EFFECT OF GIBERELLIC ACID AND STIMUFOL FERTILIZER ON GROWTH AND FLOWERING OF *Hemerocallis aurantiaca* PLANT.

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ABSTRACT

A two-year trial was carried out at the Experimental Farm of Horticulture and the Laboratory of Agricultural Botany Dept., Fac. of Agric., Benha Univ., during 2005/2006 and 2006/2007 seasons, to study the effect of sixteen treatments represented the combination between four concentrations of GA_3 (0.0, 50, 100 and 200 ppm.) and four levels of Stimufol fertilizer (0.0, 2, 4 and 6 g/L) on the vegetative growth, flowering, anatomical measurements and chemical composition of *Hemerocallis aurantiaca* plant.

GA_3 treatments positively affected vegetative growth parameters (number of leaves/ clump, fresh and dry weights of leaves/clump and number of offshoots/clump), flowering growth parameters (number of days from planting to start flowering, number of flowers/clump, length and diameter of flower stalk, fresh and dry weights of flower, duration of flower on plant and flower vase life) and chemical composition parameters (leaf total carbohydrates, N, P and K contents) with superiority to the medium and high rates. Also, all levels of Stimufol fertilizer significantly improved all the aforementioned parameters, especially the medium and high levels. Additionally, most the combinations of GA_3 concentrations and Stimufol fertilizer levels enhanced all the studied parameters, particularly the combinations of GA_3 at 100 or 200 ppm with Stimufol fertilizer at 4 or 6 g/L in both seasons.

As for the anatomical studies, several alternations were existed with different applied treatments. Most of the combinations between GA3 concentrations and levels of Stimufol fertilizer showed the highest values in transfer sections of leaf blade and flower stalk

compared with the control. The most effective treatment was GA_3 at 200 ppm provided with Stimufol fertilizer at 6 g/L.

Conclusively, it is preferable to spray *Hemerocallis aurantiaca* plant three times at three weeks interval with GA_3 at 200 ppm supplemented with Stimufol at 6 g/L to obtain the best vegetative and flowering characteristics with high quality.

Key word: *Hemerocallis aurantiaca*, GA3, Stimufol fertilizer, vegetative growth, flowering, anatomy and chemical composition.

INTRODUCTION

The flowering bulbous plants are considered as a group of the most beautiful adjuncts for garden decoration. They are used particularly in landscape, production of commercial cut-flowers and act as a source of glorious colors and perfumes. *Hemerocallis aurantiaca*, Baker (Hemero, a day; kallos, beauty; in reference to the flowers being fresh only for only day or so) belongs closely to Fam. Asphodlaceae not to Fam. Liliaceae, is a very short rhizome with numerous more or less tuberous and fleshy roots, native to Japan and commonly known as golden summer daylily or orange daylily. It is well known for its hardiness and showy blooms produced during spring and summer (Oganejova, 1990).

Hemerocallis is an indispensable choice for woodland and landscape gardens, when grown in the background or herbaceous borders, in front of a shrubbery or a long the sides of ponds or streams, a highly delightful effect is produced. Daylily is also used as a cut flowers. (Bose and Yadav, 1989). Most bulbs need more than two applications of fertilizers during the growing season, but the most important point is that the greatest increase in size and weight of the new developing bulb takes place in the period during and mostly after flowering, as long as the foliage remains in good condition. Thus, fertilization must continue for good vegetative growth to produce a good flower and large new mature bulbs (Rees, 1992). In this concern, Manoly (1996) and Naglaa and Kandeel (2001) they demonstrated that spraying iris plants with foliar fertilizers (containing macro and micro elements) produced the best results for flowering parameters. In addition, Abou-Dahab (1996) reported that most of foliar commercial fertilizers used (Irral, All-Grow, Kristalon, Stimofort and Sangoral)

improved the growth of schefflera plants. Shahin (1998) claimed that spraying *Hemerocallis aurantioca* plants with greenzit (foliar fertilizer containing macro and micro elements) at the rates of 1, 3 or $5cm^3$ per liter caused a considerable increase in vegetative and flowering growth as well as leaf chemical composition determinations. Plant growth and development are greatly influenced by chemical growth substances. The stimulatory effect of gibberellins application on growth and flowering of the different ornamental plants has been indicated by several researchers. In this concern, Singh *et al.*, (1994) on *Dahlia variables*, Naglaa and Kandeel (2001) on iris and Youssof (2004) on *Strelitzia reginae* plants found that spraying with GA_3 at 100 or 200 ppm improved vegetative growth parameters (number of leaves and offsets, plant height, fresh and dry weights of leaves) as well as flowering growth parameters (number, length, fresh and dry weights of flowers/plant). In addition, Abou El-Ella (2007) showed that spraying *Acanthus mollis* plant with GA_3 enhanced vegetative and flowering growth measurements.

The present work is an attempt to enhance the production of this plant, to prolong the flowering period and improve the quality and quantity of flowers, especially during summer months.

MATERIALS AND METHODS

This investigation was carried out in the open field at the Floriculture Nursery of the Horticulture Department and Anatomical Laboratory of Th Agriculture Botany Dept., Faculty of Agriculture at Moshtohor, Benha University, Kalubia Governorate, during the seasons of 2005/2006 and 2006/2007 to study the ability of GA_3 treatments (0, 50, 100 and 200 ppm) and Stimufol fertilizer treatments (0, 2, 4 and 6 g/L water) in combining treatments to lump their benefits in extending the flowering season provided with high flower quality, as well as increasing the plant productivity of the new hemerocallis offshoots.

Plant material:

Divisions of *Hemerocallis aurantiaca*, Baker clumps "local variety" at the weight of 75-80 g were obtained freshly from Floriculture Nursery of the Horticulture Department, Faculty of Agriculture at Moshtohor.

Planting procedure:

Divisions of hemerocallis clumps were planted in a clay loam soil " the analyses of the used soil are presented in Tables (a & b)" in mid September in beds $1x1m^2$ as each bed contain 4 divisions planted at 50x50 cm in between in both seasons.

Table (a): Mechanical analysis of the experimental soil

Parameters	Unit	Seasons	
		2005/2006	2006/2007
Coarse sand	%	4.93	5.15
Fine sand	%	16.41	15.57
Silt	%	27.33	26.98
Clay	%	51.33	52.30
Textural class	------	Clay loam	Clay loam

Table (b): Chemical analysis of the experimental soil.

Parameters	Unit	Seasons	
		2005/2006	2006/2007
$Caco_3$	%	2.21	2.32
Organic matter	%	2.41	2.39
Available nitrogen	%	0.94	0.92
Available phosphorus	%	0.45	0.49
Available potassium	%	0.79	0.81
EC	ds/m	1.21	1.33
pH	----------	7.73	7.77

Stimufol fertilizer treatments:

Hemerocallis plants received Stimufol fertilizer (as a complete foliar fertilizer containing macro and micro nutrients, Table c) at the rates of 0, 2, 4 and 6 g/L as a foliar spray three times a year after 50, 65 and 80 days from planting in both seasons.

Table (c): Chemical composition of Stimufol fertilizer (%)

Total N	P	K	Mg	B	Fe	Zn	Mn	Cu	Co	Mo	Amino acids
25	16	12	0.20	0.044	0.17	0.03	0.08	0.08	0.01	0.001	0.20

Giberellic acid treatments:

Hemerocallis plants were subjected to foliar spray with GA_3 at the rates of 0, 50, 100 and 200 ppm three times, each at two weeks interval, the first one was after 55 days from planting in both seasons.

