

4. RESULTS AND DISCUSSION

4.1.The first experiment: Effect of N, P and K fertilization on vegetative, flowering and chemical composition of Gerbera jamesonii L. during first and second seasons for one or two years-old plants.

4.1.1. Vegetative growth parameters:

4.1.1.1. Number of leaves / plant:

According to data presented in Table (1) on mean of number of leaves per plant as affected by using some chemical fertilizers treatments, it could be concluded that N_2 : P_1 : K_1 at 200 N : 100 P : 100 K g/plot gave the maximum mean number of leaves per plant as 44.67 and 44.00 in the first and second seasons with one year age, respectively. While N_3 at 200 g/plot only gave the second rank results as 40.00 and 42.00, respectively. However $N_1P_1K_1$ (100: 100: 100 g/plot) gave the third increasing number of leaves / plant.

On the other hand untreated plants gave the minimum number of leaves per plant in the first and second seasons.

As for the two years ages of plants, data presented in Table (2) showed that, $N_1P_1K_1$ (100: 100: 100 g/plot) gave the greatest number of leaves per plant and N_3 (200 g/plot) or $N_2P_1K_1$ (200: 100: 100 g/plot) were in the second rank in this respect in both seasons. Whereas the lowest mean number of leaves per plant resulted from untreated plants (control), N1 (100 g/plot) and K_2 (150 g/plot). However, the differences between treatments were significant in both seasons. In both seasons treating *Gerbera jamesonii* L. plants (one year old) with $N_2P_1K_1$ and $N_1P_1K_1$ for two

years-old appeared to be the most effective treatments for inducing the maximum number of leaves when compared with other chemical fertilizer treatments and control.

4.1.1.2. Mean length of leaves (cm):

With respect to the effect of $N_1P_1K_1$ fertilization on, mean length of leaves of gerbera plants it was significantly increased by most addition of fertilization as shown in Table (1). The rates of $N_1P_1K_1$ (100: 100: 100 g/plot) and N_2 (150 g/plot) significantly increased the length of leaves with one year-old plants in both seasons. While control and K_1 (100 g/plot) gave the lowest mean length of leaves in the two seasons.

On the other side, the plants of two years-old, data in Table (2) showed that $N_1P_1K_1$ at (100 : 100 g/plot) gave the highly significant increment in leaf length in both seasons, while N_2 at 150 g/plot was in the second rank in this concern.

However, in both seasons and for the two ages (one or two years) treating gerbera plants with $N_1:P_1:K_1$ appeared to be the most effective treatment for inducing the longest leaves compared with other chemical fertilizer treatments and control.

4.1.1.3. Number of offsets per plant:

Data of number of offsets / plant as affected by some treatments of chemical fertilizers in the first and second seasons are averaged in Table (1). Data showed that, the number of offsets / plant (one year old) was greatly increased by using $N_2P_1K_1$ as caused a highly significant increase in this parameter as it registered 6.17 and 5.83 in the first and second seasons, respectively, followed descendingly by using $N_1P_1K_1$ which gave 5.33, 6.17 in both seasons, respectively.

Concerning the plants which still in the soil (two years old), data presented in Table (2) showed that $N_1P_1K_1$ (100: 100: 100 g/plot) resulted significant increasing in the mean number of offsets per plant in both seasons, and $N_2P_1K_1$ gave the next value in this respect. Whereas the minimum number of offsprings per plant resulted from untreated plants (control).

4.1.1.4. Fresh and dry weights of vegetative parts (g):

Data of fresh weight of vegetative growth / plant as affected by some treatments of chemical fertilizers in the frist season are averaged in Table (1). Data showed that, the fresh weight of aerial parts was greatly increased by addition of $N_2P_1K_1$ at 200 : 100 : 100 g/plot as caused a highly significant increase in this character, followed by $N_1P_1K_1$ at 100 : 100 : 100 g/plot which gave the second value of this parameter in both seasons.

As for dry weight of vegetative parts / plant, data in the same Table (1) showed that, the results of the dry weight of the vegetative parts per plant attained a parallel trend with fresh weight results with little differences in the level of significance. In general, the heaviest dry weight of vegetative parts / plant was obtained by using the complete fertilizer at $N_2P_1K_1$ in the first and second seasons.

Concerning the effect of chemical fertilizers on the plants of years old, data in Table (2) revealed that, the heaviest fresh weight of vegetative parts/ plant was recorded by using $N_1P_1K_1$ application followed descendingly by using $N_2P_1K_1$ then N_3 (200 g/plot).

The above results of vegetative growth are in parallel with those obtained by Magnificon et al. (1985) on carnation, Mukhopadhyay and Bankar (1986) on Polianthus tuberosa L.,

Habib (1992) on Pelargonium peltum, Abou Dahab (1992) on Chlorophytum comosum, Asparagus sprengeri, Arambewela et al. (1993) on Catharanthus roseus, Barman and Pal (1994) on Calendula officinallis, El-Fadaly (1994) on Jasminum samba and Nasr (1997) on gerbera who reported that, treating plants with nitrogen at the high rate or NPK complete fertilizer increased the vegetative growth parameters (number of leaves, number of offsets, and fresh and dry weight of aerial parts), over control.

As for the explanation of the promotive effect of N, P and K may be due to that, nitrogen has a considerable enhancement on the meristematic activity. Also nitrogen plays an important role in photosynthetic process due to that nitrogen acts as an essential element for chlorophyll structure, it may affect cell division and cell elongation and acts as precursor of protein synthesis. Also phosphorus could be related to the fundamental role of phosphorus in enzymatic reactions that depend on phosphorylation. Also, phosphorus is the source of cell energy needed for all physiological processes in the plant, and it is very important for carbohydrates transformation and essential for the cell nucleus and cell division. Russell and Martin (1949) confirmed this statement by using radio active phosphorus (P32) on young barley plants. They found that, the actively growing meristematic cells in both leaf and root contained phosphorus, from several hundred to several thousand times, more than the cell that had ceased to divide at the mean time. Potassium plays an important role for the water balance in the plant and carbohydrate formation especially storage of the starch through translocation of carbohydrate from the aerial parts to the roots.

Table (1): Effect of N, P and K fertilization treatments on some vegetative growth parameters of Gerbera jamesonii L. plants (aged one year) during the first and second seasons (2002/2003 and 2003/2004).

					,		Fresh weight of	eight of	Dry weight of	ight of
3	Number of leaves /	er of leaves /	Length of leaves / plant (cm)	f leaves / (cm)	Number of offsets plant	of offsets /	vegetative parts	e parts/	vegetative parts	e parts/
Treatments			•		ď.		prant (g)	(8)	Dianit (E)	1 2
	First	Second	First	Second	First	Second	First	Second	First	Second
	season	season	season	season	season	season	season	season	season	season
Control	23.00	24.33	29.33	29.00	3.33	3.67	83.00	86.33	7.96	8.16
N ₁ 100g/plot	25.67	27.33	33.67	33.33	6.67	3.50	19.98	00.06	9.38	9.61
N ₂ 150g/plot	33.67	35.00	36.00	35.67	3.50	3.83	92.00	95.67	9.87	10.12
N ₃ 200g/plot	40.00	42.00	32.00	33.00	4.33	4.76	101.67	105.72	13.01	13.33
P ₁ 100g/plot	32.67	35.00	30.88	32.00	3.50	3.83	83.67	87.00	8.45	99.8
P ₂ 150g/plot	32.33	33.33	30.00	29.67	3.83	4.17	85.00	88.33	8.60	8.82
P ₃ 200g/plot	34.00	35.33	30.33	30.00	3.50	3.83	82.33	85.60	8.33	8.54
K, 100g/plot	23.33	24.67	29.99	30.00	4.17	4.17	85.33	88.74	8.19	8.39
K ₂ 150g/plot	23.00	25.33	31.33	31.33	3.17	3.33	86.00	89.44	8.07	8.27
K ₃ 200g/plot	23.67	25.00	31.00	31.00	3.83	3.00	92.67	96.37	7.84	8.03
N ₁ P ₁ K ₁	38.33	38.67	37.00	36.67	5.33	6.17	112.00	116.50	13.85	14.20
N ₂ P ₁ K ₁ 200:100:100 g/plot	44.67	44.00	32.00	32.33	6.17	5.83	121.33	126.18	15.72	15.94
L.S.D. at 5%	3.62	3.97	5.08	5.02	1.64	1.71	6.94	7.22	1.48	1.52

Table (2): Effect of N, P and K fertilization treatments on some vegetative growth parameters of Gerbera jumesonii L. plants (aged two year) during the first and second seasons (2003/2004 and 2004/2005).

					The state of the s					
-	Number of leaves	of leaves /	Length of leaves	f leaves /	Number of offsets	of offsets /	Fresh w	Fresh weight of	Dry we	Dry weight of
Treatments	pli	plant	plant (cm)	(cm)	ple	plant	vegetative parts	tative parts / plant (g)	vegetative parts	/e parts / t (g)
	First	Second	First	Second	First	Second	First	Second	First	Second
	season	season	season	season	season	season	season	season	season	season
Control	34.67	35.67	36.00	37.00	6.33	6.67	201.67	209.67	24.28	24.77
N ₁ 100g/plot	36.00	37.67	40.00	40.67	19.9	7.00	234.00	243.33	24.70	25.19
N ₂ 150g/plot	47.67	50.33	44.67	43.67	7.00	7.33	416.67	400.00	47.76	46.71
N ₃ 200g/plot	51.67	53.00	38.67	39.00	8.33	8.67	371.67	386.53	45.79	44.87
P ₁ 100g/plot	40.67	39.67	38.33	38.67	7.00	7.33	223.67	231.92	23.75	24.23
P ₂ 150g/plot	47.00	51.00	35.00	36.33	7.33	7.67	211.67	220.14	21.14	22.20
P ₃ 200g/plot	49.67	52.00	39.00	40.99	7.00	7.33	242.33	252.00	26.85	27.39
K ₁ 100g/plot	43.00	45.33	39.00	38.33	1.67	7.67	291.67	303.33	25.04	25.54
K ₂ 150g/plot	36.67	39.33	41.33	42.00	2.67	6.33	295.00	306.80	25.31	25.82
K ₃ 200g/plot	45.00	47.00	40.67	40.67	5.33	00.9	292.00	303.67	24.58	25.07
N ₁ P ₁ K ₁ 100:100:100 g/plot	55.00	29.00	46.00	45.33	10.33	11.67	572.00	538.33	59.68	58.48
N ₂ P ₁ K ₁ 200:100:100 g/plot	53.00	56.33	44.33	41.00	11.67	11.33	440.00	436.40	53.35	52.28
L.S.D. at 5%	7.93	8.17	3.06	3.04	1.72	1.75	51.84	53.91	4.65	4.74

4.1.2. Flowering parameters:

4.1.2.1. Number of flower heads / plant:

According to data presented in Table (3) on mean of number of flower heads per plant as affected by using chemical fertilization treatments, it could be concluded that N_2 : P_1 : K_1 (200:100:100 g/plot) gave the maximum mean number of inflorescences per plant as 10.33 and 9.67 in the first and second seasons with plants of one year old, respectively. While N_1 : P_1 : K_1 at 100:100:100 g/plot gave the next as 9.33 and 9.00 inflorescences, respectively. However, N_2 at 150 g/plot gave the third rank of number of inflorescences / plant.

