.250 a	
Impact of Organic Fertilizer		17.522 c	18.850b	19.783 a		

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

Flower age (days):

The results of the statistical analysis in Table (7) show that there is a significant difference in the flowering age (days) between the purple and white varieties, where the purple variety Negrita recorded the highest significant values, reaching 6,037 (days) compared to 4,000 (days) for the plants of the white Prince variety. Treatment by soaking with a concentration of 200 mg L-1 of Gibberllic acidled to significant differences in flowering lifespan, amounting to 6.277 (days) compared to 3.722 (days) for plants in the comparison treatment. The results of the table also indicated that spraying with a concentration of 4 ml L-1 of the organic fertilizer Organic Extra Plus recorded the highest values, reaching 6,000 (days) compared to 4,111 (days) for the control treatment plants.

The binary interaction data between the species and Gibberllic acid showed that there was a significant difference between the two violet species When soaking white with a concentration of 200 mg L-1 of Gibberellic acid, it gave the highest values, reaching 7.555 (days) for plants of the purple variety, compared to 2.555 (days) for plants in the control treatment of the white variety, as indicated by the data of the bilateral interaction between the variety and the organic fertilizer Organic Extra Plus. There was a significant difference between the two varieties when spraying with a concentration of 4 ml L-1 of the organic fertilizer Organic Extra Plus, as substantial differences were recorded that amounted to 7.111 (days) for the plants of the purple variety compared to 3.111 (days) for the plants of the comparison treatment of the white variety.

The results of the dual interaction between Gibberllic acid and the organic fertilizer Organic Extra Plus indicate that soaking at a concentration of 200 mg L-1 with Gibberllic acid interspersed with spraying at a concentration of 4 ml L-1 with the organic fertilizer led to recording the highest significant values, reaching 37.33 (days) versus 2.666 (days) for plants treated comparatively. Overall, the results of the triple interaction of the study factors showed that the soaking treatment of the violet Negrita variety with a concentration of 200 mg L-1 of Gibberellic acid, combined with spraying at a concentration of 4 ml L-1 with the organic fertilizer Organic Extra Plus, led to recording the highest significant values, reaching 9,000 (days) for the plants of the variety. Violet, while it decreased 333.1 (days) for plants in the comparison treatment of the White Prince species.

Table 7. The effect of soaking with gibberllic acidand spraying with organic fertilizer and their interactions on the flowering lifespan (cm) of two varieties of tulip plants Tulipa spp L.

Species	*Concentration of gibberllic acid (mg l^{-1})*	*Organic Extra plus (mL^{-1})*			*Interaction of species X Gibberellic Acid*	*Response of species*
		0	*2*	*4*		
Negrita Violet	0	3.168 k	4.200 g h i	5.233 e	4.200 d	5.583 a
	100	4.624 f g	6.126 c d	6.876 b	5.87 b	
	200	5.755 d	6.793 b	7.468 a	6.672 a	
White Prince	0	3.751 j	4.170hij	4.688 f	4.203 d	4.911 b
	100	4.003 i j	5.152e	5.832d	4.995 c	
	200	4.522 f g h	5.816d	6.267c	5.535b c	
Integration species X Organic fertilizer	Violet	4.516 d	5.706 b	6.526 a	Impact of Gibberlic Acid	
	White	4.092 e	5.046 c	5.596 b		
Interaction of Gibberlic Acid X Organic fertilizer	0	3.459 f	4.185 e	4.960 d	4.202 c	
	100	4.313 e	5.639 c	6.354 b	5.435 b	
	200	5.138 d	6.304 b	6.868 a	6.103 a	
Impact of Organic Fertilizer		4.304 c	5.376b	6.061 a		

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

The results of vegetative growth show that varieties play a major role in influencing the characteristics of vegetative growth, as the purple Negrita variety outperforms the White Prince variety in all characteristics of the vegetative plant. The reason for this may be due to genetic differences between the varieties depending on the genes that each variety carries (9). The results showed that soaking tulip bulbs with gibberellic acid had a positive effect on the characteristics of vegetative growth, in giving the best final height of the plant, the length of the longest leaf, the number of leaves, the dry weight of the leaves, and the number of branches.

The positive effects of gibberellin on vegetative growth characteristics are due to the increase in the internal content of gibberellin, which encourages vegetative growth by stimulating active cell division and cell elongation in the apical meristem (10). Another possible reason for the significant increase in plant height could be attributed to the effect of gibberellins on the activity of the photosynthesis process, thus increasing the efficiency of utilization of the products of the

photosynthesis process by plants. The results show the clear effect of organic fertilizer on vegetative growth, as the high concentration of organic fertilizer led to an increase in the studied vegetative growth characteristics. The reason may be due to the content of this fertilizer of amino acids that play a major role in the construction of proteins and then the formation of enzymes that are considered the key to the vital processes of the plant.

CONCLUSION

This study showed that the administration of gibberellin acid (GA3) and organic fertilizer had a significant effect on the growth and flowering characteristics of tulip plants (Tulipa spp.). The Negrita Violet variety consistently showed better results than White Prince, with faster flowering time, longer flower stalk length, higher fresh flower weight, and wider flower diameter. The combination of gibberellin acid soaking treatment at a concentration of 200 mg/L and organic fertilizer spraying at a concentration of 4 mL/L resulted in the best performance in all parameters measured, including flower retention time on the plant and longer flower life. These findings highlight the importance of hormonal treatments and organic nutrients in improving the quality and quantity of flower yields in ornamental plants.

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