Layout of the Experiment:

The design of this experiment was a split plot design with 16 treatments represented the combinations between Stimufol fertilizer at the rates of 0, 2, 4 and 6 g/L and GA_3 at the rates of 0, 50, 100 and 200 ppm (4 Stimufol fertilizer levels x 4 GA_3 concentrations) replicated three times (each replicate consisted of three beds, with four plants/bed). GA_3 treatments were employed to the main plot, while Stimufol fertilizer treatments were assigned to the sub plot.

The following measurements were recorded:

1- Vegetative growth parameters:

Number of leaves/clump, number of offshoots/clump and fresh and dry weights of leaves/ clump.

2-Flowering parameters:

Flowering start (days), number of flowers/clump, length and diameter of flower stalk, fresh and dry weights of flower (g), duration of flower on plant (days) and flower vase life (days).

3- Chemical composition determinations:

-Total nitrogen percentage was determined in the dried leaves by using wet digestion according to Piper (1947), using micro-kjeldahl method as described by Horneck and Miller (1998).

-Phosphorus was determined calorimetrically in spectronic (20) spectrophotometer using the method described by sandell (1950).

-Potassium content was determined by flame photometer according to Horneck and Hanson (1998).

-Total carbohydrates content was determined in dry leaf powder according to Herbert *et al.*, (1971).

All samples of chemical analyses were taken at the flowering start.

4-Anatomical studies

The samples of leaf were taken from the internodes lower the inflorescence from top and samples from flowering stalk were taken from the main inflorescence .The samples were taken from effected treatments added with the control. The specimens were taken then killed and fixed in FAA (5ml. formalin, 5ml. glacial acetic acid and 90ml. ethyl alchohol 70%), washed in 50% ethyl alcohol, dehydrated in series of ethyl alchohols 70,90,95 and 100%, infiltrated in xylene, embedded in paraffin wax with a melting point of 60-63°C, sectioned to 20 microns in thickness (Sass 1951), stained with the double stain method (fast green and safranin), cleared in xylene and mounted in Canada balsam (Johanson, 1940). Sections were read to detect histological manifestation of noticeable responses resulted from other treatments.

Statistical analysis:

All data obtained in both seasons of study were subjected to analysis of variance as factorial experiments in split plot design. L.S.D. method was used to differentiate means according to Snedecor and Cochran (1989).

RESULTS AND DISCUSSION

Effect of GA_3 and Stimufol:-

I- Vegetative growth measurements:

I-1- Number of leaves and offshoots/ clump:

Data in Table (1) indicate that all GA_3 concentrations significantly increased the number of leaves and offshoots/clump when compared with untreated plants "control" in both seasons. In this respect, the medium concentration of GA_3 (100ppm) gave the highest number of leaves and offshoots/ clump in both seasons. On the other hand, there was a positive correlation between the number of leaves

Table(1): Effect of GA_3 and Stimufol fertilizer treatments on number of leaves and offshoots/clump of *Hemerocallis aurantiaca* plants (2005/2006 and 2006/2007 seasons).

Parameters / Treatments		Number of leaves/ clump					Number of offshoots/ clump				
		GA_3				Mean	GA_3				Mean
		0.0	50 ppm	100 ppm	200 ppm		0.0	50 ppm	100 ppm	200 ppm	
		First season									
Stimufol fertilizer	0.0	15.3	16.8	18.6	18.1	17.2	2.83	3.11	3.51	3.21	3.17
	2g/L	15.9	17.2	19.2	18.6	17.7	3.01	3.41	3.81	3.19	3.36
	4g/L	16.7	19.7	22.6	21.9	20.2	3.21	3.92	4.51	3.92	3.89
	6g/L	17.2	21.2	23.8	20.7	20.7	3.18	3.82	4.63	4.18	4.00
Mean		16.3	18.7	21.1	19.8		3.1	3.57	4.12	4.00	
LSD at 5 % for GA_3 treatments				2.13					0.43		
Stimufol fertilizer treatments				1.86					0.36		
Interaction (GA_3 X fertilizer)				2.64					0.62		
		Second season									
Stimufol fertilizer	0.0	16.2	18.3	19.7	18.0	18.1	2.69	3.28	3.93	3.23	3.28
	2g/L	17.8	20.2	20.3	19.3	19.4	3.21	3.64	4.21	3.52	3.65
	4g/L	18.5	19.8	23.6	20.2	20.5	3.64	4.21	4.81	3.98	4.16
	6g/L	19.7	22.1	24.2	21.7	21.9	3.72	4.26	4.93	4.19	4.28
Mean		18.1	20.1	22.0	19.8		3.32	3.85	4.47	3.73	
LSD at 5 % for GA_3 treatments				1.98					0.44		
Stimufol fertilizer treatments				1.92					0.41		
Interaction (GA_3 X fertilizer)				2.83					0.70		

and offshoots/ clump and Stimufol fertilizer levels, so the number of leaves and offshoots were increased as the level of Stimufol fertilizer increased. In this concern, spraying the plants with high Stimufol level (6g/L) statistically induced the highest number of leaves and offshoots/ clump in both seasons.

Moreover, data in Table (1) show that all the interactions between GA_3 concentrations and Stimufol fertilizer levels statistically increased the number of leaves and offshoots/ clump as compared with control in both seasons. However, the combined treatment between GA_3 at 100ppm and Stimufol fertilizer at 6g/L significantly produced the highest number of leaves and offshoots/ clump as compared with the other combinations or control in both seasons.

I-2- Fresh and dry weights of leaves/ clump (g)

It is interest to note from Table (2) that there was a positive relationship between the fresh and dry weights of leaves and GA_3 and Stimufol fertilizer treatments. Since, as the levels of GA_3 or Stimufol fertilizer were increased, the fresh and dry weights of leaves increased until reach to the maximum increases at the high level. This trend was true in both seasons.

In addition, all interactions between GA_3 concentrations and Stimufol fertilizer levels caused remarkable increments in the fresh and dry weights of leaves in both seasons. However, the heaviest fresh and dry weights of leaves were obtained by using the combined treatment between GA_3 at 200ppm and Stimufol fertilizer at 6 g/L in both seasons.

The aforementioned results of GA_3 regarding vegetative growth measurements may be due to the fact that GA_3 may cause cell elongation by the induction of enzymes that weaken the cell walls. Also, the mechanism by which gibberellins might stimulate cell elongation is that the hydrolysis of starch resulting from the production of GA_3 induced α-amylase which might increase the concentration of sugars, thus raising the osmotic pressure in the cell sap so that water enters the cell and tends to stretch it (Macleod and Millar, 1962). The aforementioned results of vegetative growth measurements i.e. number of leaves and offshoots / clump and fresh and dry weights of leaves/clump as affected by GA_3 are in parallel with those of Singh *et al.,* (1994) on dahlia, Preeti *et al.*, (1997) and Ved *et al.*, (1998) on tuberose Dantuluri *et al.*, (2002) on *Lilium*

Table(2): Effect of GA_3 and Stimufol fertilizer treatments on fresh and dry weights of leaves/clump *of Hemerocallis aurantiaca* plants (2005/2006 and 2006/2007 seasons).