On the other hand, untreated plants and those received 200 g K/plot gave the minimum number of inflorescences per plant in the first and second seasons.

As for the two years-old plants, data in Table (4) showed that, $N_1P_1K_1$ (100 : 100 : 100 g/plot) and $N_2P_1K_1$ (200 : 100 : 100 g/plot) gave the greatest number of flower heads per plant, while N_2 at 150 g/plot was in the second rank in this respect in both seasons. Whereas, the lowest mean number of inflorescences per plant was resulted from untreated plants (control) and K_1 (100 g/plot). However, the differences between treatments were in most cases significant in both seasons.

In both seasons treating *Gerbera jamesonii* L. plant of one year-old with $N_2P_1K_1$ and $N_1P_1K_1$ for two years-old plants appeared to be the most effective treatments for inducing the maximum number of flower heads per plant when compared with other chemical fertilizers and control.

The above results of number of flower heads per plant are in agreement with those obtained by Kamel et al. (1977) on Gerbera jamesonii var "Superba" who stated that, NPK at the highest rate produced the highest number of inflorescences per plant, Nasr (1997) on gerbera stated that, supplying plants with NPK increased significantly the flower production per plant, Akbar and Rao (1982) pointed that, biomonthly foliar application of NPK at 2.5: 1.5: 1.5 g/plant of 1-year "Edward" roses plant gave the highest flower yield / plant, Bhattacharjee (1983) on Jasminum grandiflorum L. reported that, the highest flower yield was obtained with NPK at 100: 150: 100 g/plant annually, Jhon et al. (1984) on pansy obtained the maximum flower yield with NPK at 20:5:5 g/m², and Jhon and Paul (1992) on globe amaranth, supplied the plants with N at 100 and 200 kg/ha, 100 kg P₂O₅ / ha and 100 kg K₂O / ha, and found that increasing N rate increased significantly the number of flowers.

4.1.2.2. Diameter of flower head / plant:

With respect to the effect of NPK fertilization on diameter of flower head of gerbera plants it was significantly increased by most additions of fertilization treatments as shown in Table (3). The treatments of $N_2P_1K_1$ (200 : 100 : 100 g/plot), $N_1P_1K_1$ (100 : 100 : 100 g/plot) and N3 at 200 g/plot significantly increased the diameter of flower heads of one year old plants in both seasons. While, untreated plants and addition of P at any concentration gave the lowest diameter of flower head in two seasons.

On the other hand, the plants of two years-old, as shown in data presented in Table (4) recorded that, N1 at 100 g/plot, N2 at 150 g/plot, N₁P₁K₁ and N₂P₁K₁ gave the largest diameter of flower

in both seasons. The increase in the diameter was significant comparing with control or phosphorus treatments.

However, in both seasons under the two ages treating gerbera plants with NPK at (100: 100: 100 g/okit or at 200: 100: 100 g/plot) or N1 at 100 g/plot appeared to be the most effective treatments for increasing the diameter of flower heads compared with other treatments and control.

4.1.2.3. Length of flower head stem / plant (cm):

Data of length of flower head stem of Gerbera jamesonii L. as affected by some chemical fertilizer treatments in the first and second seasons are averaged in Table (3). Data showed that, the length of flower head stem (with one year old) was greatly increased by using N₃ at 200 g/plant as gave the longest stem as it registered 38.33 cm and 37.00 cm in the first and second seasons, respectively, followed descendingly by using N2 at 150 g/plot which gave 36.67 and 35.00 cm in both seasons, respectively, followed by the value resulted from N₁P₁K₁ (100: 100: 100 g/plot). Concerning two years old of gerbera plant, data presented in Table (4) showed that, $N_1P_1K_1$ (100 : 100 : 100 g/plot) resulted in the highest increase in the length of flower head stem which gave 59.67 cm, 57.33 cm in both seasons, respectively, followed by N₃ (200 g/plot) which gave the 51.33 and 50.67 cm in two seasons, respectively. Whereas the minimum length of flower head was resulted from P1 (100 g/plot) in both seasons.

The above results of length of flower head stem are in agreement with those obtained by **Borrelli (1981)** on roses cv. "Baccarra" who mentioned that, stem length increased with

increasing N from 0 to 750 kg/ha., **Afify (1985)** on gladiolus, found that NPK at the rate 20 : 10: 15+ trace elements produced the longest flowering stem, and **Nasr (1997)** on gerbera, who found that treating plants with NPK was the most effective in increasing stalk length.

4.1.2.4. Thickness of flower head stem / plant (cm):

According to data presented in Table (3) on thickness of flower head stem as affected by using chemical fertilization treatments, they revealed that, $N_2P_1K_1$ (200 : 100 : 100 g/plant) gave the thickest stems as 0.523 and 0.543 cm in the first and second seasons, respectively with plants of year old followed by N_2 (150 g/plot) which gave 0.497 and 0.515 cm in both seasons, respectively in this concern. However, $N_1P_1K_1$ (100: 100: 100 g/plot) was in the third rank for the flower stem diameter.

On the other hand, untreated plants (control) and those which received 100 g P or 100 g K/plot gave the thinnest flower head stem in the first and second seasons.

As for the two years-old of plants data in Table (4) showed that, $N_2P_1K_1$ (200 : 100 : 100 g/plot) gave the thickest flower stem, while $N_1P_1K_1$ (100 : 100 : 100 g/plot) was in the second rank in this respect in both seasons. Whereas, the lowest value was resulted from untreated plants (control) and K1 (100 g/plot). However, the differences between treatments were significant in both seasons.

In both seasons, *Gerbera jamesonii* L. plants of one or two years old which received $N_2P_1K_1$ complete fertilizer appeared to be the most effective treatment for inducing the thickest flower head stem when compared with other treatments or control.

4.1.2.5. Fresh and dry weights of flower heads / plant (g):

Data of fresh weight of flower heads / plant as affected by some treatments of chemical fertilization in the first season are averaged in Table (3). Data showed that, the fresh weight of flower head was greatly increased by addition of $N_1P_1K_1$ (100 : 100 : 100 g/plot) and $N_2P_1K_1$ (200 : 100 : 100 g/plot) as caused a significant increase in this character in both seasons over control.

As for dry weight of flower heads / plant, data in the same Table (3) showed that, the highest value resulted with $N_2P_1K_1$ (200 : 100 : 100 g/plot) to plants of one year old, and reached 4.79 and 4.98 g in the first and second seasons, respectively, while $N_1P_1K_1$ (100 : 100 : 100 g/plot) was in the second rank in this respect in both seasons, the increase was significant comparing with any other treatments and control.

Generally, the heaviest fresh and dry weights of flower heads / plant was obtained by using the complete fertilizer of $N_1P_1K_1$ or $N_2P_1K_1$ in the first and second seasons.

Concerning the effect of the chemical fertilization on the plants of two years old, data in Table (4) revealed that, the heaviest fresh weight of flower heads / plant was recorded from using $N_1P_1K_1$ treatment, followed by using $N_2P_1K_1$.

As for dry weight of flower heads, data in the same Table recorded that, the results of dry weight attained a parallel trend as fresh weight in both seasons.

The above results of fresh and dry weights of flower heads are in parallel with those obtained by Nasr (1997) on gerbera, who stated that, supplying plants with NPK either alone or combined

with trace elements increased fresh and dry weight of inflorescence, Habib (1992) on *Pelargonium peltatum* found that the heaviest flowers were obtained from plants treated with NPK at 2: 1: 2, 2: 1: 1 and 1: 1: 2, and the heaviest dry weights of flowers were obtained from NPK at 2: 1: 2, **Jhon and Paul (1992)** on globe amaranth, found that, supplying the plants with NPK at 200: 100: 100 kg/ha increased significantly the number and weight of flowers, and **Adham (1997)** on *Rosa polyantha*, found that, NPK at 2: 1: 1 was the most favourable treatment concerning fresh and dry weight of flowers.

Since, fertilizer application of $N_1P_1K_1$ (100: 100: 100 g/plot) or $N_2P_1K_1$ (200: 100: 100 g/plot) kept elements percentage nearly constant in soil or fertilizer application may replace those observed by the gerbera plants. Also, fertilizer application may improve pH and make it suitable for vigorous growth of the fertilized plants. Meantime, the rates of N, P and K were suitable for growth and ammonium nitrate has its role in protein metabolism which reflects on all vital processes as well as growth and flowering.

Table (3): Effect of N, P and K fertilization treatments on some flowering parameters of Gerbera jamesonii L. plants (one year-old) during the first and second seasons (2002/2003 and 2003/2004).