Parameters / Treatments		Fresh weight of leaves/clump (g)					Dry weight of leaves/clump (g)				
		GA_3				Mean	GA_3				Mean
		0.0	50 ppm	100 ppm	200 ppm		0.0	50 ppm	100 ppm	200 ppm	
		First season									
Stimufol fertilizer	0.0	166.7	189.8	225.0	237.1	204.7	21.3	24.4	29.2	30.6	26.4
	2g/L	174.9	194.3	236.2	249.2	213.7	21.8	24.4	30.2	31.4	27.0
	4g/L	187.0	234.4	293.9	297.8	253.3	22.8	28.8	37.0	36.9	31.4
	6g/L	206.4	267.2	285.6	310.2	267.4	22.7	32.0	36.2	36.9	32.0
Mean		183.8	221.4	260.2	273.6		22.2	27.4	33.2	34.0	
LSD at 5 % for											
GA_3 treatments				32.6					5.13		
Stimufol fertilizer treatments				45.2					3.93		
Interaction (GA_3 X fertilizer)				57.6					5.96		
		Second season									
Stimufol fertilizer	0.0	179.8	223.2	240.3	237.6	220.2	24.9	28.7	30.9	31.6	29.0
	2g/L	213.6	232.3	255.7	279.8	245.4	28.8	29.0	31.9	33.5	30.8
	4g/L	205.3	257.4	304.4	272.7	260.0	27.5	31.6	37.4	35.4	33.0
	6g/L	221.2	282.8	314.6	323.3	285.5	28.7	33.9	37.7	40.1	35.1
Mean		205.0	248.9	278.8	278.4		27.5	30.8	34.5	35.2	
LSD at 5 % for											
GA_3 treatments				30.2					3.18		
Stimufol fertilizer treatments				33.0					2.80		
Interaction (GA_3 X fertilizer)				50.7					5.14		

moculatum and Gomaa (2003) who mentioned that using GA_3 at 50, 100 and 150 ppm increased the plant height, stem diameter, number of branches and foliage fresh weight of *Dahlia pinnata* plants. Whereas, the results of Stimufol fertilizer are in parallel with those obtained by Manoly (1996) on Iris, Shahin (1998) on *Hemerocallis aurantiaca*, who mentioned that spraying the plants with greenzit (foliar fertilizer containing macro and micro elements) at the rates of 1, 3 or $5cm^3$ per liter increased the number of leaves and offshoots /plant and fresh and dry weights of leaves, Atta-Alla and Zaghloul (2002) and Youssef and Goma (2007) on *Iris tingitana* and Abou-El-Ella (2007) showed that spraying *Acanthus mollis* plants with Kristalon at 2, 3 or 4 g/L and New-Star fertilizer at 3, 4 or 5 g/L increased plant height, number of leaves and fresh and dry weights of leaves.

II- Flowering growth measurements:

II-1. Flowering start "days"

Data in Table (3) indicate that number of days to start flowering was decreased as the concentration of GA_3 increased in both seasons. So, 200 ppm GA_3- sprayed plants significantly induced earlier flowering after 250 and 249 days as compared with 260 and 278 days for control from planting in the first and second seasons, respectively. In addition, all levels of Stimufol fertilizer led to early flowering of this parameter, especially the medium level (4g/L). On the other hand, all combinations between GA_3 concentrations and Stimufol fertilizer levels induced a remarkable precocity in this parameter, especially the combinations of GA_3 at 200 ppm in both seasons. However, the earliest flowering was recorded by the combined treatment between GA_3 at 200 ppm and Stimufol fertilizer at 4g/L as it recorded 246 and 242 days in the first and second seasons, respectively.

II-2.Number of flowers/ clump.

Data in Table (3) show that all GA_3 treatments statistically increased the number of flowers/ clump as compared with control in both seasons. In this concern, the highest number of flowers/clump was obtained by medium GA_3 concentration as it gave 4.69 and 5.18 flowers/ clump in the first and second seasons, respectively.

On the other side, there was a positive relationship between the number of flowers/ clump and Stimufol fertilizer levels, hence the number of flower/clump increased as the level of Stimufol fertilizer increased. Thereupon, 6g/L Stimufol fertilizer- sprayed plants showed

Table(3): Effect of GA_3 and Stimufol fertilizer treatments on flowering start and number of flowers/clump of *Hemerocallis aurantiaca* plants (2005/2006 and 2006/2007 seasons).

Parameters / Treatments		Flowering start (days)					Number of flowers/clump				
		GA_3				Mean	GA_3				Mean
		0.0	50 ppm	100 ppm	200 ppm		0.0	50 ppm	100 ppm	200 ppm	
		First season									
Stimufol fertilizer	0.0	264	261	258	254	259	3.02	3.41	3.92	3.87	3.56
	2g/L	258	254	252	251	254	3.41	3.86	4.83	3.93	4.01
	4g/L	255	252	249	246	251	3.81	4.13	4.79	4.28	4.25
	6g/L	262	259	258	249	257	3.96	4.63	5.21	5.18	4.75
Mean		260	257	254	250		3.55	4.01	4.69	4.32	
LSD at 5 % for GA_3 treatments Stimufol fertilizer treatments Interaction (GA_3 X fertilizer)				2.38 3.21 5.97					0.56 0.63 0.86		
		Second season									
Stimufol fertilizer	0.0	261	259	256	252	257	3.21	3.82	4.32	4.35	3.93
	2g/L	257	256	253	250	254	3.93	4.15	4.82	4.39	4.32
	4g/L	253	252	251	242	250	4.50	4.11	5.67	5.37	4.91
	6g/L	259	258	256	251	256	4.39	4.60	5.92	5.82	5.18
Mean		278	256	254	249		4.01	4.17	5.18	4.98	
LSD at 5 % for GA_3 treatments Stimufol fertilizer treatments Interaction (GA_3 X fertilizer)				2.38 3.21 5.97					0.65 0.72 0.91		

to be the most effective level for producing the highest number of flowers/ clump as it gave 4.75 and 5.18 flowers/ clump in the first and second seasons, respectively. Moreover, all combinations between GA_3 concentrations and Stimufol fertilizer levels succeeded in increasing the number of flowers/ clump in both seasons. However, the highest number of flowers/ clump was registered by using the combined treatment between GA_3 at 100ppm and Stimufol fertilizer at 6g/L, followed descendingly by the combined treatment between GA_3 at 200ppm and Stimufol fertilizer at 6g/L in both seasons. The differences between the aforementioned two combined treatments were non significant in both seasons from the statistical standpoint.

II-3. Length and diameter of flower stalk (cm).

Data in Table (4) show that flower stalk length was increased with increasing GA_3 concentration. On the opposite, flower stalk diameter was decreased with increasing GA_3 concentration in both seasons. Besides, all studied Stimufol fertilizer levels statistically increased the length and diameter of flower stalk with superior for the high level in both seasons. However, the longest flower stalk was scored by using the combined treatment between GA_3 at 200 ppm and Stimufol fertilizer at 6 g/L, whereas the thickest flower stalk was registered by the combined treatment between GA_3 at 50 ppm and Stimufol fertilizer at 6 g/L in both seasons.

II-4.Fresh and dry weights of flowers (g):

Data in Table (5) reveal that all GA_3, Stimufol fertilizer treatments and their combinations increased the fresh and dry weights of flower in both seasons. In this concern, the increments in fresh and dry weights of flower were in parallel with the applied concentrations of GA_3 or Stimufol fertilizer, so the highest concentration of GA_3 (200 ppm) or the highest level of Stimufol fertilizer significantly scored the heaviest fresh and dry weights of flower, with the exception of dry weight of flower in the second season as medium concentration of GA_3 (100 ppm) surpassed the other concentrations. However, the heaviest fresh and dry weights of flower were obtained by using the combined treatment between GA_3 at 200 ppm and Stimufol fertilizer at 6 g/L in both seasons.

Table(4): Effect of GA_3 and Stimufol fertilizer treatments on length and diameter of flower stalk of *Hemerocallis aurantiaca* plants (2005/2006 and 2006/2007 seasons).

Parameters / Treatments		Flower stalk length(cm)					Flower stalk diameter (cm)				
		GA_3				Mean	GA_3				Mean
		0.0	50 ppm	100 ppm	200 ppm		0.0	50 ppm	100 ppm	200 ppm	
		First season									
Stimufol fertilizer	0.0	118.2	121.6	125.9	129.3	123.8	1.38	1.43	1.41	1.39	1.40
	2g/L	120.5	123.4	128.3	132.5	126.2	1.42	1.45	1.42	1.43	1.43
	4g/L	123.9	126.2	132.1	136.0	130.0	1.56	1.63	1.52	1.42	1.53
	6g/L	125.0	128.9	131.8	138.4	131.0	1.63	1.76	1.68	1.57	1.66
Mean		121.9	125.0	129.5	134.1		1.50	1.57	1.51	1.45	
LSD at 5 % for GA_3 treatments				7.32					N.S		
Stimufol fertilizer treatments				6.21					0.12		
Interaction (GA_3 X fertilizer)				12.41					0.15		
		Second season									
Stimufol fertilizer	0.0	115.9	118.9	122.6	126.0	120.9	1.42	1.47	1.45	1.42	1.44
	2g/L	118.3	120.6	125.7	129.3	123.5	1.51	1.59	1.49	1.47	1.52
	4g/L	120.6	125.9	127.9	133.7	127.0	1.68	1.73	1.56	1.50	1.62
	6g/L	122.0	125.3	128.2	134.8	127.6	1.72	1.82	1.63	1.61	1.70
Mean		119.2	122.7	126.1	131.0		1.58	1.65	1.53	1.50	
LSD at 5 % for GA_3 treatments				6.11					N.S		
Stimufol fertilizer treatments				5.26					0.16		
Interaction (GA_3 X fertilizer)				9.87					0.19		

Table(5): Effect of GA_3 and Stimufol fertilizer treatments on fresh and dry weights of flower *of Hemerocallis aurantiaca* plants (2005/2006 and 2006/2007 seasons).

Parameters / Treatments		Fresh weight of flower (g)					Dry weight of flower (g)				
		GA_3				Mean	GA_3				Mean
		0.0	50 ppm	100 ppm	200 ppm		0.0	50 ppm	100 ppm	200 ppm	
		First season									
Stimufol fertilizer	0.0	68.2	71.3	73.6	75.4	72.1	8.11	8.41	8.53	8.59	8.41
	2g/L	71.9	73.5	75.3	76.9	74.4	8.48	8.59	8.65	8.68	8.60
	4g/L	73.7	76.8	77.1	78.7	76.6	8.62	8.90	8.78	8.81	8.77
	6g/L	75.2	75.9	78.5	81.6	77.8	8.64	8.85	8.87	9.00	8.84
Mean		72.3	74.4	76.1	78.2		8.46	8.68	8.70	8.77	
LSD at 5 % for GA_3 treatments				3.26					N.S		
Stimufol fertilizer treatments				3.64					0.31		
Interaction (GA_3 X fertilizer)				5.28					0.52		
		Second season									
Stimufol fertilizer	0.0	71.8	73.2	76.0	78.4	74.9	8.68	8.85	9.12	9.00	8.91
	2g/L	73.6	75.6	81.9	81.2	78.1	8.97	9.07	9.66	9.33	9.26
	4g/L	76.9	78.3	80.7	83.4	79.8	9.15	9.31	9.36	9.50	9.33
	6g/L	77.3	78.1	82.3	85.2	80.7	9.12	9.39	9.38	9.62	9.38
Mean		74.9	76.3	80.2	82.1		8.98	9.16	9.38	9.36	
LSD at 5 % for GA_3 treatments				4.25					N.S		
Stimufol fertilizer treatments				4.87					0.37		
Interaction (GA_3 X fertilizer)				6.09					0.61		

II-5.Duration of flower on plant and flower vase life "days":

Data in Table (6) indicate that all tested GA_3 concentrations slightly increased duration of flower on plant and flower vase life, especially the high concentration in both seasons. Likewise, the three studied levels of Stimufol fertilizer resulted in slightly increments in these parameters. Meanwhile, 6g/L Stimufol fertilizer-sprayed plants showed to be the most effective level to induce the highest duration of flower on plant and flower vase life as compared with other levels or control in both seasons. Generally, all combinations between GA_3 and Stimufol fertilizer treatments prolonged the duration of flower on plant and flower vase life "days" in both seasons as compared with control. However, the highest values of flower duration on plant and flower vase life were scored by using the combined treatment between GA_3 at 200 ppm and Stimufol fertilizer at 6 g/L when compared with control and other combinations in both seasons.

The principal role of GA_3 upon flowering stimulation in many plants has been recommended to be manly due to its effect upon increasing the length of flower stalk (bolting), the process that strictly must proceeded flowering appearance process (Devlin and Witham, 1983). Moreover, the effects of GA_3 on flower growth measurements may be due to the fact that gibberellins play a role in flowering, probably it is further elaborated into florigen by the plant. Hence, gibberellins can not be the same substance as florigen but at least it may act as its precursor. The propounder of (Florigen concept) florigen but made up of two substances, namely gibberellins and anthesins. The latter are considered to be nitrogen rich compounds (Macleod and Millar, 1962).

The aforementioned results of flowering growth measurements i.e., flowering start, number of flowers, length and diameter of flower stalk, fresh and dry weights of flower, duration of flower on plant and flower vase life are in conformity with those obtained by Dantuluri *et al.,* (2002) and Tiwari and Singh (2002) on *Lilium maculatum*, Wankhede *et al.,* (2002) on *Polianthes tuberosa* , Gomaa (2003) on *Dahlia pinnata* and Youssef (2004) who mentioned that treated *Strelitzia reginae* plants with GA_3 at 100 or 200 ppm increased number of flowers/plant, length and diameter of flower, diameter of flower (cm), fresh weight of flower/plant, duration of flower on plant and vase life of flower as well as inducing early flowering .

Table(6): Effect of GA_3 and Stimufol fertilizer treatments on duration of flower on plant and flower vase life of *Hemerocallis aurantiaca* plants (2005/2006 and 2006/2007 seasons).