	Num	Number of	Diameter of	ter of	17		Thicki	Thickness of	Fresh w	Fresh weight of	Dry we	Dry weight of
2	flower	flower heads /	flower head	. head	Length of Hower	i Hower	flower	flower head	flower	flower heads &	flower heads &	neads &
Treatments	pls	plant	(cm)	n)	neau su	(min) min	stem (cm)	(cm)	stem/p	stem / plant (g)	stem / plant (g)	lant (g)
	First	Second	First	Second	First	Second	First	Second	First	Second	First	Second
	season	season	season	season	season	season	season	season	season	season	season	season
Control	00.9	6.33	5.09	5.50	28.00	28.67	0.377	0.392	22.00	22.00	2.43	2.52
N ₁ 100g/plot	1.67	7.67	79.7	7.33	29.33	29.33	0.453	0.471	25.67	25.67	2.84	2.95
N ₂ 150g/plot	8.00	8.33	7.33	7.67	36.67	35.00	0.497	0.515	28.00	27.67	3.16	3.20
N ₃ 200g/plot	6.33	6.67	8.33	8.50	38.33	37.00	0.468	0.486	26.00	26.00	2.98	3.00
P ₁ 100g/plot	19.9	7.00	5.00	2.67	28.33	29.33	0.369	0.383	22.33	22.67	2.68	2.78
P ₂ 150g/plot	7.00	7.33	5.00	5.50	30.00	31.00	0.432	0.450	23.00	24.33	3.30	3.43
P ₃ 200g/plot	7.33	79.7	5.33	5.67	28.00	29.67	0.474	0.492	28.09	29.38	3.57	3.71
K ₁ 100g/plot	19.9	29.9	29.9	7.08	31.67	32.33	0.325	0.338	22.67	22.00	2.21	2.29
K ₂ 150g/plot	7.00	6.67	6.33	6.67	26.33	28.33	0.398	0.413	24.67	25.00	2.90	3.02
K ₃ 200g/plot	00.9	6.33	7.33	90.8	28.33	29.67	0.461	0.480	25.00	25.33	2.23	2.32
N ₁ P ₁ K ₁ 100:100:100 g/plot	9.33	9.00	8.83	8.99	32.00	33.00	0.492	0.510	30.67	31.33	4.29	4.46
N ₂ P ₁ K ₁ 200:100:100 g/plot	10.33	29.6	9.90	80.6	31.87	31.69	0.523	0.543	29.00	30.00	4.79	4.98
L.S.D. at 5%	1.92	1.87	1.93	1.83	6.30	6.30	0.050	0.060	3.02	3.38	` 0.44	0.46

Table (4): Effect of N, P and K fertilization treatment on some flowering parameters of Gerbera jamesonii L. plants (two years-old) during the first and second seasons(2003/2004 and 2004/2005).

	Name and Address of the Owner, where the Owner, which is the Owner, where the Owner, which is the Owner, where the Owner, which is the Owner, whi	The second name of the second										
	Num	Number of	Diame	Diameter of	Tonatho	f flormon	Thick	Thickness of	Fresh w	Fresh weight of	Dry we	Dry weight of
Treatments	flower pl	flower heads / plant	flower h (cm)	flower head (cm)	head stem (cm)	head stem (cm)	flower hea	flower head stem (cm)	flower heads	heads/	flower heads	heads /
	First	Second	First	Second	First	Second	First	Second	First	Second	First	Second
	season	season	season	season	season	season	season	season	season	season	season	season
Control	8.33	9.00	5.33	5.30	41.33	41.00	0.387	0.402	23.00	25.00	2.64	2.75
N ₁ 100g/plot	11.67	12.00	8.67	8.33	42.67	43.33	0.501	0.520	24.00	25.33	3.02	3.14
N ₂ 150g/plot	13.00	13.00	8.09	8.00	48.33	49.00	0.539	0.557	27.33	28.67	4.01	4.17
N ₃ 200g/plot	11.00	11.00	00.9	29.9	51.33	20.67	0.512	0.532	26.33	27.00	3.69	3.84
P ₁ 100g/plot	11.33	11.33	2.67	00.9	35.67	38.33	0.408	0.424	26.67	27.33	2.86	2.97
P ₂ 150g/plot	10.33	11.00	2.67	00.9	41.00	41.00	0.503	0.523	23.67	27.00	4.47	4.65
P ₃ 200g/plot	29.6	10.33	00.9	6.33	42.67	44.00	0.486	0.505	32.67	31.67	4.86	5.05
K ₁ 100g/plot	8.67	00.6	7.33	7.00	46.67	47.33	0.396	0.410	26.33	27.00	2.32	2.41
K ₂ 150g/plot	9.00	10.00	6.33	7.00	40.00	41.67	0.417	0.433	28.00	29.67	2.75	2.86
K, 200g/plot	9.00	10.33	7.67	7.67	41.33	42.33	0.452	0.470	27.00	29.33	2.92	3.04
N ₁ P ₁ K ₁ 100:100:100 g/plot	13.99	13.67	8.18	8.40	29.62	57.33	0.585	809.0	39.33	38.67	5.60	5.82
N ₂ P ₁ K ₁ 200:100:100 g/plot	13.67	13.33	8.09	8.38	20.67	49.99	0.596	0.619	32.67	33.67	5.48	5.69
L.S.D. at 5%	1.52	1.56	2.01	2.11	6.72	7.01	080.0	0.090	3.82	4.03	0.52	0.54
	STREET, STREET	The Party and Published the Party and Published to Street, or other Published to Street, or othe	STREET, SQUARE, SALLOW,	STATE OF THE PERSON NAMED IN		STATE OF STREET, SQUARE, STREET, SQUARE, SQUAR	The second secon	Complete Com	Commence of the last of the la			

4.1.3. Root system parameter:

4.1.3.1. Fresh weight of roots / plant (g):

According to data presented in Table (5) on the fresh weight of roots per plant (aged one year) as affected by using some chemical fertilizers treatments, it could be concluded that $N_2P_1K_1$ (200: 100: 100 g/plot) gave the heaviest weight of roots per plant as 72.00 and 74.88 g in the first and second seasons, respectively. While P_1 (100 g/plot) in the 1^{st} season, $N_1P_1K_1$ (100: 100: 100 g/plot) in the 2^{nd} season gave the next fresh weight as 71.67 g. However, N_3 (200 g/plot) gave the third value in this respect.

On the other hand, K_1 (100 g/plot), K_3 (200 g/plot) treatments and untreated plants (control) gave the lightest weight of roots per plant in both seasons.

As for the two years old plants, data presented in Table (6) showed that, $N_1P_1K_1$ (100 : 100 : 100 g/plot) gave the heaviest fresh weight of roots per plant as 445.00 and 427.00 g in the first and second seasons, respectively. While, $N_2P_1K_1$ in the first season, N_3 in the second season gave the second heaviest fresh weight of roots.

The differences between treatments were significant in both seasons. With the two seasons *Gerbera jamesonii* L. plants (one year-old) supplied with $N_2P_1K_1$ and $N_1P_1K_1$ for two years-old appeared to be the most effective treatments for increasing the fresh weight of root system when compared with other chemical fertilizers and control.

4.1.3.2. Dry weight of roots / plant (g):

With respect to the effect of NPK and phosphorus fertilization on the dry weight of roots of gerbera plants it was significantly increased as shown in Table (5). The rates of $N_2P_1K_1$ (200 : 100 : 100 g/plant), $N_1P_1K_1$ (100 : 100 : 100 g/plot) and P_3 (200 g/plot) significantly increased the dry weight of roots with one year old of plants in both seasons. While K_3 (200 g/plot) and control gave the lowest dry weight of roots in the two seasons.

On the other hand, the plants of two years-old, data in Table (6) showed that, $N_1P_1K_1$ (100: 100: 100 g/plot) gave the significant increment in the dry weight of roots in both seasons. Also $N_2P_1K_1$ and N_3 (200 g/plot) was in the second rank in this respect. However, in both seasons under one or two years aged, treating gerbera plants with $N_1P_1K_1$ or $N_2P_1K_1$ and N_3 were the most effective treatments for inducing the heaviest dry weight of roots compared with other chemical fertilizer treatments and control.

The above results of fresh and dry weight of roots agree with those obtained by Volpi and Farina (1987) on Gerbera jamesonii "hybride" who found that, NPK was the most efficient fertilizer, Habib (1992) on Pelargonium peltatum found that, NPK treatment at 1: 1: 2 and 1: 1: 1 gave the highest fresh and dry weight of roots, Arambewela et al. (1993) on Catharanthus roseus reported that, minor elements treatment increased dry matter content of roots, NPK resulted in the highest dry matter. On the other hand Egilla and Davies (1995) on Hibiscus rosa-sinensis stated that potassium application caused a decrease in total plant dry matter and the high rate was more effective than the low rate.

Such increase in root characteristics due to the complete fertilization could be attributed to the promotive effects of this treatment on vegetative growth. Since these treatments play direct or indirect role in accumulation of dry matter in root leading to the increase in root parameters. This accumulation of dry matter formed in the upper ground parts may lead to the activation of the anabolic processes in these organs by the aid of these treatments.

Table (5): Effect of N, P and K fertilization treatmentson the fresh and dry weights of root system of *Gerbera jamesonii* L. plants (aged one year) during the first and second seasons (2002/2003 and 2003/2004).

	Fresh v	veight of	Dry weig	ht of roots
Treatments	roots /	plant (g)	/ pla	nt (g)
	First	Second	First	Second
	season	season	season	season
Control	58.67	61.02	7.16	7.37
N ₁ 100g/plot	61.00	63.44	7.49	7.64
N ₂ 150g/plot	63.33	65.86	8.07	8.23
N ₃ 200g/plot	67.33	70.02	7.59	7.74
P ₁ 100g/plot	71.67	70.52	8.68	8.85
P ₂ 150g/plot	67.33	70.02	8.20	8.36
P ₃ 200g/plot	66.67	69.34	8.75	8.92
K ₁ 100g/plot	58.00	60.32	7.20	7.34
K ₂ 150g/plot	60.67	63.09	7.31	7.46
K ₃ 200g/plot	58.33	60.66	7.02	7.16
N ₁ P ₁ K ₁ 100:100:100 g/plot	69.00	71.76	9.29	9.47
N ₂ P ₁ K ₁ 200:100:100 g/plot	72.00	74.88	9.79	9.98
L.S.D. at 5%	9.57	9.95	1.53	1.56

Table (6): Effect of N, P and K fertilization treatments on the fresh and dry weights of root system of *Gerbera jamesonii* L. plants (aged one year) during the first and second seasons (2003/2004 and 2004/2005).