Parameters / Treatments		Duration of flower on plant(days)					Flower vase life(days)				
		GA_3				Mean	GA_3				Mean
		0.0	50 ppm	100 ppm	200 ppm		0.0	50 ppm	100 ppm	200 ppm	
		First season									
Stimufol fertilizer	0.0	11.2	11.7	11.9	12.3	11.8	6.81	7.03	7.80	7.73	7.34
	2g/L	11.9	12.3	12.3	13.2	12.4	6.92	7.61	8.21	8.01	7.69
	4g/L	12.8	13.8	12.9	13.7	13.3	7.23	7.92	8.63	8.93	8.18
	6g/L	13.2	13.7	13.8	14.2	13.7	7.96	8.30	8.92	9.21	8.60
Mean		12.3	12.9	12.7	13.4		7.23	7.72	8.39	8.47	
LSD at 5 % for GA_3 treatments				0.93					0.83		
Stimufol fertilizer treatments				1.21					0.76		
Interaction (GA_3 X fertilizer)				1.34					1.14		
		Second season									
Stimufol fertilizer	0.0	11.6	12.0	12.9	12.7	12.3	6.98	7.14	7.95	8.03	7.53
	2g/L	12.2	12.3	13.0	12.9	12.6	7.23	7.63	8.17	8.26	7.82
	4g/L	13.9	13.6	13.6	13.5	13.7	7.99	8.02	8.73	8.90	8.41
	6g/L	13.7	13.9	14.1	14.3	14.0	7.83	8.19	9.10	9.36	8.62
Mean		12.9	13.0	13.4	13.4		7.51	7.75	8.49	8.64	
LSD at 5 % for GA_3 treatments				0.48					0.86		
Stimufol fertilizer treatments				0.96					0.82		
Interaction (GA_3 X fertilizer)				1.21					1.19		

The aforementioned results of Stimufol fertilizer are coincided with those obtained by Barman and Pal (1993) on *Polianthes tuberosa*, Mukherjee *et al.*, (1994) on gladiolus, Singh and Uma (1996) on *Polianthes tuberose* and Shahin (1998) on *Hemerocallis aurantiaca*, showed that spraying the plants with greenzit (foliar fertilizer containing macro and micro elements) at the rates of 1, 3 or 5cm^3 per liter improved flowering start, number of flowers, length and diameter of flower stalk, fresh and dry weights of flower and flower vase life. Youssef (2004) stated that treating *Strelitzia reginae* plants with Stimufol fertilizer at 4 or 6 g/L enhanced flowering growth parameters i.e., number of days to start flowering "flowering date", length, diameter, fresh and dry weights of flowering stalk.

III-Chemical composition determinations:

Data in Tables (7&8) reveal that all tested GA_3 concentrations slightly increased leaf N, P, K and total carbohydrates contents with non- significant increments in most cases. Regarding Stimufol fertilizer treatments, data showed that leaf N, P, K and total carbohydrates contents of hemerocallis plants increased with increasing Stimufol fertilizer level. Hence, 6g/L Stimufol–sprayed plants gave the highest values in this concern.

Moreover, all combinations between GA_3 concentrations and Stimufol fertilizer levels statistically increased leaf N, P, K and total carbohydrates content in both seasons. However, the highest values of these parameters were recorded by using the combinations of Stimufol fertilizer at the highest level in both seasons.

The stimulated effect of Stimufol fertilizer may be due to the role of Stimufol on supplying the plants with their required nutrients for more carbohydrates and proteins production which are necessary for vegetative, flowering, bulbs growth and chemical composition (Marschner, 1995).

The aforementioned results of chemical composition measurements i.e., leaf N, P, K and total carbohydrates contents concerning Stimufol fertilizer are coincided with those obtained by Shahin (1998) on *Hemerocallis aurantiaca*, demonstrated that spraying the plants with greenzit (foliar fertilizer containing macro and micro elements) at the rates of 1, 3 or 5 cm^3 per liter increased leaf N, P, K and total carbohydrates contents, Naglaa and Kandeel (2001), Ataa-Alla and Zaghloul (2002) on *Iris tingitana*, Youssef

Table(7): Effect of GA_3 and Stimufol fertilizer treatments on leaf nitrogen and phosphorus content (%) *of Hemerocallis aurantiaca* plants (2005/2006 and 2006/2007 seasons).

Parameters / Treatments		N%					P%				
		GA_3				Mean	GA_3				Mean
		0.0	50 ppm	100 ppm	200 ppm		0.0	50 ppm	100 ppm	200 ppm	
		First season									
Stimufol fertilizer	0.0	2.63	2.84	3.02	3.26	2.94	0.123	0.132	0.143	0.143	0.135
	2g/L	2.96	2.98	3.60	3.46	3.25	0.142	0.153	0.148	0.169	0.153
	4g/L	3.83	3.79	3.92	4.32	4.00	0.146	0.162	0.169	0.166	0.158
	6g/L	3.92	4.23	4.52	4.27	4.24	0.151	0.167	0.173	0.183	0.169
Mean		3.34	3.46	3.77	3.83		0.141	0.154	0.158	0.165	
LSD at 5 % for GA_3 treatments				N.S					N.S		
Stimufol fertilizer treatments				0.83					0.018		
Interaction (GA_3 X fertilizer)				0.92					0.023		
		Second season									
Stimufol fertilizer	0.0	2.90	3.24	3.41	3.38	3.23	0.136	0.142	0.152	0.152	0.146
	2g/L	3.36	3.94	3.92	3.79	3.75	0.142	0.146	0.157	0.163	0.152
	4g/L	3.97	3.87	4.36	4.11	4.01	0.167	0.153	0.169	0.179	0.167
	6g/L	4.02	4.13	4.52	4.23	4.23	0.158	0.167	0.158	0.186	0.167
Mean		3.60	3.80	4.05	3.90		0.151	0.152	0.159	0.170	
LSD at 5 % for GA_3 treatments				N.S					N.S		
Stimufol fertilizer treatments				0.87					0.016		
Interaction (GA_3 X fertilizer)				0.91					0.022		

Table(8): Effect of GA_3 and Stimufol fertilizer treatments on leaf potassium and total carbohydates content (%) of *Hemerocallis aurantiaca* plants (2005/2006 and 2006/2007 seasons).

Parameters / Treatments		K%					Total carbohydrates%				
		GA_3				Mean	GA_3				Mean
		0.0	50 ppm	100 ppm	200 ppm		0.0	50 ppm	100 ppm	200 ppm	
		First season									
Stimufol fertilizer	0.0	1.32	1.46	1.49	1.45	1.43	9.2	9.8	10.2	10.6	10.0
	2g/L	1.41	1.49	1.57	1.52	1.50	9.8	10.7	10.9	11.2	10.7
	4g/L	1.53	1.58	1.62	1.64	1.60	10.6	10.3	11.6	11.9	11.1
	6g/L	1.56	1.62	1.70	1.61	1.62	10.9	11.6	12.2	12.6	11.8
Mean		1.46	1.54	1.60	1.56		10.1	10.6	11.2	11.6	
LSD at 5 % for GA_3 treatments				N.S					1.46		
Stimufol fertilizer treatments				0.16					1.63		
Interaction (GA_3 X fertilizer)				0.19					1.82		
		Second season									
Stimufol fertilizer	0.0	1.39	1.43	1.48	1.47	1.44	9.8	10.3	10.9	10.5	10.4
	2g/L	1.47	1.48	1.53	1.50	1.50	10.3	10.8	11.6	10.8	10.9
	4g/L	1.46	1.53	1.59	1.52	1.53	10.7	11.6	12.2	11.3	11.5
	6g/L	1.52	1.57	1.63	1.58	1.58	11.2	11.9	12.9	12.8	12.2
Mean		1.46	1.50	1.56	1.52		10.5	11.2	11.9	11.4	
LSD at 5 % for GA_3 treatments				N.S					1.37		
Stimufol fertilizer treatments				0.10					1.59		
Interaction (GA_3 X fertilizer)				0.18					1.78		

(2004) on *Strelitzia reginae*, El-Sayed (2004) on *Iris tingitana* ,Abou-El-Ella (2007) on *Acanthus mollis* and Youssef and Goma (2007) showed that spraying *Iris tingitana* plants with Stimufol fertilizer at 4 or 6 g/L significantly increased leaf N, P, K and total carbohydrates contents.