	Fresh w	eight of	Dry weigh	t of roots
Treatments	roots / p	lant (g)	/ plar	ıt (g)
	First	Second	First	Second
	season	season	season	season
Control	191.33	210.33	22.53	23.20
N ₁ 100g/plot	205.00	202.89	20.22	21.62
N ₂ 150g/plot	321.00	333.84	35.87	36.59
N ₃ 200g/plot	371.33	386.18	40.73	41.54
P ₁ 100g/plot	203.67	211.82	26.93	27.47
P ₂ 150g/plot	366.00	380.64	39.16	39.94
P ₃ 200g/plot	307.33	319.62	30.42	31.46
K ₁ 100g/plot	287.33	298.82	27.44	27.98
K ₂ 150g/plot	223.33	232.26	23.92	24.39
K ₃ 200g/plot	238.67	248.22	23.90	24.38
N ₁ P ₁ K ₁ 100:100:100 g/plot	445.00	427.33	45.91	43.91
N ₂ P ₁ K ₁ 200:100:100 g/plot	396.67	380.80	41.20	40.38
L.S.D. at 5%	46.61	48.47	3.83	3.91

4.1.4. Chemical composition:

4.1.4.1. Nitrogen percentage (N%):

According to data presented in Table (7) on the nitrogen percentage, in the parts of gerbera plants, as affected by using chemical fertilizer treatments, it could by concluded that, treating plant with N at 150 or 200 g/plot and $N_2P_1K_1$ 200: 100: 100 g/plot gave the maximum percentage of nitrogen content in all plant parts (leaves, flowers and roots). The highest value in the leaves (3.70%) was recorded with N_3 at 200 g/plot followed by the value recorded with N_2 at 150 g/plot, then the value resulted from $N_2P_1K_1$ in both seasons for plant of one aged year.

On the other hand, untreated plants gave the minimum nitrogen percentage in the first and second seasons.

As for plants of two years old, the data in the Table (8) showed, the same trend of results to plants have of one year. The highest nitrogen percentage was recorded with 200 g N/plot followed by 1500 g N/plot then $N_2P_1K_1$ 200: 100 g/plot.

In both seasons treating *Gerbera jamesonii* L. plants (aged one or two years) with the high rate or nitrogen or N₂P₁K₁ appeared to be the most effective treatments for increasing nitrogen percentage in all parts of plant. The above results agree with those obtained by Frett *et al.* (1985) on *Petunia hybrida*, Adham (1997) on carnation, who found that, the nitrogen percentage in leaves, stems and flowers was increased due to the medium and high levels of N fertilizer used, while Rezkalla (1999) on *Ficus microcarpa*,

reported that, treating plants with NPK at 2: 1: 1 increased nitrogen percentage in the leaves and roots.

4.1.4.2. Phosphorus percentage (P%):

Data in Table (7) showed the effect of fertilizer treatments on the phosphorus percentage in the parts of gerbera plants. In both seasons, for the plants aged one year, the results showed that, treating plants with P fertilization increased the concentration of phosphorus in the leaves, flowers and roots, as the rate of P_3 at 200 g/plot gave the highest percentage of P in the leaves and roots, but in the flowers in both seasons, the maximum P% resulted from $N_1P_1K_1$ 100 : 100 : 100 g/plot and $N_2P_1K_1$ 200: 100 : 100 g/plot as recorded 0.641 and 0.568%, respectively against 0.506% for untreated plants (control).

For the plants aged two years old, the data in Table (8) recorded that, increasing P level increased the percentage of P in the leaves and roots, while in the flowers, $N_1P_1K_1$ mixed at 100: 100 ± 100 g/plot gave the highest concentration of phosphorus in both seasons.

On the other hand increasing N fertilization, decreased P% in the leaves while increased P% in both flowers and roots comparing with control plants.

These results were in agreement with other authors as Anuradha et al. (1988) on marigold who found that, content of P increased significantly with increasing P₂O₅ application rate, Owais (1970) on Viola odorata, reported that NPK at 2: 2: 1 increased P

content in the above ground parts and roots than in the control, Zal'Tsfas and Chemarin (1974) on rose, mentioned that, application of P₂O₅ at 120 and 180 kg/ha increased P content of both vegetative and reproductive plant organs, El-Leithy (1987) on Tagetes patula, found that, NPK treatment at medium and high levels increased P concentration in the whole plant, El-Shamey (1988) on violet, El-Kiey and El-Mana (1989) on Chlorophytum comosom, Philodendron oxycardium and Monestra deliciosa, reported that NPK mixture increased the content of P in plant tissues. However, Frett et al. (1985) on Petunia hybrida, found that, increasing N concentration increased N while decreased P.

Table (7): Effect of N, P and K fertilization treatments on the nitrogen and phosphorus percentages of gerbera plants (aged one year) during the first and second seasons.

01)				10.0								
			70 N	/0					Ь %	.0		
Plant part					1		(I	First season		Se	Second season	n
/	-	First season		ñ	Second season		~ 1	i		I corroe	Flowers	Roots
Treatments	I payes	Flowers	Roots	Leaves	Flowers	Roots	Leaves	Flowers	Koots	Leaves	rioners	0000
	Carc	1.64	270	245	1.60	2.74	0.461	905.0	0.371	0.411	0.501	0.366
Control	2.50	1.04	2.17	1 2	7 51	3.07	0 484	0.495	0.383	0.478	0.491	0.378
N, 100g/plot	3.20	2.56	3.12	3.10	1.7.7		0.150	0.518	0360	0 445	0.513	0.354
N. 150a/nlot	3.66	2.58	3.24	3.61	2.43	5.20	0.430	0.710	0000		0.532	0.122
142 130g/proc	0000	276	3 54	3.64	2.71	3.49	0.422	0.528	0.427	0.41/	0.323	0.477
N ₃ 200g/plot	5.70	7.70		2 0 1	3.08	19 6	0.528	0.540	0.563	0.524	0.535	0.558
P ₁ 100g/plot	2.86	2.13	7.00	7.01	7.00		1,530	1 563	0.427	0.530	0.559	0.422
D 150a/nlot	2 94	2.01	2.41	2.90	1.96	75.7	0.034	000	0.1	000	0750	0 650
12 120g/proc	i	1 55	275	2 90	1.50	2.70	0.574	0.573	0.661	0.565	0.300	0.03
P ₃ 200g/plot	2.95	0.1	2.73	7:70		7	7710	0.484	0360	0.462	0.479	0.355
100a/plot	274	2.16	2.79	2.69	2.12	7.74	0.40	101.0	0000		1030	0342
N 100g/proc	i	700	2 01	3.05	2.19	2.86	0.484	0.506	0.348	0.479	100.0	7+0.0
K ₂ 150g/plot	3.10	7.74	4:21	2 -	736	787	0.495	0.510	0.382	0.489	0.506	0.377
K, 200g/plot	3.16	2.41	2.92	3.11	2.30	7.0.7				27.0	3670	0.460
N.P.K.	0.07	216	3.00	2.82	2.11	2.95	0.460	0.641	0.395	0.465	0.000	0.100
100:100:100 g/plot	7.07	2.10	20:0				0,1	0750	9010	0.435	0.563	0.420
$N_2P_1K_1$	3.25	2.45	3.15	3.20	2.41	3.10	0.439	0.200	0.41.0	20.00	-	
200:100:100 g/plot												

Table (8): Effect of N, P and K fertilization treatments on the potassium and total carbohydrate percentages of gerbera plants (aged one year) during the first and second seasons.

						The state of the s	The second named in column 2 is not the owner, the second named in column 2 is not the second named in	STREET, SQUARE, SQUARE				
Plant part			K	K%				I	otal carbo	Total carbohydrates %	%	
F		First season	1	Š	Second season	nc		First season			Socond Socood	1
reatments	Leaves	Flowers	Roots	Leaves	Flowers	Roots	I Pavec	Flowere	Dogte	2	ccomu seas	
Control	2.08	1.77	1.15	2.03	1 73	1 10	2 44	2 60	NOOUS	Leaves	Flowers	Roots
N 400 '				Soii	2::	1.10	74.7	2.00	7.34	2.34	2.57	7.23
N ₁ 100g/plot	2.11	1.98	1.16	2.07	1.94	1.12	2.79	2.91	7.56	2.69	2.80	745
N ₂ 150g/plot	2.19	2.11	1.15	2.14	2.06	1.10	2.91	3.02	8.63	2.80	2 92	C 2 8
N ₃ 200g/plot	2.30	2.08	1.21	2.26	2.04	1.17	3.37	4.07	11.05	3.27	3 97	10.84
P ₁ 100g/plot	1.98	1.66	1.09	1.93	1.61	1.05	2.68	2.86	737	7 5 7	276	70.01
P ₂ 150g/plot	1.87	1.84	1.12	1.83	1.79	1.07	3.72	4.07	7.56	3.62	3.06	7.15
P ₃ 200g/plot	1.87	1.56	1.02	1.82	1.52	1.02	2.91	3.37	8 84	2.02	3.77	0.72
K ₁ 100g/plot	2.29	2.04	1.18	2.25	2.01	1.16	246	95 6	7.33	200.2	74.0	0.73
K ₂ 150g/plot	2.38	2.11	1.33	2.34	2.08	1.29	2.41	2.50	6.05	2.33	C+.4 C+ C	7.77
K ₃ 200g/plot	2.72	2.18	1.49	2.68	2.14	1.44	2.34	1.86	5.46	2.23	1.76	5.36
N ₁ P ₁ K ₁ 100:100:100 g/plot	2.26	1.98	1.15	2.21	1.94	1:11	3.26	4.19	8.02	3.15	4.08	7 97
N ₂ P ₁ K ₁ 200:100:100 g/plot	2.49	2.26	1.46	2.45	2.21	1.41	4.07	4.54	8.33	3.96	4.13	8.21

4.1.4.3. Potassium percentage (K%):

From the Tables (9 & 10) the data recorded that, increasing K fertilization to high level of 200 g/plot and N₂P₁K₁ 200: 100: 100 g/plot increased K % in all parts of plant over the other treatments in both seasons for plants of one or two years-old. While, phosphorus treatment and untreated plants gave the minimum value. In this concern **Owais** (1970) on *Viola odorata*, **El-Leithy** (1987) on *Tagetes patula*, **El-Shamey** (1988) on violet, **Abou-Dahab** (1992) on *Chlorophytum comosum*, and **Rezkalla** (1999) on *Ficus microcarpa*, indicated that, NPK treatment increased K content especially with increasing nitrogen rate in the fertilizer mixture.

4.1.4.4. Total carbohydrates %:

Data of total carbohydrates % in the parts of plants one year-old, as affected by some chemical fertilization treatments in the first and second seasons are averaged in Table (9). Data showed that, total carbohydrates percentage in leaves and flowers was greatly increased by addition of $N_2P_1K_1$ (200: 100: 100 g/plot), while the percentage of total carbohydrate in roots was greatest with the treatment of N_3 at 200 g/plot which gave 11.05, 10.84 in first and second seasons, respectively.