The aforementioned results of GA_3 contaminant with those obtained by Tawila (2000) on *Polianthes tuberose*, Dantuluri *et al.*, (2002) on *Lilium maculatum*, Wankhede *et al.*, (2002) on *Polianthes tuberose*, Tiwari and Singh (2002) on *Lilium maculatum*, Gomaa (2003) on *Dahlia pinnata*, Salama (2003) on *Strelitzia reginae* , Youssef and Goma (2007) on *Iris tingitana* and Abou El-Ella (2007) reported that spraying *Acanthus mollis* plants with GA_3 at 100 or 200 ppm increased leaf N,P,K and total carbohydrates contents.

IV-Anatomical studies:-

IV -1.Regarding cross section of leaf:

As shown in Table (9) and Figure (1) different applied treatments enhanced in mostly characters of leaf compared with the control, especially leaf blade thickness, number of vascular bundle in blade. Also, it could be noticed that increases of vascular bundle length, thickness of phloem and xylem in vascular bundle, ...etc.

Table(9): Effect of GA_3 and Stimufol fertilizer treatments on histological features (micron) in leaf of *Hemerocallis aurantiaca* plants during 2007 season.

Treatments / Characters (micron)	Control	GA_3 at 200 ppm	
		Stimufol at 4g/L	Stimufol at 6g/L
Thickness of blade.	706.50	638.10	663.00
Upper epidermal cuticle thickness.	11.70	15.75	14.40
Lower epidermal cuticle thickness.	7.65	11.25	15.30
Upper epidermal thickness.	54.00	58.80	62.55
Lower epidermal thickness.	22.85	29.25	33.75
Length of vascular bundle.	387.45	398.02	408.99
Thickness of upper fibers in vascular bundle	45.00	51.30	60.30
Thickness of phloem in vascular bundle	67.50	78.30	98.77
Thickness of xylem in vascular bundle.	146.92	164.70	187.80
Thickness of lower fibers in vascular bundle	102.60	103.05	105.97
number of vessels in the vascular bundle.	7.50	8.00	9.50
Thickness of widest xylem vessel in vascular bundle	41.40	43.65	37.80

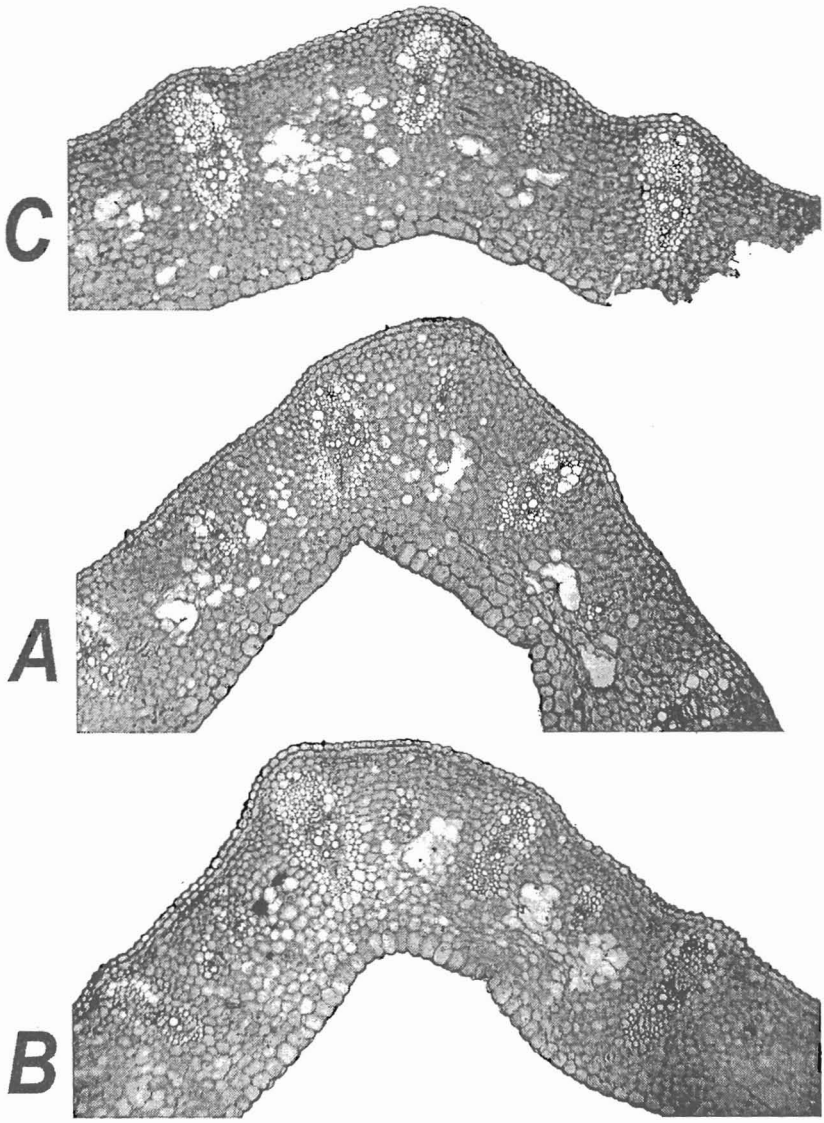

Fig. (1): Shows the effect of GA_3 and Stimufol fertilizer on histological features in leaf of Hemerocallis aurantiaca plants (100 x).

C-control A- GA_3 at 200 ppm + Stimufol fertilizer at 4g/L.
B- GA_3 at 200 ppm + Stimufol fertilizer at 6g/L.

IV -2.Concerning cross section of flower stalk:

As shown in Table (10) and Figure (2) different applied treatments improved in mostly characters of flower stalk anatomy compared with the control, specially epidermal cell layer thickness, number and thickness of cortex and pith , number of vascular bundles and thickness of xylem and phloem.

Such enhancement attributed to GA3 may be due to the fact that GA_3 stimulates the flower bud formation and enhance on cell division and elongation. The Stimufol fertilizers supply the plants with macro and micro elements to increase and improve the histological parameters.

In general, the stimulatory effects of the applied treatments upon the anatomy features of treated plants could be attributed to effects of GA_3 and Stimufol fertilizer in supplying the plants with their requirements of nutrients for more carbohydrates and proteins production which are necessary for vegetative, flowering, bulbs growth and chemical composition.

The same trend was found by Rak and Nowak (1989) on snapdragon cuttings; El- Shourbagy *et al.*, (1995) on flax; Marschner (1995) on higher plant; Shou-Fang *et al.*, (2003) on Chinese chestnut and Naor *et al.*, (2004) on *Iris tingitana.*

Conclusively, in order to produce early flowered *Hemerocallis aurantiaca* plants with higher flowers number, longer flower stalk and heaviest flower fresh and dry weights, it is preferable to spray the plants with the combined treatments between GA3 at 200ppm and Stimufol fertilizer at 4 or 6g/L.

Table (10): Effect of GA_3 and Stimufol fertilizer treatments on the histological features (micron) of the flower stalk of *Hemerocallis aurantiaca* plants during 2007 season .

Treatments / Characters (micron)	Control	GA_3 at 200 ppm	
		Stimufol at 4g/L	Stimufol at 6g/L
Flower stalk diameter.	4209.79	5145.30	6174.36
Epidermal cuticle thickness.	11.25	13.30	16.20
Epidermal cell thickness.	20.70	21.60	25.20
Cortex layers thickness.	288.00	387.00	403.20
Thickness of fibers in vascular bundle	147.60	148.50	163.80
number of vascular bundles.	86.00	91.00	117.00
Length of large vascular bundle.	515.70	1319.76	1375.57
Thickness of phloem in vascular bundle	129.15	141.75	153.90
Thickness of xylem in vascular bundle.	140.23	154.20	148.65
number of vessels in xylem bundle.	18.00	19.50	23.00
Thickness of widest xylem vessel in vascular bundle	45.00	69.30	69.75
Parenchymatous pith thickness.	640.00	1350.00	1728.00

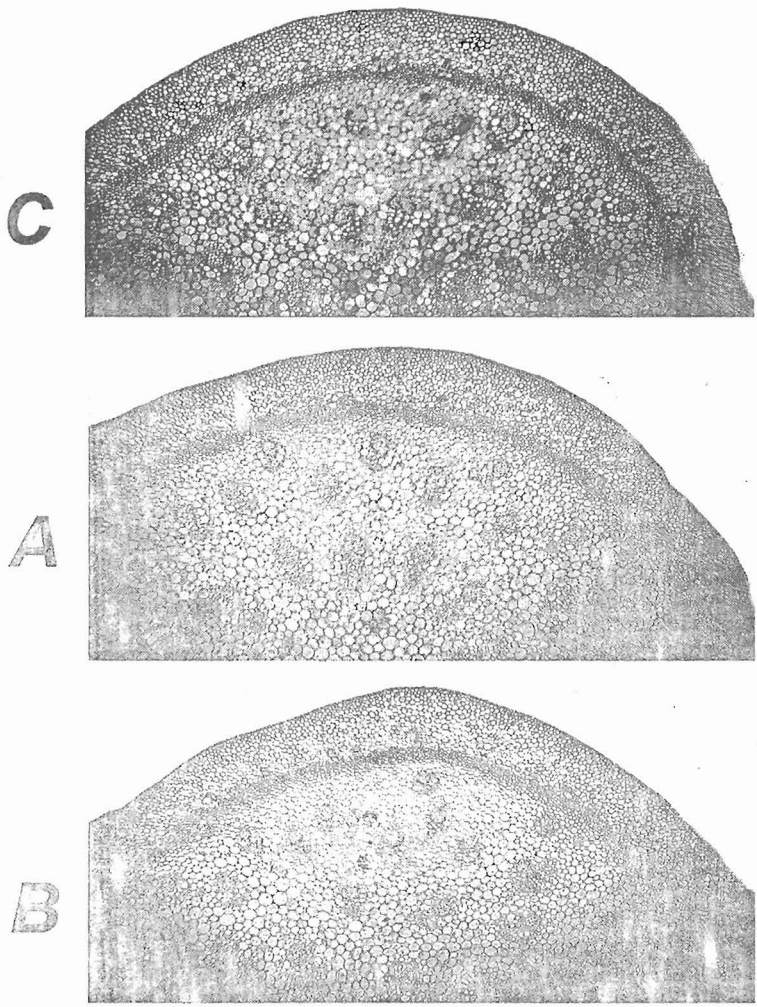

Fig. (2): Shows the effect of GA_3 and Stimufol fertilizer on histological features in flower stalk of Hemerocallis aurantiaca plants (100 x).

C-control A- GA_3 at 200 ppm + Stimufol fertilizer at 4g/L.
B- GA_3 at 200 ppm + Stimufol fertilizer at 6g/L.

REFERENCES

Abou-Dahab, T.A.M. (1996): Effect of growing media, nitrogen sources and commercial fertilizers on growth and chemical composition of *Brassaia arboricola* cv. "Gold Capella" plants. Ph.D. Thesis, Fac. Agric., Cairo Univ.

Abou El-Ella, E.M. (2007): Physiological studies on *Acanthus mollis* plant. M.Sc., Thesis, Hort. Dept. Fac. Agric., Benha Univ.

Atta-Alla, H.K. and M. Zaghloul (2002): Effect of cold storage, GA_3 and fertilization on the growth, flowering and chemical composition of *Iris tingitana* cv. Wedgwood. J. Agric. Sci. Mansoura Univ., 27 (9): 6267-6285.

Barman, D. and P. Pal (1993): A note on effects of micronutrients on growth and yield of tuberose (*Polianthes tuberosa* L.) cv. Single. Hort. J., 6 (1): 69-70.

Brown, J.D. and O. Lilland (1946): Rapid determination of potassium and sodium in plant material and soil extract by flame photometry. Proc. Amer. Soc., Hort., Sci., 73, 813.

Bose, T.K. and L.P. Yadav (1989): Commercial Flowers. B. Mitra-NAY PROKASH, 206 Bidhay Sarani, Calcotta 700006, India. PP. 894

Dantuluri, V.S.R.; Misra, R.L. and M. Sanyat (2002): Effect of growth regulating chemicals on Asiatic hybrid lily. Proceedings-of-the-national-symposium-on-Indian-floriculture-in-the-new-millenium,-Lal-Bagh,-Bangalore,-25-27-February, 147-149; 8 ref.

Devlin, R. M. and F. H. Witham (1983): "Plant Physiology". 4th Ed., publishers Willard Grant Press, Boston.

El-Sayed, M.A. (2004): Physiological studies on Iris. M.Sci., Thesis, Hort. Dept. Fac. Agric., Moshtohor, Zagazig Univ.

El-Shourbagy, M. N.; Bahia, A. and R. A. El Naggar (1995): Effect of IAA and GA_3 on the anatomical characteristics, straw and fiber yield and quality of flax. J. of Agronomy and crop Science. Vol. 174☹1)pp21-26.

Goma, A. O. (2003): Effect of foliar spraying with Gibberellic acid and calcium on growth and flowering of *Dahlia pinnata* plant. The

2nd conference of Agric.& Biological Research Division (Prospects of the Recent Agricultural Research, April, 21-23).

Herbert, D.; Phipps, P.J. and R.E. Strang (1971): Determination of total carbohydrates, Methods in Microbiology, 5 (8): 290-344.

Horneck, D. A. And D. Hanson (1998): Determination of potassium and sodium by Flam Emission Spectrophotometry. In Handbook of Referance Methods for plant analysis. Kalra, Y. P. (ed.):153-155.

Horneck, D. A. And R. O. Miller (1998):Determination of total nitrogen in plant tissue. In Handbook of Referance Methods for plant analysis. Kalra, Y. P. (ed.): 75-83.

Johanson, D. V. (1940): Plant Microtechnique. New York and London McGrow- hill Book Co. Inc. pp. 27-154.

Macleod, A.M. and A.S. Millar (1962): Effect of gibberellic acid on barley endosperm. Jour. Inst. Brewing, 68: 322-332.

Manoly, N.D. (1996): Effect of soil type, fertilization, bulb size and growth regulators on growth, flowering and chemical composition of Iris plants. Ph.D. Thesis, Hort. Dept. Fac. of Agric., Minia Univ.

Marschner, H. (1995): Mineral Nutrition of Higher Plants. Academic Pres Inc. San Diego, CA 92101.

Mukherjee, S.; Jana, S.C. and T.K. Chartterjee (1994): Effect of nitrogen and phosphorus doses on production of flowers and corms of gladiolus (*G. grandiflorum* L.). Ind. Agric., 38 (3): 211-213.