As for the plants aged two years, data in Table (10) showed that, the highest total carbohydrates in the leaves and flowers resulted form plants treated with $N_2P_1K_1$ 200: 100: 100 g/plot which gave 3.70, 3.99% in the first season, and 3.60 and 3.89% in the leaves and flowers in the second season, respectively. While the root content of carbohydrate was the highest with N_3 treatment at

200 g/plot, than any other treatments in both seasons. In this concern, Migahed (1982) on Jasminum sambac found that, the higher doses of N increased the total carbohydrates content giving the highest flower yield, Abou Dahab (1992) on Chlorophytum comosum reported that, NPK treatment at 2: 1: 1 was the most effective treatment for increasing the total carbohydrate content in the leaves and El-Fadaly (1994) on Jasminum sambac indicated that, most of the NPK ratios tended to increase the content of total carbohydrates and nitrogen in the different plant parts.

Table (9): Effect of N, P and K fertilization treatments on the nitrogen and phosphorus percentages of gerbera plants

(aged two years) during the first and second seasons.

									% d	%		
Plant part			% Z	%								
	1	First season	1000	Š	Second season	u	H	First season		Se	Second season	un l
Treatments	I paype	Flowers	Roots	Leaves	Flowers	Roots	Leaves	Flowers	Roots	Leaves	Flowers	Roots
Control	2 67		2.77	2.62	1.20	3.71	0.379	0.426	0.344	0.374	0.420	0.339
N 100g/plot	3 38	2 14	3.16	3.33	2.09	3.11	0.388	0.403	0.349	0.383	0.398	0.344
N 150c/plot	3.85	200	3.35	3.80	2.21	3.31	0.370	0.428	0.340	0.365	0.423	0.335
N 2002/plot	4.01	2 69	3.83	3.96	2.64	3.78	0.367	0.463	0.387	0.362	0.458	0.382
n ₃ 200g/piot	707	1 8 1	2.70	2.91	1.76	2.65	0.465	0.487	0.469	0.460	0.482	0.464
r, 100g/piot	2.01	1 74	2 44	2.96	1.69	2.40	0.469	0.495	0.412	0.464	0.490	0.408
F ₂ 150g/piot	20.0	1.15	376	3.01	1 09	2.72	0.503	0.501	0.523	0.498	0.496	0.519
P ₃ 200g/piot	5.00	C1.1	21.10	50.0	1 73	271	0 384	0.425	0.340	0.379	0.420	0.335
K ₁ 100g/plot	2.87	1.//	7.70	70.7	1.73	77.7		000	0 2 40	0 387	DCD 0	0 334
K, 150g/plot	2.92	1.90	2.87	2.88	1.85	2.82	0.392	0.429	0.340	1000	171.0	200
K, 2000/nlot	2.99	2.05	2.92	2.94	2.01	2.87	0.411	0.431	0.352	0.406	0.426	0.347
N,P,K,	3.10	2.11	3.02	3.05	2.06	3.00	0.402	0.527	0.396	0.397	0.521	0.391
100:100:100 g/plot N2P1K1	3.77	2 14	3.27	3.23	2.09	3.22	0.380	0.489	0.398	0.375	0.484	0.393
200:100:100 g/plot		7.7										

Table (10): Effect of N, P and K fertilization treatments on the potassium and total carbohydrate percentages of gerbera plants (aged two years) during the first and second seasons.

2			TOP TO SELECT THE PERSON NAMED IN									
Klant part			Y	K %					Potol oach	h		
/ E		First season	u		Second season	000			votal carbonydrates %	uyarates	%	
I reatments	Leaves	Flowere	1	-				First season	u	S	Second season	uc
Contino		41011513	MOOUS	Leaves	Flowers	Roots	Leaves	Flowers	Roots	Leaves	Flowers	Doote
Courtrol	1.97	1.76	1.21	1.93	1.72	1.18	2.22	2.52	6 04	2 1 1	2000	MOOUS
N ₁ 100g/plot	2.09	1.87	1.23	2.05	1 83	1 10	07.0		10.0	7.11	74.7	6.84
N ₂ 150g/plot	214	212	1 24			(1.1)	7.00	7.72	7.36	2.51	2.65	7.25
N JOOK IN	1 1	71.7	1.24	7.10	7.08	1.20	2.82	2.98	8.54	2.72	787	8 44
143 200g/plot	2.25	2.10	1.29	2.21	2.06	1.25	3.16	3.82	11 24	200	5 6	1.0
P ₁ 100g/plot	1.97	1.70	1.11	1.93	1 67	1.07	676	1000	17:11	3.00	3.72	11.13
P, 150g/plot	1 02	1 00	1 10	000	10.1	1.07	70.7	7.84	7.07	2.51	2.74	6.97
P. 200g/plet	100	70.1	1.19	1.88	1.78	1.15	3.52	3.72	7.42	3.42	3.64	7.31
101d/Soor 6 v	1.89	1.64	1.12	1.85	1.61	1.08	3.31	3.20	8 71	2.71		
K ₁ 100g/plot	2.18	2.08	1.33	2 14	200	1 20	0		17.5	17.0	3.09	8.59
K, 150g/nlot	2 20	2 1 1	1 40		1.0	1.27	2.18	17.7	6.85	2.07	2.17	6.75
7 300	7:1	2.11	1.40	7.72	2.07	1.36	2.00	1.99	6.33	1.90	1 99	622
rs 200g/plot	2.67	2.21	1.53	2.62	2.16	1.49	1.95	1 98	600	1 0 5		77.0
N ₁ P ₁ K ₁ 100:100:100 g/plot	2.19	2.02	1.22	2.14	1 98	1 18	3.08	2 01	0.02	0.00	1.8/	5.92
N2P1K1	000						0000	3.71	0.07	7.37	3.80	7.96
200:100:100 g/plot	7:27	2.25	1.42	2.27	2.21	1.38	3.70	3.99	8.13	3.60	3.88	8.03
				Philippiness in contrast of the last of th		_)	1000

4.2. The second experiment: Effect of irrigation intervals on vegetative, flowering and chemical composition of Gerbera jamesonii L. during first and second seasons (one or two years-old) of plants.

4.2.1. Vegetative growth parameters:

4.2.1.1. Number of leaves / plant:

Concerning the effect of irrigation, data in Table (11) revealed that increasing water supply i.e. irrigation "A" every 7 days in summer and 10 days in winter throughout the growing season with one aged plants year increased the number of leaves per plant in both seasons. The second value in this respect resulted from, irrigation "B" every 10 days in summer and 15 days in winter. On other hand, irrigation "C" every 13 days in summer and 20 days in winter produced the least number of leaves per plant in both seasons. The differences between treatments were significant in the two seasons.

As for two aged years plants data presented in Table (12) showed that irrigation "B" every 10 days in summer and 15 days in winter gave the maximum number of leaves / plant in the two seasons followed by irrigation "A" every 7 days in summer and 0 days in winter.

However, the differences between the three irrigations intervals were significant in the two seasons.

4.2.1.2. Mean length of leaves / plant (cm):

Data presented in Tables (11 & 12) show the effect of different irrigation intervals on mean length of leaves per plant. With regard to one year-old plants, it is evident from data at Table (11) that, mean length of leaves was significantly increased with the short and medium periods of irrigation frequencies "A" (irrigation every 7 days in summer and 10 days in winter and "B" (irrigation every 10 days in summer and 15 days in winter) throughout the growing season. At the same time the longest period of irrigation "C" (every 13 days in summer and 20 days in winter) gave the shortest length of leaves per plant in both seasons.

As for two years-old plants, data presented in Table (12) showed that medium irrigation "B" gave the longest length of leaves per plant in both seasons. While the longest period irrigation "C" (every 13 days in summer and 20 days in winter) produced the shortest leaves per plant in the first and second seasons.

In both ages (one or two years) in the two seasons the differences between irrigations were significant.

4.2.1.3. Number of offsets / plant:

With one aged year plants data presented in Table (11) on number of offsets per plant as affected by the different periods of irrigation it could be concluded that the shortest period of irrigation "A" (every 7 days in summer and 10 days in winter) produced the greatest number of offsets per plant. However, irrigation "B" (every 10 days in summer and 15 days in winter) gave the next number of offsets per plant, while the long period of irrigation "C" (every 13 days in summer and 20 days in winter) gave the least number of

offsprings per plant in both seasons. However, the differences between irrigation treatments were insignificant in the two seasons.

As for two years-old plants, data in Table (12) show that the number of offsets / plant was greatly increased by irrigation "B" (irrigated every 10 days in summer and 15 days in winter) in this parameter as it recorded 7.01, 7.33 in both seasons, respectively, followed descendingly by irrigation "A" which produced 6.67, 7.00 in the first season and second one. The differences among irrigation treatments were significant in both seasons.

4.2.1.4. Fresh and dry weight of vegetative parts (g):

Data presented in Table (11) show the effect of different irrigation intervals on fresh and dry weights of vegetative parts for one aged year plants. With regard to fresh weight, it is evident that, the heaviest fresh weight of green parts resulted from the shortest irrigation "A" (irrigation every 7 days in summer and 10 days in winter) in both seasons. While the moderate period of irrigation "B" gave the next value in this respect. On the other hand, the longest period of irrigation "C" produced the least fresh weight of green parts over surface of ground.

As for dry weight of vegetative parts / plant, data in the same Table showed that, the results of dry weight attained a parallel trend with the fresh weight results. In general, the heaviest dry weight of green parts was obtained by the shortest irrigation interval "A" in both seasons.

Also the differences between irrigation treatments in both seasons with fresh and dry weights of vegetative parts were significant.

Concerning the two years-old of plants data in Table (12) revealed that, the heaviest fresh weight of green parts / plant was recorded by by moderate irrigation "B" followed descendingly by the short period of irrigation "C" which was in the last rank in this parameter in both seasons.

Referring to dry weight of green parts the data obtained in the same table recorded that, the results of dry weight attained a parallel trend with the fresh weight in both seasons.