Naglaa, S.A.T. and A.M. Kandeel (2001): Effect of fertilization level and GA_3 application on growth, flowering, bulb productivity and chemical composition of *Iris tingitana* cv. Wedgewood. Arab Univ. J. Agric. Sci., Ain Shams Univ., Cairo, 9 (2): 803-824.

Naor, V.; Kigel, J. and M. Ziv (2004): Hormonal control of inflorescence development in plantlets of calla lily *(Zantedeschia spp.)* grown in vitro. Plant Growth Regulation, Vol. 42 (1): pp. 7-14.

Oganezova, G.G. (1990): Characteristics of the anatomical structure of seeds of some Amaryllidaceae in connection with their systematic and phylogeny. Botanicheskii Zhurnal 75(5): 615-630 USSR (C.F. Hort. Abst., 61(3):2153).

Piper, G. S. (1947): Soil and plant analysis. The Univ. of Adelaide, Adelaide.

Preeti, H.; Gogoi, S.; Mazumder, A. and P. Hatibarua (1997): Effect of pre-plant chemical treatment of bulbs on growth and flowering of tuberose (*Polianthes tuberosa* L.) cv. Single. Annals-of-Biology-Ludhiana. 1997, 13: 1, 145-149; 8 ref.

Rak, J. and J. Nowak (1989): The effect of gibberellic acid on growth and flowering of snapdragon cuttings. Acta Horticulture, 251.

Rees, A.R. (1992): Ornamental bulbs, Corms and Tubers. C.A.B. Inter., Wallingford, UK. 61-65.

Salama, W.A. (2003): Physiological studies on *Strelitzia reginae*. M.Sc. Thesis Hort., Dept., Fac. of Agric. Moshtohor, Zagazig Univ., Egypt.

Sandell, R. (1950): Colorimetric determination of traces of metal 2nd Ed. Interscience pub., Inc. New York.

Sass, J. E. (1951): Botanical Microtechnique. Iowa State College Press, Ames, Iowa, pp. 228.

Shahin, S.M.E. (1998): Physiological studies on Crinum and Hemerocallis bulbs. Ph.D. Thesis, Fac. Agric., Tanta Univ.

Shou-Fang, L.; AiLing, Y. and W. Guixi (2003): Effect of plant growth regulators on growth, sex differentiation and fructification of Chinese chestnut. Forest Res., Beijing, Vol. 16 (5): pp. 642-645.

Singh, J.N.; Singh, D.K. and K.K. Sharma (1994): Effect of GA_3 and Alar on growth, flowering and seed production of dahlia (*Dahlia variabilis L.*). Orissa-Journal-of-Horticulture. 1994, 22: 1-2, 10-12; 4 ref.

Singh, K.P. and A. Uma (1996): Response of graded levels of nitrogen on growth and flowering in "Shringar" tuberose (*Plianthes tuberosa* L.). Ind. J. of Agric. Sci., 66 (!1): 655-657.

Snedecor, G.W. and W.G. Cochran (1989): Statistical methods. 7th Ed. Iowa state Univ. Press. Ames Iowa, USA.

Tawila, A.S.I. (2000): Physiological studies on tuberose plant (*Polianthes tuberosa* L.). M.Sci. Thesis, Fac. Agric., Moshtohor, Zagazig Univ.

Tiwari, J.K. and R.P. Singh (2002): Effect of pre-planting GA_3 treatment on tuberose. Journal-of-Ornamental-Horticulture-New-Series. 2002, 5: 2, 44-45; 1 ref.

Ved, P.; Jha, K.K. and V. Prakash (1998): Effect of GA_3 on the floral parameters of gladiolus cultivars. Journal-of-Applied-Biology. 1998, 8: 2, 24-28; 12 ref.

Wankhede, S.G.; Belorkar, P.V.; Mohariya, A.D.; Alurwar, M.W.; Rathod, K.G. and P.P. Gawande (2002): Influence of bulb soaking and foliar spray of GA_3 on flower quality and yield of tuberose (*Polyanthes tuberosa* L.). Journal-of-Soils-and-Crops. 2002, 12: 2, 293-295; 4 ref.

Youssef, A.S.M. (2004): Physiological studies on growth and flowering of *Sterilitizia reginae* Ait. Plant. Ph.D. Thesis, Fac. of Agric., Moshtohor, Zag. Univ.

Youssef, A.S.M. and A.O. Gomaa (2007): Effect of some horticultural treatments on growth, flowering, bulb production and chemical composition of *Iris tingitana* cv. Wedgwood. The Third Conf. of Sustain. Agric. and Develop.Fac. of Agric., Fayoum Univ., 12-14 Nov.

تأثير الجبريللين وسماد الأستيموفول علي نمو وإزهار نبات الهميروكالس.

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*قسم النبات الزراعي-**قسم البساتين - كلية الزراعة –جامعة بنها

أجريت هذه التجربة بمزرعة الزينة بقسم البساتين ومعمل التشريح بقسم النبات بكلية الزراعة بمشتهر- جامعة بنها وذلك خلال موسمي 2006 و 2007 لدراسة تأثير 16 معاملة ممثلة في التفاعل بين أربعة تركيزات من الجبريللين(صفر, 50، 100و 200 جزء فى المليون) وأربع تركيزات من سماد الأستيموفول (صفر, 2, 4, 6 جم/ لتر) على النمو الخضري، الزهري، القياسات التشريحية والمحتوى الكيماوي لنبات الهميروكالس.

وقد أوضحت النتائج المتحصل عليها أن جميع تركيزات الجبريللين قد حسنت من قراءات النمو الخضري(عدد الأوراق, الوزن الطازج والجاف للأوراق,عدد الخلفات)و قياسات الإزهار (موعد الإزهار- عدد الإزهار/نبات - طول وقطر الحامل الزهري- الوزن الطازج والجاف للأزهار وطول مدة بقاء الأزهار علي النبات وأيضا في الفازة) والقياسات التشريحية وقياسات المحتوى الكيماوي (الكربوهيدرات الكلية , النتروجين, الفسفور, البوتاسيوم) وخاصة التركيزات المتوسطة والمرتفعة. كما وجد أن جميع مستويات سماد الأستيموفول قد حسنت من جميع القراءات المدروسة وخاصة التركيزات المتوسطة والمرتفعة. كذلك وجد أن جميع التفاعلات بين الجبريللين وسماد الأستيموفول قد حسنت جميع القراءات المدروسة وخاصة المعاملات المختلطة بين الجبريللين بتركيزي 100 أو 200 جزء في المليون وسماد الأستيموفول بتركيزي 4 أو 6 جم/ لتر.

أما بالنسبة للدراسات التشريحية فقد أظهرت اختلافات واضحة بين المعاملات المختلفة حيث أن معظم معاملات التفاعل بين الجبريللين وسماد الأستيموفول أعطت أفضل القياسات بالنسبة للقطاعات العرضية لنصل الورقة والحامل الزهري مقارنة بالكنترول. و كانت أفضل المعاملات هي المعاملات المختلطة بين الجبريللين بتركيز200 جزء في المليون وسماد الأستيموفول بتركيز 6 جم/ لتر.

ومن خلال النتائج المتحصل عليها يمكن التوصية بمعاملة نباتات الهميروكالس بالمعاملة المختلطة من الجبريللين بتركيز 200 جزء في المليون وسماد الأستيموفول بتركيز 6 جم/ لتر لكي يتم الحصول علي أفضل نمو خضري و زهري مع أعلي جودة.