Such promotive effect of irrigation on plant growth parameter may be attributed to the role of water in accelerating the physiological processes and increasing the uptake of macro nutrients which consisted and incorporated in the formation of protoplasmic material necessary for cell formation and consequently increasing the plant growth. These results are in accordance with those reported by El-Khyat (1992) on cumin, El-Bheidi et al. (1976) and Hartmann et al. (1986) on carrot, Agena (1966) on Pelargonium, Bishr (1972) on Marjoram hortensis and Abd El-Fatah (1980) on Zinnia elegans.

Table (11); Effect of irrigation intervals on vegetative growth parameters of Gerbera jamesonii L. plants (aged one year) during the first and second seasons (2002/2003 and 2003/2004).

	Number of leaves /	f leaves /	Length of	Length of leaves /	Number of offsets	f offsets /	Fresh weight of	eight of	Dry weight of	ight of
	plant	nt	plant (cm)	(cm)	plant	ınt	vegetative parts (g)	parts (g)	vegetative parts (g)	parts (g)
Treatments	First	Second	First	Second	First	Second	First season	Second	First season	Second
Irrigation (A)	23.00	24.33	30.33	29.00	4.09	4.33	96.33	100.62	8.81	8.44
Irrigation (B)	20.00	21.00	29.00	28.33	3.67	4.00	82.33	85.18	7.21	8.12
Irrigation (C)	15.33	16.67	25.00	25.00	2.67	3.00	79.00	82.16	6.79	7.06
L.S.D. at 5%	6.74	7.73	2.88	2.79	N.S	N.S	9.61	10.09	1.02	1.03

(A) = Irrigation every 7 days in summer and 10 days in winter.

(B) = Irrigation every 10 days in summer and 15 days in winter.

(C) = Irrigation every 13 days in summer and 20 days in winter.

Table (12): Effect of irrigation intervals on vegetative growth parameters of Gerbera jamesonii L. plants (aged two year) during the first and second seasons (2003/2004 and 2004/2005).

Treatments First									
	Number of leaves / plant	Length o	Length of leaves / plant (cm)	Number	Number of offsets /	Fresh v	Fresh weight of	Dry w	Dry weight of
	Second	Firet	Cooper		ant.	vegetativ	vegetative parts (g)	vegetativ	vegetative parts (g)
season		Season	Season	FIRST	Second	First	Second	First	Second
			***************************************	SCASOII	SCASOII	season	season	season	season
Irrigation (A) 36.50	0 38.67	33.67	35.00	6.67	7.00	201.00	209.50	23.09	24.01
Irrigation (B) 50.33	3 53.00	36.67	38.33	7.09	7.33	306.33	319.33	25.74	26.77
Irrigation (C) 31.50	33.67	32.87	34.09	5.67	00.9	198.67	206.00	15.07	15.67
L.S.D. at 5% 10.96	11.35	2.77	2.87	N.S	N.S	23.91	24.87	2.26	2.43

(A) = Irrigation every 7 days in summer and 10 days in winter.

(B) = Irrigation every 10 days in summer and 15 days in winter.

(C) = Irrigation every 13 days in summer and 20 days in winter.

4.2.2. Flowering parameters:

4.2.2.1. Number of flower heads / plant:

The results obtained for number of flowers per plant as affected by irrigation treatments were averaged and exhibited in Table (13) as could be summarized as follows: the mean number of flowers was greatly affected by the shortest period of irrigation as "A" (irrigation every 7 days in summer and 10 days in winter) which recorded 7.33, 7.67 in the first and second seasons, respectively. Whereas the moderate period of irrigation as "B" (irrigation every 10 days in summer and 15 days in winter) produced the next value in this concern as 6.00, 6.33 in two seasons, respectively. While the longest period of irrigation gave the least number of flowers per plant in the first season and second seasons. Also, the differences between irrigation treatments were significant in both seasons.

Concerning the plants which were two years old, data are shown in Table (14). It was obvious that the medium irrigation interval as "B" (irrigation every 10 days in summer and 15 days in winter) was more effective than any other irrigation treatments in both seasons. Also the differences among irrigation "B" and other rates of irrigation (A and C) was significantly in both seasons, it may be due to that this rate of irrigation "B" was suitable for enhancing flower formation.

4.2.2.2. Diameter of flower head per plant (cm):

The data obtained of one year plants on the diameter of flower head in Table (13) indicated that irrigation "A" succeeded in increasing the diameter of flower head in both seasons over other irrigation treatments (B or C). The differences between irrigations were significant in both seasons.

Regarding the two years-old plants, data presented in Table (14) showed that, the largest mean value of the diameter of flower head was obtained by using the medium rate of irrigation "B" in the first and second seasons. On the other hand, irrigation "A" (irrigation every 7 days in summer and 10 days in winter) gave the second goal in this parameter.

4.2.2.3. Length of flower head stem per plant (cm):

Data presented in Table (13) indicated that, regarding the one year old plants, irrigation "A" (irrigated every 7 days in summer and 10 days in winter) succeeded in increasing the length of flower stem over irrigation "B" or "C". These results was true in the second season in the same table. The differences between irrigation treatments were significant in the two seasons.

With regard to two years-old plants, data presented in Table (14) showed that irrigation "B" (irrigation every 10 days in summer and 15 days in winter) appeared to be the most effective treatment for increasing the length of flower stem in both seasons.

Moreover, using irrigation "A" gave the next value in this concern. On the other contrary, the least length of flower stem of gerbera plants was obtained in both seasons with irrigation "C" (irrigation every 13 days in summer and 20 days in winter).

4.2.2.4. Thickness of flower head stem:

Concerning the effect of irrigation treatments on one yearold plants on thickness of flower stem, data in Table (13) show that, the maximum increase was achieved at the irrigation every 10 days in summer and 15 days in winter "A" in both seasons. Whereas irrigation every 13 days in summer and 20 days in winter decreased the thickness of flower stem in both seasons.

The differences between irrigation treatments were significant in both seasons.

As for two years-old gerbera plants, in both seasons, the results in Table (14) revealed clearly an interesting trend which pointed out that, the medium rate of irrigation "B" (every 10 days in summer and 15 days in winter) exerted significantly its superiority with increasing the thickness of flowers stem compared with the other irrigation treatments followed by irrigation "A" (every 7 days in summer and 10 days in winter) which showed a significant effect during both seasons of study.

4.2.2.5. Fresh and dry weights of flower head and stem per plant (g):

Regarding one aged year of gerbera plants from, data presented in Table (13) in both seasons it could be concluded that, the heaviest fresh and dry weights of (flower head and stem) was obtained from irrigation at "A" (every 7 days in summer and 10 days in winter) in both seasons.

Moreover, irrigation "B" (every 10 days in summer and 15 days in winter) significantly increased this parameter and gave the second value in this concern.

On other contrary, the lowest fresh and dry weights values were obtained by irrigation "C" (irrigation every 13 days in summer and 20 days in winter) in both seasons.

Regarding the two aged years plants, data in Table (14) pointed out that irrigation "B" gave the heaviest fresh and dry weights of (flower head and stem) per plant in both seasons.

The above mentioned results agree with those obtained by Osman (1989) on Coriandrum sativum L., Agena (1960) on Pelargonium graveolens, Watts et al. (1981) on Capsicum and Abdel-Fatah (1980) on Zinna elegans.

The role of water for increasing the yield may be explained by its role in photosynthesis which is confirmed by the study of **Hoarea and Barrs (1975)** on the effect of different degrees of water stress, their data were on plant responses in the terms of changes in leaf water potential, transpiration on photosynthesis, translocation and carbohydrate metabolism. They concluded that, mesophyll resistance and stomatal resistance rose with increasing stress and were associated with declining photosynthesis. As a conclusion these physical and biochemical activities will reflect on relative growth rate and flowering which are the main growth aspects.

Table (13): Effect of irrigation intervals on flowering parameters of Gerbera jamesonii L. plants (aged one year) during the first and second seasons (2002/2003 and 2003/2004).

	Number of flower heads	heads/	Diameter of flower head /	Diameter of flower head /	Length of flower head stem/	ngth of flower head stem /	Thickness of flower head stem / plant (cm)	ess of head int (cm)	Fresh weight of flower heads / plant (g)	eight of neads / t (g)	Dry weight of flower heads / plant (g)	ght of neads / (g)
I reatments	pla	plant	First Seco	First Second	First	First Second	First	First Second	First	First Second	First	Second
(A)	season	season	season	season	season	season	season	season	season	season	season	season
Irrigation (A)	7.33	79.7	7.33	7.00	29.33	30.00	0.342	0.356	26.67	27.33	2.73	2.87
Irrigation (B)	00.9	6.33	5.33	5.67	28.00	28.67	0.379	0.394	22.33	22.00	2.43	2.52
Irrigation (C)	5.67	5.67	4.67	5.00	21.00	21.67	0.288	0.304	16.00	17.33	2.26	2.37
L.S.D. at 5%	1.60	1.68	1.60	1.53	5.15	5.67	0.030	0.030	6.18	7.01	0.10	0.12

(A) = Irrigation every 7 days in summer and 10 days in winter.

⁽B) = Irrigation every 10 days in summer and 15 days in winter.

⁽C) = Irrigation every 13 days in summer and 20 days in winter.

Table (14): Effect of irrigation intervals on flowering parameters of Gerbera jamesonii L. plants (aged two years) during the first and second seasons (2003/2004 and 2004/2005).

						,					÷	
Treatments	Num flower pl	Number of flower heads / plant	Diam flower plant	Diameter of flower head / plant (cm)	Length head	Length of flower head stem/ plant (cm)	Thick flowe	Thickness of flower head	Fresh w	Fresh weight of flower heads /	Dry w flower	Dry weight of flower heads/
	First	First Second	First	Second	First	Second	First	Second	First	First Second	Firet	plant (g)
	season	season	season	season	season	season	season	season	season	season		Season
Irrigation (A)	9.00	29.6	5.67	6.33	41.33	41.00	0.366	0.381	33.85	35.20	3.64	3.78
Irrigation (B)	12.00	13.33	6.33	7.00	44.00	43.67	0.399	0.415	42.00	45.77	5.06	5.21
Irrigation (C)	8.67	9.33	4.67	5.00	34.00	33.33	0.291	0.303	24.96	28.00	3.24	3.37
L.S.D. at 5%	1.79	1.97	1.45	1.53	99.6	9.17	0.030	0.050	6.47	7.67	0.92	0.95
		The state of the last of the l	STATISTICS OF STREET	STATE OF THE PERSON NAMED IN								-

(A) = Irrigation every 7 days in summer and 10 days in winter.

(B) = Irrigation every 10 days in summer and 15 days in winter.

(C) = Irrigation every 13 days in summer and 20 days in winter.

4.2.3. Root growth parameters:

4.2.3.1. Fresh and dry weights of roots / plant (g):

The results obtained on fresh and dry weights of roots per plant as affected by different irrigation treatments are averaged in Table (15). As for one year-old gerbera plants, data showed that, the fresh and dry weights of roots per plant was greatly increased with irrigation "A" (irrigation every 7 days in summer and 10 days in winter) in both seasons.

Additionally, irrigation "B" (irrigation every 10 days in summer and 15 days in winter) gave the second rank of fresh and dry weights of roots per plant in both seasons, comparing with irrigation "C" which produced the least fresh and dry weights of roots/plant in the two seasons.

Furthermore, data of the two years-old gerbera plants in Table (16) show that, the medium rate of irrigation "B" gave the most effective treatment for increasing the fresh and dry weights of roots per plant in both seasons. While, irrigation "A" produced the second rank of fresh and dry weights of roots in both seasons.

The differences between the aforementioned irrigation treatments were so high significant in both seasons. In this respect Eid (1991) on Carthamus tinctorius, Hornok and Casaki (1986) on Coriandrum sativum L. and Abdel-Fatah (1980) on Zinnia elegansm attained similar results.

Such increase in root characteristics due to the irrigation "A" of one aged year gerbera plants or to irrigation "B" with two aged years of plants, could be attributed to the promotive effects of this irrigation on vegetative growth. Since these treatments play direct or indirect role in accumulation of dry matter in roots leading to the increase in root parameters. This accumulation of dry matter might be formed in the upper ground parts by the activation of the anabolic processes in these organs by the aid of these treatments.

Table (15): Effect of irrigation intervals on the fresh and dry weights of roots of Gerbera jamesonii L. plants (aged one year) during the first and second seasons (2002/2003 and 2003/2004).

Treatments		veight of plant (g)		ht of roots nt (g)
	First season	Second season	First season	Second season
Irrigation (A)	60.00	62.40	7.35	7.57
Irrigation (B)	58.67	61.31	7.15	7.35
Irrigation (C)	51.00	53.00	6.12	6.36
L.S.D. at 5%	6.14	6.43	0.92	0.81

- (A) = Irrigation every 7 days in summer and 10 days in winter.
- (B) = Irrigation every 10 days in summer and 15 days in winter.
- (C) = Irrigation every 13 days in summer and 20 days in winter.

Table (16): Effect of irrigation intervals on the fresh and dry weights of roots of *Gerbera jamesonii* L. plants (aged two year) during the first and second seasons (2003/2004 and 2004/2005).

Treatments		veight of plant (g)		ht of roots nt (g)
	First season	Second season	First season	Second season
Irrigation (A)	225.00	219.67	18.35	19.08
Irrigation (B)	263.33	252.00	24.96	26.60
Irrigation (C)	206.67	210.13	20.72	21.46
L.S.D. at 5%	36.73	38.19	2.25	2.42

- (A) = Irrigation every 7 days in summer and 10 days in winter.
- (B) = Irrigation every 10 days in summer and 15 days in winter.
- (C) = Irrigation every 13 days in summer and 20 days in winter.

4.2.4. Chemical composition:

4.2.4.1. Nitrogen percentage (N%):

Regarding data presented in Table (17) on the nitrogen percentage as affected by using chemical fertilization treatments, it be concluded that, irrigation "A" at 7 days in summer and 10 days in winter gave the highest nitrogen % in the leaves and flowers for plants aged one year, the values were 4.02 and 2.76% in the first season and 3.97 and 2.71% in the second season, respectively. But the highest nitrogen % in the roots was obtained with irrigation "B" at 10 days in the summer and 15 days in the winter.

In the respect plants aged two years, the data in the Table (18) recorded that, the same trend of results was as for the plants aged one year.

In both seasons, increasing intervals between the irrigations decreased N % in the leaves and flowers, but decreasing irrigation intervals increased N % in the roots.

4.2.4.2. Phosphorus percentage (P%):

In both seasons, the data in Table (17) reveal that, the treatment of medium irrigation "B" at 10 days in summer and 20 days in winter gave the highest P percentage in all parts of *Gerbera jamesonii* L. plants aged one year. Also, the aged two years plants gave a similar trend of results in both seasons as recorded in Table (18).

Table (17): Effect of irrigation intervals on the nitrogen and phosphorus percentages in gerbera plants (aged one year) during the first and second seasons.

% N	First season	Second Season First concern	Flowers Doots r	Leaves Flowers Roots Leaves Flowers	27.0	2.70 2.69 3.97 2.71 2.64 0.400 0.55	2.04 0.42/ 0.392 0.455 0.42/	229 360 303 334 255	70.0	47.0 72.0
N N		7	Doote	KOOLS	0	7.69		3 60	0.00	100
Plant part	/	Treatments	Leaves		Irrigation A	4.02		11 Ingation B 3.88		Irrigation C

Table (18): Effect of irrigation intervals on the potassium and total carbohydrates percentages of gerbera plants (aged one year) during the first and second seasons.

First season Second season Flowers Roots Leaves Flowers 2.21 4.92 2.34 2.10 3.61 11.63 3.73 3.60	Plant part			K	К%				E				
Flowers Roots Leaves Flowers 1.96 1.72 2.04 1.91 1.68 2.44 2.21 4.92 2.34 2.10 2.30 1.29 2.45 2.26 1.25 3.84 3.61 11.63 3.73 3.60 1.68 1.07 1.78 1.64 1.03 2.32 2.25 2.26 2.34 2.00	/		Dinot poor							otal carbo	hydrates	%	
Flowers Roots Leaves Flowers Roots Leaves Flowers Roots Leaves Flowers Roots Leaves Flowers 1.96 1.72 2.04 1.91 1.68 2.44 2.21 4.92 2.34 2.10 2.30 1.29 2.45 2.26 1.25 3.84 3.61 11.63 3.73 3.60 1.68 1.07 1.78 1.64 1.03 2.60 2.23 7.56 2.2 2.60	Treatments		ritst seaso	u	Ś	econd seas	on		Tiret conco.				
Lowers Roots Leaves Flowers Roots Leaves Flowers 1.96 1.72 2.04 1.91 1.68 2.44 2.21 4.92 2.34 2.10 2.30 1.29 2.45 2.26 1.25 3.84 3.61 11.63 3.73 3.60 1.68 1.07 1.78 1.64 1.03 2.69 2.33 7.66 2.2 2.2		Legvee	Floridae						1131 354301		Š	cond seas	on
1.96 1.72 2.04 1.91 1.68 2.44 2.21 4.92 2.34 2.10 2.30 1.29 2.45 2.26 1.25 3.84 3.61 11.63 3.73 3.60 1.68 1.07 1.78 1.64 1.03 2.69 2.33 7.56 2.20 3.60		Sal mar	LIOWELS	KOOLS	Leaves	Flowers	Roots	I Pavae	Floridan		,		
1.96 1.72 2.04 1.91 1.68 2.44 2.21 4.92 2.34 2.10 2.30 1.29 2.45 2.26 1.25 3.84 3.61 11.63 3.73 3.60 1.68 1.07 1.78 1.64 1.03 2.69 2.33 7.56 2.20	Trigation A	000						20110	LIOWEIS	KOOLS	Leaves	Flowere	Poote
2.30 1.29 2.45 2.26 1.25 3.84 3.61 11.63 3.73 3.60 1.68 1.07 1.78 1.64 1.03 2.69 2.33 7.56 2.34 2.10	W Women	2.08	1.96		204	101	1 60						Troope
2.30 1.29 2.45 2.26 1.25 3.84 3.61 11.63 3.73 3.60 1.68 1.07 1.78 1.64 1.03 2.69 2.33 7.56 2.26 2.33 3.60						1.71	1.00		2.21	4 92	234		
1.68 1.07 1.78 1.64 1.03 2.69 2.33 7.55 3.60	Irrigation B	249	230		310	,,,,	,			1	10.7		4.81
1.07 1.78 1.64 1.03 2.69 2.33 7.56 2.50	,	i	50.1		7.43	97.7	1.25		3 61	11 62	273	Γ	
1.07 1.78 1.64 1.03 2.69 2.33 7.50 2.3	Irrigation C	1 00	1 60	101					10.0	11.03	5./3		11.52
		1.02	1.08	1.07	1.78	1.64	1.03	269	222	756	0		

B = Irrigation every 10 days in summer and 15 days in winter. C = Irrigation every 13 days in summer and 20 days in winter. A = Irrigation every 7 days in summer and 10 days in winter.

4.2.4.3. Potassium percentage (K%):

The similar trend of results was present in the Tables (19 & 20) in both seasons for one aged year and two aged years plants. Irrigation interval "B" was the most effective treatment for increasing potassium % in the leaves and flowers as 2.49 and 2.30% comparing with 2.08 and 1.82% of irrigation "A" and 1.82 and 1.86% for irrigation "C" in the first season.

On the other hand, irrigation "C" in both seasons for plants of one or two aged years, resulted in a lowest potassium % in the leaves and flowers. The results may surely suggest, the importance of water balance in the plant through the moderate watering and its effects on all biological processes in the plant. While increasing intervals of irrigation refers to poor watering, which led to decrease plant water and resulted some problems in the plant metabolism.

4.2.4.4. Total carbohydrates %:

The data in Table (19) show total carbohydrates percentage in gerbera plants (aged one year) as affected by the different irrigation intervals. The data showed that, the medium treatment (irrigation at 10 days in summer and 15 days in winter) increased total carbohydrate percentage in all parts of plant. While, the lowest values resulted from the short irrigation intervals (every 7 days in summer and 10 days in winter) in both seasons. Although with two years-old plant from the Table (20) showed that, the moderate irrigation "B" produced the highest level of total carbohydrates in plant parts especially in the roots which recorded great percentage of total carbohydrates in both seasons. On the other hand, increasing watering decreased total carbohydrates content in the leaves, flowers and roots of gerbera plants.

Table (19): Effect of irrigation intervals on the nitrogen and phosphorus percentages of gerbera plants (aged two years) during the first and second seasons.

Plant part			Z	% N					Д	7 d		
/ E		First season	u	Š	Second season	no		Firet coacon				
1 reatments	1	Ē	6					200000			second season	on
	Leaves	Flowers	Roots	Leaves	Leaves Flowers Roots Leaves Flowers Roots	Roots	Leaves	Flowers	Poote	Location	2	1
I migotion A	10	., .						2	ALOUES	Leaves Flowers	riowers	KOOLS
IIIIIganon A	4.9/	7.65	2.86	4.92	2.60	2.81	2.81 0.469	0435 0380	0380	0.464 0.430	0 420	1000
Invitedtion D	,	,,,	-					0000	0.303	101.0	0.400	0.384
ri iganon b	3.83	7.36	3.77	3.78	2.31	3.72	3.72 0.582	0.667 0.470 0.577 0.663 0.465	0.470	777	0 663	0 165
Irrigotion	200							100:0	0/1:0	110.0	700.0	0.400
IIIIganon C	3.73	1.16	3.18	3.21	1:11	3.13	3.13 0.423	0.590 0.382 0.410 0.594 0.320	0 200	0110	0 204	1

Table (20): Effect of irrigation intervals on the potassium and total carbohydrates percentages of gerbera plants (aged two years) during the first and second seasons.

Plant part			K	К%				T	otal carbo	Total carhohydrates %	2/2	
Trantmonto		First season	u	S	Second season	no	H	First season		3	Second coacon	
1 Cauments	Lagrage	Floring		,	-	1				5	coma scas	711
	Leaves	riowers	KOOLS	Leaves	Leaves Flowers	Roots	Leaves	Leaves Flowers	Roots	Leaves	Flowere	Doote
Irrigation A	,	000		- 0							. 1011013	
A I I I Balloll A	7.17	1.88	1./3	2.07	1.83	1.68	2.75	2.30	4 73	265	000	163
Invitation D		0	,					000		20.7	7.70	4.00
ti i iganon D	7.04	7.73	1.46	2.59	2.24	1.41	3.81	3.43	11 27	3 60	2 2 2 3	11 16
Invigation	-			,					17:	7.07	0.00	11.10
migauon C	1.09	1.60	1.24	1.64	1.55	1.20	2.98	2.43	7.70	287	232	760
	STATE OF THE PERSON NAMED IN	To Charlest Administration of the Party of t	THE OWNER WHEN PERSON NAMED IN						1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	i	1:51	00.

A = Irrigation every 7 days in summer and 10 days in winter. B = Irrigation every 10 days in summer and 15 days in winter. C = Irrigation every 13 days in summer and 20 days in winter.

Antimicrobial activity of Gerbera jamesonii plants:

Data recorded in Tables (21 & 22) show that methanolic and water extraction of *Gerbera jamesonii* fresh leaves, obtained from plants treated with some chemical fertilizers (N at 150 g/plot, P at 200 g/plot, K at 150 g/plot, NPK at 200: 100: 100 g/plot and NPK 100: 100 g/plot) and irrigation treatment at 10 days in summer and 15 days in winter and control (without any extraction) have different levels of inhibitory activities against some phytopathogenic fungi.

As for kind of extraction, generally can be concluded that (methanolic) extraction was more effective than using water extraction for inhibition activity for fungi.

This result may be due the effect of methanolic for extracting more ingredients than using water.

Concerning the effect of different treatments of fresh leaves taken from plants treated with $N_2P_1K_1$ (200: 100: 100 g/plot), $N_1P_1K_1$ (100: 100: 100 g/plot) and N_2 (150 g/plot) were more effective for inhibition of the phytopathogenic fungi which were used under this experiment.

The tested fungi were sensitive to inhibition with methanol extract, *Alternaria solani* was more inhibited followed by *Rhizoctonia solani*, *Fusarium solani* and *Fusarium oxysporum* as illustrated in Figs. (1, 2, 3 & 4).

These results may be a new and need further studies to be confirmed.

Table (21): Evaluation of different treatments on Gerbera jamesonii plant extracts against Fusarium oxysporum, Fusarium solani, Rhizoctonia solani and Alternaria solani.

	F. s	olani	F. oxy	sporum	R. s	olani	A. s	olani
Treatments	Methanol	Water	Methanol	Water	Methanol	Water	Methanol	Water
T0	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
T1	7.40	8.30	7.00	8.00	4.50	8.50	6.70	7.90
T2	5.30	7.50	5.10	7.10	5.50	7.70	4.80	6.80
Т3	2.60	6.30	2.30	6.00	2.80	6.50	2.10	5.80
T4	3.47	6.90	3.50	6.50	3.90	7.20	3.20	6.10
T5	3.10	6.50	2.80	6.10	3.40	6.80	2.50	5.90
Т6	8.00	8.80	7.80	8.73	8.30	8.60	7.50	8.50
Mean	5.63	7.64	5.44	7.38	5.86	7.78	5.18	7.14
L.S.D. 0.5 E/W	0.1	19	0.	12	0.	12	0.	
L.S.D. 0.5 T	0.3	38	0.2	25	0.2	25	0.2	24

Key:

T0 = Control

T1 = Irrigation B at 10 days in summer and 15 days in winter.

 $T2 = P_3$ at 200 g/plot.

 $T3 = N_2 P_1 K_2$ at 200: 100: 100 g/plot.

 $T4 = N_1 P_1 K_2$ at 100: 100: 100 g/plot.

 $T5 = N_2$ at 150 g/plot.

 $T6 = K_2$ at 150 g/plot.

Table (22): Reduction percentage of different treatments on Gerbera jamesonii plant extracts against Fusarium oxysporum, Fusarium solani, Rhizoctonia solani and Alternaria solani.

Т	reatments	Fusarium solani %	Fusarium oxysporum %	Rhizoctonia solani %	Alternaria solani %	Mean
	Irrigation B	17.8	22.2	16.7	25.6	20.6
	P ₃	41.1	43.3	38.9	46.7	42.5
lou	$N_2P_1K_1$	71.1	74.4	68.9	76.7	72.8
Methanol	$N_1P_1K_1$	57.8	61.1	56.7	64.4	60.0
Μ̈́	N ₂	65.6	68.9	62.2	72.2	67.2
	K ₂	11.1	13.3	7.8	16.7	12.2
	Mean	42.2	45.2	39.9	48.6	44.0
	Irrigation B	7.8	11.1	5.6	12.2	9.2
	P ₃	16.7	21.1	14.4	24.4	19.2
10	$N_2P_1K_1$	30.0	33.3	27.8	35.6	31.7
Water	$N_1P_1K_1$	23.3	27.8	20.0	32.3	25.9
>	N ₂	27.8	32.3	24.4	34.4	29.7
	K ₂	2.2	4.4	2.2	5.6	3.6
	Control	9.0	9.0	9.0	9.0	
	Mean	17.3	20.8	15.2	23.7	19.3

Reduction
$$\% = \frac{\text{Control} - \text{treatment}}{\text{Control}} \times 100$$

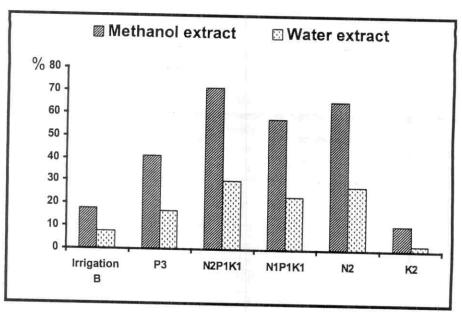


Fig. (1): Reduction percentage of different treatments of gerbera plants extracts against Fusarium solani.

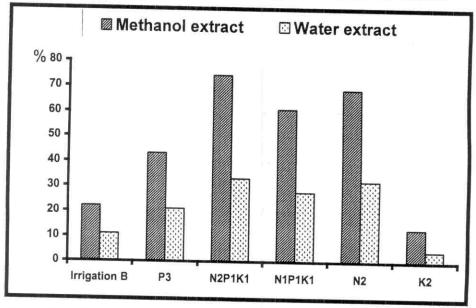


Fig. (2): Reduction percentage of different treatments of gerbera plants extracts against Fusarium oxysporum.

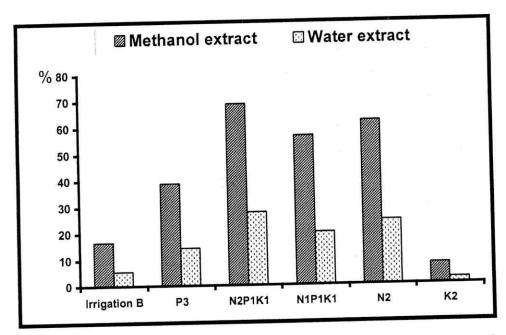


Fig. (3): Reduction percentage of different treatments of gerbera plants extracts against *Rhizoctonia solani*.

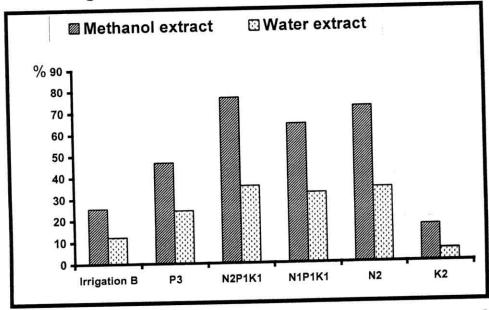


Fig. (4): Reduction percentage of different treatments of gerbera plants extracts against *Alternaria solani*.

These results mean that *Gerbera jamesonii* plants can protect itself against pathogenic microbes, if it received some chemical fertilizers (N₁P₁K₁), (N₂P₁K₁) and N₂ which lead to healthy plants and more self proective against plant pathogens as *Gerbera jamesonii* has antimicrobial substances which need to be separated, identified and investigated for their effect on other plants.

Gerberin and parasorboside are glucosidic lactones, gerberin has been found only in gerbera, and its biological role is unknown. Parasorboside is best known as the bitter tasting compound in mountain ash berries (Sorbus aucuparia), but it is also found in cranberry (Vaccinum macrocarpon) and in the fern Osmunda japonica. The glucoside acts as antifeeding compound against certain butterfly larvae, and is regarded as the precursor to parasorbic acid, the plant forms the widely used food preservative sorbic acid.

The disease resistance provided by gerberin and/or parasorboside would be attractive to the utilized in other ornamental or crop plants. (Elomaa et al., 1995).

Gerberin and parasorboside are not related to flavonoids but related to glucosides that have bioprotective properties (Helariutta et al., 1995).